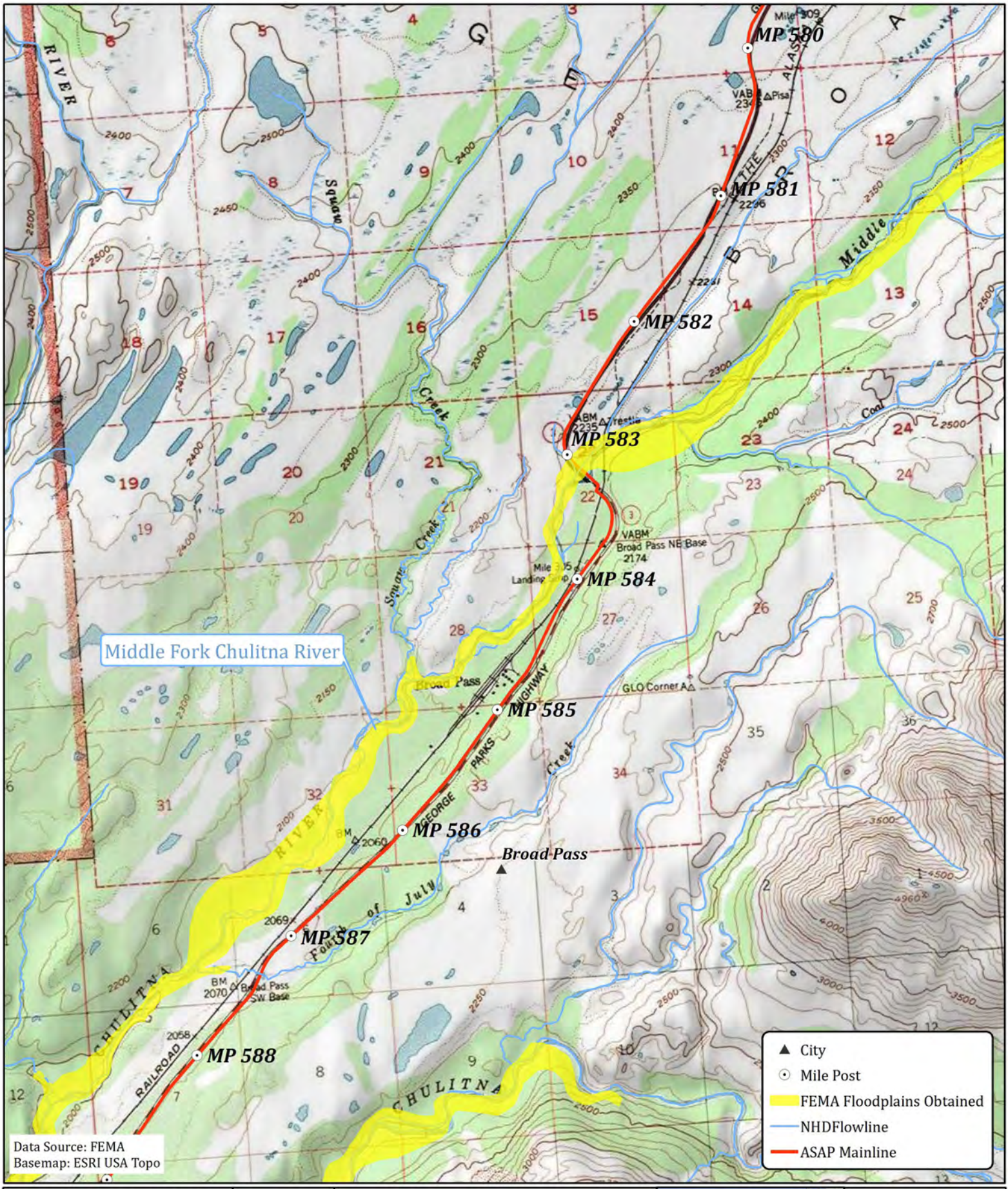
Appendix G

FEMA Floodplain Data Maps
Surface Water and Ground Water Monitoring Sites
USGS Surface Water Quality Sampling Sites



Data Source: FEMA
Basemap: ESRI USA Topo

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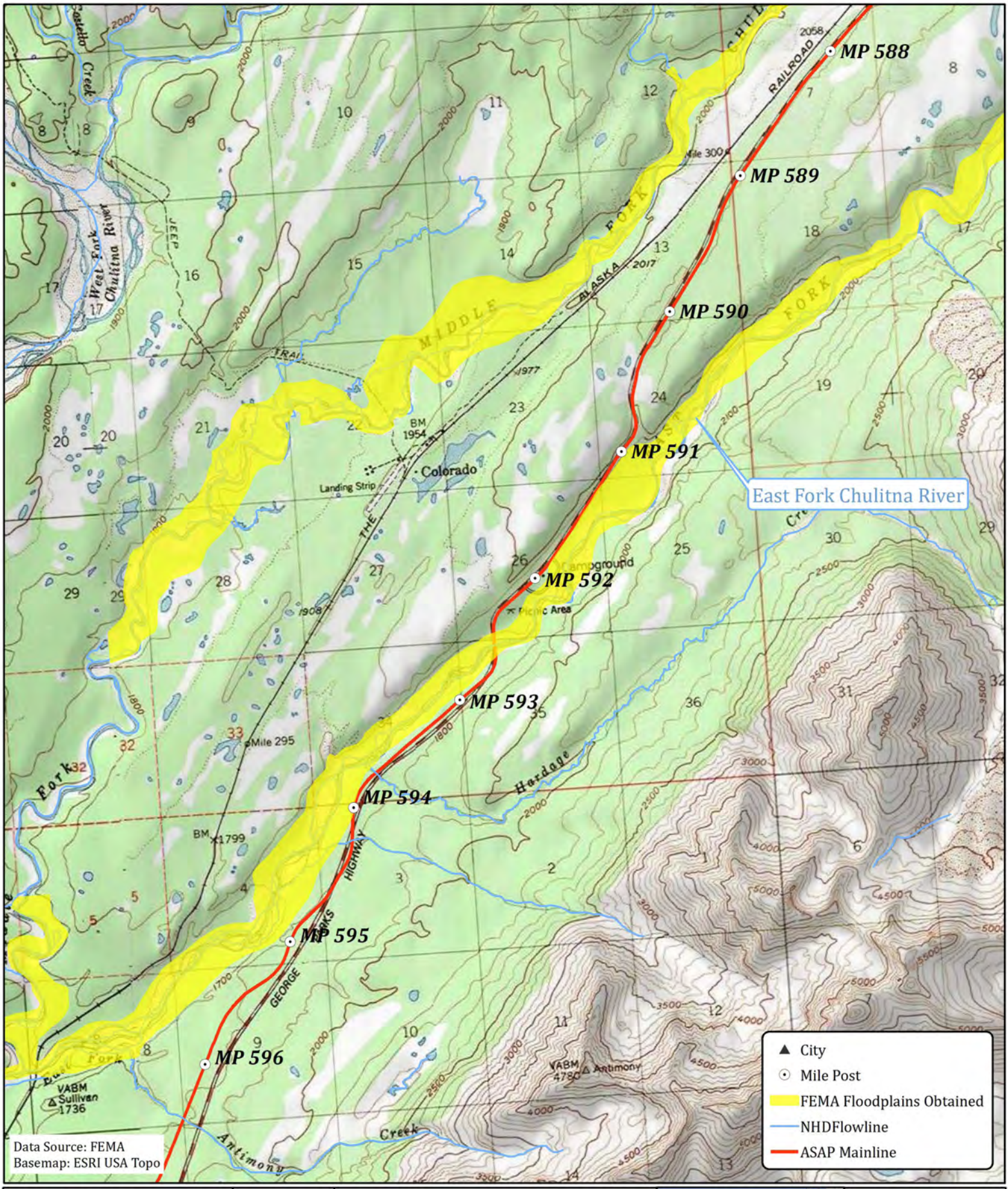
Alaska Stand Alone Gas Pipeline
FEMA Floodplain Data Available

0 0.5 1 Miles

May 2012

NAD 1983 State Plane Alaska



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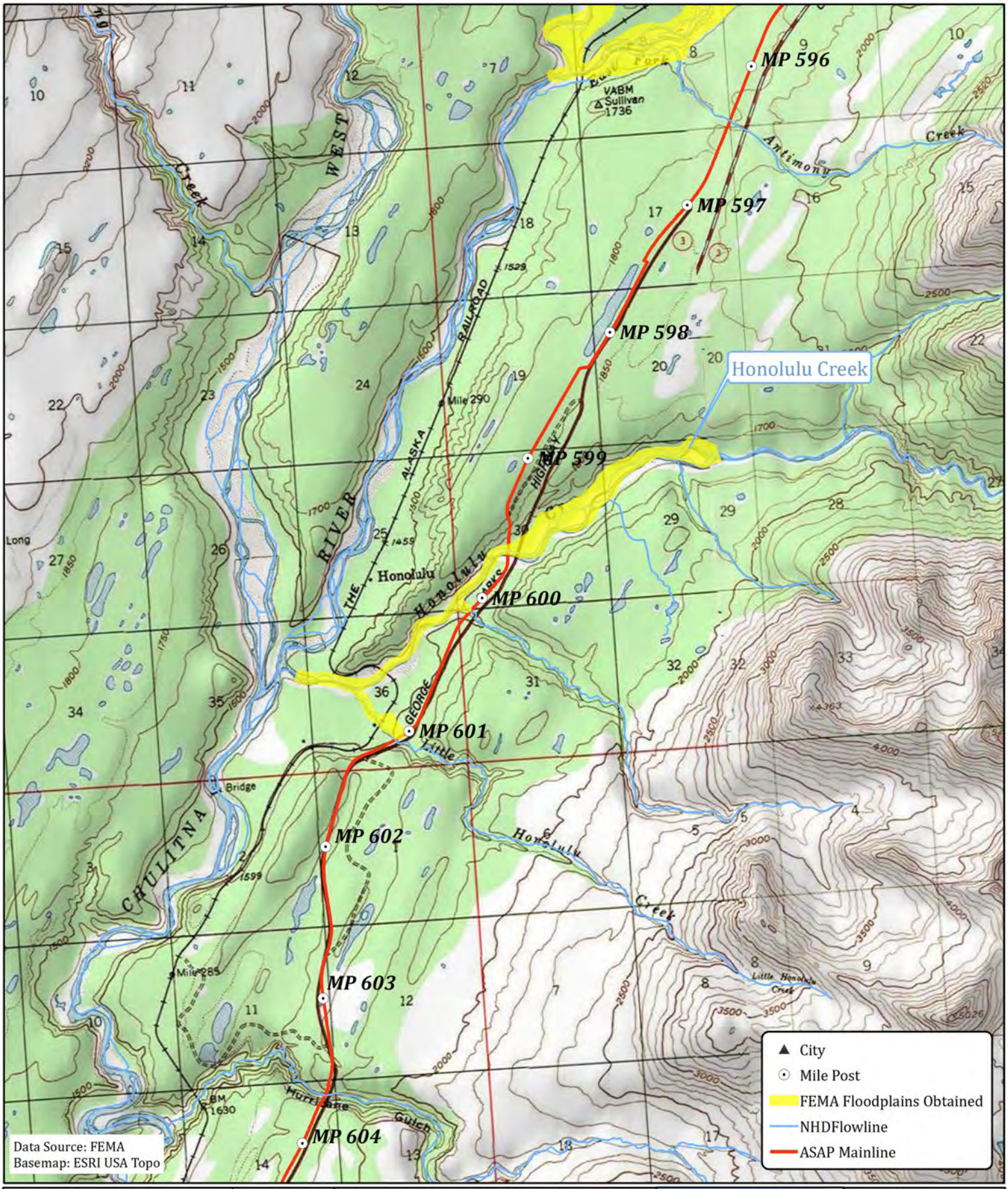
Alaska Stand Alone Gas Pipeline
FEMA Floodplain Data Available

0 0.5 1 Miles

May 2012

NAD 1983 State Plane Alaska



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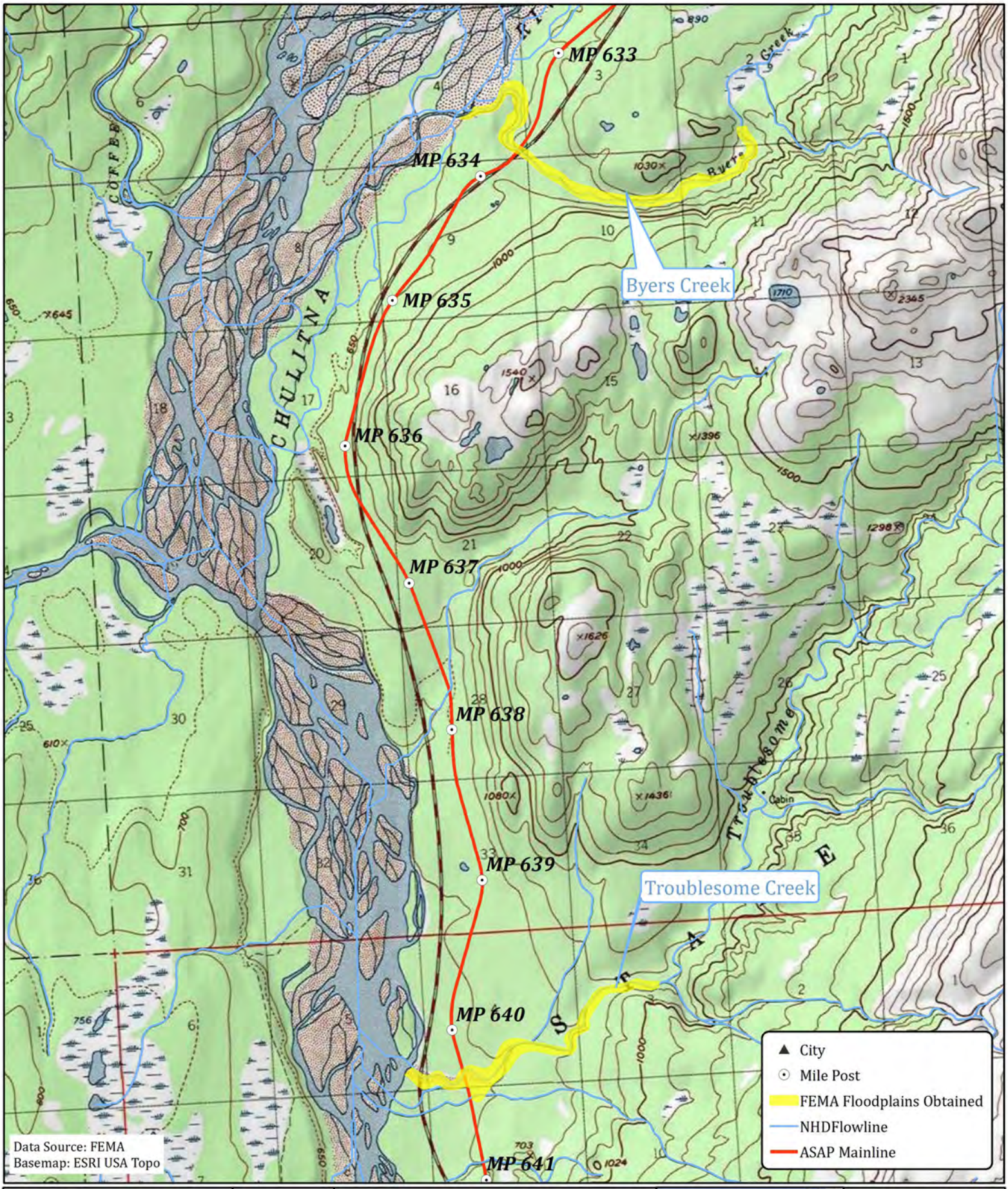
Alaska Stand Alone Gas Pipeline
FEMA Floodplain Data Available

0 0.5 1 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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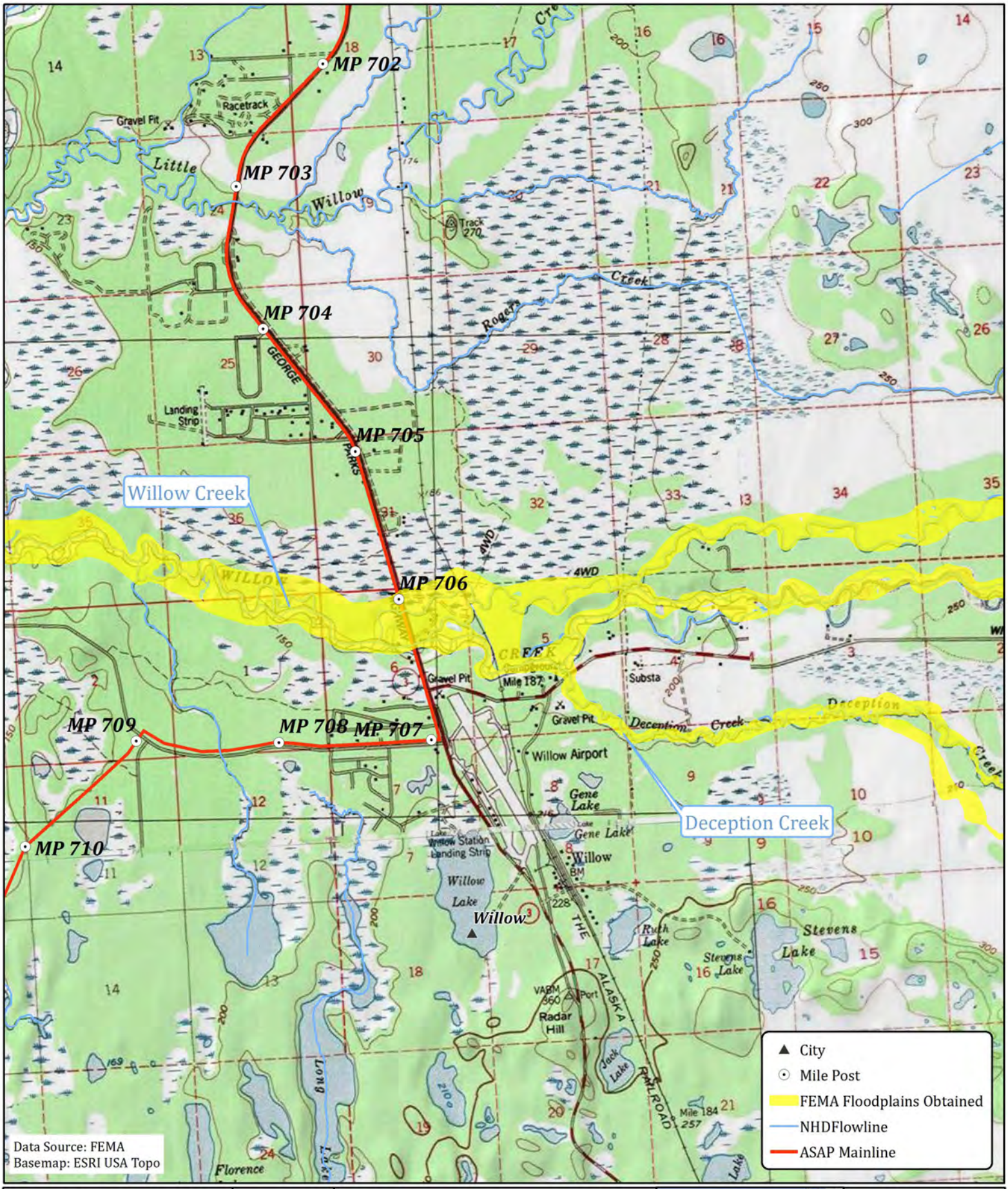
Alaska Stand Alone Gas Pipeline
FEMA Floodplain Data Available

0 0.5 1 Miles

May 2012

NAD 1983 State Plane Alaska



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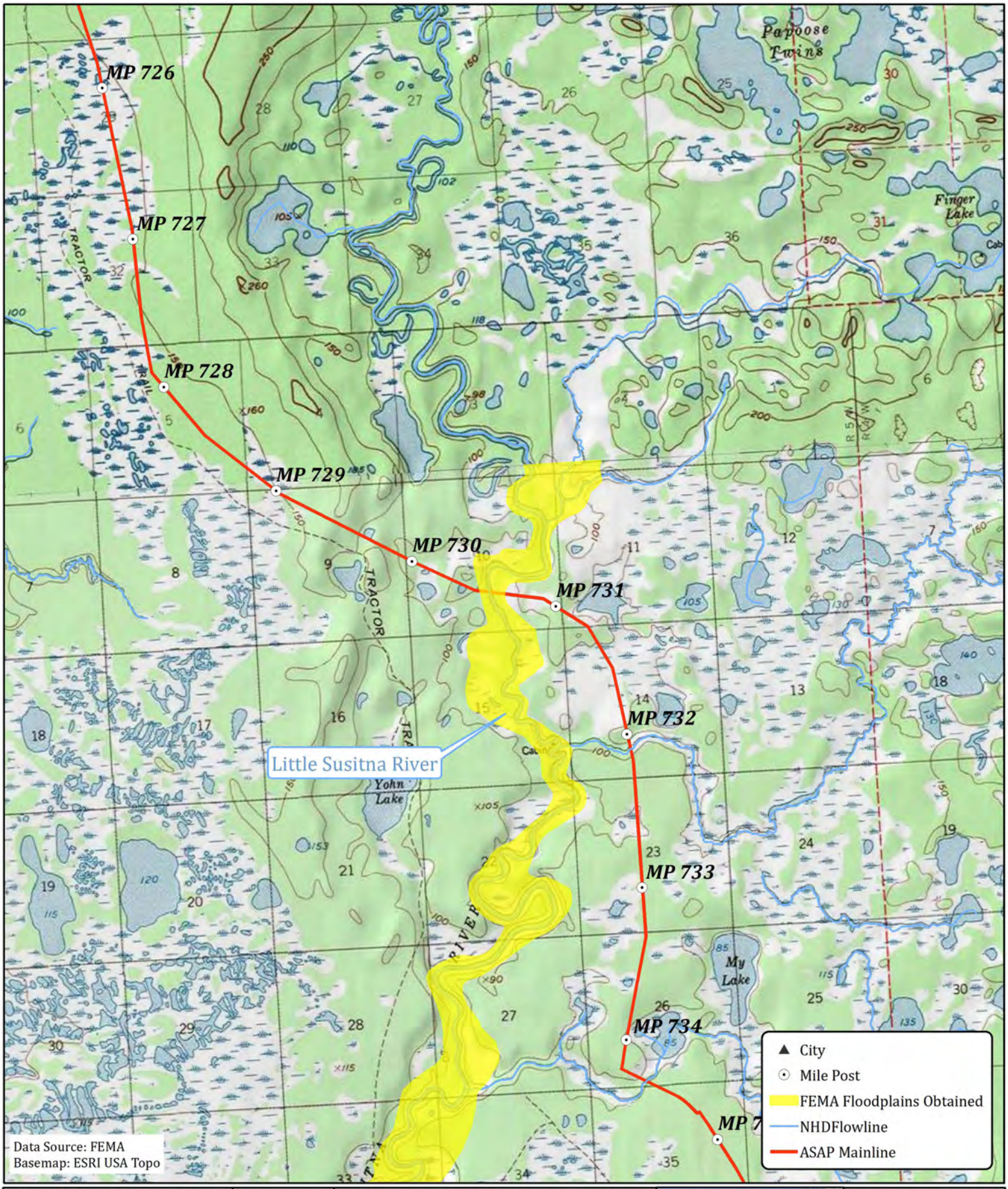
Alaska Stand Alone Gas Pipeline
FEMA Floodplain Data Available

0 0.5 1 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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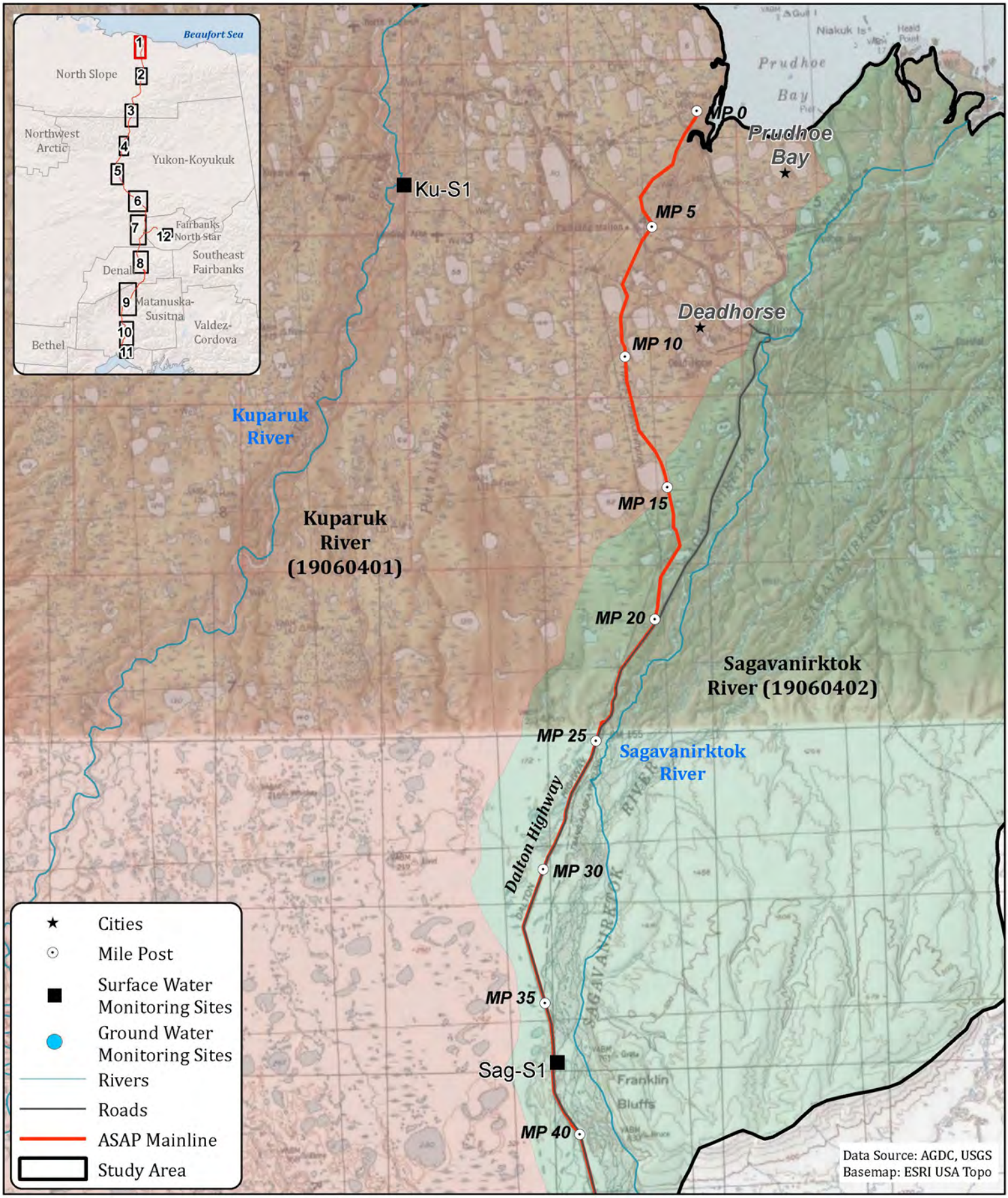
Alaska Stand Alone Gas Pipeline
FEMA Floodplain Data Available

0 0.5 1 Miles

May 2012

NAD 1983 State Plane Alaska



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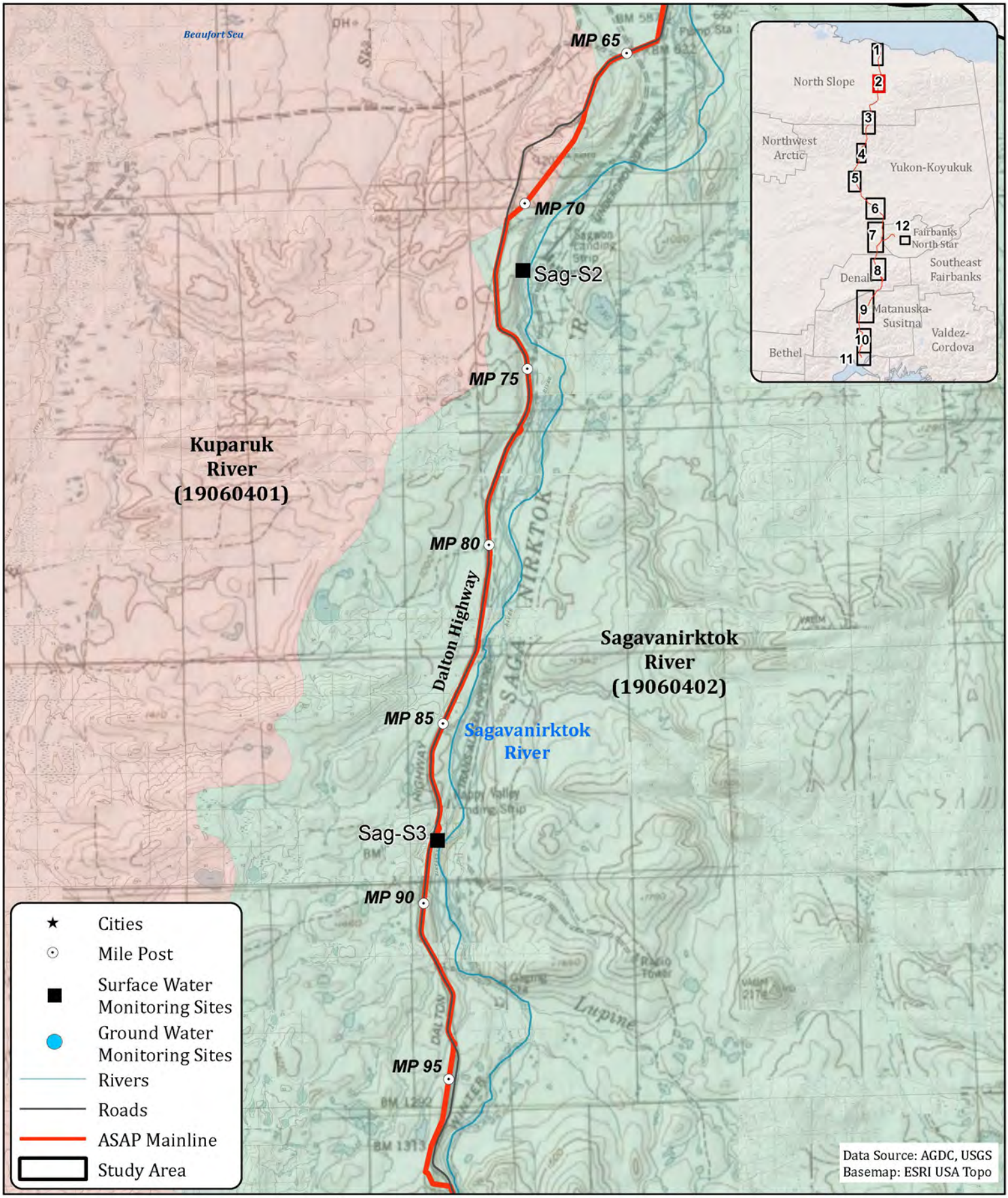
Alaska Stand Alone Gas Pipeline Surface Water and Ground Water Monitoring Sites

0 2.5 5 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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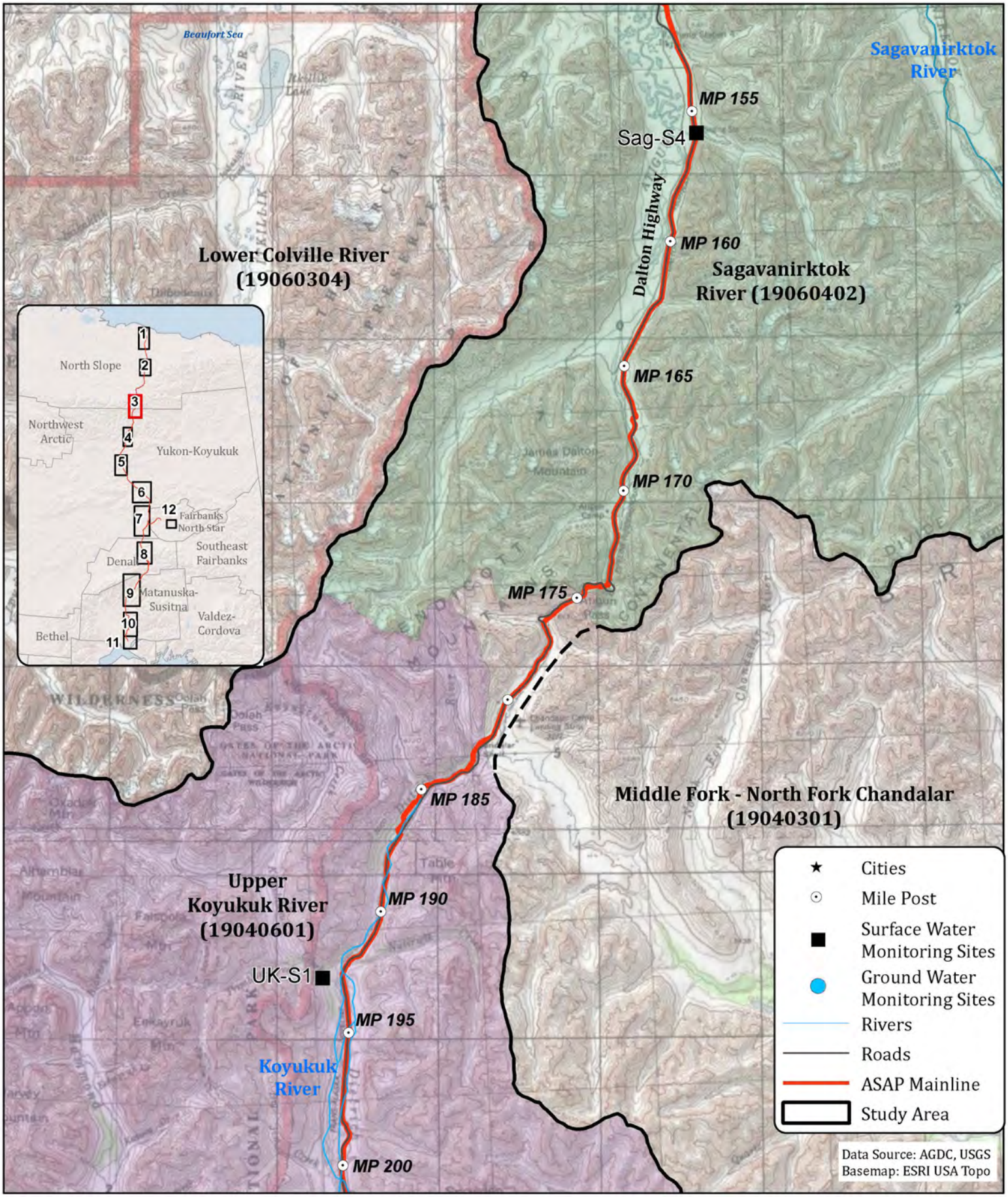
Alaska Stand Alone Gas Pipeline Surface Water and Ground Water Monitoring Sites

0 2.5 5 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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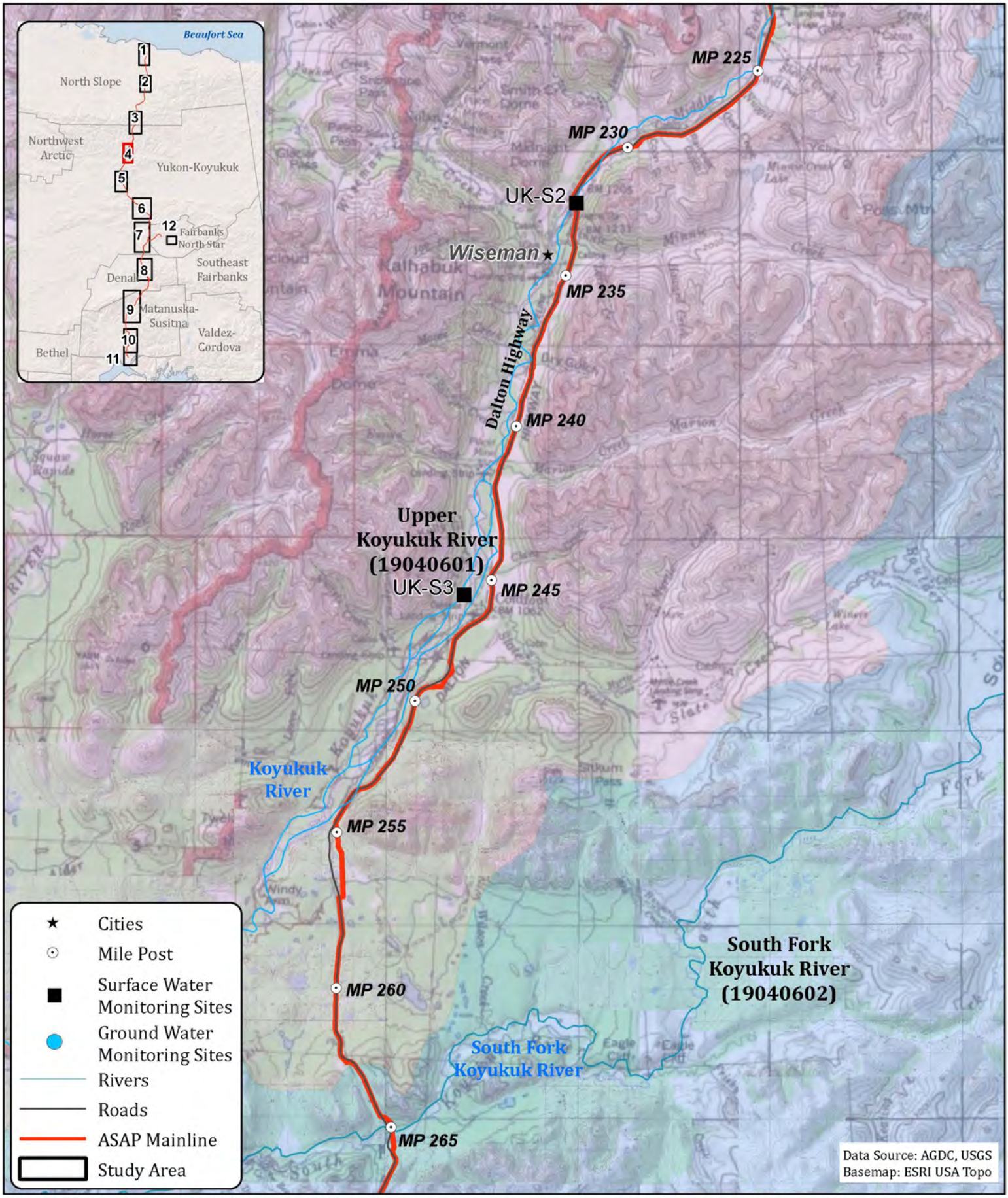
Alaska Stand Alone Gas Pipeline
Surface Water and Ground Water Monitoring Sites

0 2.5 5 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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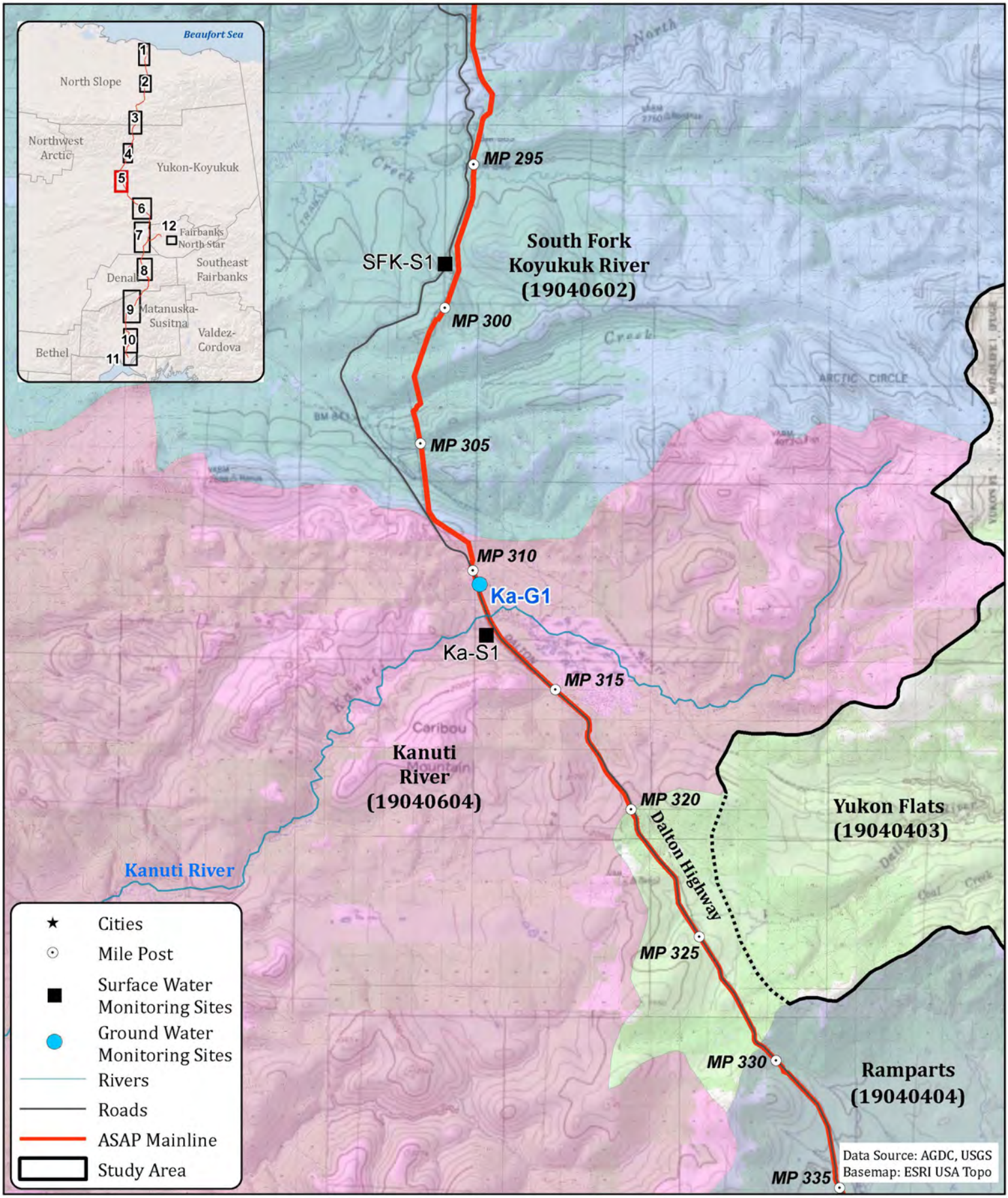
Alaska Stand Alone Gas Pipeline
Surface Water and Ground Water Monitoring Sites

0 2 4 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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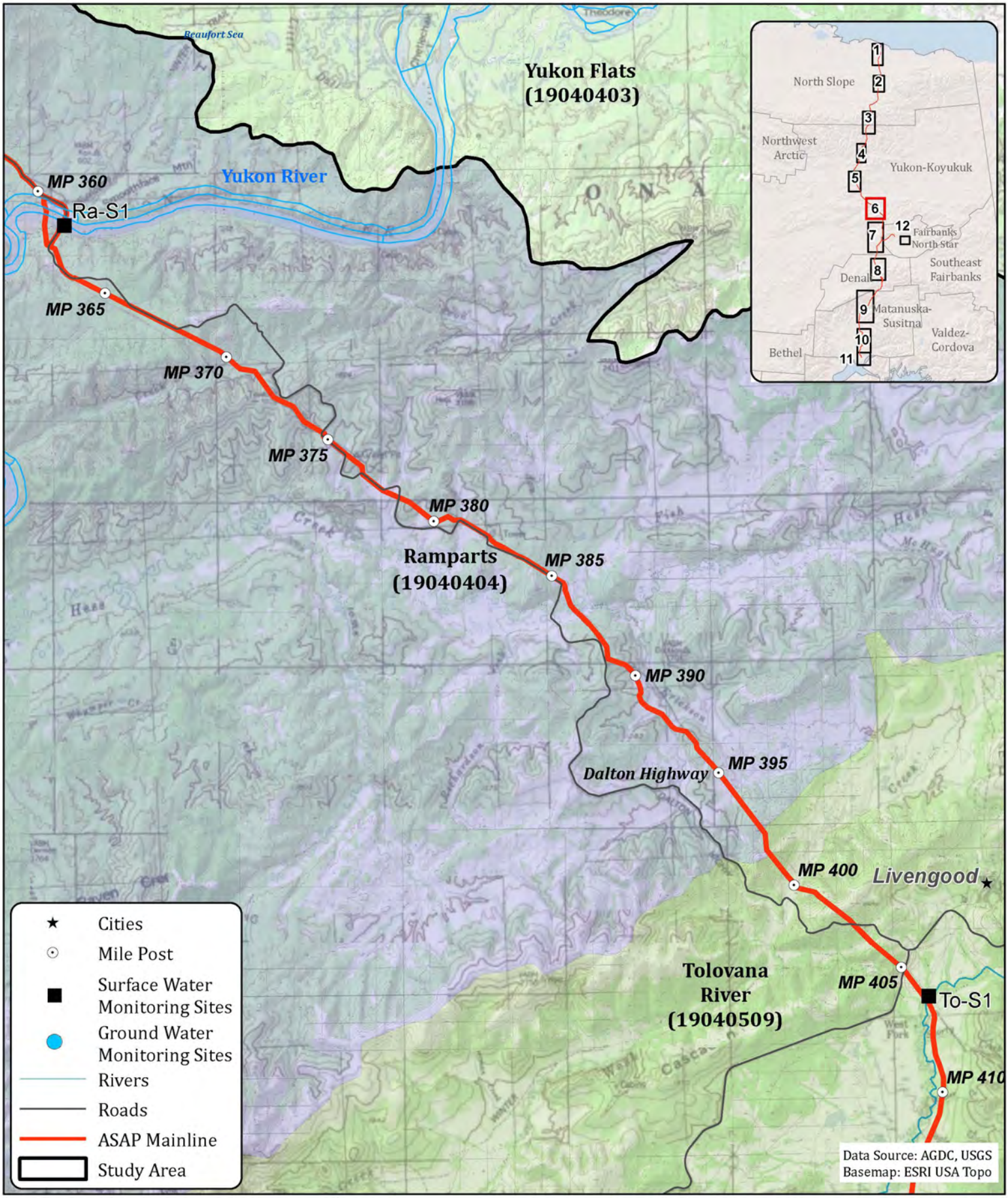
Alaska Stand Alone Gas Pipeline Surface Water and Ground Water Monitoring Sites

0 2.5 5 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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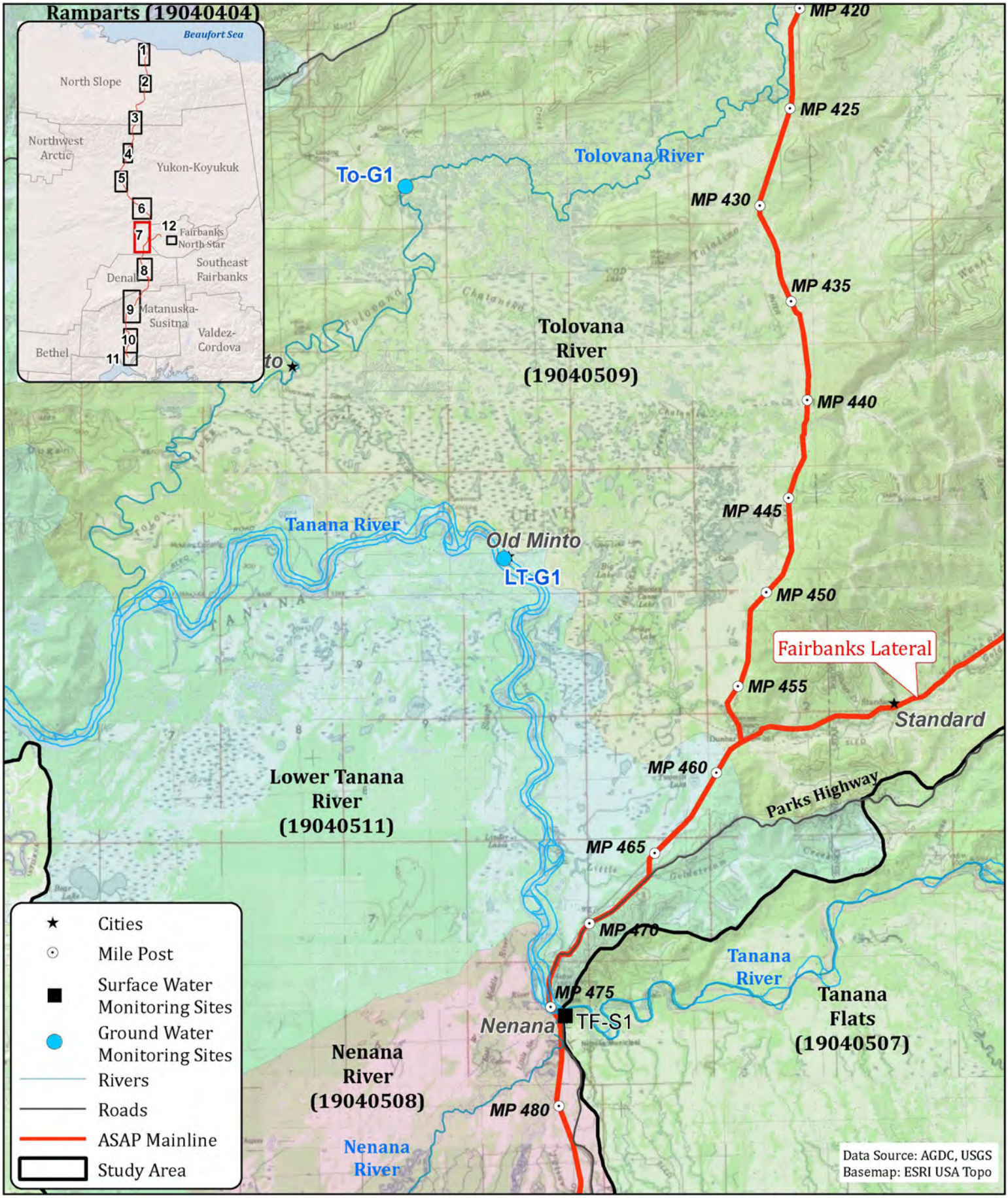
Alaska Stand Alone Gas Pipeline
Surface Water and Ground
Water Monitoring Sites

0 2.5 5 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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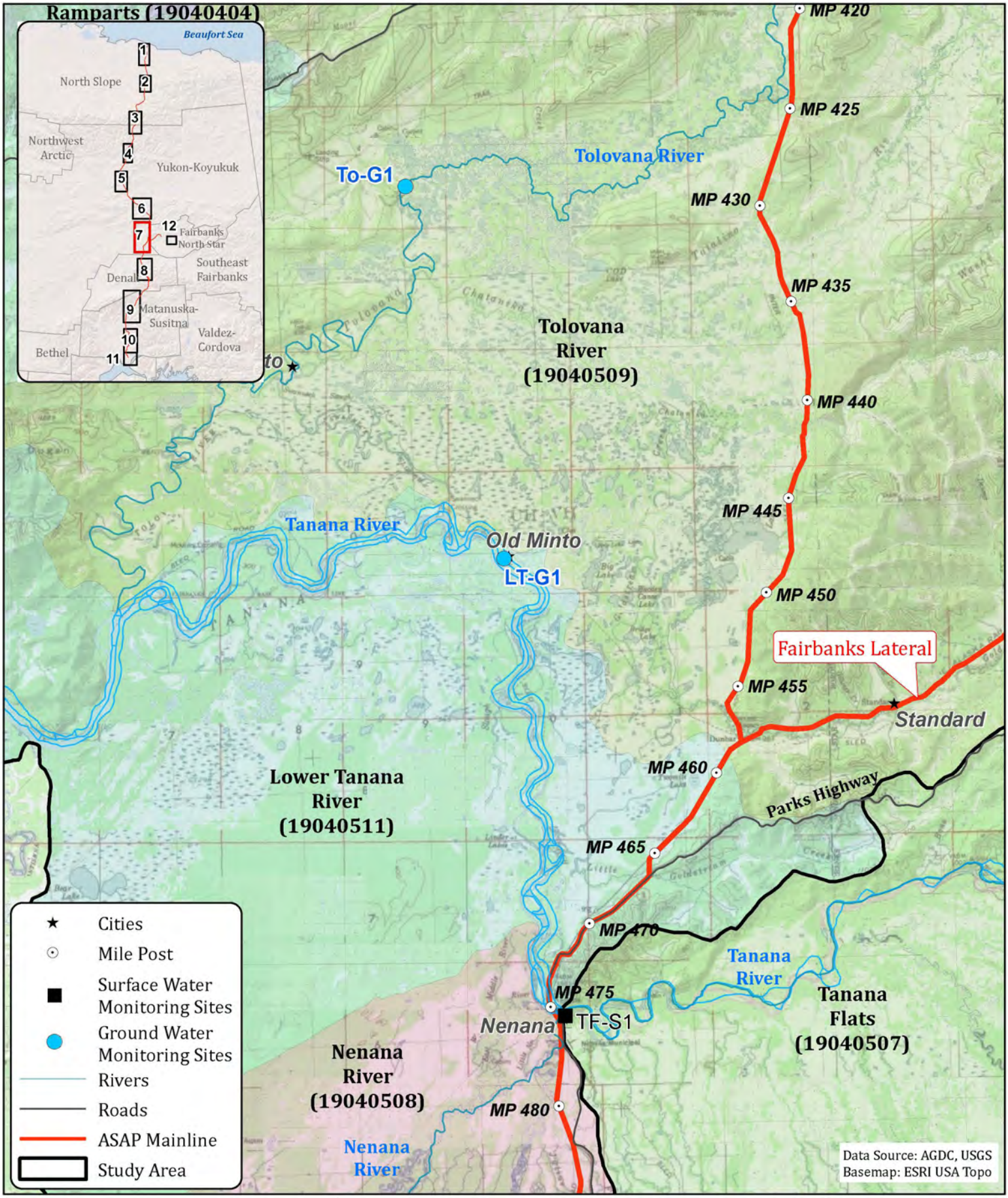
Alaska Stand Alone Gas Pipeline
Surface Water and Ground Water Monitoring Sites

0 2.5 5 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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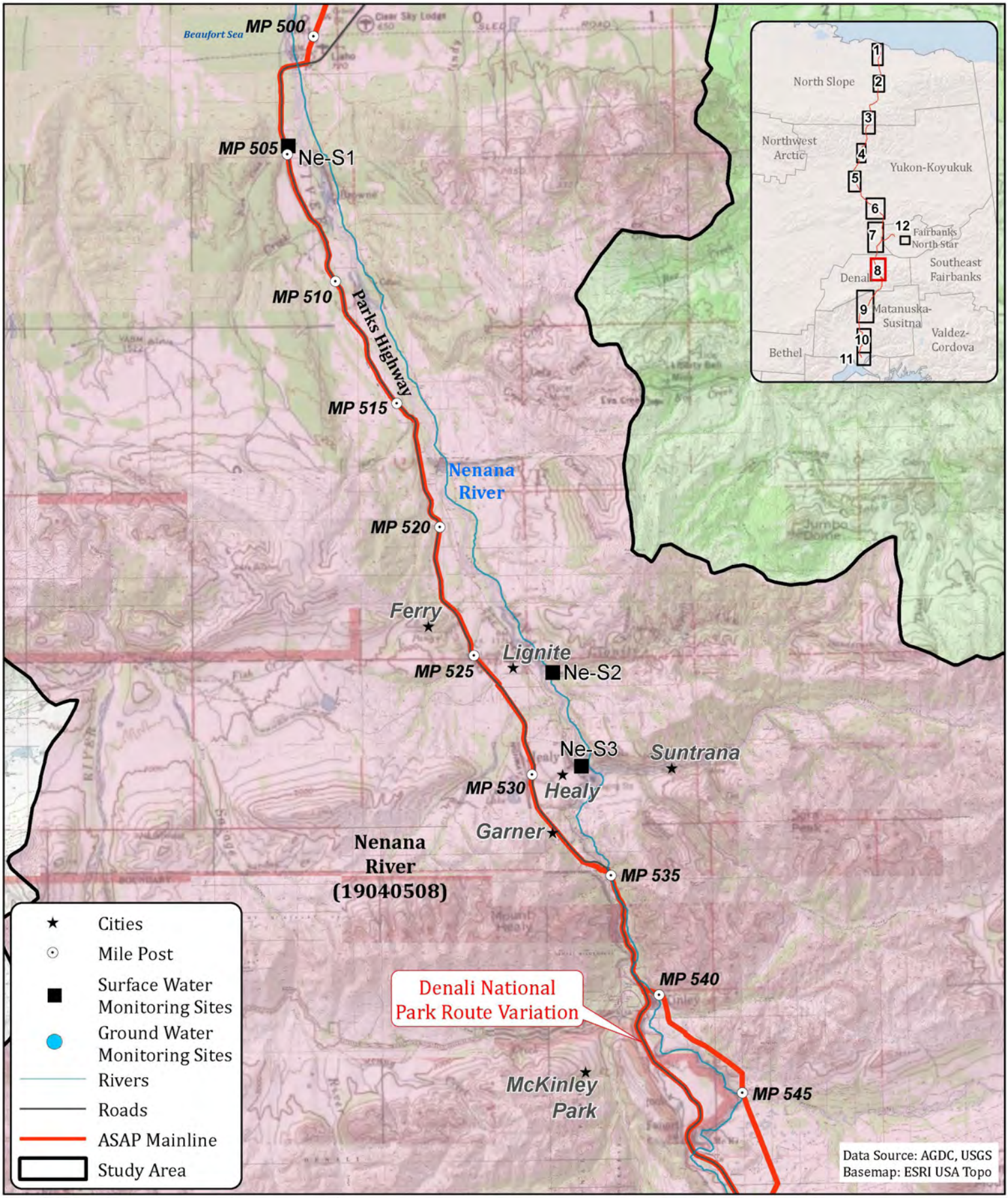
Alaska Stand Alone Gas Pipeline
Surface Water and Ground Water Monitoring Sites

0 2.5 5 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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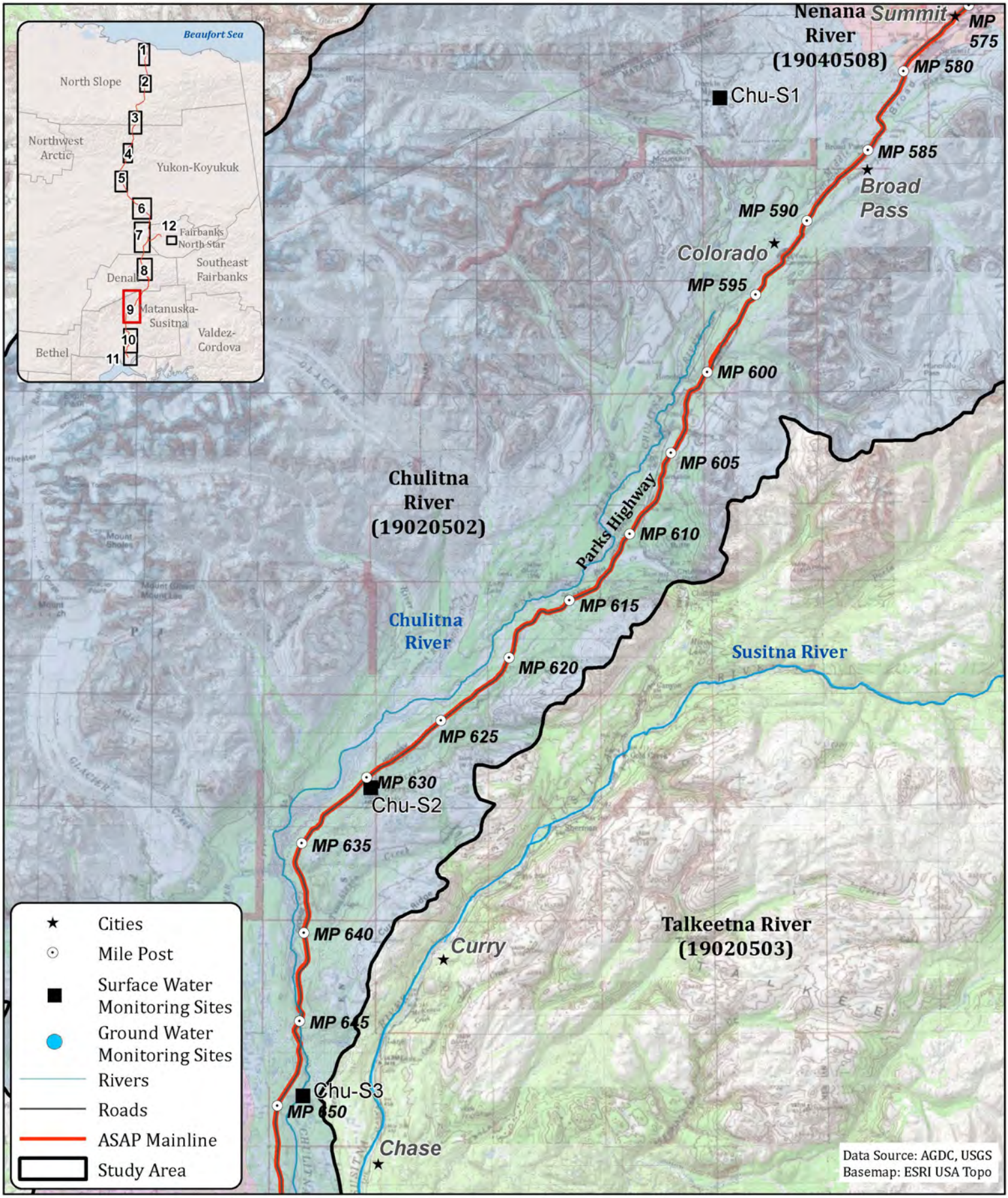
Alaska Stand Alone Gas Pipeline
Surface Water and Ground Water Monitoring Sites

0 2.5 5 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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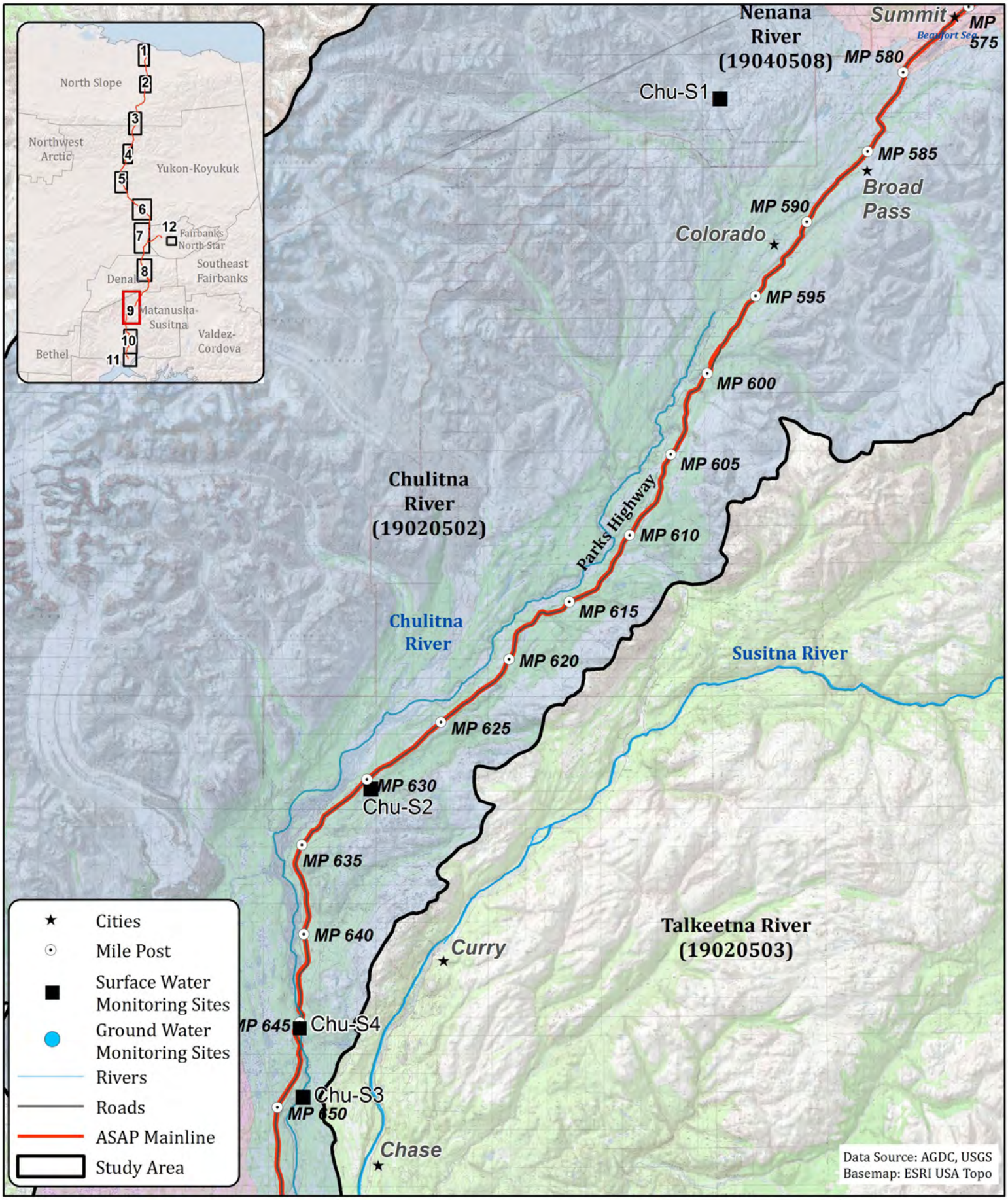
Alaska Stand Alone Gas Pipeline
Surface Water and Ground Water Monitoring Sites

0 2.5 5 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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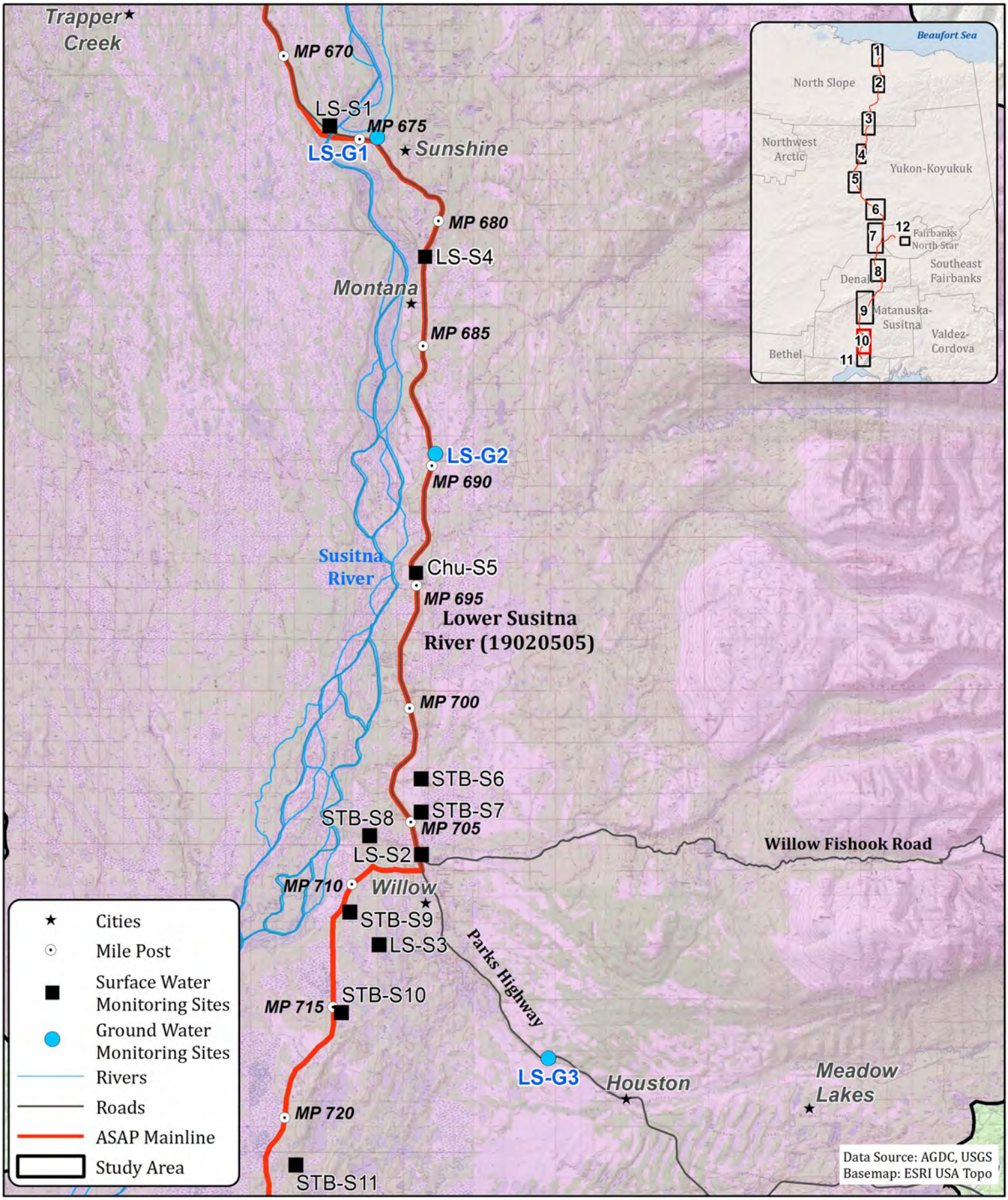
Alaska Stand Alone Gas Pipeline
Surface Water and Ground Water Monitoring Sites

0 2.5 5 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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N

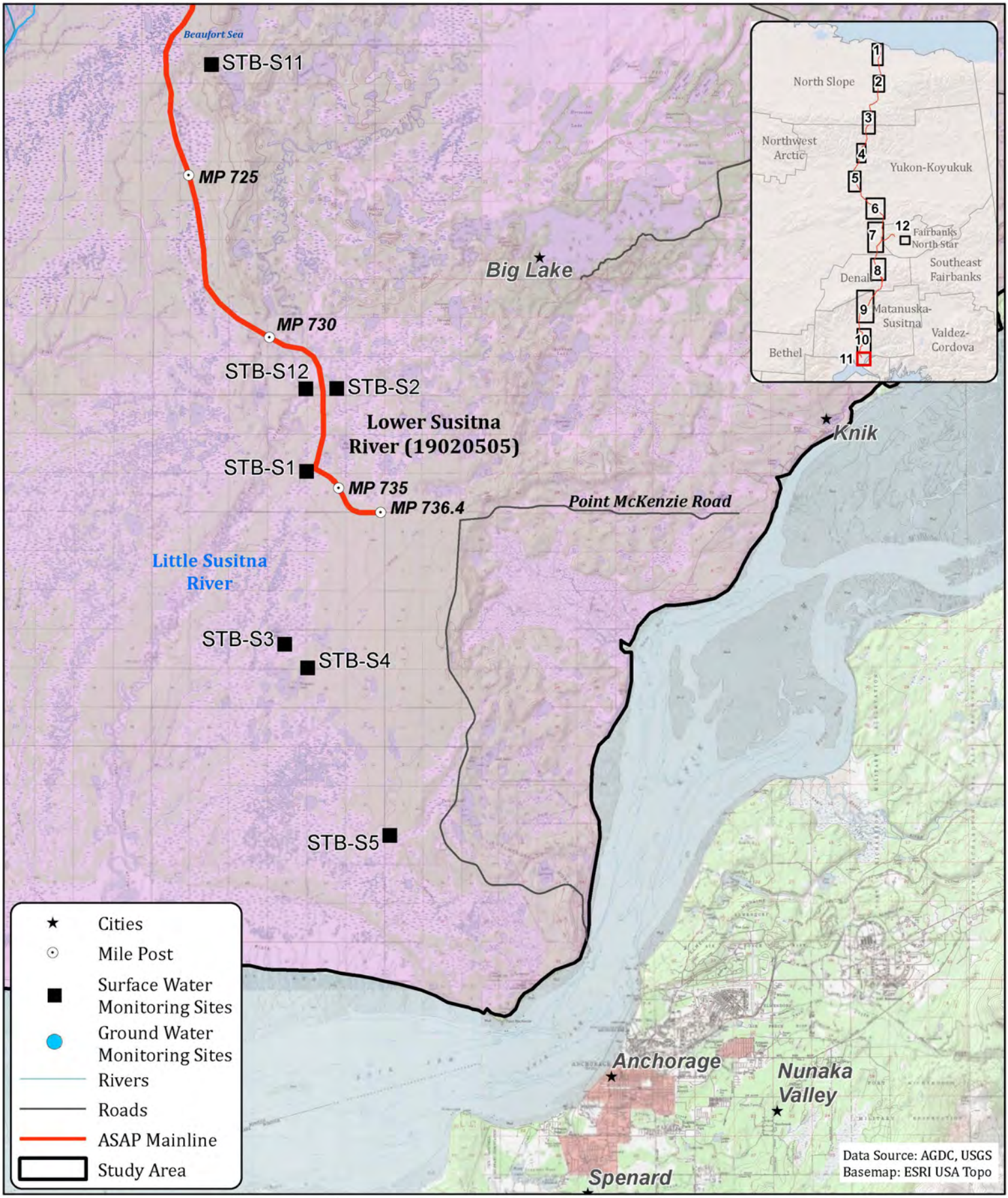
Alaska Stand Alone Gas Pipeline Surface Water and Ground Water Monitoring Sites

0 2.5 5 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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N

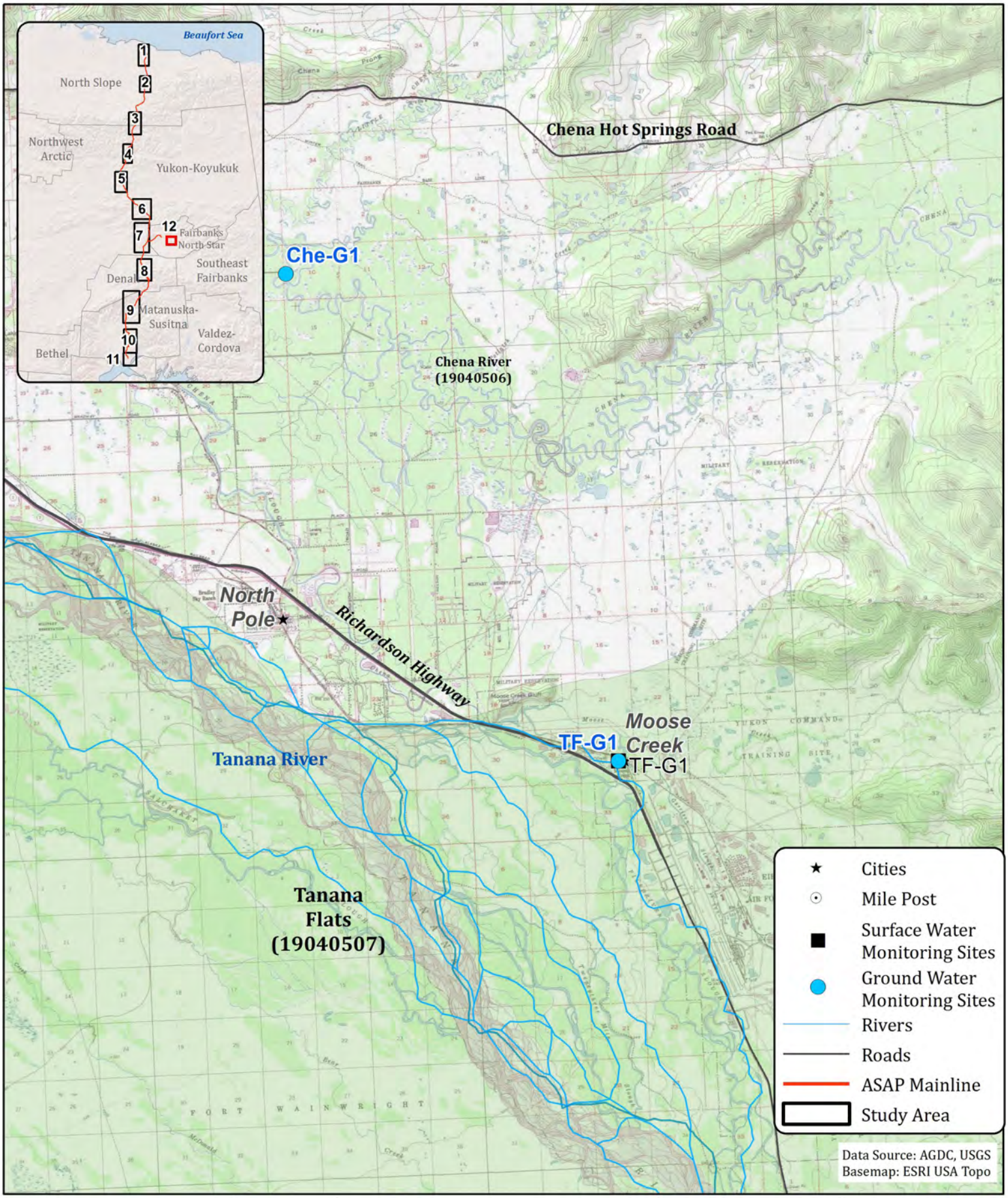
Alaska Stand Alone Gas Pipeline
Surface Water and Ground
Water Monitoring Sites

0 1.75 3.5 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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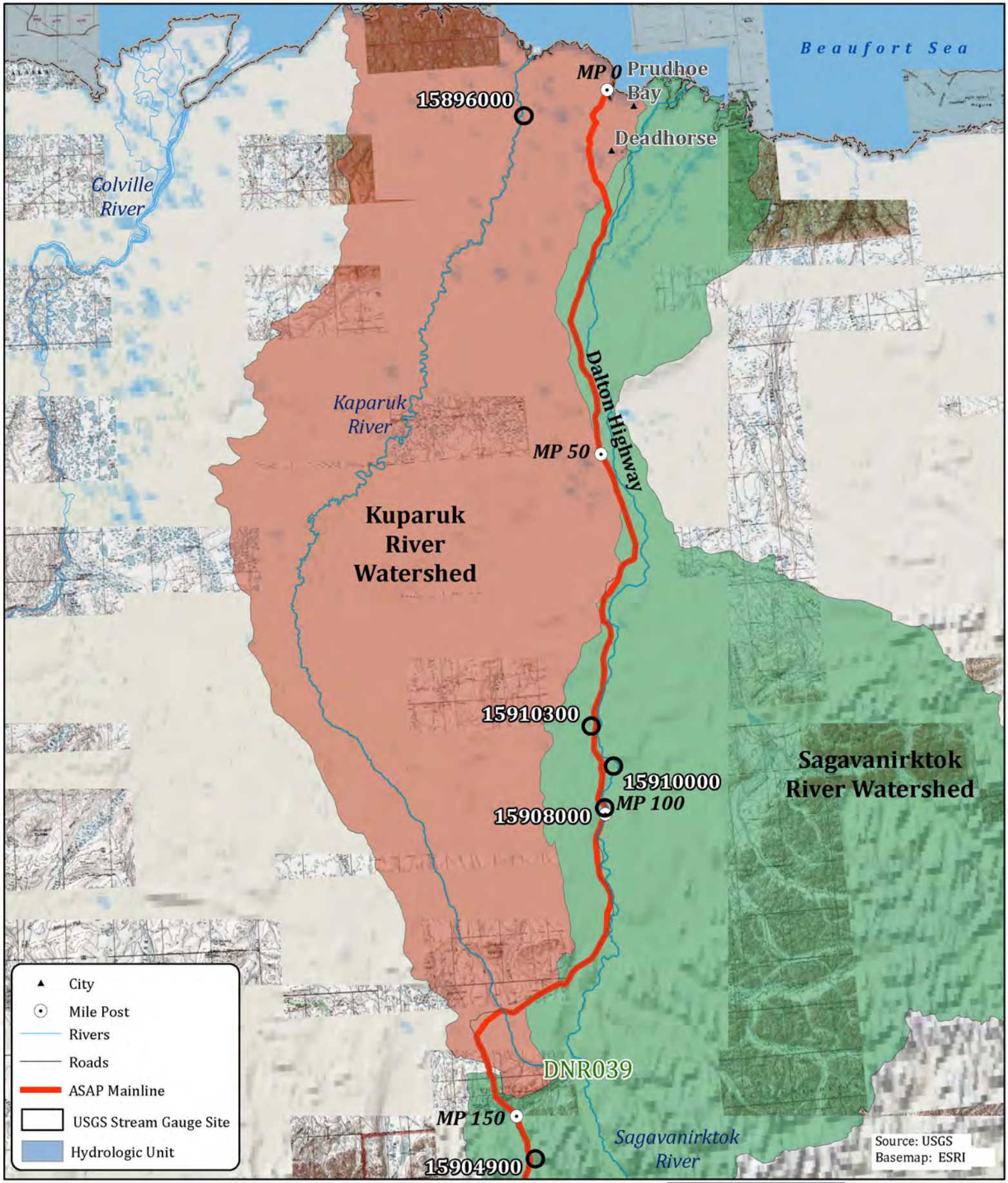
Alaska Stand Alone Gas Pipeline
Surface Water and Ground Water Monitoring Sites

0 1.25 2.5 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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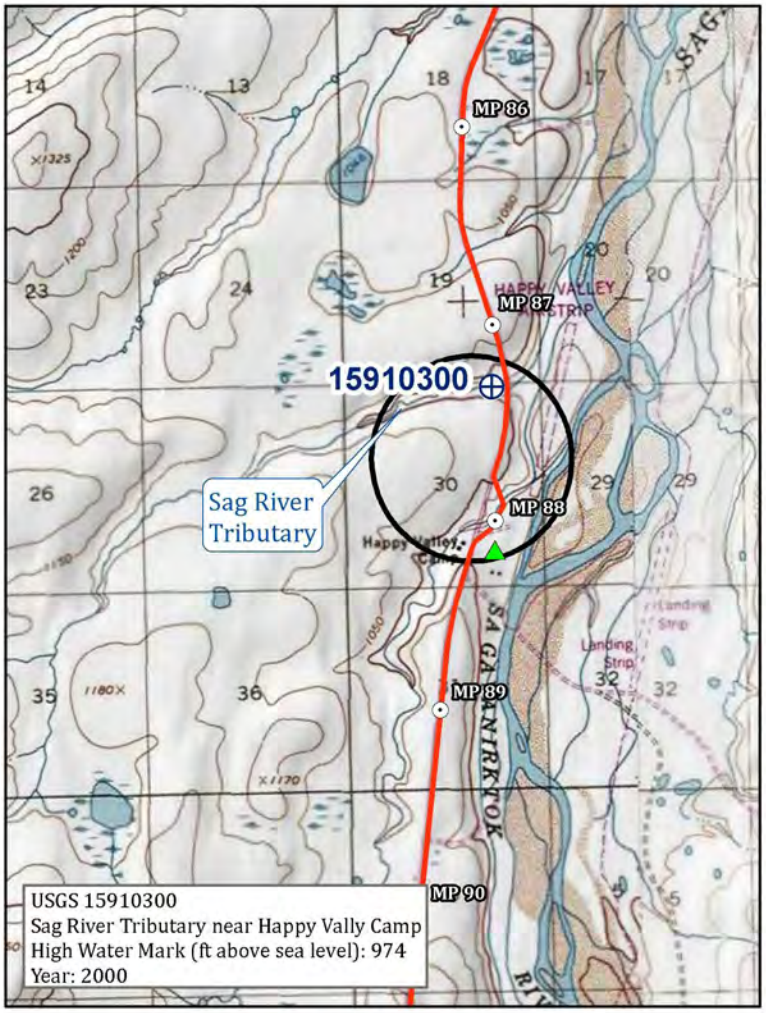
N

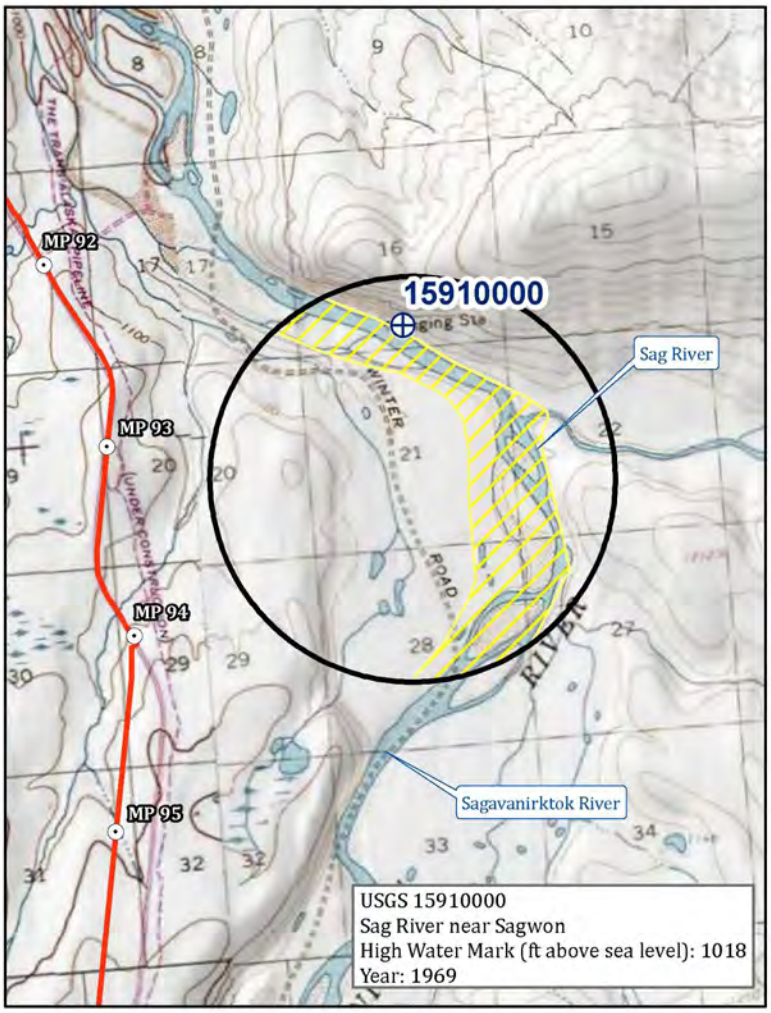
Alaska Stand Alone Gas Pipeline
High Water Mark Index

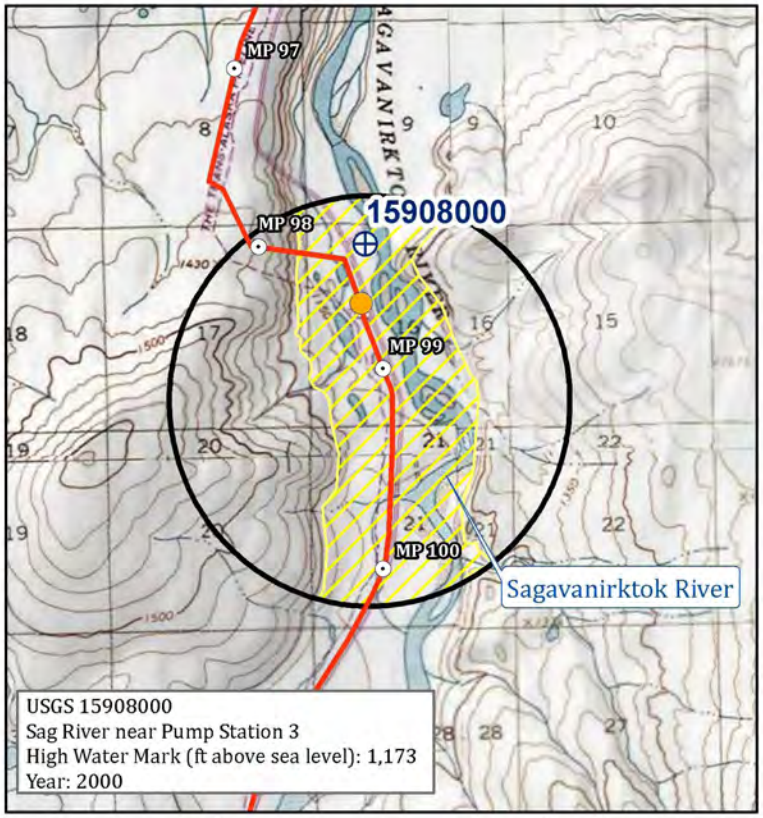
0 10 20 Miles

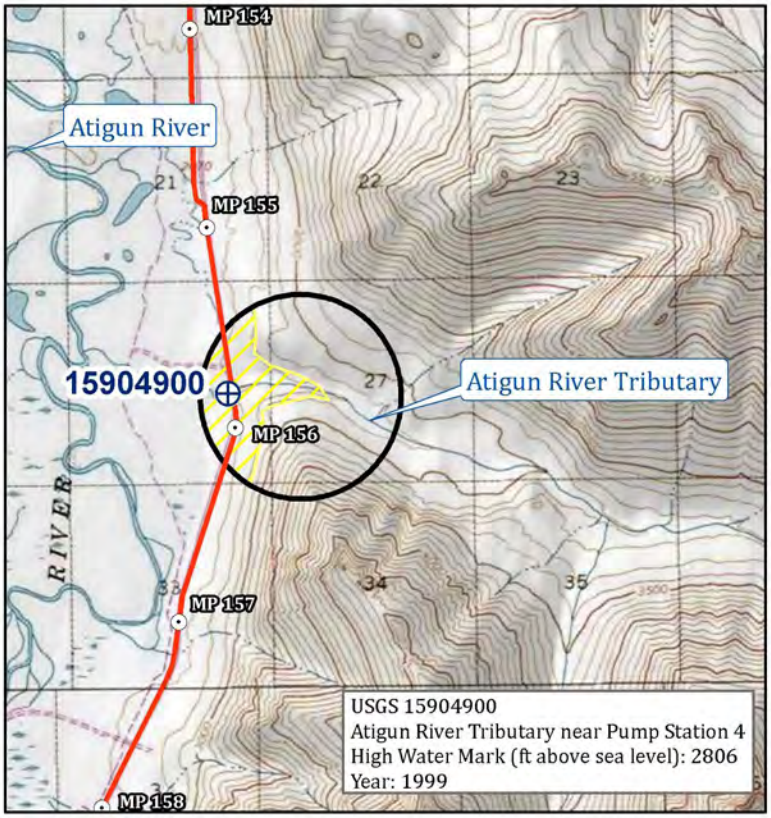
May 2012

NAD 1983 State Plane Alaska









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Block Valve
USGS Stream Gage
Camp Laydown
ASAP Mainline
Mile Post
High Water Mark
1 & 2 Mile Diameter Buffer

Alaska Stand Alone Gas Pipeline

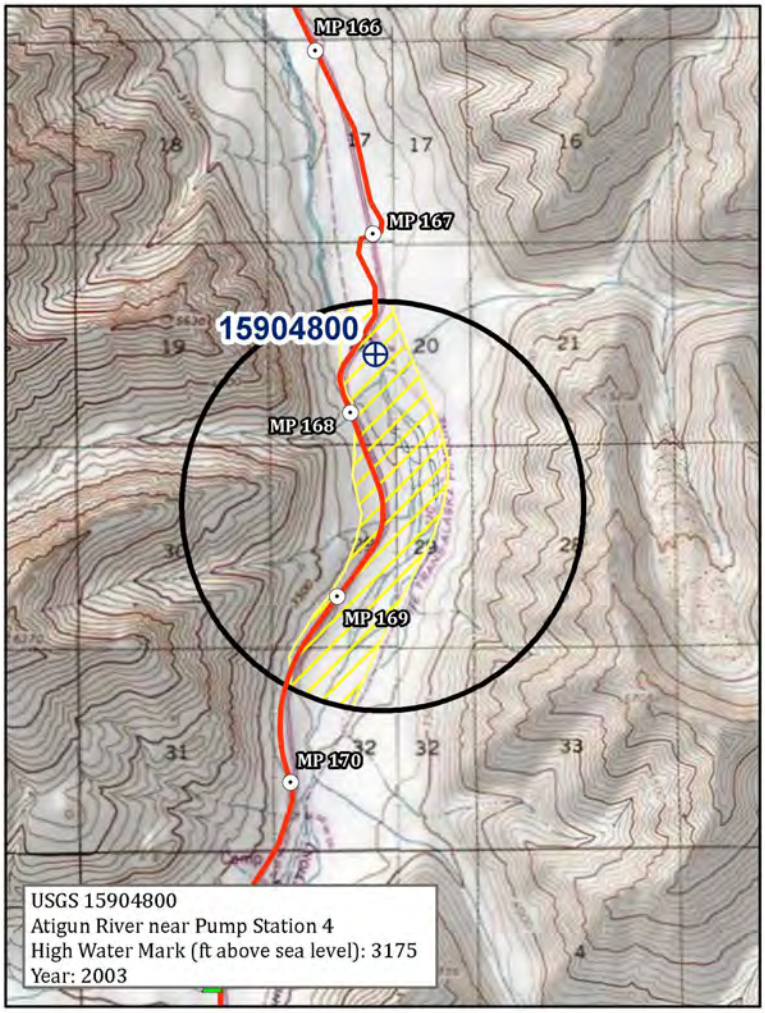
High Water Marks

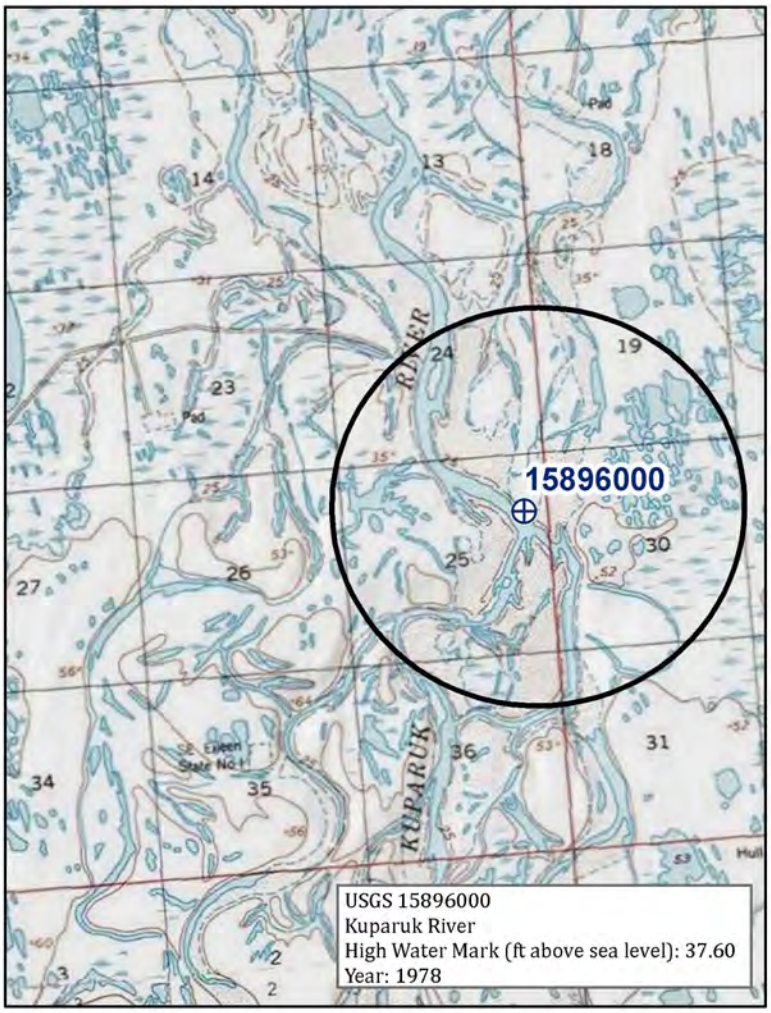
Arctic Subregion

0 0.5 1 Miles

May 2012

NAD 1983 State Plane Alaska





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Block Valve
USGS Stream Gage
Camp Laydown
ASAP Mainline
Mile Post
High Water Mark
1 & 2 Mile Diameter Buffer

Alaska Stand Alone Gas Pipeline

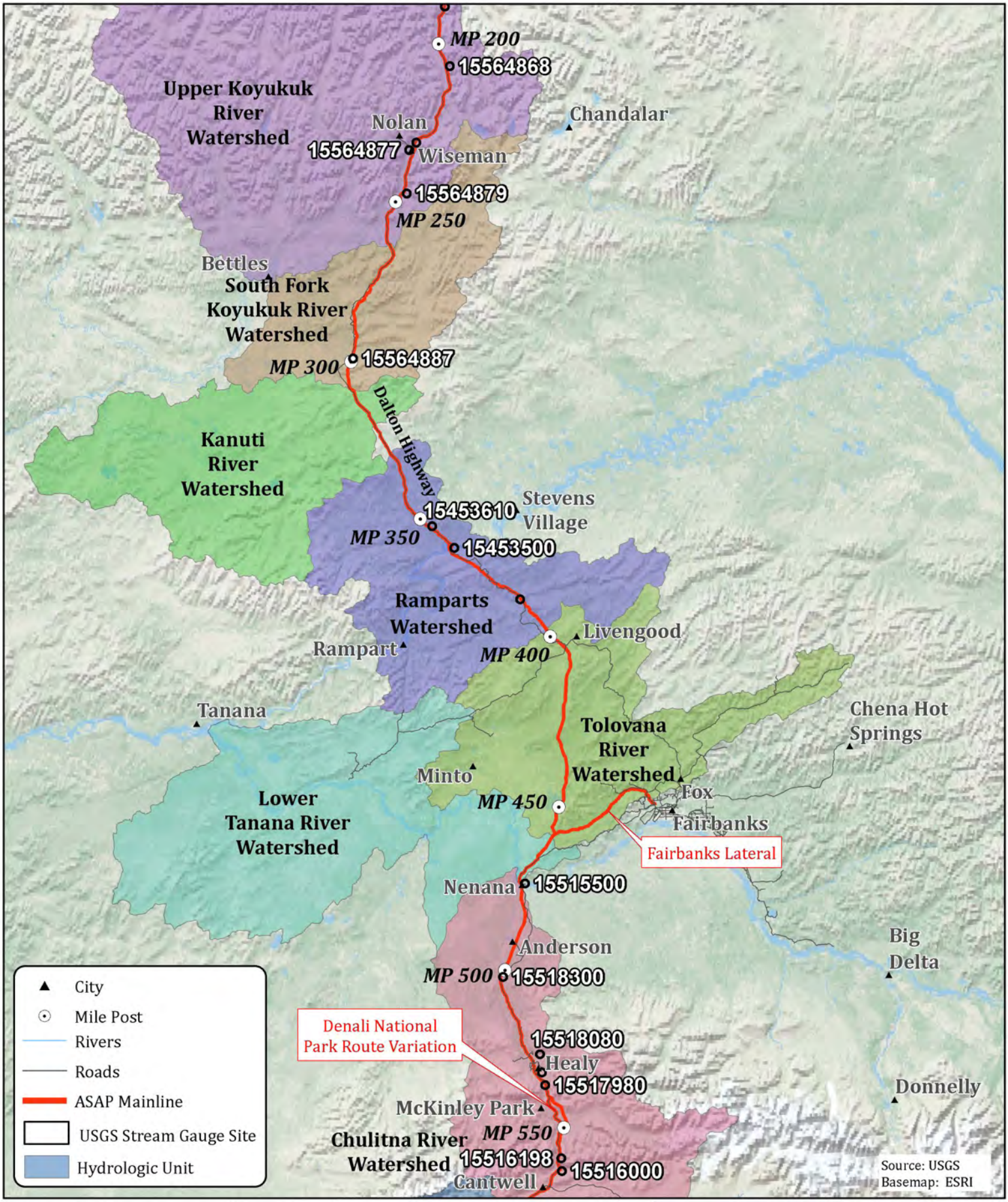
High Water Marks

Arctic Subregion

0 0.5 1 Miles

May 2012

NAD 1983 State Plane Alaska



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N

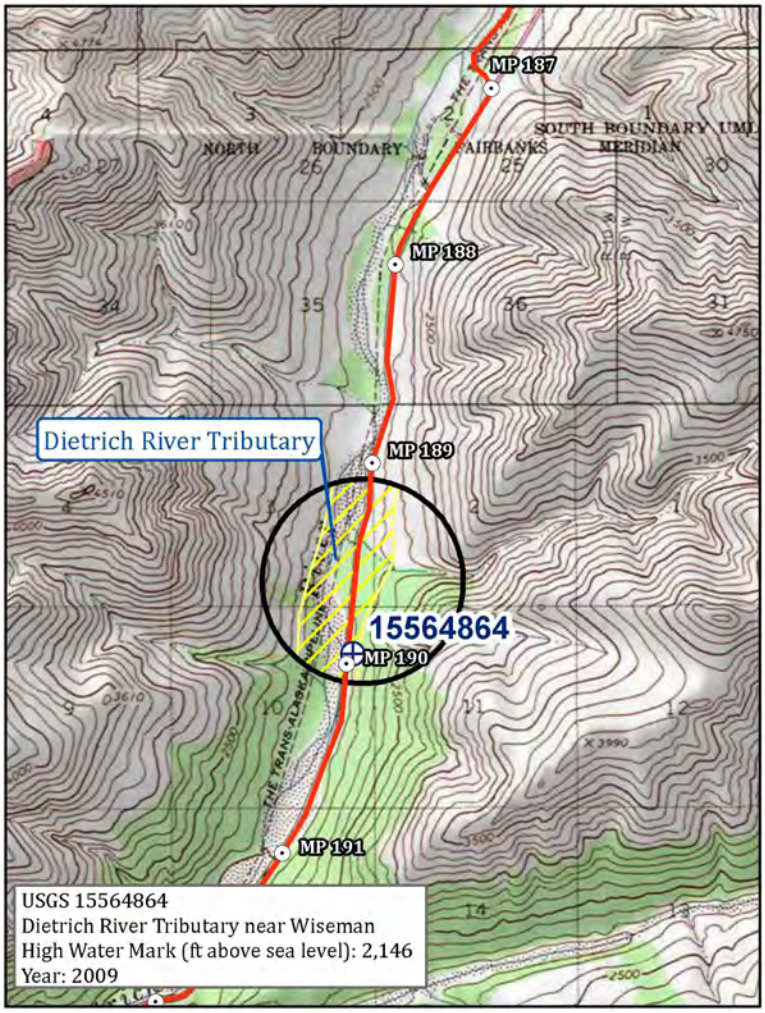
Alaska Stand Alone Gas Pipeline
High Water Mark Index

0 25 50 Miles

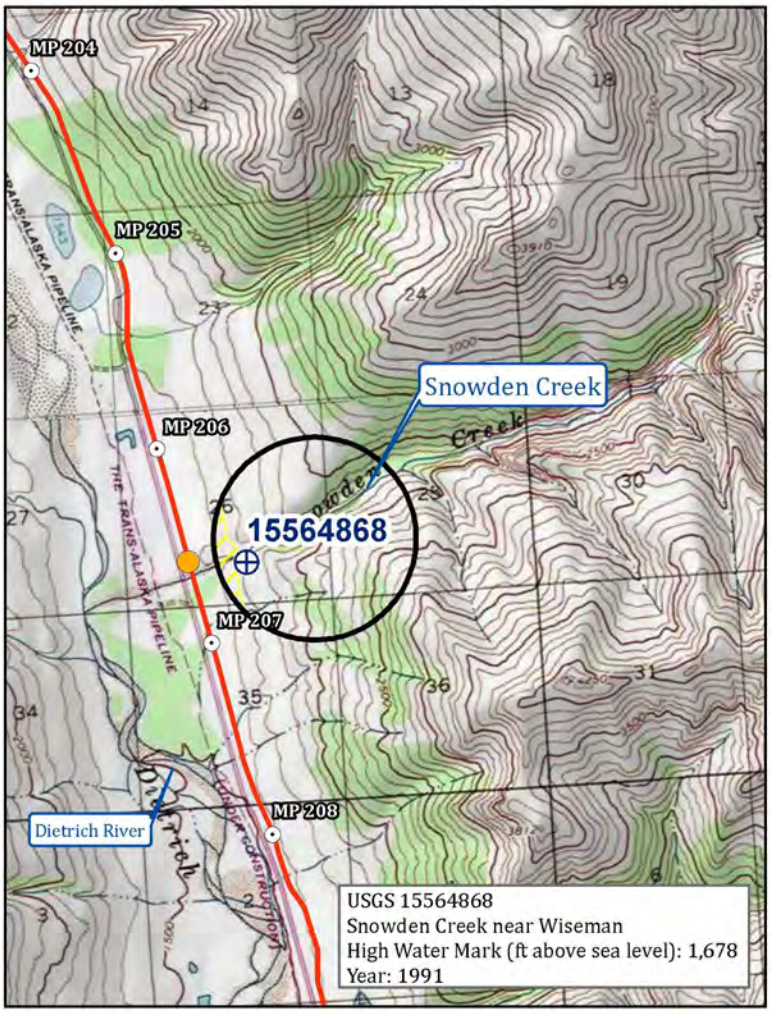
Alaska Canada

May 2012

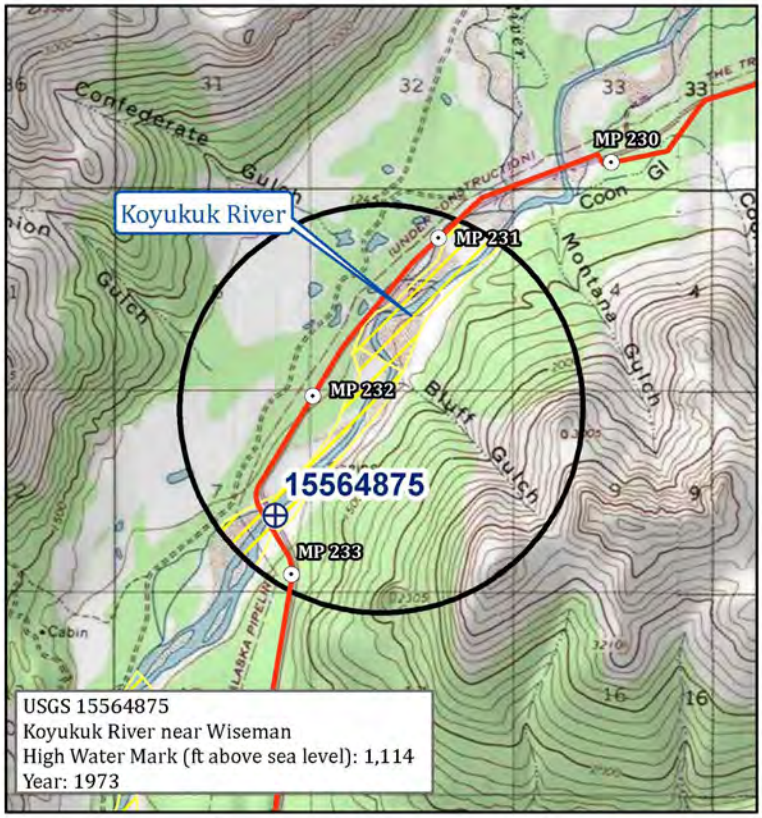
NAD 1983 State Plane Alaska



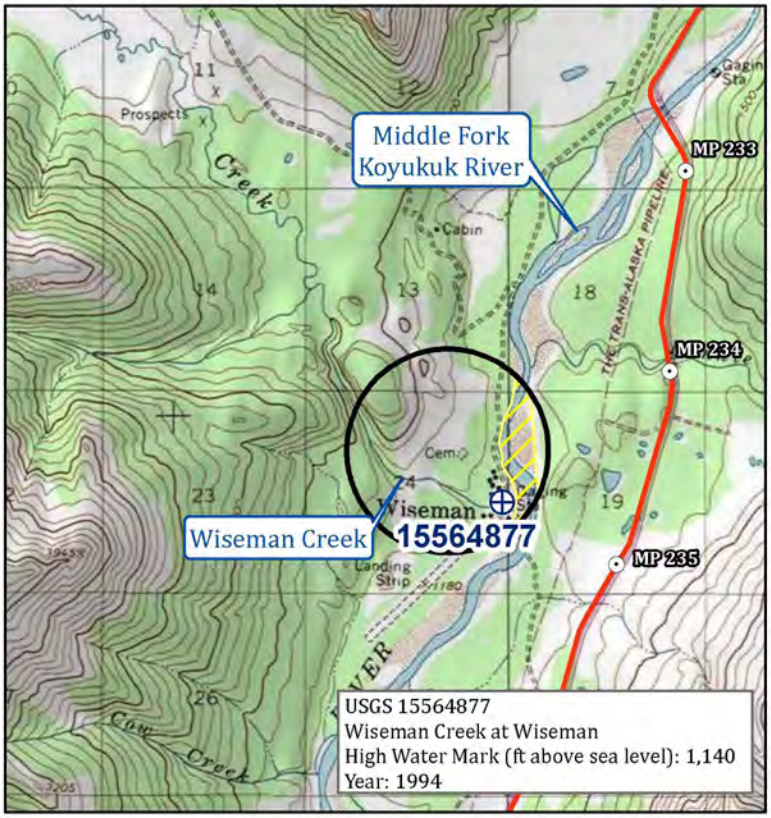
USGS 15564864
Dietrich River Tributary near Wiseman
High Water Mark (ft above sea level): 2,146
Year: 2009



USGS 15564868
Snowden Creek near Wiseman
High Water Mark (ft above sea level): 1,678
Year: 1991



USGS 15564875
Koyukuk River near Wiseman
High Water Mark (ft above sea level): 1,114
Year: 1973



USGS 15564877
Wiseman Creek at Wiseman
High Water Mark (ft above sea level): 1,140
Year: 1994

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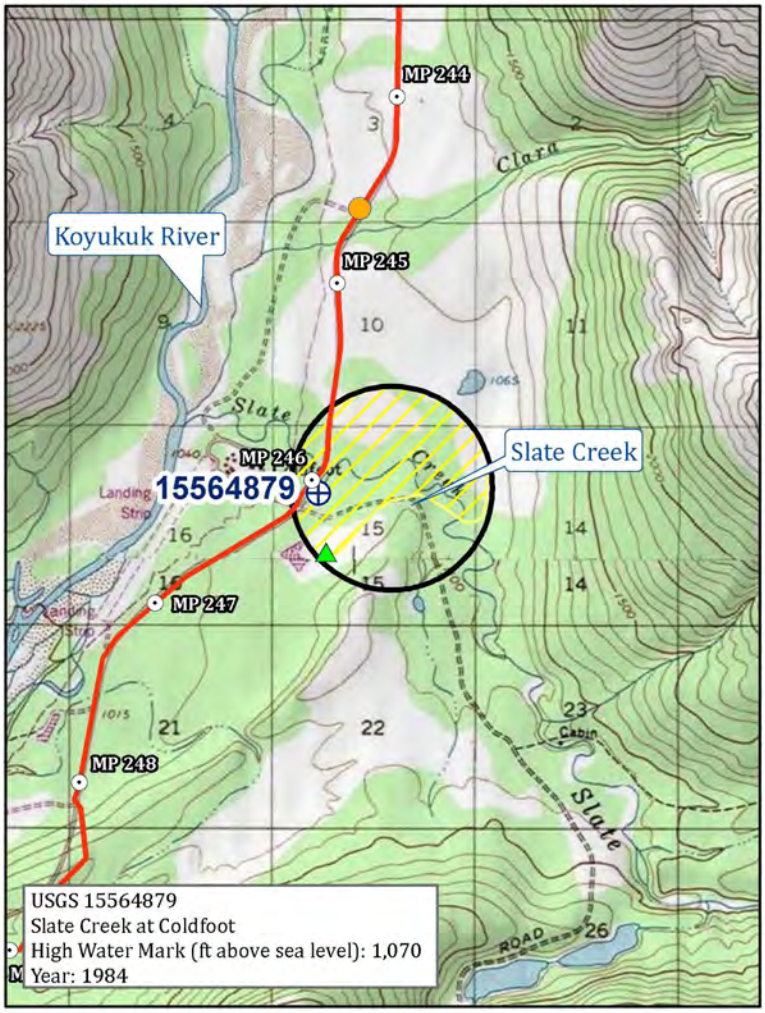
Block Valve
Camp Laydown
Mile Post
1 & 2 Mile Diameter Buffer
USGS Stream Gage
ASAP Mainline
High Water Mark

Alaska Stand Alone Gas Pipeline

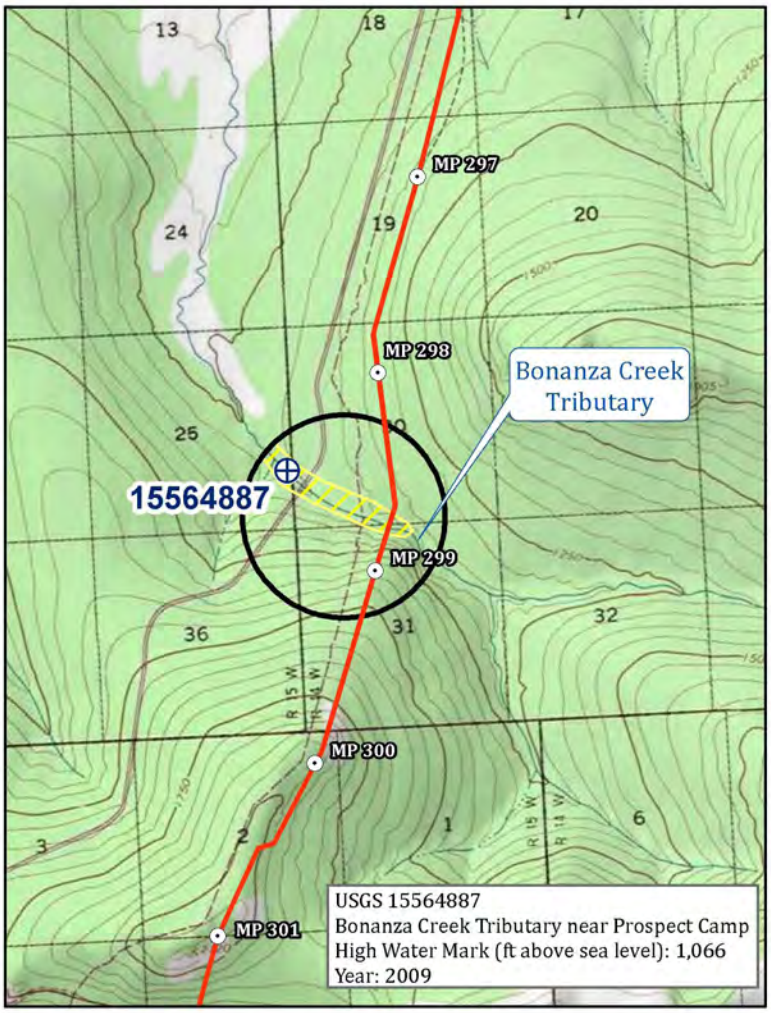
High Water Marks
Interior Yukon Subregion

0 0.5 1 Miles

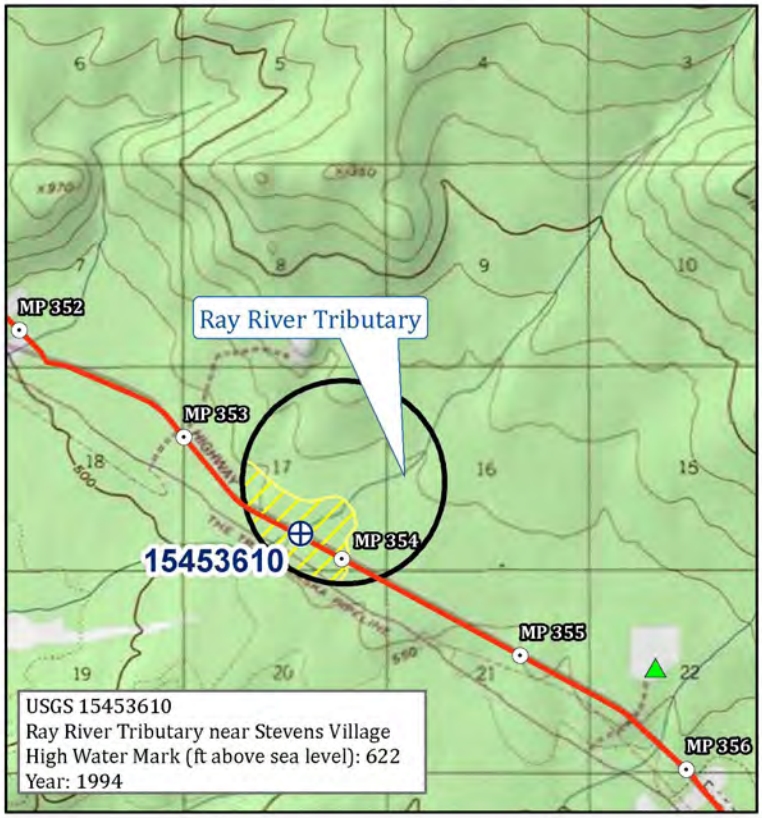
May 2012
NAD 1983 State Plane Alaska



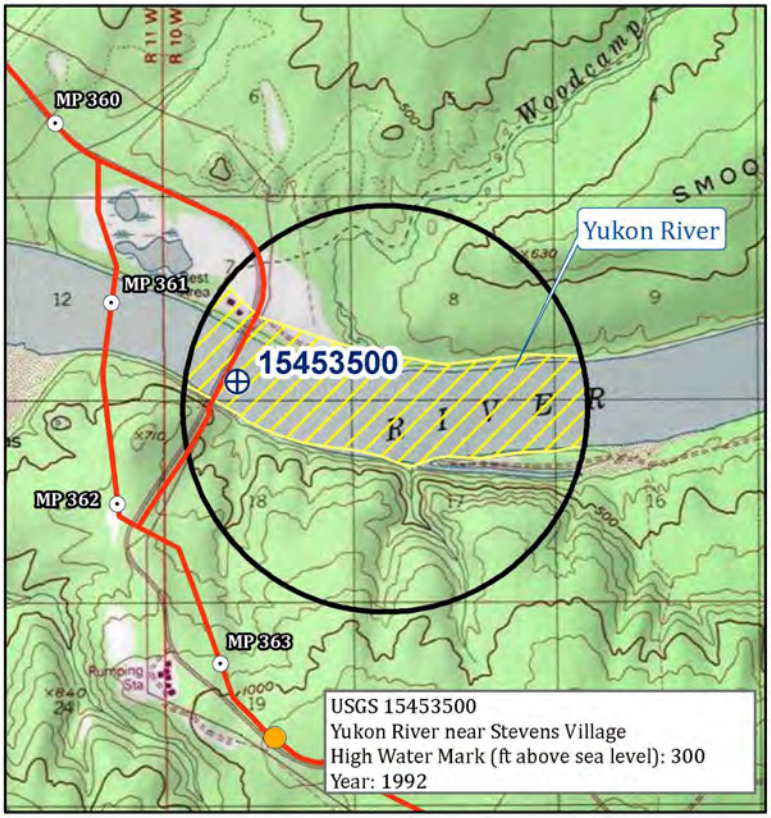
USGS 15564879
Slate Creek at Coldfoot
High Water Mark (ft above sea level): 1,070
Year: 1984



USGS 15564887
Bonanza Creek Tributary near Prospect Camp
High Water Mark (ft above sea level): 1,066
Year: 2009



USGS 15453610
Ray River Tributary near Stevens Village
High Water Mark (ft above sea level): 622
Year: 1994



USGS 15453500
Yukon River near Stevens Village
High Water Mark (ft above sea level): 300
Year: 1992

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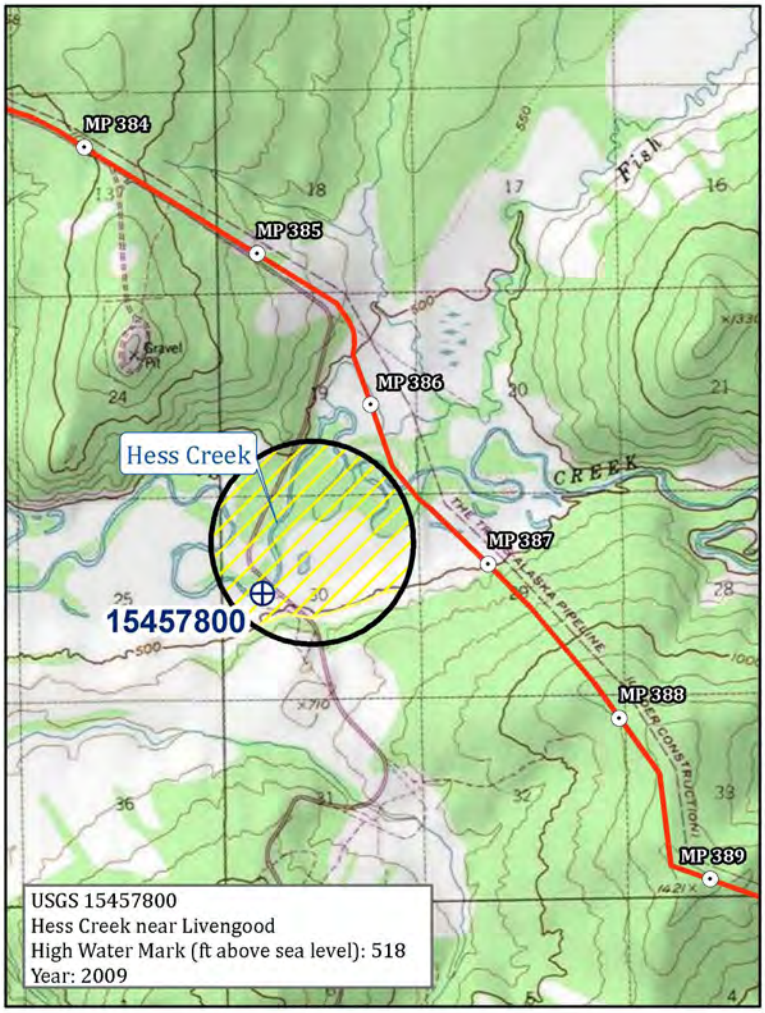
1 & 2 Mile Diameter Buffer

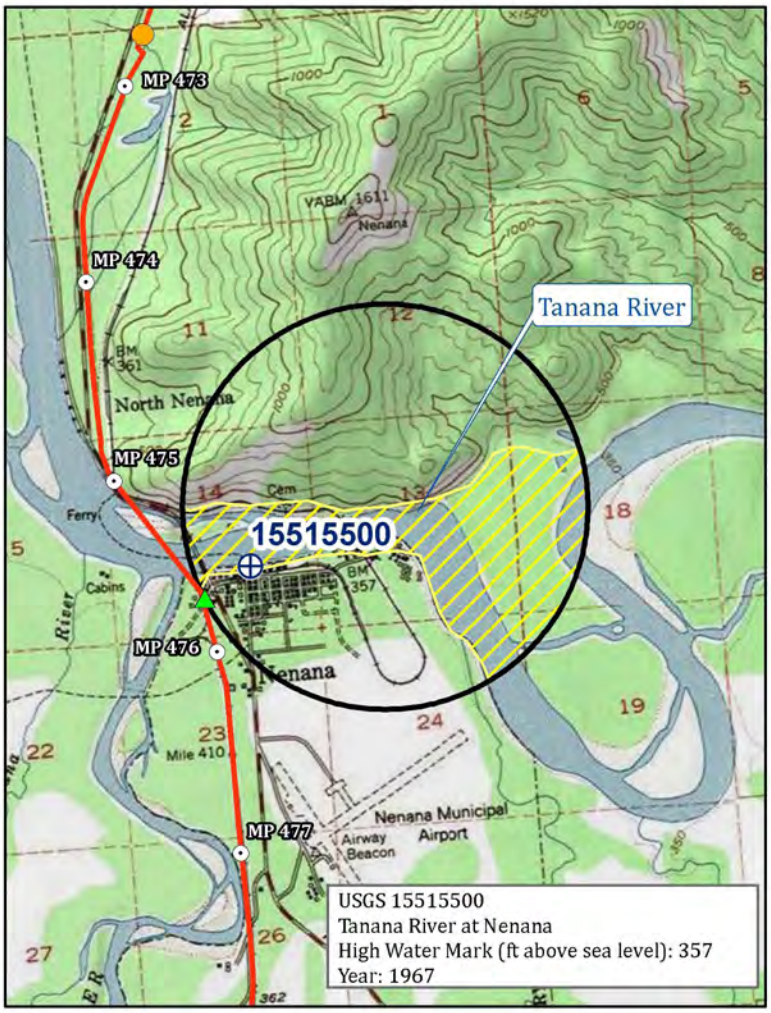
Alaska Stand Alone Gas Pipeline

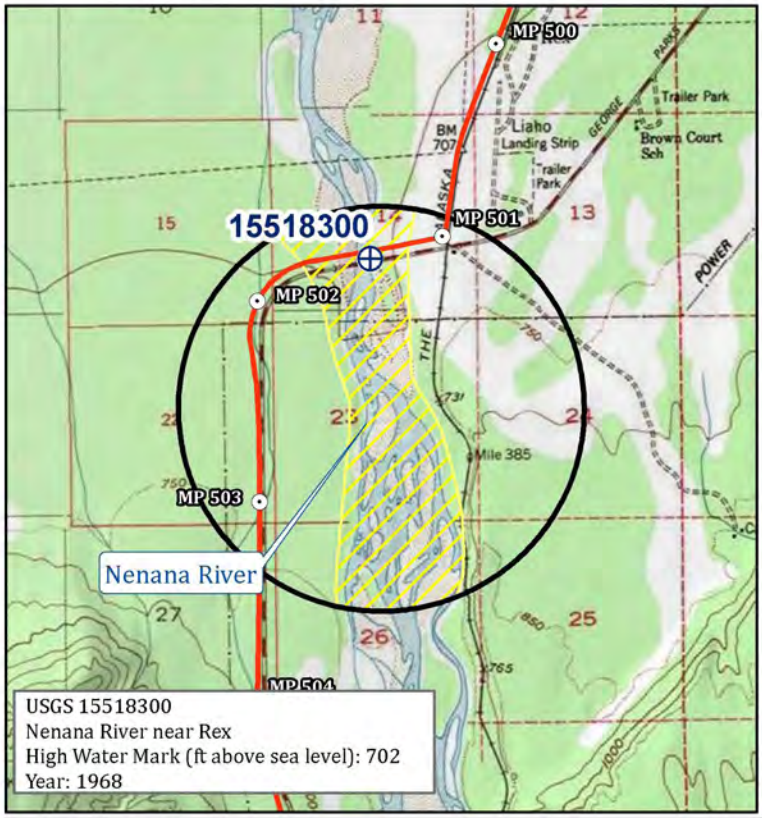
High Water Marks
Interior Yukon Subregion

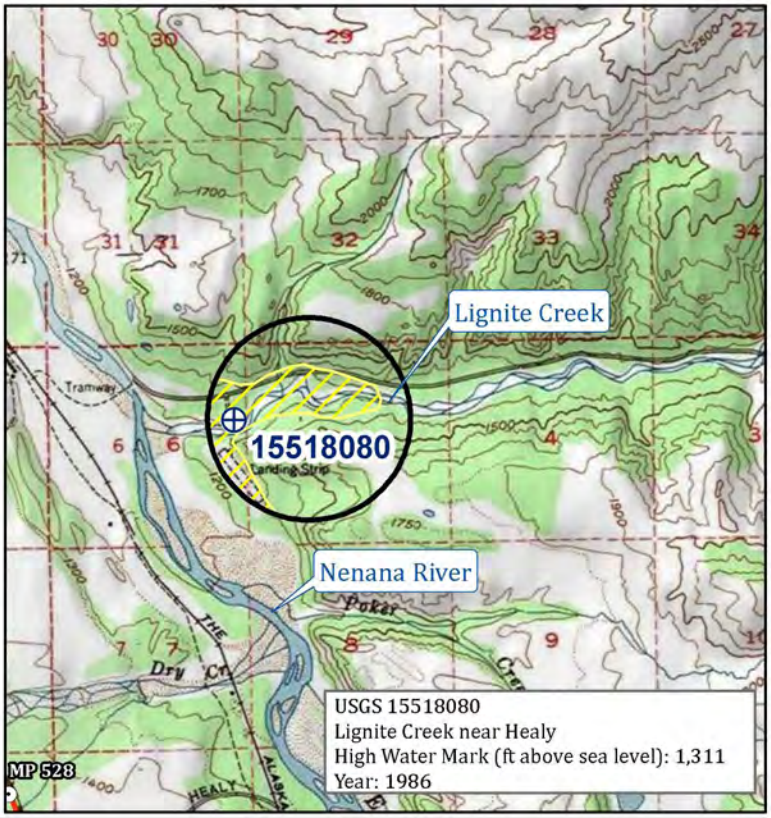
0 0.5 1 Miles

May 2012
NAD 1983 State Plane Alaska









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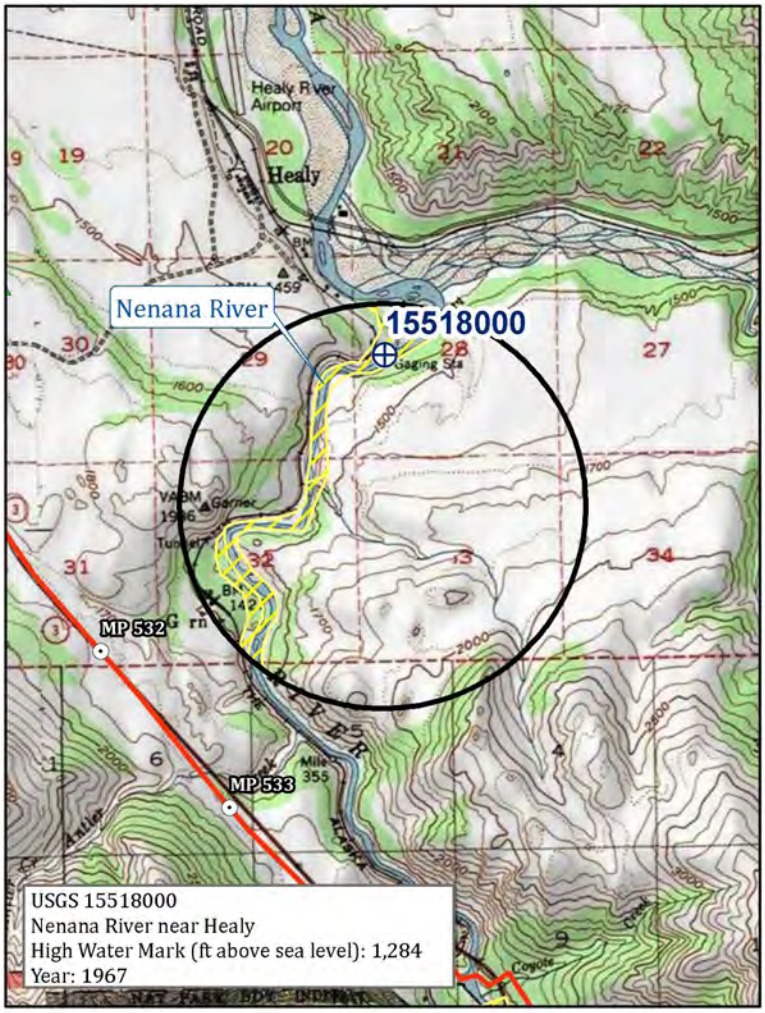
Alaska Stand Alone Gas Pipeline

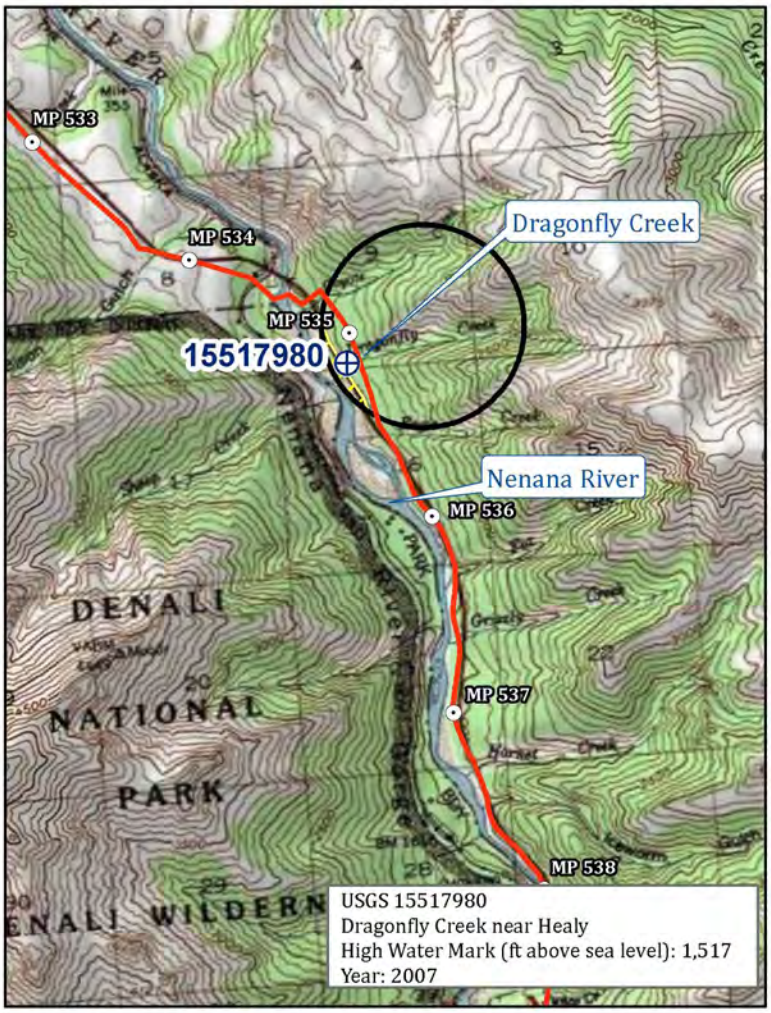
High Water Marks
Interior Yukon Subregion

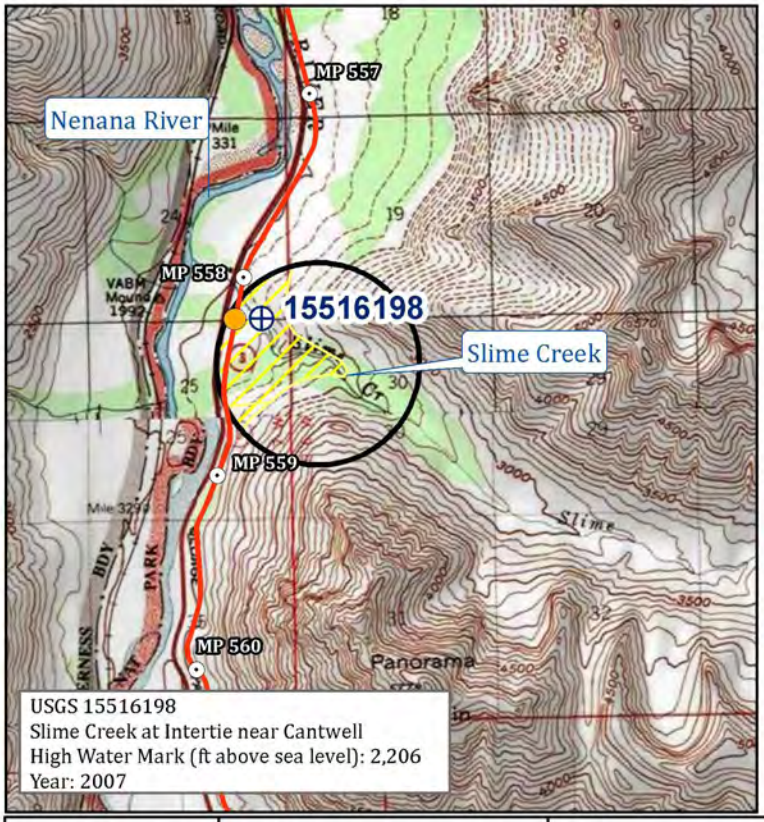
0 0.5 1 Miles

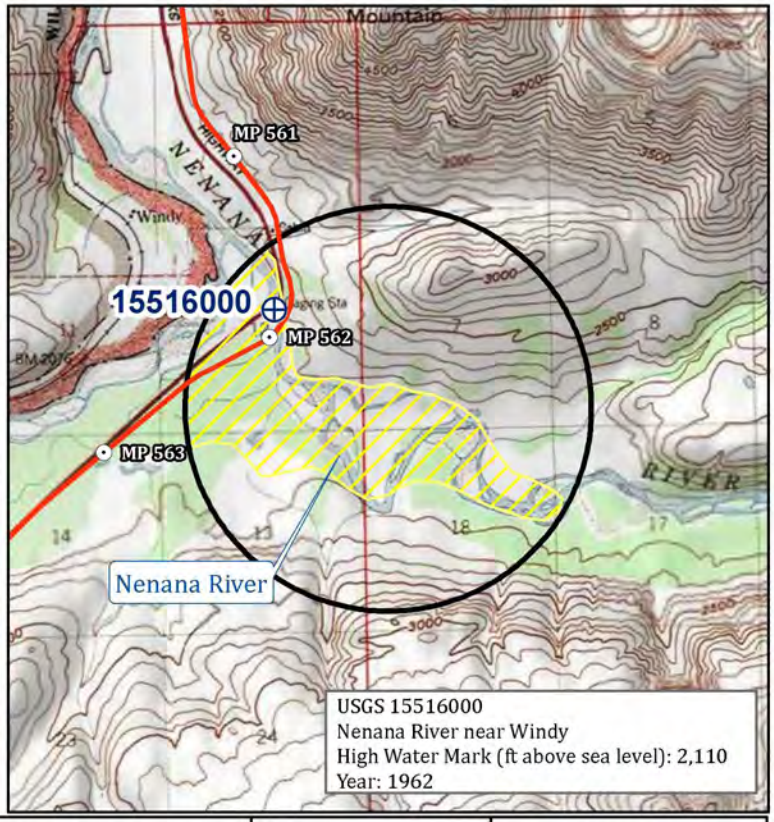
Alaska Canada

May 2012
NAD 1983 State Plane Alaska









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1 & 2 Mile Diameter Buffer

Alaska Stand Alone Gas Pipeline

High Water Marks

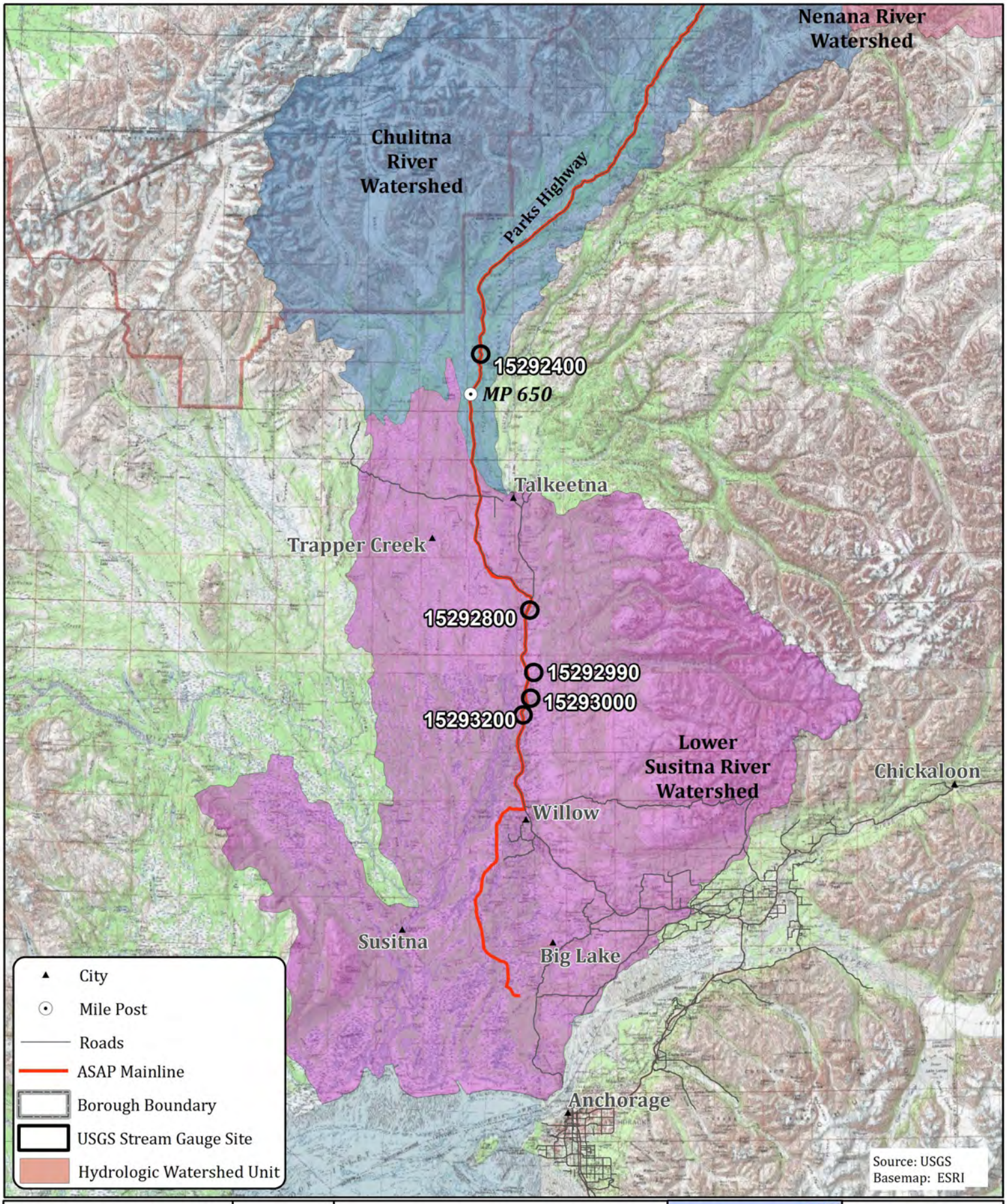
Interior Yukon Subregion

0 0.5 1 Miles

Alaska Canada

May 2012

NAD 1983 State Plane Alaska



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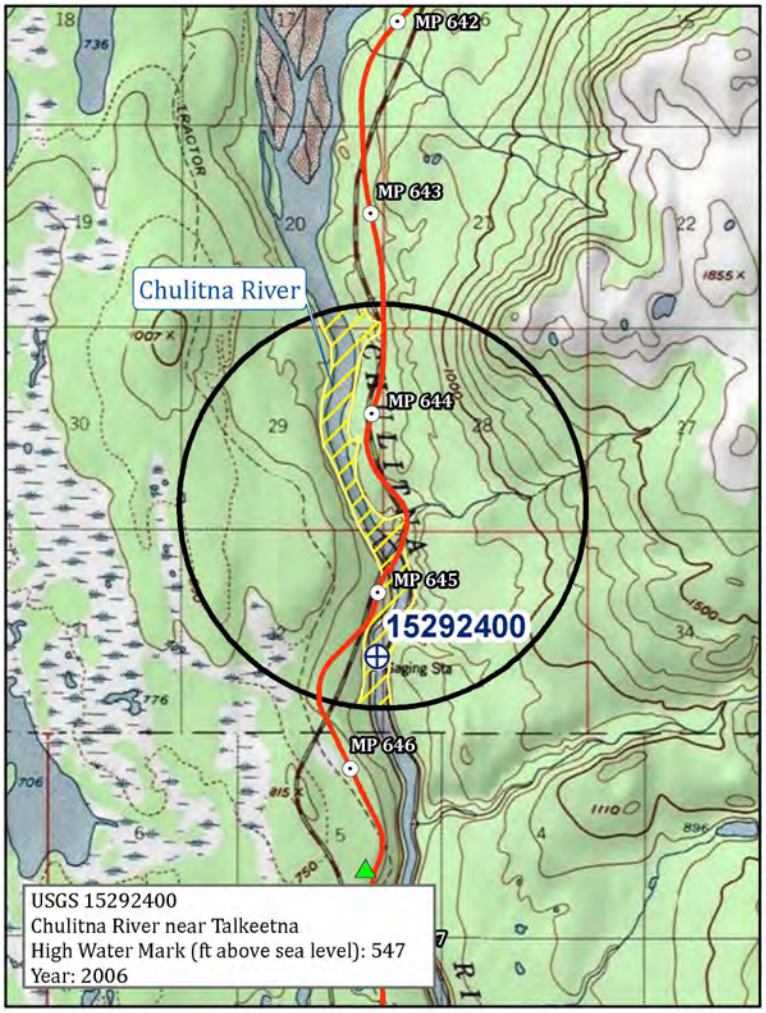
N

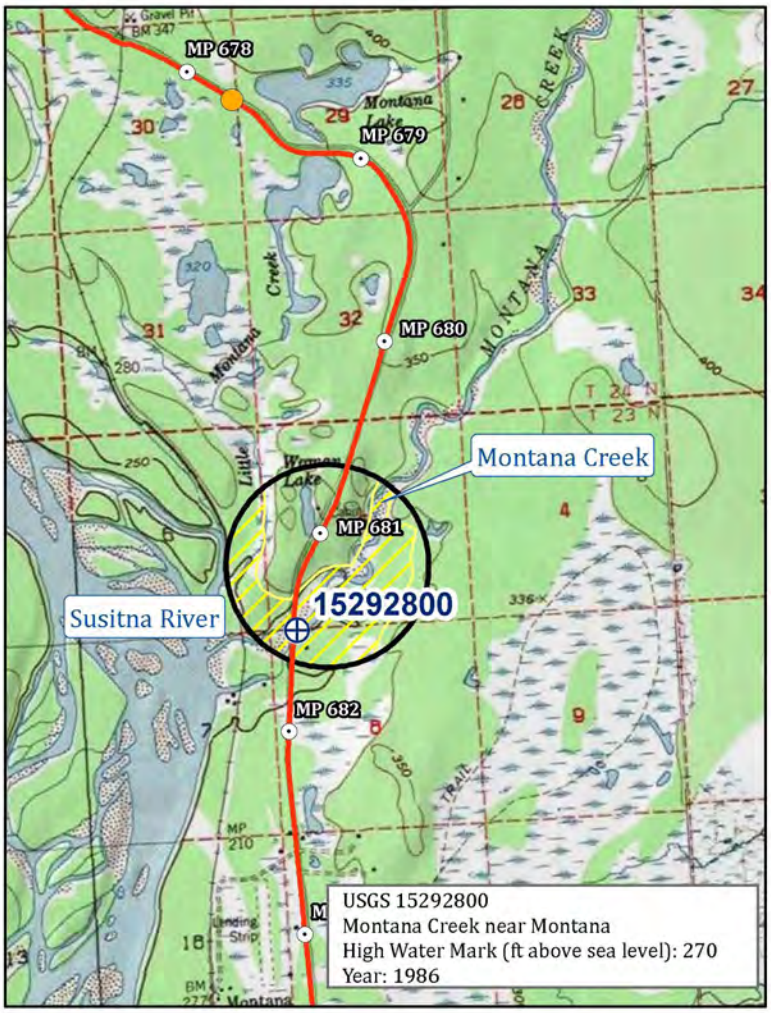
Alaska Stand Alone Gas Pipeline
High Water Mark Index

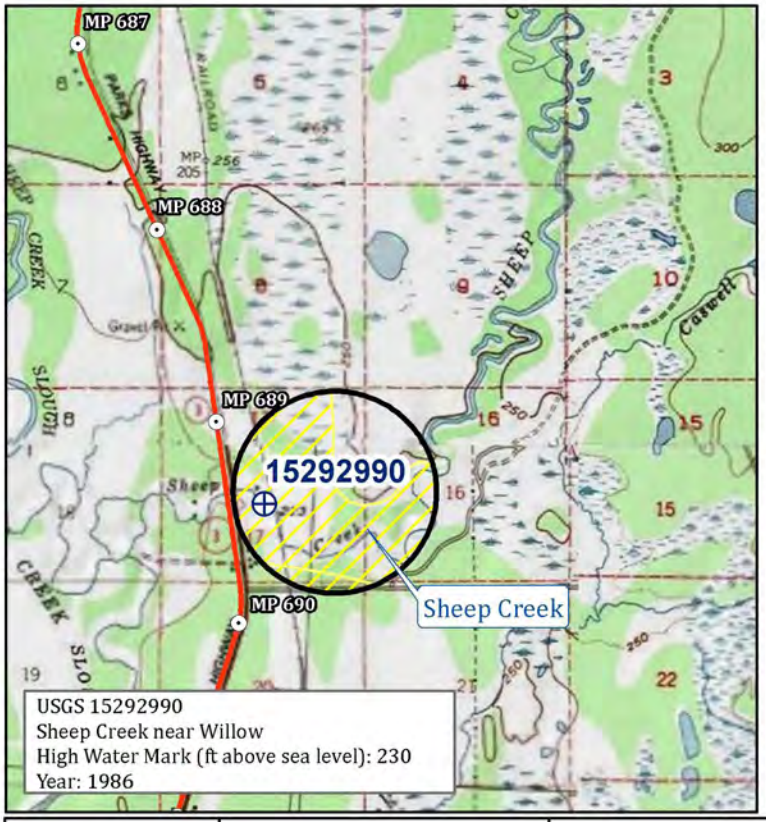
0 10 20 Miles

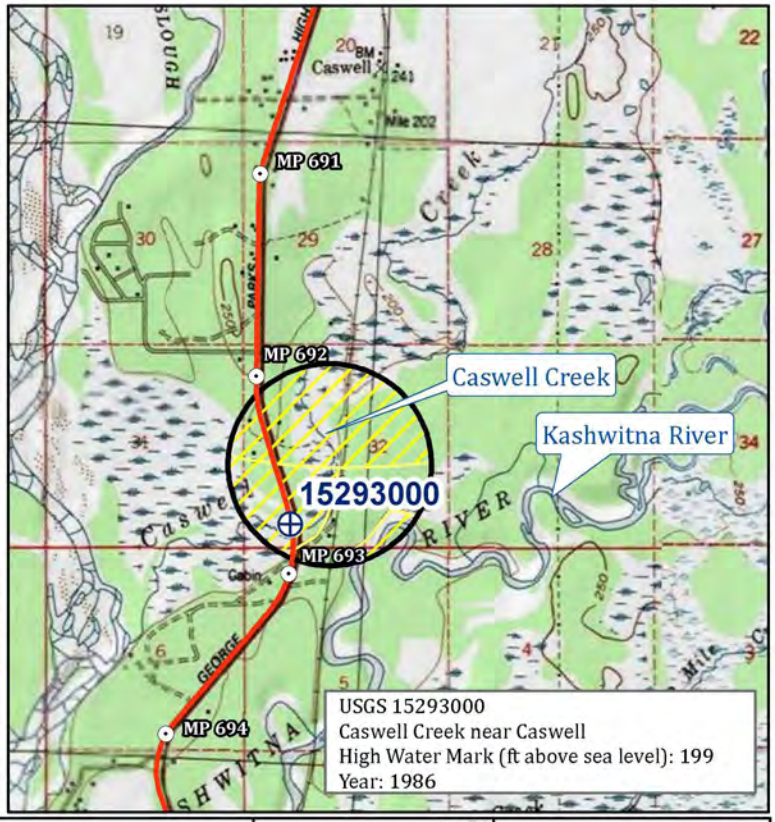
May 2012

NAD 1983 State Plane Alaska









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USGS Stream Gage
Camp Laydown
ASAP Mainline
Mile Post
High Water Mark
1 & 2 Mile Diameter Buffer

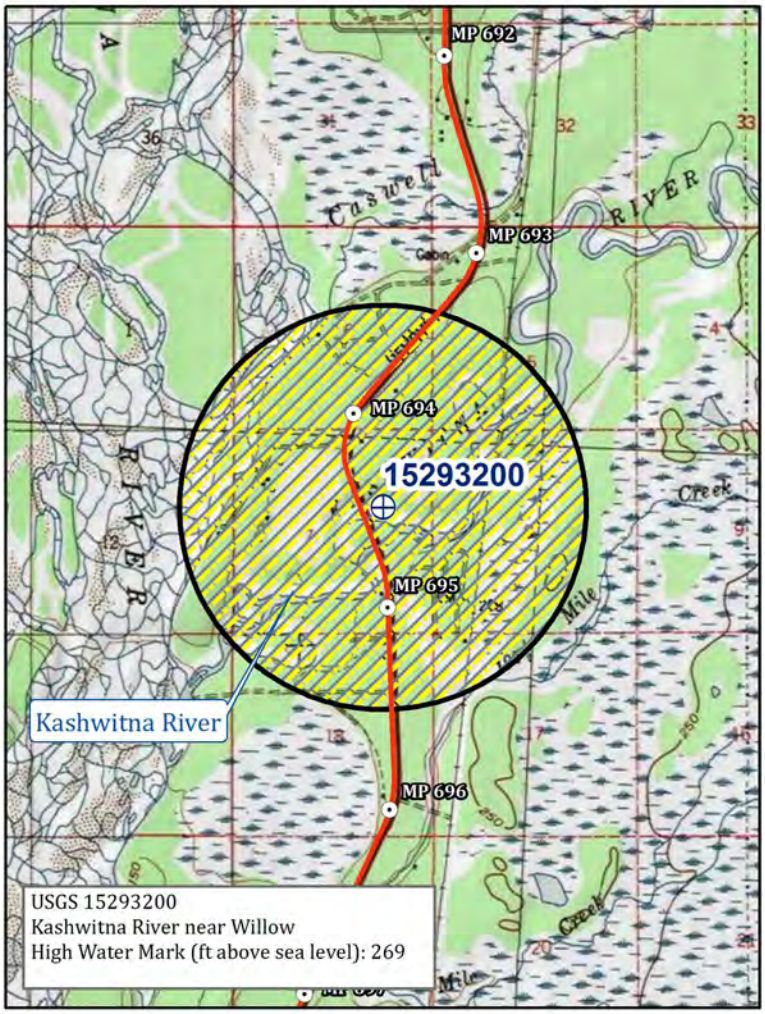
Alaska Stand Alone Gas Pipeline

High Water Marks
South Central Subregion

0 0.5 1 Miles

Alaska Canada

May 2012
NAD 1983 State Plane Alaska



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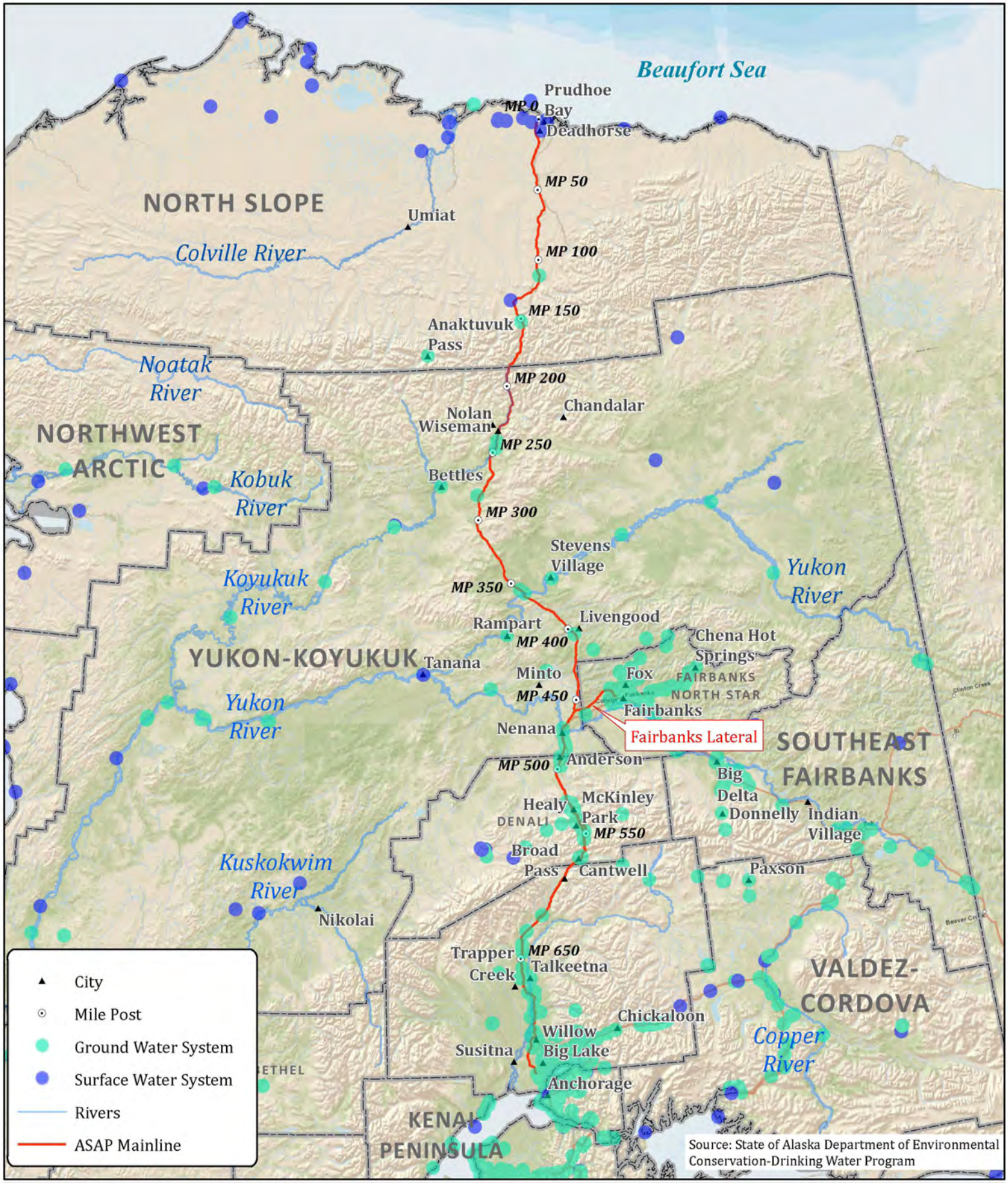
Alaska Stand Alone Gas Pipeline

High Water Marks
South Central Subregion

0 0.5 1 Miles

May 2012

NAD 1983 State Plane Alaska



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N

Alaska Stand Alone Gas Pipeline
Drinking Water Protection Areas

0 50 100 Miles

May 2012

NAD 1983 State Plane Alaska

Appendix H

Mitigation Measures

Applicant proposed mitigation measures are included in Section 5.23 of the Final EIS and can also be viewed on the Project website at www.asapeis.com

Appendix I

Affects Determination

Biological Assessment

Biological Opinion

Section 7 Letter of Concurrence

ALASKA STAND ALONE GAS PIPELINE/*ASAP*

Biological Assessment

May 2011

Alaska Gasline Development Corporation
P.O. Box 101020
Anchorage, AK 99510

NOTICE

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Appendix A USFWS Correspondence and NMFS Correspondence
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Appendix C Mitigation Measures

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
ACP	Arctic Coastal Plain
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOT&PF	Alaska Department of Transportation and Public Facilities
AES	ASRC Energy Services Alaska, Inc.
AEWC	Alaska Eskimo Whaling Commission
AGDC	Alaska Gasline Development Corporation
AOOS	Alaska Ocean Observing System
ARRC	Alaska Railroad Corporation
ASAP	Alaska Stand Alone Gas Pipeline
ASME	American Society of Mechanical Engineers
BA	Biological Assessment
BACT	Best Available Control Technology
BLM	U.S. Department of Interior, Bureau of Land Management
BMP	best management practices
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement
BOWFEST	Bowhead Whale Feeding Ecology Study
BP	British Petroleum
bscfd	billion standard cubic feet per day
CFR	Code of Federal Regulations
CH_4	Methane
CO_2	carbon dioxide

CO_2 eq	CO_2 equivalent
CS	compressor station
Delta	Yukon-Kuskokwim Delta
DNP&P	Denali National Park and Preserve
DPS	distinct population segment
EDPS	Eastern distinct population segment
EIS	environmental impact statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FLIR	forward-looking infrared
FR	Federal Register
GCF	gas conditioning facility
GHG	greenhouse gas
GIS	geographic information systems
H_2S	hydrogen sulfide
HAPs	Hazardous Air Pollutants
HB	House Bill
HDD	horizontal directional drilling
Hz	hertz
IPCC	Intergovernmental Panel on Climate Change
ITR	incidental take regulations
IUCN	International Union for Conservation of Nature
IWC	International Whaling Commission
LOA	letter of authorization
MLV	mainline valve

MMBtu	million British thermal units
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
MMscfd	million standard cubic feet per day
MP	milepost
N/A	not applicable
N_2O	Nitrous Oxide
NEPA	National Environmental Policy Act
NGL	natural gas liquids
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	Criteria Pollutants
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NSB	North Slope Borough
NWT	Northwest Territories
O&M	operations and maintenance
OC	organochlorine
OCS	Outer Continental Shelf
PAH	poly-aromatic hydrocarbons
PCE	primary constituent elements
POD	Plan of Development, Rev. 1
POP	Persistent organic pollutants
ROW	right-of-way
SB	Southern Beaufort Population

SPCC	spill prevention control and countermeasure
SPCO	State Pipeline Coordinator Office
SWPPP	Storm Water Pollution Prevention Plan
TAPS	Trans-Alaska Pipeline System
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VSM	vertical support members
WDPS	Western distinct population segment

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1.0 EXECUTIVE SUMMARY

Pursuant to House Bill (HB) 369 passed by the Alaska Legislature in July 2010, the Alaska Gasline Development Corporation (AGDC) has initiated federal permitting processes for the Alaska Stand Alone Gas Pipeline/***ASAP*** (ASAP), including application for a Clean Water Act § 404 permit from the U.S. Army Corps of Engineers (USACE), and a federal grant and state lease for the respective federal and state portions of the associated ASAP right-of-way. By agreement among the stakeholder federal agencies, USACE has been designated the lead federal agency for the ASAP Environmental Impact Statement (EIS) process being undertaken pursuant to the National Environmental Policy Act (NEPA). The ASAP EIS cooperating agencies are the U.S. Environmental Protection Agency (EPA), the U.S. Department of Interior, Bureau of Land Management (BLM) and the National Park Service (NPS), and the Alaska Pipeline Coordinator's Office (SPCO). USACE has initiated consultation regarding the ASAP project under Section 7 of the Endangered Species Act (ESA) with both the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) (collectively, the Services). AGDC, acting through ASRC Energy Services Alaska, Inc. (AES) has been designated as the Non-Federal Representative, and has prepared this draft biological assessment (BA) for USACE's review.

As described in more detail in Section 2.0 of this BA and the applicant's Plan for Development, Rev. 1 (POD), the ASAP entails construction and operation of (i) a 737-mile, 24-inch-diameter mostly buried natural gas pipeline extending from Prudhoe Bay on the North Slope of Alaska to a connection point at milepost (MP) 39 of the existing ENSTAR Beluga Pipeline near Wasilla, Alaska, (ii) a 35-mile, 12-inch-diameter lateral pipeline spur from MP 458 of the ASAP to Fairbanks, and (iii) associated surface facilities. Construction activities include the transport of materials via barge through the Port of Seward and the Port of Anchorage to West Dock located on the North Slope. Accordingly, the action area addressed in this BA encompasses both the pipeline and surface facilities' construction and operations right-of-way, and port facilities and areas involved in transportation of construction materials.

The ASAP action area encompasses areas occupied by ESA-listed threatened and endangered species, designated critical habitat areas, and areas occupied by ESA candidate and proposed species. Table 1.0-1 provides a list of the species addressed in this BA, their ESA status and the action agency's initial effects determination.

TABLE 1.0-1 POTENTIALLY AFFECTED SPECIES AND CRITICAL HABITAT

Agency	Common Name	Scientific Name	Federal Status	Determination of Effect
USFWS	Spectacled Eider	*Somateria fischeri*	Threatened	Likely to adversely affect
	Steller's Eider	*Polysticta stelleri*	Threatened	Likely to adversely affect
	Polar Bear	*Ursus maritimus*	Threatened	Likely to adversely affect
	Polar Bear Critical Habitat	N/A	N/A	Likely to adversely affect
	Pacific Walrus	*Odobenus rosmarus divergens*	Warranted but Precluded	May affect, but not likely to adversely affect
NMFS	Bowhead Whale	*Balaena mysticetus*	Endangered	May affect, but not likely to adversely affect
	Fin Whale	*Balaenoptera physalus*	Endangered	May affect, but not likely to adversely affect
	Humpback Whale	*Megaptera novaengliea*	Endangered	May affect, but not likely to adversely affect
	Cook Inlet DPS Beluga Whale	*Delphinapterus leucas*	Endangered	May affect, but not likely to adversely affect
	Cook Inlet DPS Beluga Whale Critical Habitat	N/A	N/A	No effect
	Steller Sea Lion	*Umatopias jubatus*	Threatened	May affect, but not likely to adversely affect
	Ringed Seal	*Phoca hispida*	Proposed	May affect, but not likely to adversely affect
	Bearded Seal	*Erignathus barbatus*	Proposed	May affect, but not likely to adversely affect

In general, the vast majority of the proposed pipeline and associated surface facilities will not effect ESA-listed or ESA-proposed species and critical habitat. The potential for effects on species or critical habitat are limited to the polar bear and polar bear critical habitat, and to two eider species, and pertain to either port areas, through which ASAP construction materials will be transported, or to nearshore activities adjacent to the Beaufort Sea on the North Slope of Alaska.

2.0 PROJECT DESCRIPTION

The proposed project is a 24-inch-diameter natural gas pipeline with a natural gas flow rate of 500 million standard cubic feet per day (MMscfd) at peak capacity. The proposed pipeline will be buried except from MP 0 to 6, and at elevated-bridge stream crossings, compressor stations, possible fault crossings, pigging facilities, and off-take valve locations. The pipeline system will be designed to transport a highly-conditioned natural gas highly-enriched in non-methane hydrocarbons (i.e., natural gas liquids [NGLs]).

The purpose of the project is to provide a long-term, stable supply of up to 500 MMscfd of natural gas and NGLs from North Slope gas fields to markets in Fairbanks and Cook Inlet areas by 2016.

The routing of ASAP is from Prudhoe Bay following the Trans Alaska Pipeline System (TAPS) and Dalton Highway corridors, generally paralleling the highway corridor from the North Slope to near Livengood, northwest of Fairbanks. At Livengood, the pipeline route heads south, joining the Parks Highway corridor west of Fairbanks near Nenana. From there it continues south and terminates at MP 737. The ASAP will connect to ENSTAR's existing natural gas distribution system at MP 39 of the Beluga Pipeline near Wasilla. A lateral pipeline to Fairbanks (Fairbanks Lateral) will take off from the main pipeline just a few miles north of Nenana at Dunbar. The Fairbanks Lateral will travel northeast to Fairbanks, a distance of approximately 35 miles. Figure 2.0-1 provides the ASAP route overview.

2.1 *Primary Project Components*

The primary structures, facilities, and related project components are listed below.

Pipeline

- The 24-inch-diameter mainline is 737 miles in length.
- The 12-inch-diameter Fairbanks Lateral pipeline is 35 miles in length and will tie-in with the main pipeline at MP 458 of the ASAP.

Gas Conditioning Facility

- A 70-acre gas conditioning facility (GCF) will be located on the North Slope at Prudhoe Bay to provide conditioning necessary to remove carbon dioxide (CO_2), hydrogen sulfide (H_2S) and other impurities from the source gas stream.
- Natural gas will be obtained from the existing Central Gas Facility located approximately 1,000 feet north of the planned GCF.

Compressor Stations

- A maximum of two compressor stations will be required. Design optimization may allow construction using a single compressor station.
- Gas turbine-driven centrifugal compressors are proposed.
- Propane-cycle gas-chiller plants will be installed at compressor stations located north of Minto Flats.
- There will be two gas-turbine-driven electric-power generators per station.
- Each compressor station site will be on a gravel pad.
- Compressor station sites will be fenced.

Straddle and Off-Take Facility

- The Straddle and Off-Take Facility will be located at the Fairbanks Lateral Tie-In at MP 458 near Dunbar.
- The Straddle and Off-Take Facility will separate natural gas liquids (NGL[s]) from the gas stream to Fairbanks, providing 60 MMscfd of utility-grade gas to Fairbanks. NGLs extracted from the gas stream to Fairbanks will be re-injected into the main pipeline.
- A custody transfer gas metering station will be collocated with the Straddle and Off-Take Facility.

Cook Inlet NGL Extraction Facility and Terminus

- The Cook Inlet NGL Extraction Facility and Terminus will be located at MP 737. It will connect at MP 39 of the ENSTAR Beluga Pipeline.
- The Cook Inlet NGL Extraction Facility will separate NGLs from the gas stream and inject utility-grade gas into the ENSTAR Beluga pipeline. NGLs extracted from the gas stream will be sold separately.
- A custody transfer gas metering station will be collocated with the Cook Inlet NGL Extraction Facility and Terminus.

Other Permanent Facilities

- Mainline block valves will be set at a maximum of every 20 miles. It is expected that 30 mainline block valves and two valves along the Fairbanks Lateral will be required.
- A pig launcher will be located at the GCF. Pig launcher/receiver assemblies will be located at the compressor stations. A pig receiver will be located at the pipeline terminus. A pig launcher will be located at the tie-in for the Fairbanks Lateral and a receiver at the end of the alignment.
- Operation and maintenance (O&M) facilities will be located in Prudhoe Bay, Fairbanks, and Wasilla.

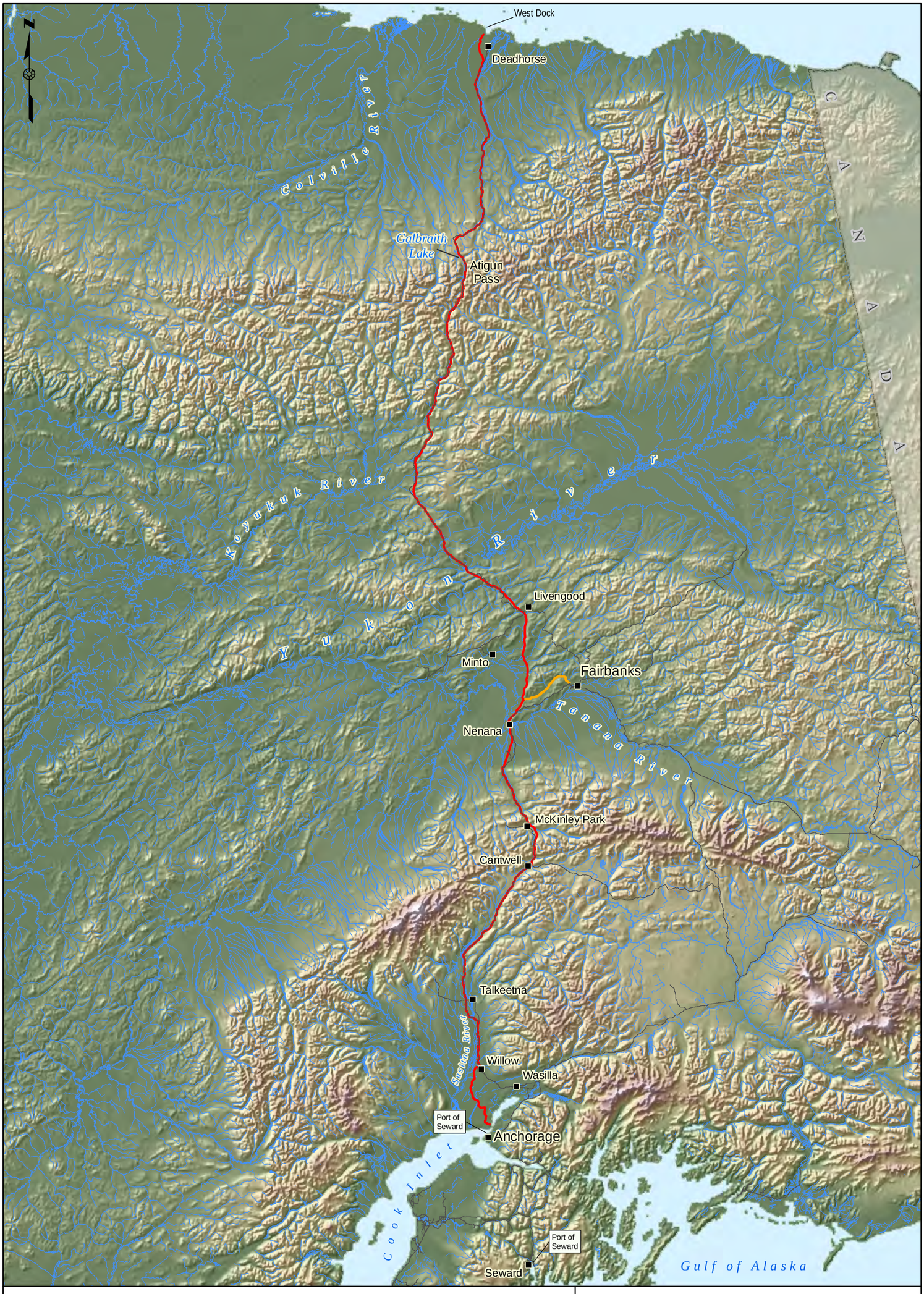
Material and Water Sources

- Material sites (gravel pits) will be distributed along the route to minimize hauling distances. Existing material sites will be used whenever possible.
- Water sources used for construction needs will be collected from surface water sources such as lakes and streams.

Construction Support Facilities

The facilities will include the following:

- Project Offices
- Logistics Support Sites
- Personnel Housing and Support
- Port Facilities
- Access Roads
- Construction Workpads (gravel, ice or snow, and grade)
- Laydown Yards and Storage Facilities
- Airports and Airstrips



Alaska Stand Alone Gas Pipeline Route

Fairbanks Lateral

Road

River

Town

NAD83, Alaska Albers

ASRC Energy Services
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Regulatory and Technical Services

ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

PROJECT AREA OVERVIEW
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE: 0 30 60 120 Miles

FIGURE: 2.0-1

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A detailed description of the entire proposed project is provided in the POD published in March 2011, included here as Appendix B.

2.2 *Action Area and Scope of Biological Assessment*

The ASAP action area includes the complete 737-mile-long pipeline corridor and all associated facilities, existing port facilities in Alaska through which construction materials will be transported, and an area one-quarter-mile seaward from ship docking facilities at these port facilities. In order to focus efforts of this BA on the aspects of the proposed action that are likely to affect ESA species within the action area, the geographic areas evaluated focus on designated critical habitat or other portions of the action area where there is a likelihood of finding ESA-listed or ESA-proposed species. The northern portion of the action area is depicted in Figure 2.2-1. The southern portion of the action area for the Port of Anchorage is depicted in Figure 2.2-2 and the southern portion of the action area including the Port of Seward is depicted in Figure 2.2-3.

All of the ESA-protected species that may be affected by the ASAP are found exclusively in the marine environment or in nearshore areas. With the exception of the two eider species, all of these species are marine mammals (i.e., whales, walrus, seals, sea lions, and polar bear). Within the ASAP action area, the range for three species – Spectacled and Steller's eiders and the polar bear – includes both marine areas of the Beaufort Sea and terrestrial nearshore areas of the Arctic Coastal Plain (ACP) of Alaska's North Slope.

Critical habitat has been designated for the polar bear, Steller sea lions, spectacled and Steller's eiders, and Cook Inlet beluga whales. However, only portions of polar bear critical habitat and Cook Inlet beluga whale critical habitat are located within the ASAP action area.

Because of the concentration of ESA species and critical habitat within the ASAP action area on or adjacent to the ACP, a brief description of the proposed action occurring on the ACP and the adjacent Beaufort Sea is provided below.

2.2.1 Gas Conditioning Facility

The GCF will be located on the North Slope at Prudhoe Bay within an existing developed industrial area The GCF will remove CO_2, H_2S, and other impurities. NGLs (propane, butane, and pentanes) will be injected to enrich the gas, then compressed and cooled to maintain the existing thermal regime in permafrost soils, and injected into the proposed ASAP.

The GCF will be located on a 70-acre gravel pad and access to it will be via a permanent gravel road accessible from existing Prudhoe Bay roads. Module sections of the GCF will be transported to the facility site via barge to West Dock, then transported on existing roads and assembled on-site.

2.2.2 Aerial Pipeline Mode

The first six miles (MP 0–6) of the pipeline will be constructed aboveground on steel vertical support members (VSMs) spaced at approximately 20-foot increments at a minimum height of 7 feet above the tundra. This section of the pipeline is slated for winter construction. Once the necessary right-of-way (ROW) preparations have been made VSM locations will be surveyed, marked, and foundations drilled. Installation of VSMs will include standing and bracing the member, then backfilling around the VSM column with concrete slurry. Once VSMs have been installed, welded sections of pipe will be lifted and

placed using sidebooms. Tie-ins will be accomplished in a manner similar to the remainder of the pipeline.

2.2.3 Buried Pipeline Mode

In general, the pipeline will be buried south of MP 6. The pipeline from MP 6 to the Atigun River Valley at MP 163 is slated for winter construction. The construction ROW will be cleared to remove vegetation and graded. Sections of pipe will be hauled from storage yards and distributed along the construction ROW, strung and placed into a trench, and the trench backfilled.

Alaska Stand Alone Gas Pipeline Route

Pipeline

Road

Facility

ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

NORTHERN PORTION OF THE ACTION AREA
WEST DOCK
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

ASRC Energy Services
a subsidiary of Arctic Slope Regional Corporation
REGULATORY AND TECHNICAL SERVICES

SCALE: 0 0.7 1.4 2.1 2.8 Miles

FIGURE: 2.2-1

NAD83, Alaska Albers

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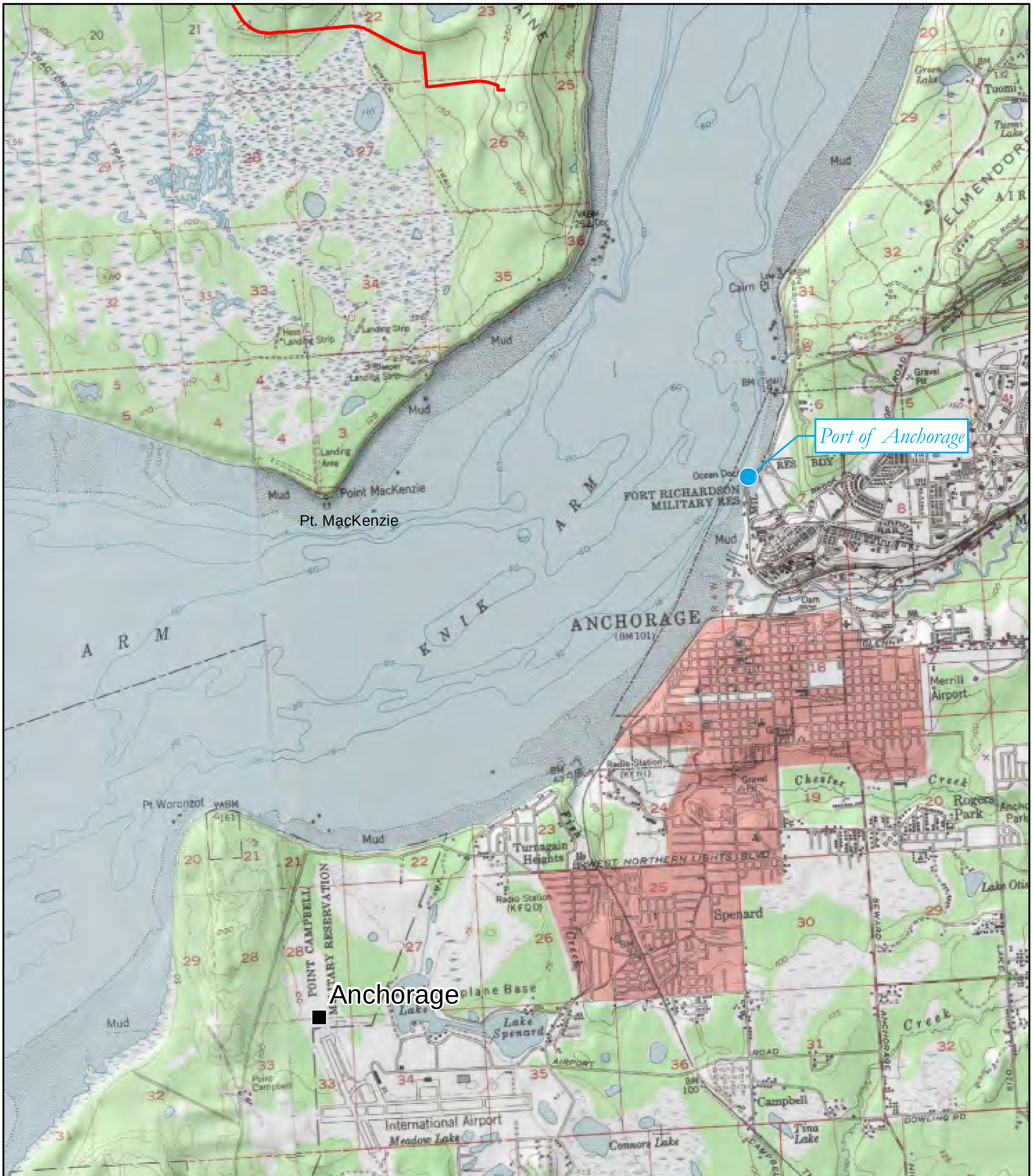

Alaska Stand Alone Gas Pipeline Route

Port of Anchorage

NAD83, Alaska Albers

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Regulatory and Technical Services

ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

SOUTHERN PORTION OF THE ACTION AREA
PORT OF ANCHORAGE
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE:
0 0.5 1 1.5 Miles

FIGURE:
2.2-2

AES-RTS: 11-001-003.mxd, 04/06/11, R00

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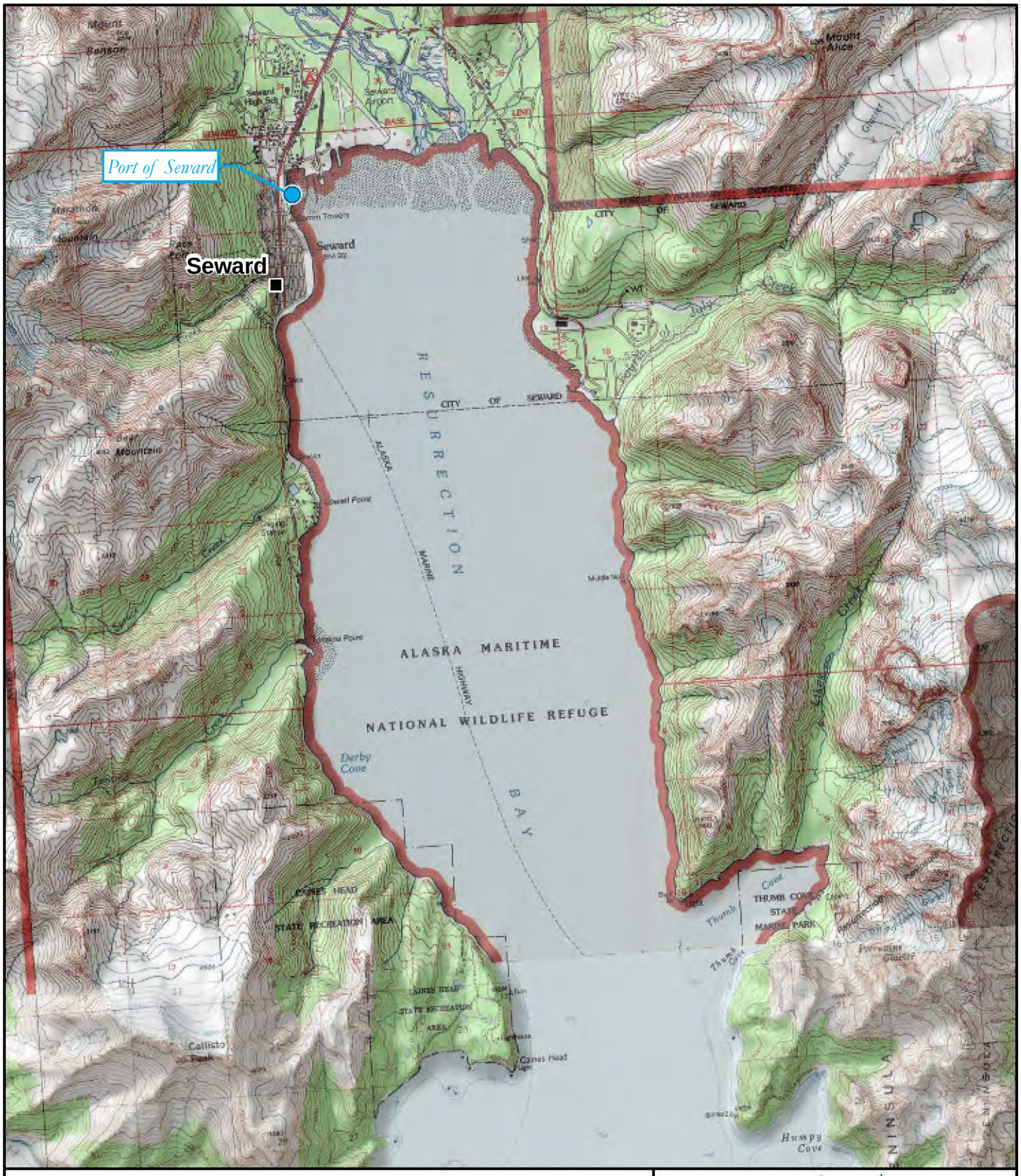

Port of Seward

NAD83, Alaska Albers

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Regulatory and Technical Services

ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

SOUTHERN PORTION OF THE ACTION AREA
PORT OF SEWARD
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE: 0 0.5 1 1.5 2 Miles

FIGURE: 2.2-3

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3.0 DESCRIPTION OF THE SPECIES AND THEIR HABITATS

The species and critical habitats discussed in this BA are those identified as a result of a USACE-initiated consultation with USFWS and NMFS. On 2 November 2010, the USACE forwarded letters to USFWS and NMFS that described the ASAP project, including action area, and requested a list of threatened and endangered species and critical habitat that may be present.

The USFWS responded with a letter dated 17 December 2010, stating that the project is within the range of the spectacled eider (*Somateria fischeri*), Steller's eider (*Polysticta stelleri*), and polar bear (*Ursus maritimus*), and that critical habitat for the polar bear was designated on 7 December 2010, which includes sea ice habitat, denning habitat, terrestrial denning habitat, and barrier island habitat. Since the receipt of the USFWS's letter, on 8 February 2011, the Pacific walrus was designated a candidate species based on the USFWS's determination that the Pacific walrus warrants protection under the ESA, but that its listing is currently precluded by limited agency resources and higher priorities. Accordingly, this BA addresses Pacific walrus, which may seasonally occur in very small numbers in the ASAP action area.

The NMFS responded with a letter dated 10 December 2010, stating that bowhead whales may be found in or adjacent to the action area near West Dock and that their presence would be considered seasonal or occasional occurrences. NMFS further stated that Cook Inlet beluga whales (*Delphinapterus leucas*), fin whales (*Balaenoptera physalus*), humpback whales (*Megaptera novaengliae*), and Steller sea lions (*Eumetopias jubatus*) may be found in or adjacent to portions of the action area in Cook Inlet, near Anchorage, and that fin whales, humpback whales, and Steller sea lions may be present in or adjacent to the action area around the Port of Seward. Although not identified in NMFS's species letter, the agency has proposed listing as threatened species, distinct population segments (DPSs) of bearded seals (*Erignathus barbatus*) and ringed seals (*Phoca hispida*) that occur in the Alaskan Arctic and that may be present in or adjacent to the action area near West Dock. In addition, NMFS has designated critical habitat for the Cook Inlet beluga whale that encompasses that portion of the ASAP action area located adjacent to the Port of Anchorage. Accordingly, this BA addresses potential effects on the proposed bearded and ringed seal DPSs, and to the Cook Inlet beluga whale critical habitat.

Descriptions of these species and critical habitats are provided below.

3.1 *Threatened and Endangered Species*

3.1.1 Steller's Eider

Biological Populations and Listing Status

The Steller's eider is a small sea duck with a Holarctic distribution in Russia and Alaska. Three distinct breeding populations are recognized: the Alaska breeding population, the Russian-Atlantic breeding population, and the Russian-Pacific breeding population. These breeding populations mix in wintering areas such as the Bering Sea.

USFWS was petitioned in December 1990 to list the Steller's eider as endangered under the ESA, and they concluded after a status review that listing the Steller's eider was warranted but precluded by higher listing priorities. Status of the species was subsequently reconsidered and USFWS concluded in August 1993 that available information did not support listing the species range-wide, but did support listing the Alaska-breeding population. Listing the species across its entire range was considered to be unwarranted because counts in 1992 indicated that at least 138,000 Steller's eiders wintered in southwest Alaska, and

because indications of decline were based upon imprecise population size estimates. Although population size estimates for the Alaska-breeding population were also imprecise, it was clear that Steller's eiders had essentially disappeared as a breeding species from the Yukon-Kuskokwim Delta (Delta), where they had historically occurred, possibly in significant numbers.

On June 11, 1997, the Alaska-breeding population of the Steller's eider was listed as threatened based on the observed contraction in the breeding range in Alaska and the resulting increased vulnerability of the remaining breeding population to extirpation (Federal Register [FR] 62:31748–31757). Causes for the decline were not identified when the listing occurred; potential causes referenced included hunting, ingestion of lead shot, predation, and changes in the marine environment that may be affecting eider food resources, Causes of the decline are still poorly understood (USFWS 2002a). The Alaska-breeding population is the only population listed under the ESA.

Population Status, Trends, and Abundance

The current world population of Steller's eiders is estimated to be about 150,000 to 200,000 birds, but is thought to have declined by as much as 50 percent in the 1960s, 1970s and 1980s (ADFG 2011). Currently, most of the world's Steller's eiders nest in Russia, with the Alaskan breeding population being much smaller than the Russia population. The species has undergone near extirpation in western Alaska. It still breeds on the ACP (Dau et al. 2000), but populations may number as low as 1,000 birds. Mallek et al. (2007), reporting the results of 21 consecutive years of aerial surveys, provided estimates of breeding Steller's eiders on the ACP that ranged from 0 to 2,543 with an average of 631. Based on these aerial surveys, Larned et al. (2010) reported a positive growth rate of 1.010 percent annually for the North Slope subpopulation of Steller's eiders from 1992–2009, and 1.056 percent annually for 2001–2010.

Range

Range of the Steller's eider in the Pacific is indicated below in Figure 3.1-1. The nesting distribution for the Alaska breeding population of Steller's eider includes much of the ACP in Alaska. A very small population also nests in the Delta. The majority of sightings of nesting Steller's eiders observed during annual aerial surveys of breeding pairs of waterfowl (e.g. Mallek et al. 2007) since 1986, and eider breeding population surveys (e.g. Larned et al. 2006) conducted across the ACP annually since 1992, have occurred east of Point Lay and west of Prudhoe Bay, and within about 50 miles of the coast (USFWS 2002a). The largest concentrations of breeding Steller's eiders in Alaska are found in the Barrow area, which is considered to be the core of the nesting area (USFWS 2002a), east to the Colville River Delta (USFWS 2005). Steller's eiders winter in coastal waters along the Aleutian Islands, Kodiak Island, and lower Cook Inlet.

Life History and Habitat Use

Breeding pairs are formed on wintering grounds. The birds congregate in large numbers in estuaries along the north side of the Alaska Peninsula in the spring, and then migrate north and east to the breeding grounds using coastal waters and offshore leads (Roseneau and Herter 1984, USFWS 2002a). Steller's eiders begin migrating into the ACP in late May or early June, when ponds and tundra begin to thaw. Steller's eiders that have arrived on the North Slope but have not begun to nest are often associated with deep to shallow Arctophila and Carex ponds (Rojek 2006, 2007, 2008).

Nesting in the Barrow area began 10 June – 1 July in 2005, 2006, and 2007 (Rojek 2006, 2007, 2008). Nest sites are chosen in open tundra or within shrub communities near ponds (Deygtyarev et al. 1999), often on slightly elevated areas near ponds (Murie 1924, Brandt 1943, Cramp et al. 1977). USFWS reported that most observed nests in the Barrow area have been found on the rims of low-centered

polygons within partially-drained lake basins that contain a mosaic of shallow ponds with emergent sedges, and most are within 330 feet of permanent water (unpublished data summarized in FR 65:13262–13283).

Figure 3.1-1 Range of the Steller's Eider in the Pacific

Source: USFWS 2002

Steller's eiders hatch in late June and the female and brood move from the nest site to brood habitat in nearby ponds and wetlands, where they feed on aquatic insects and plants until they are capable of flight (Solovieva 1997). In the Barrow area, hatching was determined to occur 12 July – 2 August in 2005, 2006, and 2007 and the distance traveled from the nest to the brooding area was found to range from 328 feet to 2 miles (Rojek 2006, 2007, 2008). Steller's eiders and their broods forage on insect larvae and beetle species in emergent vegetation in shallow ponds.

Females and their broods move to coastal marine waters as the broods fledge. Rojek (2006, 2007, and 2008) reported that broods are fledged in the Barrow area anywhere from the second half of August to early September. Males and unsuccessful hens leave the tundra earlier, being found at small ponds on the tundra nesting ground until the middle or end of July, at which time they move to coastal waters (Rojek 2006, 2007, 2008). In successful years, males move to nearshore waters prior to molting body feathers and forage prior to fall migration. Unsuccessful females may congregate near incubating females until departure (Solovieva 1997). In unsuccessful years, all birds generally depart the breeding grounds sometime in July (Fredrickson 2001) or even mid-June (Rojek 2008).

The birds move to molting areas in Western Alaska, such as the Alaska Peninsula, Izembek Lagoon, Nelson Lagoon, Port Heiden, and the Seal Islands (Petersen 1981). As sea ice forms in the Arctic Ocean,

flocks move south through open leads and eventually arrive at ice-free lagoons along the north and south side of the Alaska Peninsula, Cook Inlet, and the eastern Aleutian Islands (USFWS 2005). Winter habitat consists of waters typically less than 30 feet deep, so most birds are found within about 1,312 feet of the shore, except where shallows extend further (USFWS 2002a). In these areas they dive for mollusks, crustaceans, small fish, and other invertebrates (Petersen 1981). These prey items are often associated with eelgrass meadows, which provide a substrate for invertebrates (Metzner 1993).

Critical Habitat

Approximately 2,830 square miles of land and coastal waters in five units were designated as critical habitat for the Alaskan breeding population of Steller's eiders in 2001 (FR 66:8849). These areas include the historic breeding range on the Delta (Unit 1), and molting or wintering grounds at the Kuskokwim Shoals (Unit 2), Seal Islands (Unit 3), Nelson Lagoon (Unit 4), and Izembek Lagoon (Unit 5). All designated critical habitat for Steller's eiders is located more than 100 miles from the action area.

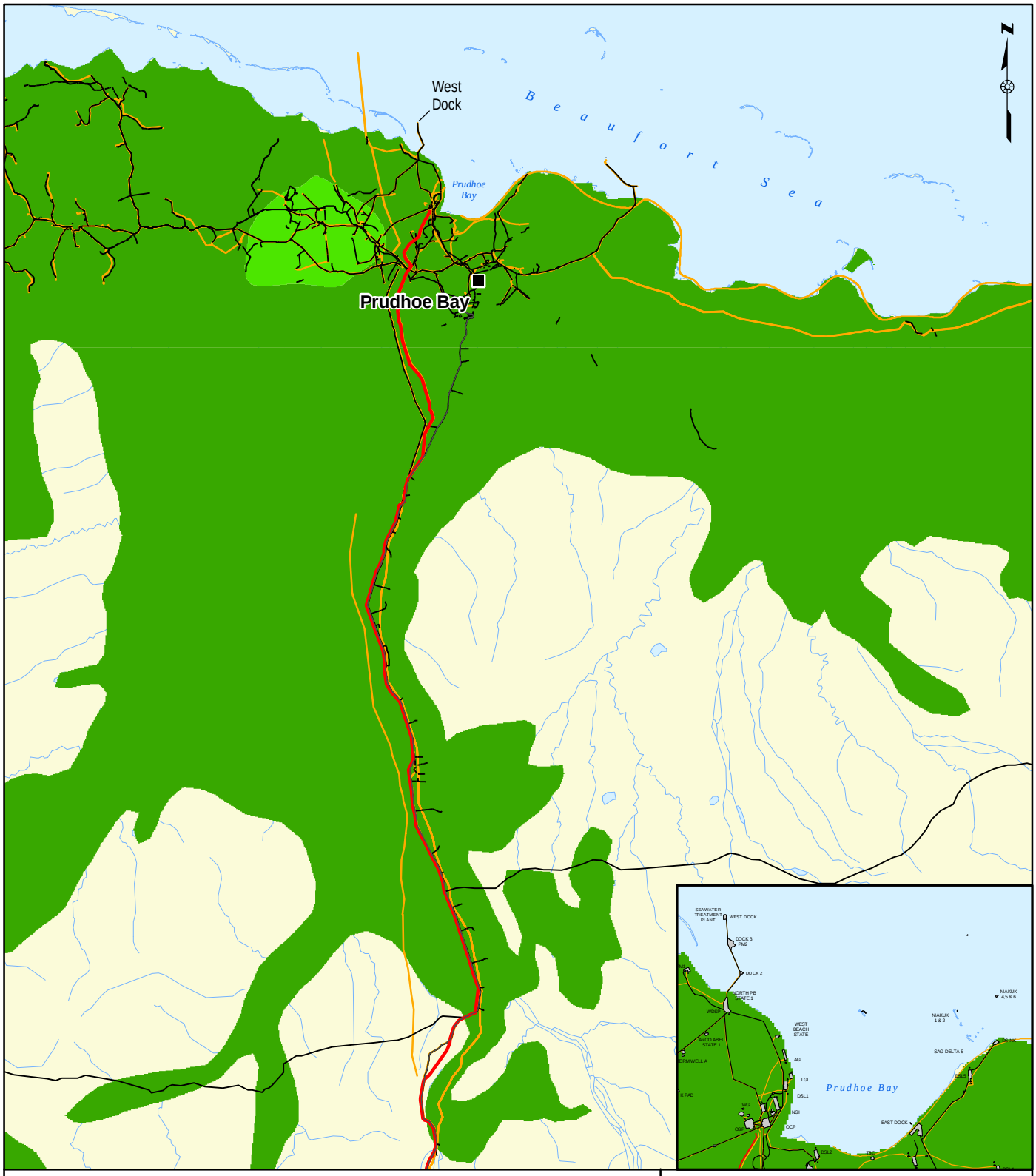
Steller's Eiders in the Action Area

From late May through early September, Steller's eiders may be found within or near portions of the action area located on the ACP, and in coastal waters near West Dock in the Beaufort Sea (See Figure 3.1-2). All other portions of the action area, including other terrestrial portions of the action area, and coastal waters adjacent to the Ports of Anchorage or Seward are not within the range of the species according to published maps, and the eiders would not be expected to occur in these areas.

The USFWS conducted annual aerial population surveys for breeding pairs of waterfowl on the entire ACP, including the Prudhoe Bay area, from 1986–2006 (Mallek et al. 2007), and conducted separate aerial surveys in the same area specifically for eiders from 1992 to 2006 (Larned et al. 2006). Since 2007, the two survey programs have been combined (Larned et al. 2010). The action area lies within areas documented by these survey programs as having low densities of nesting or breeding eiders. Since 1986 these surveys have resulted in observations of only four pairs of Steller's eiders in the Prudhoe Bay area. The USFWS survey data also indicate a mean positive annual population growth rate for Steller's eiders on the North Slope over the last 20 years of 1.010 percent annually, but the trend estimate is not considered to be meaningful because it is based on so few observations (Larned et al. 2010).

Site-specific surveys for Steller's eider's have not been conducted in the action area for the ASAP. However, Troy and Johnson (1987) reported the results of intensive avian surveys conducted for shorebirds and waterfowl in the lagoon waters on either side of West Dock and on the adjacent tundra in July–September 1981 that were part of a monitoring study for the Prudhoe Bay waterflood project. No Steller's eiders were observed along transects in the lagoon waters, but one Steller's eider was observed on the tundra. It was also reported in the FR 62:31750 (citing Troy personal communication) that a few pairs of Steller's eiders were observed on the tundra in the Prudhoe Bay oil fields each year from 1992 to 1994.

Extensive aerial surveys of the bird use of nearshore and offshore waters extended from Barrow to the Canadian border and from the shoreline offshore for distances of up to 62 miles in 1991, 2000, and 2001 (Fischer and Larned 2004). Only three Steller's eiders were observed, representing about 0.01 percent of all observed birds. The observed Steller's eiders were in Smith Bay more than 100 miles to the west of the action area.



Steller's Eider Densities:

- Low
- Medium Low
- Medium
- Medium High
- High

- Alaska Stand Alone Gas Pipeline Route
- Pipeline
- Road

Bird Density data source: U.S. Fish and Wildlife Service, Arctic Coastal Plain Survey 1993-2005.

NAD83, Alaska Albers Equal Area.

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ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

STELLER'S EIDER DENSITY ON THE EASTERN NORTH SLOPE
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE: 0 3 6 9 12 Miles

FIGURE: 3.1-2

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Threats

Toxic Contamination of Habitat

Lead poisoning from the deposition of lead shot in nearshore habitats is a threat to spectacled and Steller's eiders. Lead poisoning of spectacled eiders has been documented on the North Slope of Alaska. Use of lead shot for hunting all birds on the North Slope is prohibited. Hunter outreach programs are being conducted to educate hunters and prevent the use of lead shot on the North Slope. Development of the proposed project will not increase hunting of spectacled or Steller's eiders or the use of lead shot in the action area.

Increased Predator Populations

Predator and scavenger populations may be increasing on the North Slope near industrial development and human infrastructure. Increased fox, gull, and raven populations (due to anthropogenic food sources and increased denning and nest sites) may have affected eider populations, although this has not been proven (USFWS 2009a).

Harvest

Hunting for spectacled and Steller's eiders was closed in 1991, however harvest data indicates that listed eiders continue to be hunted on the North Slope. Efforts are being conducted by BLM, North Slope Borough and USFWS to curtail this activity. Much of this activity has taken place near Barrow and other villages, not in the project action area. Intra-service consultations for the Migratory Bird Subsistence Hunting Regulations are conducted annually and the harvest of listed eiders is being monitored.

Impacts from Development

Alteration of North Slope nesting habitat of listed eiders has not been extensive to date. Some areas of breeding habitat have been altered by wetland fill and human infrastructure that may disturb individual birds, increase nesting or denning predators, or present collision obstacles. However, human activities on the ACP are not thought to have played a significant role in population declines of listed eiders, and, accordingly, Steller's eiders were not listed as a result of the impacts of development. Development and other activities that may adversely affect listed eiders undergo a Section 7 consultation, and the amount of impact is estimated in order to issue an Incidental Take Statement and a non-jeopardy conclusion (USFWS 2009a).

Climate Change

The North Slope of Alaska is especially sensitive to climate fluctuations. How this will likely affect individual organisms, species, or communities is difficult to assess, due to the large number of variables affecting and affected by climate change. Lakes and ponds used by eiders for forage and nesting are affected by warmer temperatures and longer growing seasons. Changes in precipitation patterns, air and soil temperature, and water chemistry are also affecting tundra communities (Hinzman et al. 2005). The comprehensive effects of global climate change that will impact both the habitats of spectacled and Steller's eiders are unknown at this time (USFWS 2009a).

3.1.2 Spectacled Eider

Biological Populations and Listing Status

The spectacled eider *(Somateria fischeri)* is a sea duck that inhabits the northern extent of the Pacific Ocean in the Chukchi and Bering Seas. Three primary breeding populations have been identified, the Russian arctic population, the ACP of Alaska population, and the Delta population in western Alaska.

The spectacled eider was listed as threatened throughout its range under the ESA in 1993 (FR 58:27474). It is believed that large declines in the populations were due to exposure to lead shot, increased predation, and changes in forage quality in wintering areas of the Bering Sea (USFWS 2002a).

Populations Status, Trends, and Abundance

The world-wide population of spectacled eiders was estimated by Larned and Tiplady (1999) to be about 330,000–390,000 birds. This estimate was based on survey counts of birds wintering in the Bering Sea, and therefore presumably includes many non-breeding birds. It has been estimated that about 4,000 pairs nest annually in the Delta, another 3,000–4,000 pairs nest on the ACP, and perhaps 40,000 or more pairs nest in arctic Russia (USFWS 2009a). Populations in the Delta declined by about 96 percent in the 1970s, 1980s, and 1990s, to the present 4,000 pairs. Due to the scarcity of historical data, it is unknown whether such declines ever occurred in Russia or on the ACP. Current survey data suggest that the spectacled eider population on the ACP is generally stable (Larned et al. 2006).

Range

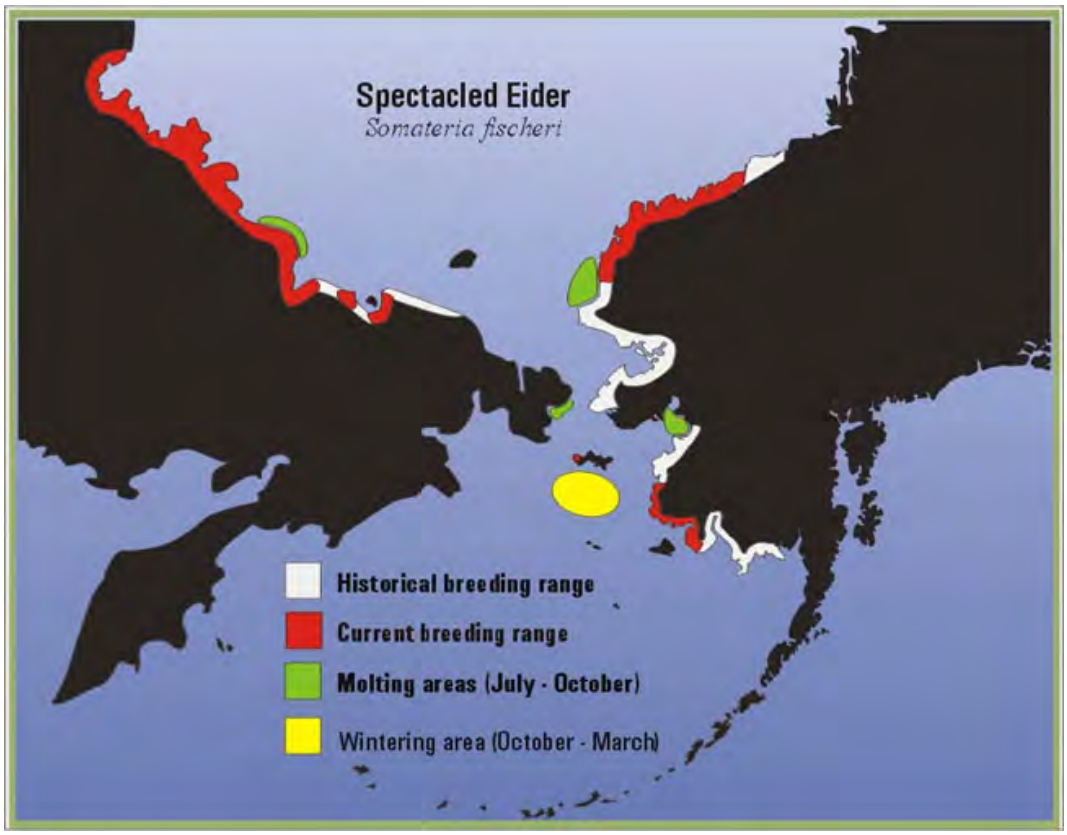
The range of the spectacled eider in the Pacific is indicated below in Figure 3.1-3. Although the historical nesting range was considerably larger, today spectacled eiders nest in three primary locations, the central coast of the Delta, the ACP of Alaska, and the eastern ACP of Russia (Petersen et al. 1999).

Nesting occurs on the ACP from about the Utukok River just south of Icy Cape, north and west to the Shaviovik River, and within this area most of the nesting takes place between Cape Simpson and the Sagavanirktok River (USFWS 2000), and primarily north of latitude of 70 degrees (USFWS 2000) or within about 50 miles of the coast (Larned and Balogh 1997).

Four principal molting areas have been identified: Ledyard Bay along the northeastern Chukchi Sea, Norton Sound in the northeastern Bering Sea, and Mechigmenskiy Bay and the Indigirka-Kolyma Delta in Russia. Most females from the North Slope molt in Ledyard Bay and Mechigmenskiy Bay, while the males molt in all three areas with about equal numbers molting at Ledyard Bay, Mechigmenskiy Bay, and the Indigirka-Kolyma Delta (Peterson et al. 1999).

The only known wintering area used by spectacled eiders is located in the Bering Sea south of Saint Lawrence Island, in water depths of 165–200 feet. Thousands of spectacled eiders are known to congregate in open areas in the pack ice in this area.

Figure 3.1-3 Range of the Spectacled Eider in the Pacific



Source: USFWS 2002

Life History and Habitat Use

Spectacled eiders spend most of their life in the marine environment where they dive to feed on bottom-dwelling prey such as mollusks, bivalves, and crustaceans (Petersen et al. 1998). These prey items are part of a benthic community that is highly variable, being influenced by seasonal and decadal weather systems in the North Pacific (Peterson and Douglas 2004; Grebmeier and Dunton 2000). This variability, coupled with the extreme energetic requirements of their habitats, may explain as much as 50 percent of winter mortality of female spectacled eiders (Flint et al. 2000).

Spectacled eiders return from wintering areas in the Bering Sea in late May or early June and nest in coastal wetlands near relatively shallow lakes and ponded areas dominated by emergent vegetation. Densities of spectacled eiders vary across the ACP, with larger densities west of the proposed action area (Figure 3.1-4). Surveys conducted since 1992 by the USFWS have recorded higher densities in recent years near Teshekpuk Lake. In the action area, the breeding population density of spectacled eiders is between 0.05 and 0.4 eiders per square mile (Larned et al. 2006).

Males depart the nesting grounds once females begin to incubate their clutch of eggs from mid- to late June. Depending upon breeding success, females will leave nesting areas between late June and early September (USFWS 2009a). As the annual sea ice forms, open water, or leads, provide molting and foraging habitat for spectacled eiders in northeast Russia and Ledyard Bay in the Chukchi Sea prior to winter migration (USFWS 2002a).

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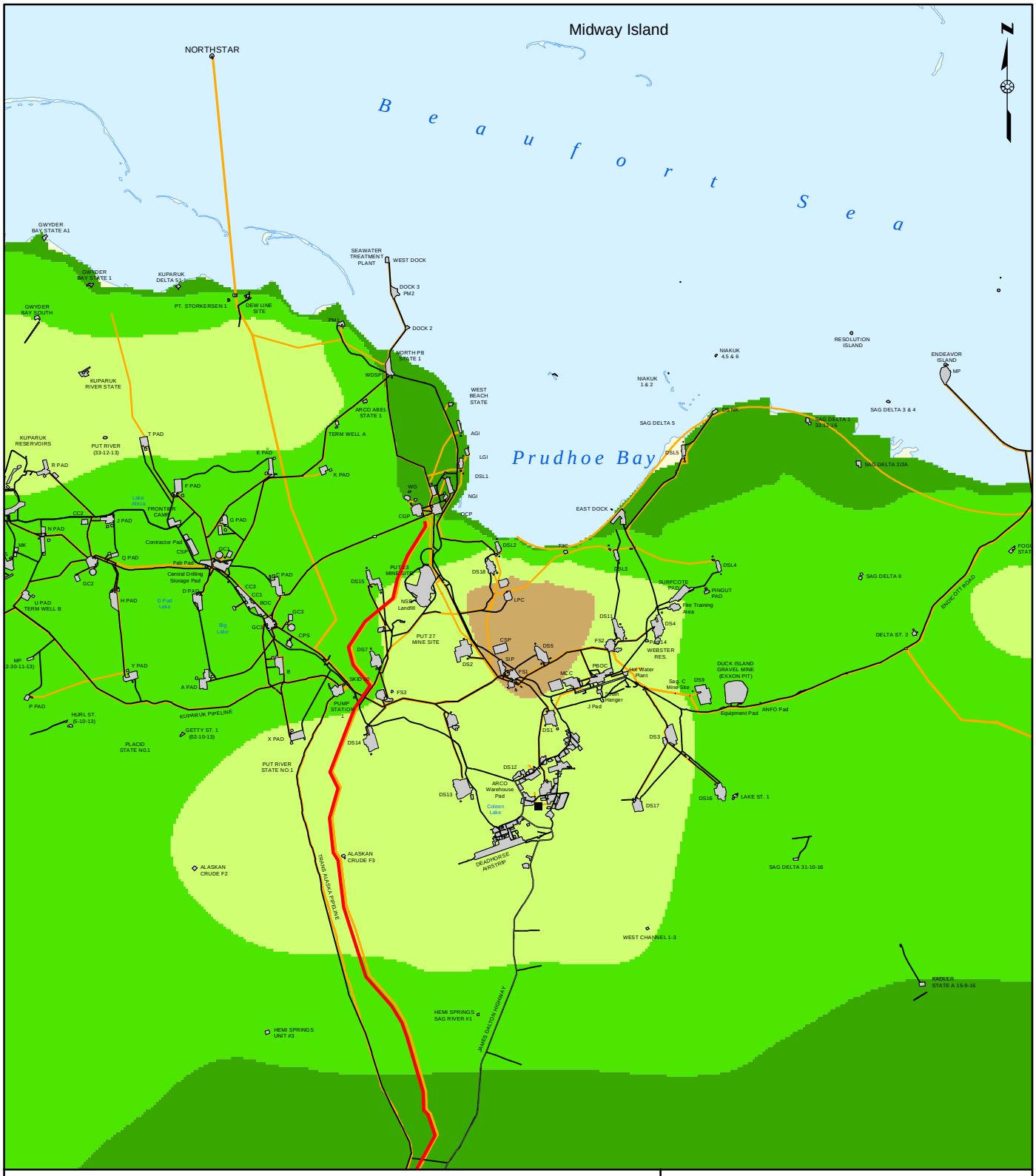

Spectacled Eider Densities:

- Low
- Medium Low
- Medium
- Medium High
- High

- Alaska Stand Alone Gas Pipeline Route
- Pipeline
- Road
- Facility

Bird Density data source: U.S. Fish and Wildlife Service, Arctic Coastal Plain Survey 1993-2005.

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Alaska Gasline Development Corp.
Gas for Alaskans

SPECTACLED EIDER DENSITY ON THE EASTERN NORTH SLOPE
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE: 0 1 2 3 4 Miles

FIGURE: 3.1-4

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All three breeding populations congregate in a 3,000-square mile area south of St. Lawrence Island (Peterson and Douglas 2004; FR 66:9146).

Critical Habitat

Critical habitat for spectacled eiders was designated by the USFWS in 2001 (FR 66:9146) and comprises nesting habitat in the Delta, molting areas in Norton Sound and Ledyard Bay, and wintering habitat south of St. Lawrence Island (Figure 3.1-3). All designated critical habitat is located more than 400 miles from the action area.

Spectacled Eiders in the Action Area

Spectacled eiders may be present in or near the action area near the northern coast of Alaska and West Dock but are not expected near the action areas in Seward or Anchorage or along the pipeline corridor further than approximately 50 miles from the northern coast.

Surveys were conducted in offshore waters of the Beaufort Sea in order to determine the composition and distribution of birds in June, July, and August 1999–2001 (Fischer and Larned 2004). In 1999 and 2000 the area near West Dock at Prudhoe Bay was surveyed. Spectacled eider density was low throughout the entire survey area. In 2001, 15 spectacled eiders were seen between Prudhoe Bay and Barrow, and the density in the area encompassing West Dock was 0.0 (Fischer and Larned 2004).

Threats

Toxic Contamination of Habitat

Lead poisoning from the deposition of lead shot in nearshore habitats is a threat to spectacled and Steller's eiders. Lead poisoning of spectacled eiders has been documented on the North Slope of Alaska. Use of lead shot for hunting all birds on the North Slope is prohibited. Hunter outreach programs are being conducted to educate hunters and prevent the use of lead shot on the North Slope. Development of the proposed project will not increase hunting of spectacled or Steller's eiders or the use of lead shot in the action area.

Increased Predator Populations

Predator and scavenger populations may be increasing on the North Slope near industrial development and human infrastructure. Increased fox, gull, and raven populations (due to anthropogenic food sources and increased denning and nest sites) may have affected eider populations, although this has not been proven (USFWS 2009a).

Harvest

Hunting for spectacled and Steller's eiders was closed in 1991, however harvest data indicates that listed eiders continue to be hunted on the North Slope. Efforts are being conducted by BLM, North Slope Borough and USFWS to curtail this activity. Much of this activity has taken place near Barrow and other villages, not in the project action area. Intra-service consultations for the Migratory Bird Subsistence Hunting Regulations are conducted annually and the harvest of listed eiders is being monitored.

Impacts from Development

Alteration of North Slope nesting habitat of listed eiders has not been extensive to date Some areas of breeding habitat have been altered by wetland fill and human infrastructure that may disturb individual birds, increase nesting or denning predators, or present collision obstacles. However, human activities on the ACP are not thought to have played a significant role in population declines of listed eiders, and, accordingly, spectacled eiders were not listed as a result of the impacts of development. Development and other activities that may adversely affect listed eiders undergo a Section 7 consultation, and the amount of impact is estimated in order to issue an Incidental Take Statement and a non-jeopardy conclusion (USFWS 2009a).

Climate Change

The North Slope of Alaska is especially sensitive to climate fluctuations. How this will likely affect individual organisms, species, or communities is difficult to assess, due to the large number of variables affecting and affected by climate change. Lakes and ponds used by eiders for forage and nesting are affected by warmer temperatures and longer growing seasons. Changes in precipitation patterns, air and soil temperature, and water chemistry are also affecting tundra communities (Hinzman et al. 2005). The comprehensive effects of global climate change that will impact both the habitats of spectacled and Steller's eiders are unknown at this time (USFWS 2009a).

3.1.3 Bowhead Whale

Biological Populations and Listing Status

Five stocks of bowhead whales are recognized worldwide (Angliss and Allen 2009b): the Western Arctic, Sea of Okhotsk, Spitsbergen, Davis Strait, and Hudson Bay stocks or populations. The Western Arctic stock of bowhead whales is the only stock found within U.S. waters. The bowhead whale is federally designated as endangered. The species was listed as an endangered species on 2 June 1970 (FR35:8495). It is also an Alaska Species of Special Concern. The Western Arctic stock is classified by NMFS as a strategic stock because the bowhead whale is listed as endangered under the ESA and therefore also designated as depleted under the Marine Mammal Protection Act (MMPA) (Angliss and Allen 2009b).

Populations Status, Trends, and Abundance

Small stocks occur in the Sea of Okhotsk and the offshore waters of Spitsbergen. These are composed of only tens to hundreds of individuals (Shelden and Rugh 1995, Zeh et al. 1993). Until recently, available evidence indicated that only a few hundred bowheads were in the Hudson Bay and Davis Strait stocks, but it now appears these should be considered one instead of two stocks based on genetics (Postma et al. 2006), aerial surveys (Cosens et al. 2006), and tagging data (Dueck et al. 2006; Heide-Jørgensen et al. 2006), and the abundance may be over a thousand (Heide-Jørgensen et al. 2007).

Based on the most recent abundance estimates, approximately 10,545 bowhead whales make up the Western Arctic stock (Angliss and Outlaw 2008). In the late 19th and early 20th century, this stock was overwhelmed by highly successful commercial whaling. The number of bowhead whales plummeted from an estimated population, in 1848, of 10,400–23,000 whales to a rough count of 1,000–3,000 individuals in the mid-20th century (Woodby and Botkin 1993). Commercial whaling of bowheads was outlawed in 1996 by a moratorium from the International Whaling Commission (IWC), although specific exemptions for certain countries exist and limited modern subsistence whaling continues with oversight and quotas regulated by the IWC.

Studies and surveys indicate the bowhead whale population has slowly increased at an annual rate of 3.4 percent between 1978 and 2001 to the current estimated number of 10,470 individuals (George et al. 2004), despite regulated harvests by subsistence hunters. The 1993 population was estimated at 8,200 (Zeh et al. 1995). Calf counts in 2001 were the highest on record, 121 individuals, confirming a growing population (George et al. 2004). Today, some reports suggest Western Arctic stock bowhead whales are approaching the carrying capacity of their habitat (Brandon and Wade 2004).

Range

Bowhead whales are distributed seasonally in ice-covered waters of the Arctic and near-Arctic, generally between 60 degrees and 75 degrees North latitude in the Western Arctic Basin (Moore and Reeves 1993). The majority of bowhead whales overwinter in the central and northwestern Bering Sea (November to March), migrate through the Chukchi Sea in the spring (March through June) following offshore ice leads around the coast of Alaska in continental shelf waters, and spend summers in the Canadian Beaufort Sea (mid-May through September) (Braham et al. 1980; Moore and Reeves 1993).

Life History and Habitat Use

Most bowheads of the Western Arctic population overwinter in the central and western Bering Sea, where they are associated with polynyas and the marginal ice zone. The amount of feeding that takes place in the Bering Sea is unknown (Richardson and Thomson 2002), however most mating is thought to occur there

(MMS and NMFS 2008). The whales congregate in polynyas before migrating in the spring (Moore and Reeves 1993), passing through the Bering Strait and into the Chukchi Sea from late March to mid-June (NMFS 2008a). Migration through the eastern Chukchi Sea takes place largely in open leads, some or most calving occurs at this time in the Chukchi Sea. Spring whaling takes place at this time by residents of Point Hope, Point Lay, Wainwright, and Barrow. Bowheads have been observed to pass Barrow, entering into the Beaufort Sea from early April to late May (IWC 2004). Migration through the Beaufort Sea occurs through lead systems offshore of the barrier islands. The whales arrive on their summering grounds in near Banks Island in Canada from Mid-May through June (IWC 2005). Bowheads move back out of the Canadian Beaufort and into the Alaska Beaufort Sea in August and September, with migration in the Central Beaufort and Prudhoe Bay area continuing from late August through late October (Moore and Reeves 1993).

Bowheads frequently interrupt their migration to feed (Ljungblad et al. 1986; Lowry 1993; Lowry et al. 2004) and their stops vary in duration from a few hours to a few weeks (MMS 2002). A commonly used feeding area is in and near Smith Bay, east of Barrow. Less consistently used feeding areas are in coastal and shelf waters near and east of Kaktovik. In 2007 and 2008, bowhead whales also used areas near Camden Bay to feed during their migration (Ireland et al. 2008, Funk et al. 2008). More research is being funded by the former Minerals Management Service (MMS) (now the Bureau of Ocean Energy Management, Regulation and Enforcement [BOEMRE]) Bowhead Whale Feeding Ecology Study (BOWFEST) to determine the extent to which bowheads might feed in the western Beaufort Sea.

During the fall migration (September–November) bowhead whales typically travel in continental shelf waters that are less than 164 feet deep on their way back to the Bering Sea. Ice cover influences the timing, duration, and path that the whales follow (Treacy 2002). In heavy ice conditions, bowhead whales divert north and migrate in deeper water further offshore (Moore et al. 2000).

Fall whaling for Kaktovik and Nuiqsut residents occurs from late August to mid-September. Traditional Knowledge gathered from local Iñupiat residents suggests that migration pods are segregated by sex and age (Braham et al. 1980). Bowhead whales typically reach the Barrow area in mid-September to late October during their westward migration from the feeding grounds in the Canadian Beaufort. Fall bowhead whaling near Barrow normally begins in mid-September, but may begin as early as August if whales are present and ice conditions are favorable (BLM 2005). Whaling near Barrow may continue into October, depending on the quota and conditions.

Fall surveys of bowhead whales in the Beaufort Sea have been conducted annually by MMS since 1979 (Ljungblad et al. 1986, 1987; Moore et al. 1989; Treacy 1988-1998, 2000, 2002a,b). Results of those surveys show that bowhead whales tend to migrate to deeper water (farther offshore) in the fall during years with higher-than-average ice coverage (Moore et al. 2000b). Most bowhead whales migrate west in water ranging from 50 to 650 feet deep (Miller and Davis 2002), though some individuals enter shallower water, particularly in light ice years. Ice cover influences the timing, duration, and path that the whales follow (Treacy 2002).

Bowhead whales feed primarily on copepods and euphausiids (Lowry 1993; Lowry and Sheffield 2002). To satisfy energy requirements, bowheads may need to find areas with above-average concentrations of zooplankton (Lowry 1993).

Bowhead whales are long-lived, slow-growing, late-maturing, and reproduce infrequently (Koski et al. 1993). Females and males become sexually mature around 25 years of age (George et al. 2007). Bowhead whales mate and calve during spring migration (Nerini et al. 1984), and calving occurs every three to four years (Koski et al. 1993). Gestation lasts between 12 and 16 months (Nerini et al. 1984). The majority of bowhead whale mating occurs in March and April (IWC 2004).

Critical Habitat

No critical habitat has been designated for the bowhead whale. The NMFS was petitioned by the Center for Biological Diversity and Marine Biodiversity Protection Center on 22 February 2000, to designate critical habitat for the Western Arctic bowhead stock. Petitioners asserted that the nearshore areas from the U.S.–Canada border to Barrow, Alaska should be considered critical habitat. Upon review, NMFS found the petition to have merit (FR 66:28141), but subsequently on 30 August 2002 (FR 67:55767), they announced the decision to not designate critical habitat for this population. In this decision, NMFS reported that they believed designation of critical habitat was not necessary because the population is known to be approaching its pre-commercial whaling population size, the population is increasing, there are no known habitat issues which are slowing the growth of the population, and activities that occur in the petitioned area are already managed to minimize impacts to the population (Angliss and Allen 2000b).

Bowhead Whales in the Action Area

Bowheads do not occur in Cook Inlet or the Gulf of Alaska and therefore would not be expected to occur in marine portions of the action area at Anchorage or Seward. Most of the bowhead whale population migrates through the Beaufort Sea offshore of West Dock during spring and fall (late August through late October) migrations to and from the summer feeding grounds. The migrations have been monitored by BOEMRE and NMFS since 1982 (Treacy et al. 2006, Clarke and Ferguson 2010) and industry (Blackwell et al. 2007, Ireland et al. 2009) over a number of years. A small number of bowhead whales have been seen or heard offshore near Prudhoe Bay in late August. (LGL and Greenridge 1996, Greene et al. 1999, Blackwell and Greene 2004, Blackwell et al. 2008, Goeta et al. 2008). Figure 3.1-5 shows bowhead whale sightings by the former MMS in the Beaufort Sea. However, these survey data indicate that the fall migration off northern Alaska occurs primarily over the continental shelf, mainly in waters 66–197 feet deep (Moore et al. 1989, Moore and Reeves 1993, Treacy 2002), e.g., generally 12–37 miles offshore (Treacy 2002, Monnett and Treacy 2005, Treacy et al. 2006).

Monitoring surveys have been conducted annually at the Northstar offshore oil and gas facility since 2001, and the survey area is just offshore of West Dock. Over 95 percent of the bowheads observed during these fall surveys occurred more than 13.9 miles offshore in 2001, 14.2 miles in 2002, 8.4 miles in 2003, and 10.1 miles in 2004 (Blackwell et al. 2007). West Dock extends out from the shoreline a total distance of 2.7 miles to water depths 7 feet. The occurrence of bowhead whales in the action area is therefore highly unlikely.

Threats

Known actions that have had an effect on bowhead whales in the past or are having an effect now in the proposed action area include historic commercial whaling, subsistence hunting, oil and gas-related activity, non-oil and gas industrial development, research activities, marine vessel traffic and commercial fishing, pollution and contaminants baseline, and climate change. Other than historic commercial whaling, no data is available to signify that any previous or current human activity has had population-level negative effects on bowhead whales or the recovery of the species (MMS and NMFS 2008).

The following documents have more detailed information regarding threats to bowhead whales and are incorporated here by reference:

Biological Opinion on Issuance of Annual Quotas Authorizing the Harvest of Bowhead Whales to the Alaska Eskimo Whaling Commission for the Period 2008 through 2012 (NMFS 2008a)

Final Environmental Assessment for Issuing Subsistence Quotas to the Alaska Eskimo Whaling Commission for a Subsistence Hunt on Bowhead Whales for the Years 2003 through 2007 (NMFS, 2003).

Biological Opinion on Oil and Gas Leasing and Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska, and Authorization of Small Takes under the Marine Mammal Protection Act (NMFS 2008c).

Historical Commercial Whaling

Current information suggests that bowhead whales in the Chukchi and Beaufort Sea planning areas are resilient at least to the level of human-caused mortality and disturbance that has existed after the cessation of commercial whaling (MMS and NMFS 2008).

Historic commercial whaling has had the greatest negative impact on bowhead whales of all past and present human industrial activities (NMFS 2008). Prior to the onset of commercial whaling activity in the late 1800s, it is estimated that the bowhead whale population was between 10,400 and 23,000 whales (Woodby and Botkin 1993). Near the end of commercial whaling, it is estimated that between 1,000 and 3,000 animals remained (Woodby and Botkin 1993). The Western Arctic population has increased in abundance significantly since the end of commercial whaling.

Subsistence Hunting

Alaska Native communities harvest bowhead whales for subsistence and cultural purposes as they have been doing for over 2,000 years (Stoker and Krupnik 1993). Currently, ten Alaskan villages participate in the bowhead whale hunt. There is no evidence that subsistence harvesting caused a significant negative impact on the Western Arctic population of bowhead whales prior to commercial whaling (MMS and NMFS 2008). However, as technological advances have been made, bowhead whales have become more accessible and easier to harvest, creating a possibility of over-harvest if unregulated (MMS and NMFS 2008).

Since 1977, the IWC has implemented a quota system to regulate the harvest of this population. There is currently a co-management agreement between the Alaska Eskimo Whaling Commission (AEWC), and the National Oceanic and Atmospheric Administration (NOAA). The IWC establishes strike limits for Russian and Alaskan communities. Over a period of five years 280 landings are currently allowed. Because the quota is dependent upon the population size of bowhead whales, it is unlikely that subsistence activities will cause a significant impact on the recovery of the Western Arctic population in the future.

Bowhead Whale Sighting

Alaska Stand Alone Gas Pipeline Route

Pipeline

Road

Facility

Sighting data obtained from Minerals Management Service Bowhead Whale Aerial Survey Project Historical Database, 1979-2007.

NAD83, Alaska Albers Equal Area.

ASRC Energy Services
a subsidiary of Arctic Slope Regional Corporation
Regulatory and Technical Services

Alaska Gasline Development Corp.
Gas for Alaskans

BOWHEAD WHALE SIGHTINGS IN THE BEAUFORT SEA 1979-2007

Alaska Stand Alone Gas Pipeline/***ASAP***

Biological Assessment

SCALE: 0 1 2 3 4 Miles

FIGURE: 3.1-5

AES-RTS: 11-001-006.mxd, 04/06/11, R00

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Oil and Gas Activity

Offshore oil and gas activity, including seismic surveys, has occurred in the Chukchi and Beaufort Seas since the late 1960s (MMS and NMFS 2008). Two- and three-dimensional seismic programs have been conducted in both program areas. Twenty-three Geological and Geophysical permits were issued in the Beaufort Sea by the MMS in 1982 and 24 in 1983. There has been more seismic survey activity in the Beaufort Sea than in the Chukchi Sea. Between 1981 and 2002, 30 exploratory wells were drilled in the Beaufort Sea. Offshore oil and gas operations often require support operations that can also cause impacts to bowhead whales, such as ice-breaking, aircraft traffic, and vessel traffic.

More information on the history of oil and gas activity between 1979 and 1999 in the Beaufort Sea can be found in MMS Study 2002-071, *GIS Geospatial Data Base of Oil-Industry and Other Human Activity (1979-1999)* in the Alaskan Beaufort Sea (MMS 2002).

There is no indication that oil and gas activity in the Beaufort and Chukchi Seas have had any detectable long-term negative impacts on the health, status, or recovery of bowhead whale populations (MMS and NMFS 2008). The Western Arctic population has continued to increase over the period of time that oil and gas activities have been conducted offshore in the Alaskan Arctic.

The NMFS previously consulted with the MMS on the potential impacts of oil and gas leasing and exploration in the Beaufort and Chukchi Seas. NMFS issued seven Biological Opinions related to Outer Continental Shelf (OCS) lease sales. The Arctic Regional Biological Opinion was issued in 1988 on the potential effects of leasing and exploration activities in the Arctic Region and reinitiated in 1999. By 1999, oil and gas emphasis was placed on the Beaufort Sea. Therefore, the Biological Opinion issued in 1988 focused on the Beaufort Sea and presented newly available information on the potential effects of oil and gas-related noise on the bowhead whale. The Biological Opinion was revised in 2001 and concluded that oil and gas leasing and exploration in the Beaufort Sea was not likely to jeopardize the continued existence of bowhead whales.

With renewed industry interest in oil and gas exploration in the Chukchi Sea, the MMS reinitiated consultation with the NMFS in 2006 to include the Beaufort and Chukchi Seas. A revised opinion was issued in March 2006. After new information about the presence of humpback and fin whales in the Chukchi and Beaufort Seas, NMFS published a Biological Opinion of the potential impacts of oil and gas activities on those species along with the bowhead whale. They concluded that oil and gas activities in the Alaskan Beaufort and Chukchi Seas may affect but are not likely to jeopardize the continued existence of Western Arctic bowhead whales (MMS and NMFS 2008).

Vessel and Aircraft Traffic

Vessel traffic, in general, can impact bowhead whales due to disturbances by noise and vessel strikes. There are few documented records of vessel strikes of bowhead whales. There is speculation that vessel strikes could become more common in the future as vessel traffic is projected to increase due to receding ice levels (MMS and NMFS 2008). Noise disturbances could result in temporary changes in behavior, such as deflection or avoidance, of individual whales from a highly-localized area (MMS and NMFS 2008). Noises from vessels that could affect bowhead whales are generally associated with motors, seismic airguns, sonar, and ice-breaking (MMS and NMFS 2008). All disturbance effects on bowhead whales from marine vessels are expected to be short duration.

Low-flying aircraft could also produce noise that could temporarily disturb individual bowhead whales in a highly-localized area (MMS and NMFS 2008). Aircraft are generally flown at heights that do not cause harassment.

Fuel spills from either vessels or aircraft would introduce contaminants into the environment which could potentially impact bowhead whales if ingested, inhaled, or if physical contact occurred.

Commercial Fishing

Commercial fishing activities could impact whales via incidental take, entanglement in fishing gear, behavioral changes due to disturbances by associated activities, and vessel strikes. The association of bowhead whales with habitat associated with sea ice limits its exposure to commercial fishing activities (MMS and NMFS 2008). If commercial activity increases in the arctic and subarctic environments due to a reduction in sea ice, disturbances of bowhead whales by commercial fishing activities will increase. There have been no reports by marine mammal observers on commercial fishing vessels of bowhead whale mortalities due to commercial fish operations (Angliss and Lodge 2002). There have been few documented incidents of bowhead whales interacting with commercial crab pot gear, but, according to preliminary results of the examination of harvest records, there are slightly more incidents associated with ropes (Angliss and Outlaw 2008). The annual rate of bowhead entanglement in marine debris or gear between 2003 and 2008 is 0.4 percent annually (Angliss and Outlaw 2008.)

Climate Change

The current trend of warming in the arctic environment is attributed to the changes in sea ice extent, thickness, distribution, age, and melt duration (MMS and NMFS 2008). Sea ice extent is becoming less in both the summer and winter, although the reduction is more pronounced in the summer (Intergovernmental Panel on Climate Change [IPCC] 2001). Ice thickness is also decreasing, while the melt duration is increasing. It is uncertain whether non-ice-obligate arctic species, such as baleen whales, will be adversely influenced by diminishing sea ice (MMS and NMFS 2008). Moreover, the reduction in sea ice extent could beneficially increase the availability of prey for the Bering-Chukchi-Beaufort Sea Stock of bowhead whales (Moore and Laidre 2006). The reduction of sea ice over the past 20 years could be related to the recovery trend of bowhead whales (Walsh 2008), and the trend is expected to continue as the ice extent retreats further (Sheldon et al. 2003). Bowhead whales may alter routes used for migration and change feeding areas as the ice extent changes due to climate change (Moore and Huntington 2008).

3.1.4 Fin Whale

Biological Populations and Listing Status

Three individual ocean-basin populations have been identified: North Atlantic, North Pacific, and Southern Ocean. Individuals within each ocean-basin population rarely, if ever, mix. Additionally, within each ocean-basin population, geographical populations (stocks) also exist. In U.S. waters, three stocks are recognized: Alaska, California/Washington/Oregon, and Hawaii (Ohsumi and Wada 1974).

The fin whale was listed as endangered under the ESA in 1970 (FR 35:8495) and as depleted under the MMPA throughout their range. No critical habitat has been designated. Since 2007, fin whales have also been listed as endangered on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species.

Populations Status, Trends, and Abundance

The worldwide population of fin whales is estimated to be 120,000 (MMS and NMFS 2008). The North Pacific population is estimated to include 15,000 individual fin whales (Angliss et al. 2001), down from their pre-commercial whaling population estimate of 42,000 to 45,000 (Ohsumi and Wada 1974). Currently, the population of fin whales in Alaskan waters west of Kodiak Island is estimated to be a minimum of 5,700 (Angliss and Outlaw 2009).

Range

Fin whales appear to be limited by tropical waters and sea ice. Fin whales prefer temperate or cool waters, and tend to avoid areas with very warm water (approximately 60 degrees Fahrenheit [°F] [15 degrees Celsius (°C)]), areas at the poles close to the ice pack, and small areas of water separated from the open ocean (NMFS 2006a; MMS and NMFS 2008). The North Pacific population distribution ranges from British Columbia, along the northern Pacific Rim, and to the far eastern Russian coast. The summer distribution of fin whales extends from Baja California to the northern Bering Sea or southern Chukchi Sea and over to Japan (MMS and NMFS 2008).

The Alaska stock of fin whales can be found in the deep waters of Prince William Sound, the Bering Sea, and the Gulf of Alaska. The highest densities of Alaska stock fin whales can be found in the northern part of the Gulf of Alaska and southeastern part of the Bering Sea during the summer (May through October) (MMS and NMFS 2008). The majority Alaska stock fin whales tend to aggregate along the mixing zones between coastal and oceanic waters that correspond roughly with the 656-feet isobaths, or shelf edge, in the northern North Pacific and Bering Sea (NMFS 2006a). Fin whales may be seen seasonally in the southwestern Chukchi Sea, although there is no indication that such occurrences are typical (MMS and NMFS 2008). There are no reports of fin whales in the Beaufort Sea (MMS and NMFS 2008), which is outside the published species range (Angliss and Outlaw 2009).

Life History and Habitat Use

The migratory status of the North Pacific fin whales is not well known; however, in the winter they have been seen off the southern coast of California and near the Hawaiian Islands (Angliss et al. 2001). Age, reproductive state, and stock affinity can all affect migration, as well as their movement inshore or offshore and north or south (NMFS 2006a).

Known fin whale feeding habitats extend through the Bering Sea into the southern Chukchi Sea, especially the southwestern Chukchi Sea near the Asian coast. Fin whales travel through the Aleutian Islands entering and exiting the Bering Sea to access their summer feeding grounds. They have also been known to travel from the northern Gulf of Alaska through the Shelikof Strait to reach the southeastern and northern Bering Sea (MMS and NMFS 2008). In recent years fin whales have been seen regularly around Pribilof Islands (NMFS 2006a).

Oceanographic changes may become favorable to the expansion of fin whale distribution into more northern waters if arctic warming continues. Availability of food sources will be the determining factor. The possibility of their distribution expanding into the Chukchi and Beaufort seas could result from long-term continued arctic warming (MMS and NMFS 2008).

Fin whales feed primarily on krill or euphausiids, as well as substantial quantities of fish (MMS and NMFS 2008). North Pacific fin whales favor *Euphausia pacifica, Thysanoessa longpipes, T. spinifera, and T. inermis* species of euphausiids. A significant portion of their diet also consists of large copepods, principally *Calanus cristatus.* A smaller portion of their diet is made up of herring, walleye pollock, and

capelin (Nemoto 1970). In the northern Bering Sea, *Thyanoessa raschii* is the only species of euphausiid that the fin whale is known to feed on. In the Arctic and Subarctic, fin whales are thought to feed chiefly on capelin, Alaska pollock, herring, and saffron cod. Above 58 degrees North latitude in the Bering Sea, fish are the primary food source, consisting almost entirely of capelin, pollock, and herring (MMS and NMFS 2008).

The gestation period for fin whales is less than one year and calving intervals are estimated, based on whaling data, to be two years (NMFS 2006a). Calves are nursed for six to seven months, and mortality rates are estimated to be between 0.04 and 0.06 percent annually. Ice entrapment, attack by killer whales, disease, shark attacks on young and/or weak fin whales, and crassicaudiosis in the urinary tract are likely the principal causes of natural mortality among fin whales, though relatively little is actually known and most studies have been focused on the North Atlantic population (NMFS 2006a).

Low-frequency vocalizations from fin whales occur in the 10 to 200 hertz (Hz) band. The low-frequency sounds have potential to travel a great distance, allowing for the possibility of long-distance communication (Edds-Walton 1997). The most common vocalizations are in the 18 to 35 Hz band and are long, patterned sequences of short-duration infrasonic pulses (Patterson and Hamilton 1964). Bouts of long patterned sounds are common in temperate waters and can also occur to a lesser extent in high latitude feeding areas (Clark and Charif 1998). Fin whales in social groups tend to vocalize rapid pulses in short sequences in the 20 to 70 Hz range. While male reproductive displays typically are vocalized by a series of pulses in a regular repeating pattern that may last for more than a day (Tyack 1999).

While no studies have been done to directly measure fin whales' sound sensitivity, it is reasonable to assume that fin whales are similar to other large mysticetes and have acute infrasonic hearing (Ketten 1997).

Critical Habitat

No critical habitat has been designated for the fin whale.

Fin Whales in the Action Area

Fin whales are not known to occur in the Beaufort Sea. Fin whales are frequently observed in the northern Gulf of Alaska and southeastern Bering Sea from May to October, but do not commonly occur in Upper Cook Inlet or the Anchorage area, as they generally congregate near the 656-foot isobath which is approximately 190 miles from shore according to Alaska Ocean Observing System (AOOS) bathymetry data from 2010. Resurrection Bay is significantly deeper than the waters surrounding the Port of Anchorage, the 656 foot-isobath is only about seven miles from the Port of Seward, so fin whales may occur in closer proximity.

Threats

There are a number of actions that have effects on fin whales in the proposed action area. They include historic commercial whaling, subsistence hunting, oil and gas-related activity, non-oil and gas industrial development, research activities, marine vessel traffic and commercial fishing. Other than historic commercial whaling, no data is available to establish that any previous or current human activity has had negative effects on fin whale populations (MMS and NMFS 2008).

Historic Commercial Whaling

Throughout the 19th century, whalers on sailing vessels hunted fin whales in relatively small numbers (Mitchell and Reeves 1983). Steam-powered boats and harpoon guns in the latter part of the 19th century heightened the hunting success of fin whales. The eventual invention of deck-mounted cannons allowed commercial fin whale hunting and harvest to occur at much higher success, or mortality, rates (MMS and NMFS 2008). The first three-quarters of the 20th century saw a great deal of commercial fin whale hunting in all of the world's oceans. The estimated catch in the Southern Hemisphere from 1904 to 1979 is almost 750,000 individuals (IWC 1995:129B30). Commercial overharvesting from the 1940s through the 1960s led the Fin whale to be placed on the threatened and endangered species list, as well as listed as depleted and protected under the MMPA. In the 1950s and 1960s estimated numbers of 1,000 to 1,500 North Pacific fin were harvested annually, though not all Soviet catches were reported (MMS and NMFS 2008).

The 1946 International Convention for the Regulation of Whaling first began regulation of fin whale commercial hunting by enforcing a size limit on commercially hunted North Pacific fin whales; they had to be longer than 55 feet (Allen 1980). The IWC began management of commercial whaling of North Pacific fin whales in 1969, and later in 1976 for the North Atlantic fin whales. Full protection from hunting was granted by the IWC in 1976 for the North Pacific and Southern Ocean fin populations and in 1987 for the North Atlantic population.

Subsistence Hunting

In Alaska, subsistence hunters have not reported hunting or taking fin whales. Currently, Greenland is the only area in the Northern Hemisphere where fin whales are allowed to be hunted and taken for local nutritional subsistence. The IWC has granted approximately 20 takes per year as part of their aboriginal subsistence whaling scheme (Gambell 1993; Caulfield 1993). Japan has recently begun taking fin whales for research purposes in the Southern Ocean region; total catches have been minimal each year. They also import fin whale meat from an Icelandic company, Hvalur H/F, which takes approximately 125 fin whales each year (IWPO 2011).

Commercial Fishing

Each year North Atlantic fin whales are occasionally hurt or taken by inshore fishing gear, however prior to 1999 there were no observed or reported North Pacific fin whale takes incidental to commercial fishing operations (Read 1994; Angliss and Outlaw 2008). In 1999, one fin whale was reported killed incidental to the pollock trawl fishery in the Gulf of Alaska (Angliss and Outlaw 2008). Currently, fin whale fatalities incidental to commercial activity in Alaska are estimated at 0.6 individuals per year (Angliss et al. 2001).

Vessel Traffic

Marine vessel traffic also has the possibility to pose a threat to fin whales. In Alaska, there are 14 stranding records in the Alaska Region marine mammal stranding database between 1981 and 2009; two are a result of ship strikes. One of the ship strikes occurred in Uyak Bay near Kodiak in 2000, and the other occurred in Resurrection Bay near Seward in 2006. The cause of stranding for the majority could not be determined (MMSN 2010). Short term changes in dive behaviors have been documented when fin whales are disturbed by the presence of vessels. This may include reduced dive times, decreased dive and surface times, and a reduced number of blows per surface (Stone et al. 1992).

Fin whales that may occur near the Port of Seward are likely to have habituated to the vessel traffic in the area. There are a number of vessel-based activities that occur in the area, including whale-watching tours, recreational boating, cruises, and commercial shipping. Commercial vessel traffic has mitigation measures in place, as required by state and federal law, to prevent significant adverse effects on any marine mammal, including fin whales. The vessel traffic in Resurrection Bay, and specifically near the Port of Seward, does not pose a threat with population-level effects.

Oil and Gas-Related Activity

Oil and gas activities have had a minimal impact on fin whales. The oil and gas activity areas have relatively little overlap with fin whale habitat. Possible effects of oil and gas activity include interruption by loud ship noises, seismic testing, and sources of low-frequency communication, and possible courtship sounds from fin whales. Like the bowhead whale, the fin has a low-frequency hearing range, and effects are expected to be similar to that of the bowhead whale (MMS and NMFS 2008). Fin whales, in a study off Oregon, continued to produce normal sounds regardless of the presence of seismic air gun pulses (McDonald et al. 1993).

In Alaska, current human impacts that may result in serious injury or the fatality of fin whales are not known to be at a level that would incur population level effects (MMS and NMFS 2008).

Climate Change

It is uncertain whether non-ice-obligate arctic species, such as baleen whales, will be adversely influenced by diminishing sea ice resulting from climate change (MMS and NMFS 2008). The arctic range of fin whales may beneficially expand northward as their prey does. In the future, climate change may allow for increased vessel traffic, fishing, or other activities that could adversely affect fin whales in their existing or expanded range.

3.1.5 Humpback Whale

Biological Populations and Listing Status

Worldwide, approximately 13 different humpback whale stocks are recognized. Five stocks are found in U.S. waters: the Gulf of Maine, the Western North Pacific, the Central North Pacific, the California/Oregon/Washington, and the American Samoa. Three of these stocks occur within the North Pacific Stock: the Central North Pacific Stock, Western North Pacific Stock, and California/Oregon/Washington stocks. Stocks commonly return to traditional sites for reproduction, and there is very little interchange between stocks, though on rare occasion it does occur (NMFS 1991). Only the Central North Pacific and Western North Pacific stocks could be expected to occur near the action area.

The humpback whale is listed as endangered under the ESA, and as depleted under the MMPA. In 2008, the IUCN upgraded the status of the humpback whale from a vulnerable species to a species of least concern. A status review of humpback whales was initiated on 12 August 2009, seeking public comment on potential changes to their listing under the ESA.

Populations Status, Trends, and Abundance

Prior to exploitation, the worldwide population of humpback whales totaled around 125,000 and the North Pacific population was estimated to be 15,000. Post-exploitation, the status (both in numbers and range), was considerably reduced, primarily as a result of intensive commercial whaling (NMFS 1991).

There are an estimated 80,000 humpback whales worldwide currently. The North Pacific population is currently estimated to be 12,000 whales, up from an estimated low of 1,500 when commercial whaling was banned. The Western Pacific population was last estimated at 394 (Calambokidis et al. 1997); however, its thought this might be an underestimation in light of the low geographic coverage of sampling effort (Angliss and Allen 2009).

Range

Humpback whales are present in all of the world's oceans, though less so in arctic waters. Their winter range includes temperate and tropical waters in both hemispheres, generally between 10 degrees and 23 degrees North latitude, where they typically mate and calve. Their summer range is usually in areas with high biological diversity between higher latitudes of 35 degrees and 75 degrees North. This is where they do the majority of their feeding. Humpback whales prefer waters of continental shelves, along their edges, and near some oceanic islands (NMFS 1991). Humpback whales in the high latitudes of the North Pacific are seasonal migrants. In Alaska, humpback whales are found from southeastern Alaska, north and west through the Gulf of Alaska, Bering Sea, and into the southern Chukchi Sea. Most of the humpback whales that summer in Alaskan waters are thought to winter on the wintering grounds surrounding the Hawaiian Islands.

In the summer, the Western North Pacific stock occupies areas along the continental shelf off the Aleutian Islands and the Alaska Peninsula. Some individuals in this stock may still summer along the Asian coast, particularly around Kamchatka Peninsula and the Sea of Okhotsk (Tomlin 1967). This stock was once considered the center of the entire North Pacific population (Berzin and Rovnin 1966; Nishiwaki 1966). The northern range of this stock now extends throughout the Bering Sea, through the Bering Strait, and into the southern Chukchi Sea. Historically, sightings in the Western North Pacific stock's range have been most common south of Nunivak Island and east of the Pribilof Islands (MMS and NMFS 2008). They have not been documented in the Beaufort Sea. This migratory stock winters on the wintering grounds around the Hawaiian Islands or at the Asian wintering grounds from the Marshall Islands to the Philippines (Angliss and Allen 2009).

The Central North Pacific stock can be found throughout southeast Alaska in the summer, as well as in central and western portions of the Gulf of Alaska. This area includes Prince William Sound, around Kodiak Island, the Shelikof Strait, the Barren Islands, and the southern coastline of the Alaska Peninsula (MMS and NMFS 2008). Sightings in offshore waters of the Gulf of Alaska are generally attributed to migration into coastal waters, some feeding may also be occurring on offshore banks (Morris et al. 1983).

Life History and Habitat Use

The majority of humpback whales that summer in Alaska waters migrate to wintering grounds in the Hawaiian Islands. Six to 11 percent of the whales in the Hawaiian wintering grounds are calves (Herman et al. 1980). A smaller number of individuals may migrate to wintering grounds along the Pacific coast of Baja California and Mexico. Most that migrate to this area summer in southeast Alaska and migrate along the relatively shallow coastal waters rather than through deeper, offshore waters as is the case in migration to the Hawaiian Islands. The majority of animals that winter offshore of Baja California and the Pacific coast of California spend their summers off the central California coast. An even smaller number of individuals within the North Pacific population winter near Mariana, Bonin, and Ryukyu Islands and near Taiwan (Nishiwaki 1966; Ivashin and Rovnin 1967; Townsend 1935). The total number that winter in this area is expected to be in the low 100s, though at one point this area did support a shore-based whaling station near Ryukyu Island in the late 1950s and 1960s (NMFS 1991).

Humpback whales feed primarily on small schooling fish and large zooplankton, mainly krill. Species of humpback prey include: capelin, walleye pollock, atka mackerel, eulachon, sand lance, Pacific cod, saffron cod, arctic cod, salmon, pollock, haddock, rockfish, shrimps, euphausiids, mysids, and pelagic amphipods. In the Bering Strait and southern Chukchi Sea, the main source of prey are mysids (NMFS 1991). Physical oceanographic factors that contribute to productivity and local distribution of prey (and thus likely feeding areas), are upwelling, converging currents, continental shelves, offshore banks, and edges of continental shelves (NMFS 1991). Feeding occurs almost entirely on humpback whales' summer range. On average, humpback whales will dive 135–197 feet to catch their prey (Dolphin 1987a,b). While they may stay submerged for 21 minutes, the average dive time is 2.8 minutes for feeding whales, 3.0 minutes for non-feeding whales, and 4.3 minutes for resting whales (Dolphin 1987a,b). They also use the most diverse techniques to obtain their prey of any baleen whale.

Female humpback whales reach sexual maturity between four and six years of age, while male humpback whales reach sexual maturity between seven and 15 years of age. Conception is usually between December and March and the average gestation period is between 10 and 12 months. Birthing will occur during the same time frame the next year. Sexually mature females typically breed every two to three years. Females live to be an average of 61 years old, and males live to be an average of 57 years old. Females make up roughly one-quarter of the total population (NMFS 1991).

The primary causes of natural mortality among humpback whales are parasites, predation, red-tide toxins, and ice entrapment. Killer whales have been known to prey on humpbacks, usually on young or disabled individuals. However, the two species have also been known to peacefully coexist and feed in close proximity. Humpback whales have also been observed with shark bites. Ice entrapment is a concern in Newfoundland for the most part (NMFS 1991). Collisions with vessels and entanglement in fishing gear and collision with vessels are causes of injury and mortality worldwide.

Critical Habitat

No critical habitat has been designated for the humpback whale.

Humpback Whales in the Action Area

Humpback whales are not known to occur in the Beaufort Sea (Angliss and Allen 2009, MMS and NMFS 2008). Humpback whales are frequently observed in Lower Cook Inlet during May–September (MMS 1995), but do not commonly occur in Upper Cook Inlet or the Anchorage area. Humpback whales are also found in waters of the Gulf of Alaska and lower Resurrection Bay. Humpback whales are not expected to be found in near proximity to the Port of Anchorage, and while they do exist in Resurrection Bay, they have become habituated to vessel traffic in the area. They are not expected to be in direct proximity to the Port of Seward.

Threats

Known actions that have an effect on humpback whales in the proposed action area include historic commercial whaling, subsistence hunting, oil-and-gas-related activity, non-oil and gas industrial development, research activities, marine vessel traffic and commercial fishing. Other than historic commercial whaling, no data is available to establish that any previous or current human activity has had negative effects on humpback whale populations.

Historic Commercial Whaling

Historic commercial whaling decimated the humpback whale population to approximately 10 percent of its original population. At the time of the IWC moratorium on commercial whaling, humpback whales were feared to be in danger of extinction. Nearest to the project area, there was a whaling station at Port Hobron off of Kodiak Island and in Akutan on Akutan Island in the eastern Aleutians. Port Hobron operated from 1926 to 1937 and Akutan operated until 1939 (Brueggeman et al. 1986). Since the IWC's moratorium on commercial whaling in 1966, their numbers and distribution have risen and expanded, though the Soviets did continue hunting until the 1980s (Perry et al. 1999).

Subsistence Hunting

Worldwide, a limited amount of subsistence hunting for humpback whales occurs. The only areas where subsistence hunts for humpbacks whales are currently conducted are in Bequia (Grenadines) and Greenland. No subsistence hunt for humpbacks currently takes place in Alaska. Subsistence hunting of humpbacks has never been at a level known to cause population level effects.

Oil and Gas-Related Activity

The effects of oil-and-gas-related activity are relatively minimal. The primary concern attributed to oil-and-gas-related activity is the noise associated with seismic acquisition. Mitigation measures are in place to avoid negative interaction and harassment of humpback whales. Oil and gas activity is known to have no negative effects on population levels.

Vessel Traffic

The concern for vessel collisions with humpback whales is shared amongst oil and gas vessel traffic, non-oil and gas industry traffic, marine vessel traffic, research activities, and commercial fishing. Of all vessel traffic, commercial fishing is responsible for the largest number of collisions, as well as entanglements.

Worldwide, humpback whales are second only to fin whales in the number of ship strikes (Jensen and Silber 2003). Within Alaska, between the years of 1986 and 2007, there were 54 confirmed or suspected ship strikes listed in the NMFS Alaska Regional Stranding Database. The fate of the animals is not always known. The types of vessels that struck a humpback whale during this period include cruise ships, recreational cruisers, whale watching catamarans, fishing vessels, and skiffs. The lengths of these vessels have ranged from 20 feet to 250 feet (Jensen and Silber 2003). This shows that neither the type nor the length of the vessel makes it more or less likely to be party to humpback ship strike.

Cruise ships are of particular concern within the waters of southeast Alaska where humpback whales concentrate in shallower waters. Oil tankers generally transit further offshore in water where fewer concentrations of humpback whales can be found. Charter and private vessels run the same risks as cruise ships, as they operate in areas overlapping with nearshore distributions of humpback whales (NMFS 1991).

Commercial Fishing

In the Central North Pacific stock, humpback whales are killed incidental to federal groundfish and longline fisheries and state managed commercial salmon fisheries. The average annual mortality rate prior to 2004 was 1.5 individuals. Between the years of 2001 and 2005, incidental injuries and mortalities within the Central North Pacific stock were also attributed to sablefish pot fisheries (MMS and NMFS 2008). In the Western North Pacific stock, the annual mortality rate from fisheries is 0.20. Serious injuries

and mortalities have occurred incidental to sablefish pot fisheries in the Bering Sea and Aleutian Islands (MMS and NMFS 2008).

Humpback whales can usually get out of entanglements in fishing gear (they are large enough to break through the netting), but sometimes they get entangled in the lead anchor which they cannot break (NMFS 1991). Between 1997 and 2007, Alaska reported 97 humpback entanglements. The majority of these involved southeast Alaska humpbacks (NMFS Alaska Regional Stranding Data). The gear involved in these reports was primarily from crab, ship, and unidentifiable pot gear.

Neither ship strikes nor entanglements are known to be at a level that would cause population-level negative effects on humpback whales. However, continued arctic warming and melting sea ice may allow industry to move north. Increased traffic and shipping, combined with an increased summer feeding-ground-range for humpback whales, may result in a greater possibility of interaction (NMFS 1991).

Climate Change

It is uncertain whether non-ice-obligate arctic species, such as baleen whales, will be adversely influenced by diminishing sea ice resulting from climate change (MMS and NMFS 2008). The range of humpback whales may beneficially expand northward as their prey does. In the future, climate change may allow for increased vessel traffic, fishing or other activities that could adversely affect humpback whales in their existing or expanded range.

3.1.6 Cook Inlet Beluga Whale

Biological Populations and Listing Status

Beluga whales are distributed throughout waters seasonally covered in ice in arctic and subarctic regions (Gurevich 1980) and are associated with leads and polynyas in the ice (Hazard 1988). Five recognized stocks of beluga whales occur in U.S. waters: the Beaufort Sea stock, Eastern Chukchi stock, Eastern Bering Sea stock, Bristol Bay stock, and the Cook Inlet stock. All of these stocks occur exclusively in Alaska. Only the Cook Inlet beluga whale has been listed under the ESA, and is discussed below. The NMFS listed the DPS of the beluga whale found in Cook Inlet, Alaska, as endangered under the ESA on 22 October 2008, effective 22 December 2008 (FR 73:62919–62930). The NMFS designated the Cook Inlet beluga as depleted under the MMPA on 31 May 2000 (FR 65:34590).

Population Status, Trends, and Abundance

Results from the most recent abundance survey by the NMFS indicated a population size of 375 in 2008, which was the same as the estimate derived from the 2007 survey (Hobbs and Shelden 2008). Most early surveys of belugas in Cook Inlet were incomplete in coverage of the area, and can therefore not be used to provide an estimate of the total population. Analysis of the most complete survey prior to 1994 resulted in a population estimate of 1,293 beluga in Cook Inlet in 1979 (Calkins 1989). The NMFS (2008a) now considers this estimate of approximately 1,300 beluga whales to be a good indicator of historical abundance, and therefore the carrying capacity of Cook Inlet. More complete surveys of the inlet were conducted by the NMFS beginning in 1993. According to the NMFS (Hobbs et al. 2000 in NMFS 2008b), these surveys, which included lower, middle, and upper Cook Inlet, documented a 47 percent decline in the population from between 1994 (653 belugas) and 1998 (347 belugas). The NMFS (73 FR 6219) has also reported that the population trend for the Cook Inlet beluga from 1999 to 2008 was a -1.45 percent per year (Table 3.1-2); they added that while this trend is not significantly different from zero, it is significantly less than the expected growth of an unharvested population of 2–4 percent.

TABLE 3.1-1 ESTIMATED POPULATION OF COOK INLET BELUGA WHALES 1999-2008 BASED ON AERIAL SURVEYS.

Species	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Beluga Whales[1]	367	435	386	313	357	366	278	302	375	375

[1] Hobbs et al. 2000; Rugh et al. 2003, 2004a, 2004b, 2005a, 2005b, 2005c, 2006, 2007; FR 73:62919).

A definitive cause of the sharp decline in beluga whale abundance in Cook Inlet has not been determined. Mortalities of belugas from subsistence, strandings, and predation have been indicated as contributing causes.

Local villages in the Cook Inlet region have been harvesting belugas for subsistence for decades, but there was a significant increase in the number of whales taken in the 1990s (NMFS 2008b). Following the relatively sharp decline in beluga whale abundance in the Cook Inlet, a conditional moratorium on the subsistence harvesting of beluga whales was implemented by the NMFS in 1999 and 2000 (Public Laws 106-31 and 106-553). Subsistence harvests of beluga whales are authorized only under co-management agreements between Native subsistence groups and the NMFS. Harvest levels are set in five-year increments based upon the average abundance estimate for the previous five-year period. Since the five-year abundance estimate for the period between 2003 and 2007 was below 350 belugas, no harvest of belugas will be authorized in Cook Inlet through 2012 (FR 73:60976; 15 October 2008).

Range

The range of the Cook Inlet beluga DPS is restricted to the Cook Inlet. Most, if not all, of the stock is thought to reside in Cook Inlet year-round and it does not seem to interbreed with other stocks of belugas outside of Cook Inlet (Hansen and Hubbard 1999, Rugh et al. 2000). There seems to have been some historical contraction of the summer range. In the 1970s, the summer distribution of Cook Inlet belugas included the upper, middle, and lower Cook Inlet (NMFS 2008b). Calkins (1989) reported that belugas were observed throughout Cook Inlet during a 1979 survey. Although the NMFS has received a few reports of belugas in the Lower Cook Inlet during summer, they have not been observed there during NMFS's annual summer surveys since 2001 (NMFS 2008b); However Belugas may still disperse throughout Cook Inlet during winter (NMFS 2008b). The contraction of the summer range is thought to be due to the reduced size of the population, with the more favorable habitats of the Upper Cook Inlet being able to accommodate the smaller population (NMFS 2008b).

Life History and Habitat Use

Within Cook Inlet, beluga whales typically inhabit shallow, coastal waters (Ridgway and Harrison 1981). Satellite tagging studies, aerial surveys, and boat- and land-based observations have shown that the beluga whales remain in the inlet year-round (Hobbs et al. 2005; Rugh et al. 1999, 2000, 2004a,b, 2005a,b,c, 2007; Cornick and Kendall 2008; McGuire et al 2008). Cook Inlet beluga whales frequent Knik Arm, Turnagain Arm, Chikaloon Bay, and the Susitna River delta area in upper Cook Inlet (NMFS 2008b). Data received from satellite transmitters attached to 14 beluga whales in Cook Inlet between 2000 and 2002 indicated that in the summer and fall they concentrated in upper Cook Inlet near rivers and bays (Hobbs et al. 2005), dispersing further south and offshore in the winter.

Seasonal use of Cook Inlet habitats by belugas appears to be strongly correlated with the movements and availability of prey. Within Cook Inlet, the distribution of beluga whales is closely tied to the distribution of prey and waterbody bathymetry (NMFS 2008b). Known feeding grounds in Cook Inlet include the Big and Little Susitna Rivers, Eagle Bay to Eklutna River, Ivan Slough, Theodore River, Lewis River, and

Chickaloon River and Bay (NMFS 2008b). The dramatic tidal influx and efflux in Cook Inlet are also major factors that dictate the whales distribution throughout the day (Hobbs et al. 2005; Huntington 2000; Funk et al. 2005).

In the spring and summer, observations of belugas frequently coincide with runs of eulachon and salmon. Beginning in late April and May they are associated with eulachon runs in the Susitna and Twenty Mile Rivers in Turnagain Arm. They arrive in the Knik Arm in May, where they tend to be concentrated near the Susitna River Delta feeding on various salmon runs (NMFS 2008b). Throughout the summer they frequent the Susitna and Little Susitna Rivers, as well as smaller streams along the west side of the Inlet south to Chinitna Bay (NMFS 2008b).

Belugas use waters of the Knik Arm intensively in the fall apparently preying on runs of coho salmon. They have been observed to congregate in Eagle Bay and elsewhere on the east side of Cook Inlet at this time, and sometimes in Goose Bay on the west side of Knik Arm. In the fall the whales start to disperse to locations further offshore including Trading, Tuxedni, and Chinitna Bays. In winter, the whales moved offshore and to the upper- and mid-inlet including Knik Arm and Turnagain Arm (Hobbs et al. 2005) but also Cook Inlet waters at least as far south as Redoubt Bay and Kalgin Island (NMFS 2008b). NMFS (2008a) concluded that they probably move throughout most of Cook Inlet during winter.

Calves are born in the summer and are grey in color that lightens with age. Beluga whales typically care for their calves for about two years. Beluga whales use echolocation to hunt for prey in the turbid waters of Cook Inlet. It is now thought that beluga whales may live more than 60 years (NMFS 2008b).

Cook Inlet beluga whales hunt both individually and cooperatively (NMFS 2008b). They are opportunistic feeders and prey upon a variety of fish depending on the species available during their seasonal movements. Analysis of the stomach contents of beluga whales in Cook Inlet has shown that belugas also feed on available marine invertebrates (Klinkhart 1966; Haley 1986; Perez 1990). The euchalon is an important prey species in early spring (NMFS 2008). In the summer, belugas rely primarily on salmon (NMFS 2008b). Little is known about the winter diet of Cook Inlet beluga whales (NMFS 2008b).

Critical Habitat

Critical habitat has been proposed for the Cook Inlet beluga and is discussed below in Section 3.2.1.

Cook Inlet Beluga Whales in the Action Area

Cook Inlet belugas commonly use waters in the action area at the Port of Anchorage. Waters around the Port of Anchorage area are used by prey species of beluga whales for migration, rearing, and foraging (Pentec 2005). During the late fall, when beluga whales concentrate at the mouth of Ship Creek, they are commonly seen within 300 feet of the docks at the Port of Anchorage (Great Land Trust 2000; Blackwell and Greene 2002; NMML 2004; Port of Anchorage et al. 2009). Markowitz and McGuire (2007) reported that belugas were commonly seen traveling and feeding within 5,000 feet of the Port, and beluga whales have been seen following the tidal influx and outflux close to the Port of Anchorage in October and November (Cornick and Kendall 2008). During pre-construction surveys at the Port of Anchorage between August and November 2005, scientists observed belugas adjacent to the port and within the footprint of the planned expansion of the port on a regular basis (Prevel Ramos et al. 2006). They were also seen swimming and feeding near the mouth of Ship Creek and off of Cairn Point (Prevel Ramos et al. 2006). Table 3.1-2 shows beluga whale observations recorded by Cornick and Saxon-Kendall (2009) in the action area from June to November in 2008.

TABLE 3.1-2 BELUGA WHALE OBSERVATIONS IN THE ACTION AREA FROM JUNE TO NOVEMBER 2008

Month	Total Sightings	Total Count of Beluga Whales
June	0	0
July	1	7
August	34	262
September	12	50
October	3	10
November	10	102
Cumulative Totals	**60**	**431**

(Source: Cornick and Saxon-Kendall 2009)

Threats

Subsistence Hunting

Limited Cook Inlet beluga whale subsistence hunting occurs today. Since 1999, zero to two whales have been allowed to be harvested each year, which is substantially different than the unsustainable levels seen in the 1980s and the majority of the 1990s (NMFS 2008b). Harvest levels prior to 1980 are unknown, but they are thought to have been significantly less than those between 1980 and 1999. The reported subsistence harvest numbers between 1994 and 1998 account for the estimated decline in Cook Inlet belugas during that period. In 1996, the takes from subsistence harvest totaled nearly 20 percent of the Cook Inlet beluga population, highlighting the significant impact that subsistence hunting was having on the stock (NMFS 2008b).

Between the years of 1995 and 1998, the annual subsistence harvest of Cook Inlet belugas was 77 individuals (NMFS 2008b). In 1999, there was a voluntary moratorium on beluga whale subsistence hunting, and from 2000 to 2010 only five beluga whales were harvested for subsistence purposes. Subsistence hunting is currently well-regulated and has minimal impact on the Cook Inlet beluga whale population.

Oil-and-Gas-Related Activity

The oil and gas industry in the Cook Inlet presents a number of potential dangers to the belugas in residence there. Threats include: seismic surveys; vessel operations; low-altitude aircraft operations; well drilling and logging; the marine discharge of drilling fluids; produced waters; gray waters; and sanitary wastes (NMFS 2008b). An oil spill represents the biggest danger, but is also least the likely to occur. Seismic activities require federal permits and mitigation measures. All discharges are regulated by the EPA, and NMFS reviews and comments on all oil and gas activities.

Vessel Traffic

Vessel traffic in the Cook Inlet occurs year round, but is most pronounced during the late spring, summer, and early fall months. The port facilities in Cook Inlet include Anchorage, Point MacKenzie, Tyonek, Drift River, Nikiski, Kenai, Anchor Point, and Homer. To date, there have been no confirmed mortalities incidental to vessel traffic in the Cook Inlet (NMFS 2008b).

Commercial vessel traffic and other large vessel traffic do not pose a significant threat to Cook Inlet beluga whales because of their slower speed and straight line movement. Smaller boats that travel at

quicker speeds and less direct routes offer more of a threat. The likely response to vessels in general is avoidance behavior, but the smaller, faster boats may elicit a more pronounced response (NMFS 2008b).

Commercial Fishing

The MMPA requires all fisheries operators to maintain logbooks and participate in a reporting program which provides information concerning fishing effort, interactions with marine mammals, and if the interaction resulted in determent, entanglement, injury or mortality. Based on these reports, the mortality rate of Cook Inlet belugas incidental to commercial fisheries is zero (NMFS 2008b). Additionally, observations in the upper Cook Inlet in 1999 and 2000 showed evidence that neither set gillnet fisheries nor drift gillnet fisheries were responsible for any beluga whale injury or mortality. The current commercial fishing level in the Cook Inlet is such that it should not delay the recovery of Cook Inlet beluga whales (NMFS 2008b).

Climate Change

Climate change models expect effects to be most pronounced in the high northern latitudes, but effects to a lesser magnitude may also be seen in the Cook Inlet (NMFS 2008b). It is uncertain whether diminishing sea ice or other climate effects will result in adverse effects to non-ice-obligate species, such as the Cook Inlet beluga whale.

3.1.7 Steller Sea Lion

Biological Populations and Listing Status

Because of their decline, NMFS listed the Steller sea lion as threatened range-wide under the ESA in April 1990. Critical habitat has been defined for Steller sea lions as a 20-nautical-mile buffer around all major haul-outs and rookeries, as well as associated terrestrial, air and aquatic zones, and three large offshore foraging areas (50 CFR 226.202 on Aug. 27, 1993).

Prior to 1997, only one population of Steller sea lions was recognized in Alaskan waters— the Eastern U.S. DPS. Based largely on differences in genetics, morphology, and population trends, this single population was split into two DPSs (Baker et al. 2005, Phillips et al. 2009, FR 62:30772). The Western DPS (WDPS) inhabits an area of Alaska from Prince William Sound westward to the end of the Aleutian Island chain and into Russian waters (NOAA 2010a). This segment occurs from 144 degrees W (Cape Suckling, east of Prince William Sound), westward to Russia and Japan. The Eastern DPS (EDPS) of Steller sea lions occurs from southeast Alaska southward to California (NMFS 2004; NMML 2010).

Because of a pattern of continued decline in the WDPS, it was listed as endangered on 5 May 1997 (FR 62:30772), while the EDPS remained under threatened status (NOAA 2010a). Population surveys suggest that a portion of the EDPS in the northern part of its range (Southeast Alaskan and British Columbia) is stable or increasing, while the remainder of the EDPS and all the WDPS is declining (NOAA 2010b).

Population Status, Trends, and Abundance

There are approximately 39,000–45,000 Steller sea lions in the Western U.S. and 44,500–48,000 in the Eastern U.S. The WDPS declined by 75 percent between 1976 and 1990, and decreased another 40 percent between 1991 and 2000 (the average annual decline during this period was 5.4 percent). Since the 1970s, the most significant drop in numbers occurred in the eastern Aleutian Islands and the western Gulf of Alaska (NOAA 2010b).

Based on non-pup counts of Steller sea lions on trend-sites throughout the Gulf of Alaska and Aleutian Islands, the overall WDPS population trend is stable and may be insignificantly increasing. The number of non-pups counted at trend-sites between 2000 and 2008 increased 12 percent. The increase in counts between 2004 and 2008 is 1 percent (NOAA 2010a).

Range

Steller sea lions range along the North Pacific Ocean rim from northern Japan to California (Loughlin et al. 1984), with centers of abundance and distribution in the Gulf of Alaska and Aleutian Islands. The northernmost rookery in the Bering Sea is on Walrus Island near the Pribilof Islands. In the Gulf of Alaska the northernmost rookery is on Seal Rocks just outside of Prince William Sound (Kenyon and Rice 1961).

Steller sea lions are distributed across the North Pacific Ocean rim from northern Hokkaido, Japan, through the Kuril Islands, Okhotsk Sea, and Commander Islands in Russia, the Aleutian Islands, central Bering Sea, and southern coast of Alaska, and south to the Channel Islands off California (NMML 2010).

Life History and Habitat Use

Steller sea lions prefer the colder, temperate to sub-arctic waters of the North Pacific Ocean. Haul-outs and rookeries usually consist of beaches (gravel, rocky, or sand), ledges, and rocky reefs. In the Bering Sea and Okhotsk Sea, sea lions may also haul-out on sea ice, but this is considered atypical behavior (NOAA 2010b). During the May–July breeding season, Steller sea lions congregate at more than 40 rookeries, where adult males defend territories, pups are born, and mating takes place. Non-reproductive animals congregate to rest at more than 200 haul-out sites where little or no breeding takes place. Sea lions continue to gather at both rookeries and haul-out sites outside of the breeding season (NMML 2010).

Steller sea lions forage near shore and in pelagic waters. They are capable of traveling long distances in a season and can dive to approximately 1,300 feet in depth. Steller sea lions are opportunistic predators, foraging and feeding primarily at night on a wide variety of fishes (e.g., capelin, cod, herring, mackerel, pollock, rockfish, salmon, and sand lance), bivalves, cephalopods (e.g., squid and octopus) and gastropods. Prey varies geographically and seasonally. They may disperse and range far distances to find prey. Steller sea lions have been known to prey on harbor seal, fur seal, ringed seal, and possibly sea otter pups, but this would represent only a supplemental component to their diet (NMML 2010).

Critical Habitat

Critical habitat has been designated for Steller sea lions and is discussed below in Section 3.2.2.

Sea Lions in the Action Area

Sea lions do frequently occur in the action area of the Port of Seward, as well as the greater Resurrection Bay. Vessel traffic is common in the area and sea lions have become accustomed to the disturbances of this local traffic.

Threats

Subsistence Hunting

Under the ESA and the MMPA, Coastal Alaska Natives are allowed to harvest threatened and endangered species for subsistence purposes. The annual subsistence harvest has decreased substantially from approximately 550 sea lions in 1992 to annual takes of between 165 and 215 from 1997 to 2004 (Wolfe et al. 2005). The greatest numbers of sea lions harvested were in the Pribilof Islands and the Aleutian Islands (Wolfe et al. 2005). The surveys that produced these estimates covered all Alaskan communities that regularly hunt Steller sea lions. Males of all ages are the most vulnerable to subsistence harvests; however, the threat of hunting occurs at a medium frequency. Therefore, the relative impact on the recovery of the WDPS due to the Alaska Native subsistence harvest is considered low, with a high-feasibility of mitigation. The proposed action will not impact the annual harvest of Steller sea lions, which are not hunted in the action area.

Contaminants

Aside from the Exxon Valdez Oil Spill in 1989, which occurred well after the Steller sea lion decline was underway, no events have been recorded that support the theory of acute toxicity leading to Steller sea lion decline (Calkins et al. 1994). Steller sea lions have shown relatively low levels of toxic substances as well as heavy metals (Lee et al. 1996). However, there are no studies on the effects of toxic substances at the population level to determine their impact on vital rates and population trends. Sea lions exposed to oil spills may become contaminated with polycyclic aromatic hydrocarbons (PAHs) through inhalation, dermal contact and absorption, direct ingestion, or by ingestion of contaminated prey. Overall, there is still some concern that toxic substances may have indirect impacts on individual vital rates, however, relative impact on the recovery of the western DPS of Steller sea lion due to toxic substances is not considered high.

Climate Change

The potential impact of environmental change, through a reduction in quality and quantity of Steller sea lion prey species, has received substantial attention from the scientific community. Periodic shifts in oceanic and atmospheric conditions may have major effects on some prey fish populations. Precisely how the “regime shifts” alter fish populations and affect Steller sea lions, is poorly understood and has not been resolved.

The change in North Pacific fish community structure stemming from the regime shift in 1976–77 may have been substantial enough to alter the quality and availability of prey, such as pollock and other gadids for Steller sea lions, across the North Pacific Ocean (NMFS 2008). This may have resulted in part to nutritional stress of juvenile Steller sea lions. It is likely that, although oceanographic and atmospheric conditions have changed over the last several decades, those changes have not been outside the range of natural fluctuation previously experienced by Steller sea lions (NMFS 2008). Further, available evidence indicates that the current fish community structure is very similar to that just prior to the 1976–77 regime shift, and changes in Steller sea lion diets between regimes were unremarkable (NMFS 2008). Thus, the potential impact of environmental variability on recovery in the near term is minimal. A threat to recovery, nonetheless, will persist until the environment and associated fish distributions and populations change again to favor Steller sea lions, increasing their carrying capacity and subsequently Steller sea lion survivorship and birth rates.

Vessel Disturbance

The possible impacts of various types of disturbance on Steller sea lions have not been well studied, yet the response by sea lions to disturbance will likely depend on season and their stage in the reproductive cycle. Vessels that approach rookeries and haul-outs at slow speed, in a manner that allows sea lions to observe the approach, have less effect than vessels that appear suddenly and approach fast. Sea lions may become accustomed to repeated slow vessel approaches, resulting in minimal response. There are no rookeries in the action area. Routine vessel traffic into Seward is not known to have resulted in adverse effects on Steller sea lions.

Commercial Fishing

The potential impact of competition with fisheries, through a reduction in the biomass and quality of Steller sea lion prey species, is a highly debated topic among the scientific community. The effect of fisheries on the Steller sea lion prey field over time is largely unknown. As noted above, it is likely that no one factor accounts for the dramatic shifts in Steller sea lion abundance in the WDPS, and there are different theories as to the reasons for the period of steep decline (e.g., 1980s), slow decline (e.g., 1990s), and slow recovery (e.g., 2000s).

Fishing may have contributed to changes in the location, density, distribution, availability, quality, and energy value of the Steller sea lion prey field. While it seems reasonable to conclude that commercial fisheries for primary prey species of Steller sea lions have led to a reduction in the carrying capacity of the environment, it is much less clear how commercial fisheries are currently affecting the recovery of the WDPS. Nonetheless, regarding the indirect effects of commercial fisheries on the WDPS, it seems reasonable to conclude that such activities may be a continuing stressor.

Commercial fisheries can directly affect Steller sea lions in the Gulf of Alaska, by injuring and killing them in fishing gear or in vessel collision or being killed by fishermen. In general, the current level of direct impact to Steller sea lions is relatively small. However, it is likely that historical direct impacts influenced the rapid decline rate observed in the 1980s, but by the mid-1990s was no longer an important factor in the decline and lack of recovery (NMFS 2010). Commercial fishing regulations are in place to protect endangered Steller sea lions.

3.1.8 Polar Bear

Biological Populations and Listing Status

Evidence from telemetry surveys, tagging studies, and traditional knowledge has resulted in the recognition of 19 partially-discrete polar bear populations (IUCN 2006). Two recognized polar bear populations occur in Alaska: the Southern Beaufort Sea stock and the Chukchi/Bering Seas stock. Only the Southern Beaufort Sea Stock is found in or near the action area.

Because the principal habitat of polar bears is sea ice, it is considered a marine mammal, and included in the species protected under the MMPA. On 15 May 2008, the polar bear was listed as a threatened species range-wide under the ESA (FR 73:28212). This listing is based on the best available science showing that a loss of sea ice threatens polar bear habitat. The polar bear was listed as a threatened species which is defined as a species likely to become endangered in the foreseeable future.

The Southern Beaufort Sea (SB) population occurs between Icy Cape, Alaska on the western boundary and Pearce Point, Northwest Territory (NWT), Canada (Amstrup et al. 1986, Amstrup and DeMaster 1988, Stirling 1988). The size of the SB population was estimated to be approximately 1,800 animals in

1986 (Amstrup et al. 1986). A new population assessment derived from capture-recapture data collected during 2001 to 2006 estimated 1,526 (with a 95 percent confidence interval equal to 1,211–1,841) polar bears in the region in 2006 (Regehr et al. 2006). Because the precision of the earlier estimate was low, the two estimates cannot be statistically differentiated. The harvest of polar bears in the SB region is shared between Canada and the United States and since 1988 has been managed under the "Polar Bear Management Agreement for the Southern Beaufort Sea" by the Inuvialuit Game Council of Canada, and the North Slope Borough of Alaska. The harvest quota for the SB is 80 animals (40 for Alaska and 40 for NWT). In 2004/2005 the joint harvest was 46 bears (Schliebe et al. 2006, Branigan et al. 2006). The status of the SB population is designated as reduced (FR 73:28212, 15 May 2008; page 28217) and the predicted trend is declining (Aars et al. 2006).

Populations Status, Trends, and Abundance

The total number of polar bears worldwide is estimated to be about 20,000–25,000 bears (Schliebe et al. 2006). The most recent stock assessment estimated a population size of 1,526 bears (USFWS 2009a; USFWS 2010a). The SB population of polar bears was thought to be low and declining in the 1960s due to excessive harvest, and to have increased dramatically, (perhaps doubling) between the 1960s and the 1990s (Amstrup et al. 1998, Amstrup 2000,). The size of the SB population was estimated to be approximately 1,800 animals in 1986 (Amstrup et al. 1986, Amstrup 2000), and may have been as high as 2,500 in the late 1990s (Amstrup et al. 2001).

In 2006, results from an intensive five-year mark-recapture study indicated that the SB subpopulation included 1,526 polar bears (Regehr et al. 2006) suggesting a decline between the late 1990s and 2006, although low precision in the previous estimate of 1,800 precluded a statistical determination. Subsequent analyses of the 2001–2006 data indicates that the survival and breeding of polar bears during this period were affected by sea ice conditions. The population is currently considered to be declining.

Range

Polar bears are the apical predators of the Arctic marine ecosystem (Amstrup 2003) and are distributed throughout regions of arctic and subarctic waters where the sea is ice-covered for large portions of the year. The SB population is found from Icy Cape, Alaska east to Pearce Point, NWT, Canada (Amstrup et al. 1986, Amstrup and DeMaster 1988, Stirling 1988).

Life History and Habitat Use

Polar bears are common in the Beaufort Sea and are known to occur in small, widely-distributed numbers in the proposed project area. Over most of their range, polar bears remain on the sea ice year round, as the sea ice is where their prey (mostly ringed seals [*Phoca hispida*]) is accessible. Polar bears visit land only for short periods, however, polar bear use of coastal areas during the fall open-water period has increased in recent years and is projected to continue to increase (Kochnev et al. 2003; Schliebe et al. 2005).

Female polar bears will come ashore to den and give birth to young. In the northern Alaska coastal areas, pregnant females enter maternity dens by late November and emerge as late as early April. Maternal dens typically are located in snow drifts in coastal areas, stable parts of the offshore pack ice, or on landfast ice (Amstrup and Gardner, 1994). Studies have shown that more bears are now denning nearshore rather than in far offshore regions (Fischbach et al. 2007). The highest density of land dens in Alaska occur along the coastal barrier islands of the eastern Beaufort Sea and within the Arctic National Wildlife Refuge (USFWS 2009a). See Figure 3.1-6.

Sighting data obtained from Minerals Management Service Bowhead Whale Aerial Survey Project Historical Database, 1979-2007.

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POLAR BEAR SIGHTINGS AND CRITICAL HABITAT IN THE BEAUFORT SEA
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE: 0 1 2 3 4 Miles

FIGURE: 3.1-6

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Only pregnant female polar bears den; other members of the population (males, solitary females, females with older cubs) remain active throughout winter. Pregnant females from the SB stock may den in the action area. Durner et al. (2006) found approximately 50 percent of pregnant females in the Beaufort Sea came ashore to construct maternity dens, while Amstrup and Gardner (1994) found 42 percent of females observed in the Alaskan Chukchi and Beaufort seas and Canadian Beaufort Sea from 1983–1991 denned on land. Fishbach et al. (2007) suggest 60 percent of females in these areas den on land, while the remaining females denned on shorefast ice, or drifting pack ice (USFWS 2009a).

Pregnant females come ashore to den in late October/early November depending upon ice movements and timing of freeze up (Lentfer and Hensel 1980). In Alaska, dens are sparsely distributed along a narrow coastal strip with sightings reported up to 30 miles inland (Lentfer and Hensel 1980) and 38 miles inland (Amstrup and Gardner 1994). Denning habitat includes areas such as coastal and river banks and bluffs where snow accumulates early.

Polar bears derive essentially all their sustenance from marine mammal prey obtained on sea ice habitat. The high fat intake from specializing on marine mammal prey allows polar bears to thrive in the harsh arctic environment (Stirling and Derocher 1990; Amstrup 2003; USFWS 2009a). Over much of their range, polar bears are dependent on ringed seals (Smith 1980) and where common, bearded seals (Derocher et al. 2002).

Polar Bears in the Action Area

Polar bears are expected to occur in the action area infrequently (Figure 3.1-6). As mentioned above, they spend the majority of time on sea ice, coming on land only occasionally. Some pregnant females from the SB stock come on land to enter dens in late fall. Maternal polar bear denning habitat exists in the action area, however there are few documented den sites found in that area (Figure 3.1-7).

Amstrup and Garner (1994) studied fidelity to denning locations and found that bears that denned once on pack ice were more likely to den on pack ice than on land in subsequent years. Bears were also found to be faithful to general areas. They are more likely to return to the eastern coastal area to den (if that is where they previously denned), earlier than to the western half of the Alaska coast. Annual variations in weather, ice conditions, prey availability, and the long-distance movements of polar bears (Amstrup et al. 1986, Garner et al. 1990) make recurrence of exact denning locations unlikely. If there are documented historical den sites found in the action area, there is no evidence indicating that a particular den site will be used again.

Threats

Historical and present potential threats effecting polar bears in the Beaufort Sea area include subsistence and sport hunting, environmental contaminants, climate change and development.

Hunting

Since passage of the MMPA, the sport hunting of polar bears in the United States has ceased. Alaska Natives that live on the North Slope of Alaska still harvest polar bears for subsistence purposes. There is a Native-to-Native agreement between the Iñupiat people of Alaska and the Inuvialuit people of Canada, developed in 1988, that establishes quotas and recommendations concerning hunting practices (USFWS 2009a). The current harvest levels, which have averaged 36 bears per year since 1980, are thought not to impact the rate of recovery of the species (USFWS 2006). Subsistence hunting for polar bears occurs near the villages of Barrow, Kaktovik, and Nuiqsut, the closest being Nuiqsut, located 59 miles from West Dock.

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Maternal Polar Bear Den Location

Maternal Bear Denning Habitat

Alaska Stand Alone Gas Pipeline Route

Pipeline

Road

Facility

Maternal Polar Bear Den Location data obtained from:
USGS Catalogue of Polar Bear Maternal Den Locations in the Beaufort Sea and Neighboring Regions, Alaska 1910-2010 [Data Series 568].

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MATERNAL POLAR BEAR DEN LOCATIONS/HABITAT IN THE BEAUFORT SEA
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE: 0 1 2 3 Miles

FIGURE: 3.1-7

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Environmental Contaminants

The types of contaminants with the greatest potential to be a threat threat to polar bears in the Arctic are petroleum hydrocarbons, persistent organic pollutants (POPs), and heavy metals. The Arctic ecosystem is particularly sensitive to environmental contamination due to the slower rate of breakdown of POPs, including organochlorine compounds (OCs) (Fisk et al. 2001; Lie et al. 2003). The highest concentrations of OCs have been found in species at the top of the marine food chains such as polar bears, which feed primarily on seals (Braune et al. 2005). The SB polar bear populations may also have concentrations of mercury close to the reported toxicological threshold levels of 60 micrograms wet weight for marine mammals (Arctic Monitoring and Assesment Program [AMAP] 2005).

Polar bear ranges overlap with many active oil and gas operations within 25 miles of the coast or offshore (Schliebe et al. 2006). Exposure of polar bears to petroleum hydrocarbons could potentially come from direct contact with oil spill products. To date, no major oil spills have occurred in the Alaska marine environment within the range of polar bears. Industrial development in polar bear habitat may also expose individuals to other hazardous substances through improper storage or spills.

The USFWS determined that contaminants are not a past, present, or future forseeable threat to the survival and recovery of polar bears throughout all or a portion of their range (FR 73:28,288).

Climate Change

The listing of polar bears as a threatened species under ESA is based largely on findings that continuing declines in arctic sea ice, linked to climate change, are likely to threaten the polar bear species within the foreseeable future (FR 73:28212, May 15, 2008). USFWS has determined that ongoing and projected loss of sea ice habitat is likely to result in nutritional stress and reduced productivity as already evidenced in the Western Hudson Bay and Southern Beaufort Sea populations (FR 73:28292). Eventually, at rates and magnitudes that will vary among populations, all polar bear populations are projected to suffer adverse effects, with some populations at risk of becoming extirpated if sea ice declines continue as projected through the end of the century.

Declining sea ice in the arctic marine environment may also lead to changes in polar bear use of their terrestrial environment. Sea ice must be stable for ice denning to be successful. Therefore, if the quality of sea ice decreases, more females may den on land (Durner et al. 2006). An estimate of greater than 60 percent of females from the SB stock currently den on land, while the remaining females den on drifting pack ice (Fischbach et al. 2007). In addition, if large areas of open water persist until late winter females may be unable to access land to den (Stirling and Andriashek 1992). Climate change may also affect the quality of denning habitat on coastal or island bluffs due to rapid erosion and slope failure due to melting permafrost (Durner et al. 2006). Changes in autumn and winter precipitation or wind patterns could significantly alter the availability and quality of denning habitat (Durner et al. 2003).

Polar bears' use of coastal habitats in the fall, during open-water and freeze-up conditions, has increased since 1992 (USFWS 2006). Since the late 1990s, the timing of ice formation in the fall has occurred later in the year (November or early December, as opposed to early or mid-October in the 1980s) resulting in an increased amount of time that the area was not accessible to polar bears. Consequently, bears spent a greater amount of time on land and not feeding. The later formation of nearshore ice increases the probability of bear–human interactions occurring in coastal villages (Schliebe et al. 2006). USGS created a website containing a compilation of new polar bear findings.

Human Development

The primary form of human development near the polar bear range that overlaps the action area has been oil and gas exploration and production-related facilities. Minimal effects have occurred to polar bears from the oil and gas industry in Alaska during the past 30 years. Since 1968 there have been only two known incidents of lethal takes of polar bears by industry in Alaska. Formal Section 7 Consultations have been conducted for the Chukchi Sea and Beaufort Sea Incidental Take Regulations (ITRs), which authorize the incidental taking of a small number of polar bears in these seas and the adjacent ACP during oil and gas activities in the Alaskan Arctic. No lethal take associated with the oil and gas industry has occurred during the period covered by ITRs (1991 until present) in either the Chukchi or Beaufort seas (USFWS 2009a).

Females and cubs denning on land can be vulnerable to disturbance from oil and gas activities; however, most females have been found to be relatively tolerant of human disturbance (Amstrup 1993). If disturbed, females appear more likely to abandon their dens in the fall before cubs are born and relocate, than in the spring when young cubs are less likely to survive if they leave the maternal den early (Lentfer and Hensel 1980, Amstrup 1993, Durner et al. 2006). Polar bears occur at or near most coastal and offshore facilities, and can occur in the project action area. The proposed project and associated activities will be subject to regulations under the MMPA, ITRs, and associated Letters of Authorization (LOAs), therefore minimizing human–bear incidents and interactions.

3.2 *Critical Habitat*

3.2.1 Cook Inlet Beluga Critical Habitat

Designation of Critical Habitat

On April 11, 2011, the NMFS published a final rule to designate 3,013 sq mi of critical habitat for the Cook Inlet beluga whale DPS, effective May 11, 2011 (76 FR 20180). Figure 3.2-1 shows an overview of the critical habitat in Cook Inlet. The NMFS excluded the Port of Anchorage from the final rule in consideration of national security interests. Portions of military lands were determined to be ineligible for designation of critical habitat.

Essential Features and Description of Critical Habitat

The NMFS has categorized Cook Inlet into three habitat types according to their importance to the conservation of the beluga whales. The most northern portion of the inlet is considered Type I habitat and the more southern portion is Type II habitat. Figure 3.2-1 shows the boundaries of the habitat types.

Type I habitat—The southern boundary of the Type I habitat area stretches from three miles southwest of the Beluga River across to Point Possession. It contains essential foraging and nursery habitat intensively used by beluga whales between the spring and fall. It is also the area of the inlet with the greatest potential of impacts from anthropogenic sources, such as industrial activities.

The northern portion of Cook Inlet, which has been designated as Type I habitat, consists of shallow tidal flats, and river mouths. The shallow tidal flats may also aid in molting or escaping predators (NMFS 2008b). The river mouths are important for eulachon and salmon and therefore attract feeding belugas. Following the coho salmon run, belugas spend more time in Type I habitat during the spring and fall (Funk et al. 2005). Type I habitat is the most valuable of the three habitat types.

Type II habitat—The Type II habitat area is primarily used during the fall and winter. However, there are a few isolated spring feeding areas within this habitat. Type II habitat includes the area south of the Type I area to a southern boundary line at 60.2500 N latitude (NMFS 2008b). Type II habitat also includes nearshore areas that extend down the west coast of the inlet following the tidal flats into Kamishak Bay to Douglass Reef, and a section of Kachemak Bay (NMFS 2008b). During the time beluga whales spend in Type II habitat, they tend to be in lower densities and deeper water (NMFS 2008b).

Critical Habitat Relative to the Proposed Action Area

The Port of Anchorage lies within the NMFS-determined Type I habitat (Figure 3.4-1), which is important to beluga whales for feeding and nursing calves. Belugas will likely be present in or near the action area during the construction period in the summer, when barges associated with the project will be arriving at the port.

3.2.2 Polar Bear Critical Habitat

Designation of Critical Habitat

On December 7, 2010, USFWS published a final rule designating critical habitat for the threatened polar bear (FR 75:76086–76137).

Primary Constituent Elements and Description of Critical Habitat

The Primary Constituent Elements of critical habitat for the polar bear in the United States in §17.95 Critical Habitat (FR 75:76137), include the following:

> (*i) Sea ice habitat used for feeding, breeding, denning, and movements, which is sea ice over waters 984 feet (300 m) or less in depth that occur over the continental shelf with adequate prey resources (primarily ringed and bearded seals) to support polar bears.*
>
> *(ii) Terrestrial denning habitat, which includes topographic features such as coastal bluffs and river banks, with the following suitable macrohabitat characteristics:*
>
> > *(A) Steep, stable slopes (range 15.5–50.0°), with heights ranging from 4.3 to 111.6 feet (1.3 to 34 m), and with water or relatively level ground below the slope and relatively flat terrain above the slope;*
> >
> > *(B) Unobstructed, undisturbed access between den sites and the coast;*
> >
> > *(C) Sea ice in proximity to terrestrial denning habitat prior to the onset of denning during the fall to provide access to terrestrial den sites; and*
> >
> > *(D) The absence of disturbance from humans and human activities that might attract other polar bears.*
>
> *(iii) Barrier island habitat used for denning, refuge from human disturbance, and movements along the coast to access maternal den and optimal feeding habitat. This includes all barrier islands along the Alaska coast and their associated spits, within the range of polar bears, in the United States, and the water, ice, and terrestrial habitat within 1 mile (1.6 km) of these islands (no-disturbance zone).*

Designated critical habitat encompasses three areas or units: Unit 1–sea ice, Unit 2–terrestrial denning habitat, and Unit 3–barrier island habitat. The total area designated covers 187,157 square miles, of which about 96 percent is sea ice habitat. The units are:

- *Sea ice habitat*: Extends from the Canadian border in the east to a point south of Hooper Bay, located over the continental shelf; including ice over water out to the 984 feet water depth contour or limits of the U.S. Exclusive Economic Zone;
- *Terrestrial denning habitat*: The lands within 20 miles of the northern coast of Alaska from the Canadian border west to the Kavik River, and the lands within 5 miles of the shoreline between the Kavik River and Barrow.
- *The Barrier Island habitat*: The offshore islands along Alaska's northern coast from the Canadian border west to Barrow, south to Point Hope, southwest to Wales, southeast to Nome, and ending at Hooper Bay, Alaska.

Certain areas were exempted from critical habitat according to the Final Rule designating the critical habitat, these are:

- Five U.S. Air Force (USAF) Radar Sites–located at Point Barrow, Point Lonely, Oliktok Point, Point Bullen, and Barter Island (measures to protect polar bears occurring in habitats within or adjacent to these facilities are included in the rule)
- Townsites at the Native communities of Barrow and Kaktovik
- All existing manmade structures, regardless of land ownership status (USFWS 2010a)

Critical Habitat in the Action Area

The action area of the proposed project includes approximately 1,112 acres located within designated Polar Bear Critical Habitat areas (As noted in Figure 3.1-6 above). This area consists mostly of terrestrial habitat, a small proportion of which may be suitable for, and could be used by, pregnant females for maternal denning in the winter months (As noted in Figure 3.1-7 above). Terrestrial dens provide pregnant polar bears with a safe environment away from predatory polar bears, human disturbance, and harsh weather, all of which threaten cub survival. In addition, Barrier Island habitat is used by polar bears for denning, as a corridor for traveling, a refuge from human disturbances, and for access to dens and feeding (USFWS 2010a). West Dock is located 1 mile from the nearest barrier island. West Dock is an existing facility and is exempted in the final critical habitat designation.

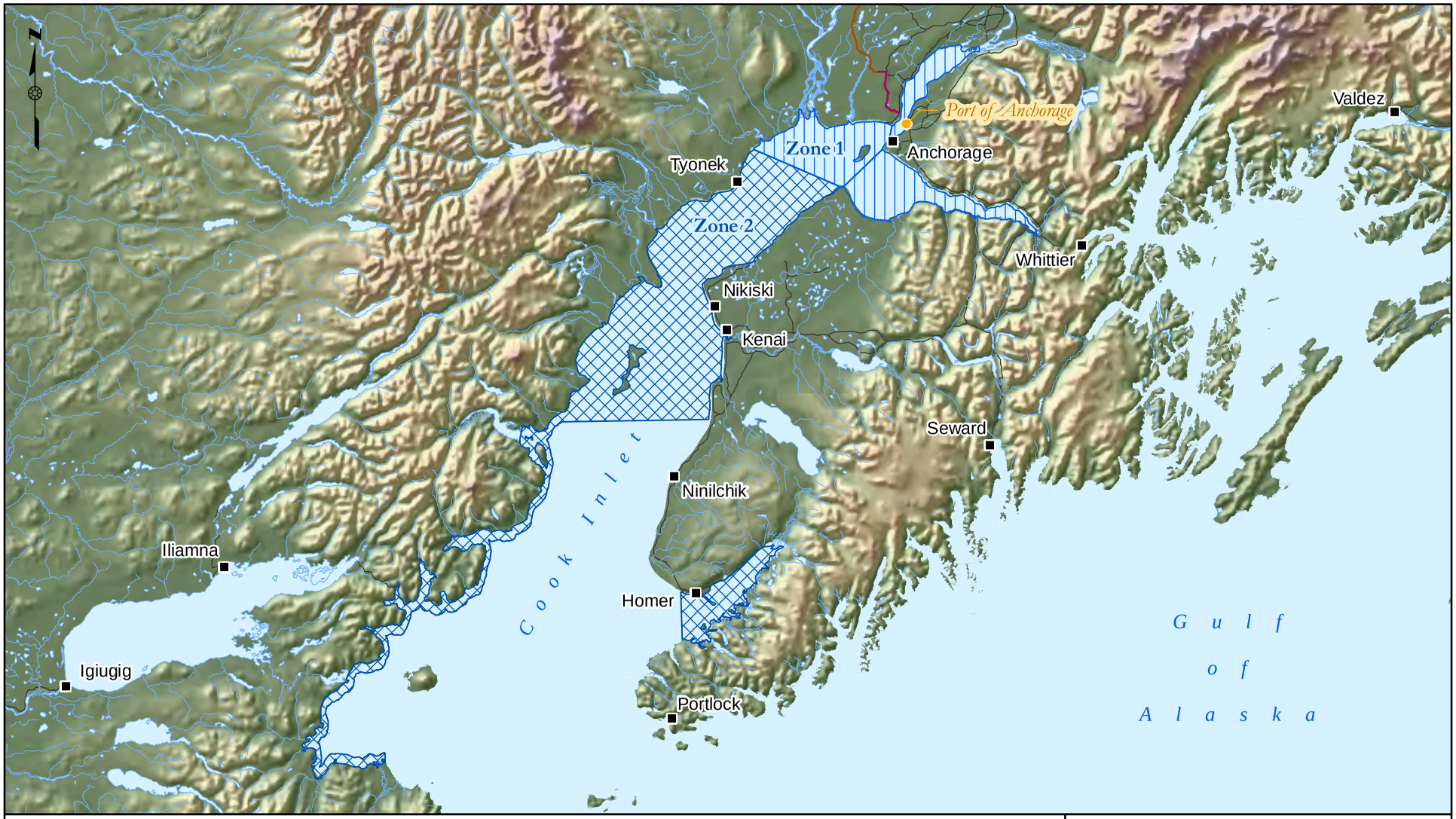
Sea ice habitat provides a platform for polar bears to hunt, breed, rest, move to terrestrial denning areas, and for long-distance travel. Polar bears require a stable ice platform from which to hunt seals, as this platform provides access to seals either at breathing holes, the ice edge, or near leads and polynyas. Sea ice habitat adjacent to open water areas over the shallower waters, where the highest densities of seals occur, is preferred polar bear habitat (USFWS 2010a).

3.2.3 Steller Sea Lion Critical Habitat

Designation of Critical Habitat

On 27 August 1993 NMFS published a final rule to designate critical habitat for the threatened and endangered populations of Steller sea lions (FR 58:45269).

However, there is no designated Steller sea lion critical habitat in the ASAP action areas, including action areas within Cook Inlet or Resurrection Bay (Figure 3.2-2). Critical habitat nearest to the Port of Seward is associated with the major haul-out at Outer Island and haul-outs at Gore Point located in Gulf of Alaska waters outside Resurrection Bay.



Beluga Whale Proposed Critical Habitat - Zone 1

Beluga Whale Proposed Critical Habitat - Zone 2

Alaska Stand Alone Gas Pipeline Route

Road

Town

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BELUGA WHALE
CRITICAL HABITAT IN COOK INLET
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE: 0 12.5 25 50 Miles

FIGURE: 3.2-1

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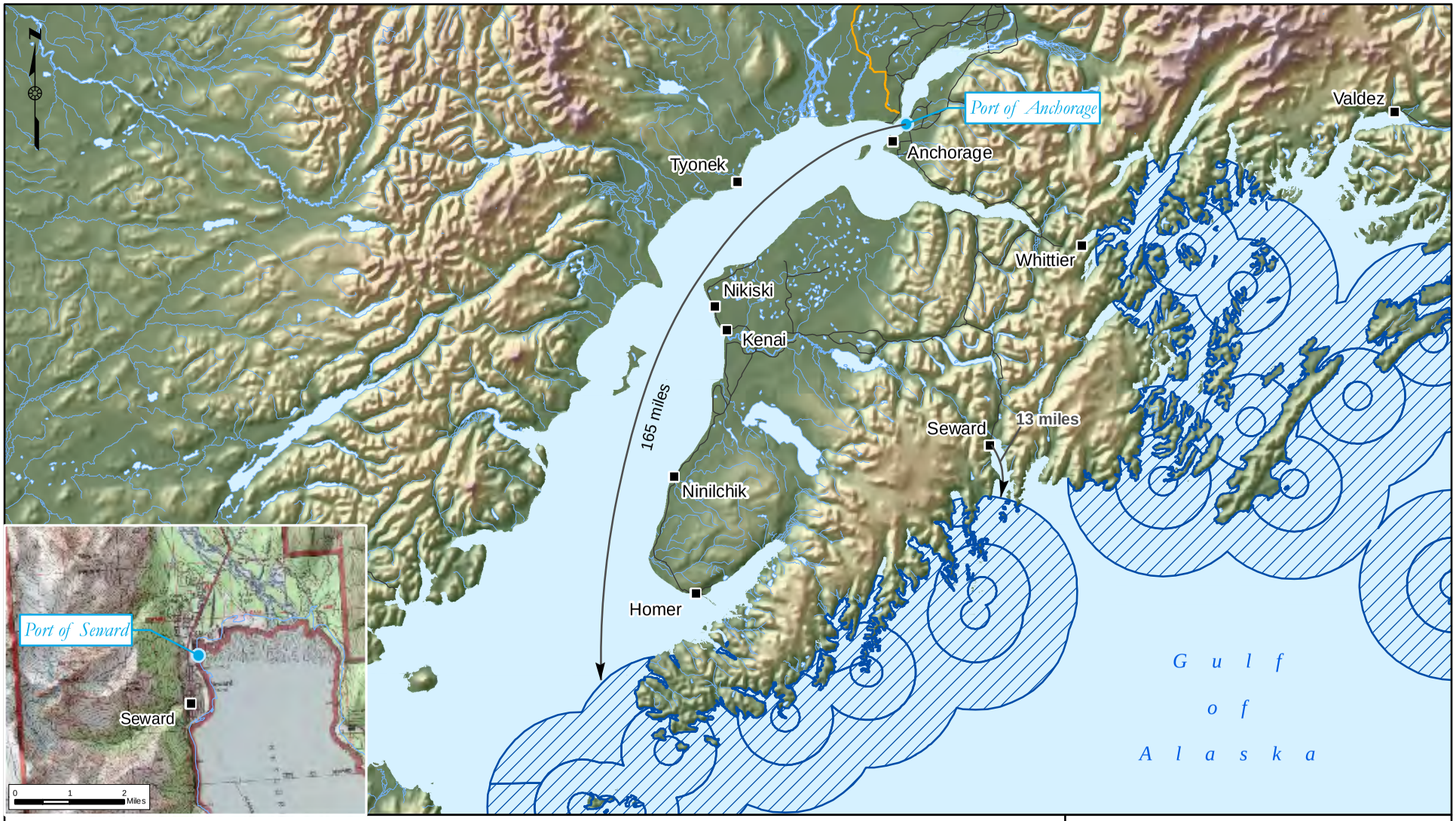

Stellar Sea Lion Critical Habitat

Alaska Stand Alone Gas Pipeline Route

Road

Town

NAD83, Alaska Albers Equal Area

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ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

STELLER SEA LION CRITICAL HABITAT NEAR THE ACTION AREA

Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE: 0 12.5 25 50 Miles

FIGURE: 3.2-2

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3.3 *Candidate and Proposed Species*

3.3.1 Pacific Walrus

Biological Populations and Listing Status

On 8 September 2009, the USFWS announced a finding on a petition to list the Pacific walrus as threatened or endangered under the ESA and to designate critical habitat. The USFWS found that the petition presented scientific information indicating that listing a subspecies may be warranted. On February 8, 2011, the USFWS designated the Pacific walrus as a candidate for ESA protection. The 12-month finding indicated that, while the Pacific walrus warrants protection under the ESA, there are higher priority species that need to be addressed prior to the walrus. The walrus' status will be reviewed annually and a proposed rule to protect the species under the ESA will be developed in the future.

Populations Status, Trends, and Abundance

There is no reliable estimate for the size of the Pacific walrus population. Aerial surveys conducted by the U.S. and Russia between 1975 and 1990 produced population estimates ranging from 201,039 to 234,020 animals. However, these estimates are considered minimum values and are not suitable for detecting trends in population size (Gilbert, et al. 1992).

The number of Pacific walrus surveyed within a 122,860 square mile area was estimated at 129,000 with 95 percent confidence limits of 55,000 to 507,000 individuals in 2006. This estimate does not account for areas that were not surveyed, some of which are known to have had walruses present. Therefore the estimate was negatively biased to an unknown degree (Fay 1982; Burn, et al. 2009; USFWS 2010b) which provides assurance that walrus population size was greater than the estimate (NMFS 2005). Considering this, more surveys will be required to verify any trends in population size and to quantify such changes.

Range

The Pacific walrus is distributed in Russian and Alaskan waters over the continental shelves of the Chukchi and Bering seas, and ranges in the north from the eastern East Siberian Sea to the western Beaufort Sea. Migrations are directly related to the seasonal advance and retreat of the sea ice (Fay 1982, ADF&G 2009). Walruses are found in waters less than 656 feet deep along the pack ice margin where ice concentrations are less than 80 percent (Fay 1982). This ice-covered, shallow continental shelf is important for walruses, as they use this for rest and for calves incapable of deep or long-term diving (MMS 2007). Walruses use floating sea ice for birthing, nursing, resting, isolation from predators, and for passive transport to new feeding areas (USFWS 2009b). Reduced summer sea ice over the continental shelf in the Chukchi Sea in the past decade has resulted in increased use of land haul-outs by adult females and young during ice-free periods (Jay and Fischbach 2008).

Life History and Habitat Use

Walruses feed on benthic macroinvertebrates and prefer to forage in areas less than 262-feet-deep (Fay 1982). Walruses feed on a wide variety of organisms including worms, snails, clams, marine birds, and seals; but most frequently on clams, snails, and polychaete worms (Fay 1982; Sheffield and Grebmeier 2009).

Walruses in the Action Area

The Pacific walrus is found in low numbers in the Beaufort Sea (USFWS 2010b) (See Figure 3.3-1). Some walruses have hauled-out onshore near Kaktovik in the past, but this is not a frequent event.

The Beaufort Sea does not provide the optimal habitat for walruses. The probability of walruses occurring in or near the proposed action area offshore of Prudhoe Bay is very low, as is the probability of walruses hauled-out on the coast in the action area (Fischbach, personal comm. 2010).

Threats

Subsistence Hunting

Walruses have an intrinsically low rate of reproduction and are therefore limited in their capacity to respond to exploitation (Fay 1982). In the late 19th century, American whalers intensively harvested walruses in the northern Bering and southern Chukchi seas. The population was substantially depleted by the end of the century (Fay et al. 1989). Since 1930, the combined U.S. and Russia walrus harvests have ranged from 2,300–9,500 animals per year. These harvest levels were thought to be of sufficient scale to result in subsequent population declines (Fay et al. 1989; Fay et al. 1997). Since 1992, harvest levels have been limited; through the 1990s harvests ranged from approximately 2,400–4,700 animals per year. Current assessment of sustainable harvest rate is unknown (Garlich-Miller et al. 2006).

Climate Change

Pacific walrus is an ice-dependent species. Individuals use ice for many aspects of their life history throughout the year. Because of the projected loss of sea ice over the 21st century, USFWS has identified the loss of sea ice and associated effects to be a threat to the Pacific walrus population. Although USFWS anticipates that sufficient ice will remain, so that breeding behavior and calving will still occur in association with sea ice, the locations of these activities are expected to change in response to changing ice patterns. The greatest change in sea ice, walrus distribution, and behavioral responses is expected to occur in the summer (June–August) and fall (October–November), when sea ice loss is projected to be the greatest. USFWS has concluded that loss of sea ice, with its concomitant changes to walrus distribution and life-history patterns, will lead to a population decline, and is a threat to Pacific walrus in the foreseeable future because, over time, walruses will be forced to rely on terrestrial haul-outs to an increasingly greater extent.

Although USFWS determined that threats resulting from climate change warrant listing Pacific walrus under the ESA, the agency also determined that such a listing is precluded by limited resources and higher priority species. USFWS has assigned the Pacific walrus a priority listing of 9, on a scale of 1 to 12, with 1 representing the highest priority species for ESA listing and protection. USFWS assigned Pacific walrus a lower priority ranking because of its relatively high present abundance and its ability to rely on terrestrial haul-outs as sea ice diminishes.

Walrus Sighting

Alaska Stand Alone Gas Pipeline Route

Pipeline

Road

Facility

Sighting data obtained from Minerals Management Service Bowhead Whale Aerial Survey Project Historical Database, 1979-2007.

NAD83, Alaska Albers Equal Area.

ASRC Energy Services
a subsidiary of Arctic Slope Regional Corporation
Regulatory and Technical Services

Alaska Gasline Development Corp.
Gas for Alaskans

WALRUS SIGHTINGS IN THE BEAUFORT SEA 1979-2007

Alaska Stand Alone Gas Pipeline/***ASAP***

Bilogical Assessment

SCALE: 0 1 2 3 4 Miles

FIGURE: 3.3-1

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Commercial Fishing and Marine Vessel Traffic

As walruses are normally closely associated with sea ice, their interaction with commercial fishing and marine vessel traffic in the Arctic is very limited.

Offshore Oil and Gas related activities

Oil-and-gas-related activities have been conducted in the Chukchi and Beaufort Seas since the late 1960s. Much of this activity has occurred in the Beaufort Sea OCS rather than the Chukchi Sea OCS.

Pacific walruses do not normally range into the Beaufort Sea (USFWS 2002b), though individuals and small groups are occasionally observed. During the history of the incidental take regulations in the Beaufort Sea interactions with walruses have been minimal. From 1994 to 2004, a total of nine sightings, involving 10 walruses were recorded by Industry during the open water seasons.

3.3.2 Ringed Seal

Biological Populations and Listing Status

The range of the ringed seal is circumpolar with five subspecies being recognized: the Arctic ringed seal (*Phoca hispida hispida*), the Baltic ringed seal (*Phoca hispida botnica*), the Okhotsk ringed seal (*Phoca hispida ochotensis*), the Ladoga ringed seal (*Phoca hispida ladogensis*), and the Saimaa ringed seal (*Phoca hispida saimensis*). On 10 December 2010, NMFS published a proposed rule to list the Arctic, Okhotsk, Baltic, and Ladoga subspecies as threatened and the Saimaa subspecies as endangered under the ESA (FR 75:77476). The only subspecies occurring in the action area, and addressed in this BA, is the Arctic subspecies. No critical habitat has been proposed for the ringed seal. A detailed comprehensive description of the distribution, life history, and abundance of ringed seals is included in the status review of the ringed seal recently published by the NMFS (NMFS 2010).

Populations Status, Trends, and Abundance

Specific estimates of the Arctic ringed seal population are not available but NMFS suggested that the population numbers are in the millions (FR 75:77492). Bengston et al. (2005) conducted ringed seal surveys in the Chukchi Sea in 1999 and 2000 and found densities higher at nearshore locations. They estimated the Chukchi population at 252,488 animals in 1999 and 208,857 in 2000. Frost et al. (2002) conducted surveys in the Beaufort Sea and estimated the density of ringed seals was 2.65 seals per square mile. Combining the estimated population sizes with the densities from previous surveys (Bengston et al. 2005, Frost et al. 2002), Angliss and Allen (2009a) estimated that there are at least 249,000 Arctic ringed seals in the Chukchi and Beaufort Seas (Angliss and Allen 2009a). This is considered to be a very conservative estimate given that some surveys did not correct the density for seals that were not visible during the survey because they were in the water, and because the survey did not include the entire range of the ringed seal habitat. Considering that these surveys were restricted to U.S. and Canadian waters, and did not include large areas of pack ice, Kelly et al. (2010) provided a reasonable estimate for the total population of Arctic ringed seals in the Chukchi and Beaufort Seas of 1,000,000 seals.

Reliable data on population abundance trends for the Arctic stock of ringed seals do not presently exist (Angliss and Allen 2009a). Frost et al. (2002) reported that trend analyses based on comparisons of observed seal densities in the central Beaufort Sea suggested a marginally significant but substantial decline of 31 percent from 1980–1987 to 1996–1999; however, Angliss and Allen (2009a) concluded that the apparent decline between the 1980s and the 1990s may have been due to a difference in the timing of surveys rather than an actual decline.

Range

In Alaska, the range of the ringed seal encompasses the Beaufort, Chukchi, and Bering Seas and can reach as far south as Bristol Bay in Alaska in years with extensive ice coverage. Throughout their range, ringed seals exhibit an affinity for ice-covered waters.

Life History and Habitat Use

The seals excavate subnivean lairs in the snow above some of the holes, in which they have their pups between March and April. The lair protects the pup against hypothermia and predation by Arctic foxes and polar bears (Smith et al. 1991). Once the pup is born, it is nursed there for five to eight weeks during which time the pup stays in the lair. There is a positive relationship between lack of maternal experience and increased predation by polar bear, which could account for poor reproductive success of less experienced females (Eley 1994). The primary food sources for ringed seals are arctic cod, saffron cod, shrimp, amphipods, and euphausiids (Reeves et al. 1992).

Ringed seals tend to prefer large floes (i.e., greater than 147 feet in diameter) and are often found in the interior ice pack where the sea ice coverage is greater than 90 percent (Simpkins et al. 2003). They remain in contact with ice most of the year and pup on the ice in late winter to early spring. During late April through June, ringed seals are distributed throughout their range from the southern ice edge northward (Burns and Harbo 1972, Burns et al. 1981, Braham et al. 1984). Ringed seals overwinter on pack and shorefast ice (Bengston et al. 2005). They create breathing holes in the newly formed ice and maintain them throughout the year by scraping the sides using the nails on their foreflippers (Smith and Hamill 1981).

The density of ringed seals is dependent upon the availability of food, ice conditions, and water depth. Frost et al. (2004) conducted aerial surveys over the Beaufort Sea coast between Barrow and Kaktovik to assess what variables such as water depth, distance from fast ice, and ice quality have on distribution. They determined that ringed seal density was greatest in intermediate water depths of 16.4–115 feet and in areas of smooth ice nearest to the edge of fast ice. Ringed seal densities were estimated from similar surveys flown in 1996–1999 in the Alaska Beaufort Sea from Barrow to Kaktovik. Observed seal densities in that region ranged from 0.81 to 1.17 per square kilometer (Frost et al. 2002, 2004). Results of surveys conducted by Frost and Lowry (1999) indicate that, in the Alaskan Beaufort Sea, the density of ringed seals in May–June is higher to the east than to the west of Flaxman Island. These surveys are conducted in the spring when seals are visible on ice, less is known of their distribution during summer months.

Ringed Seals in the Action Area

British Petroleum (BP) conducted seal surveys near the Northstar Unit located approximately 6 miles from West Dock offshore of Prudhoe Bay to determine baseline conditions prior to the construction of the satellite drilling island. Ringed seal densities close to the Northstar site ranged from 0.39 to 0.63 seals per square kilometer (Moulton et al. 2002.) These numbers did not indicate a decline in densities during 1997 to 1999 (Moulton et al. 2003).

Ringed seals are associated with sea ice and typically remain with the ice throughout the year (Angliss and Allen 2009a; Bengston et al. 2005), although in the summer, ringed seals are commonly seen alone or in small groups in open water (Harwood and Stirling 1992). Large concentrations of ringed seals are not expected near West Dock during activities associated with the proposed project, partly because they do not tend to travel in large groups and partly due to the normal industrial activity present at West Dock

(Figure 3.3-2). They are, however, the most frequently-encountered seal species in the Prudhoe Bay region (Simpkins et al. 2003).

Threats

Pollution and Contaminants

Contaminants accumulate in the Arctic and can adversely affect marine mammals. Contaminant loads have been studied in ringed seals, because they are the main prey for polar bears and they are an important subsistence species for Alaskan Natives (Dietz et al. 1995, Zhu et al. 1995, Muir et al. 1999, Fisk et al. 2001, Fisk et al. 2005, Kovacs et al. 2007, Dietz 2008).

Contaminant loads of pollutants such as organochlorine compounds and heavy metals in ringed seals that live in the Alaskan Arctic are lower than those found in ringed seals in Europe (Borga et al. 2005). High levels of mercury have been found in the liver and muscles of ringed seals in the Canadian Arctic, although no toxic effect of the metal was observed (Smith and Armstrong 1978). Mercury concentration becomes higher as seals age (Dehn et al. 2005). POP levels measured in ringed seals taken from Barrow were similar to those found in the Canadian Arctic and lower than those in Svalbard and the Kara Sea in the Russian Arctic (Nakata et al. 1998) (Kucklick et al. 2002). Levels of perfluorononanoic acid were higher and levels of perfluorooctane sulfonate were higher in ringed seals from the Bering and Chukchi Seas than in Canada and Greenland (Quakenbush and Citta 2008).

Section 4.2.5.1 in *The Status Review of the Ringed Seal (Phoca hispida)* contains more detailed information on contaminants in ringed seals and is incorporated in this document by reference (NMFS 2010).

Subsistence Hunting

Ringed seals are an important subsistence resource for Native Alaskans living in communities along the Beaufort Sea coast. Harvest levels decreased during the 1970s from 7,000–15,000 to 2,000–3,000 by 1979 (Frost 1985). In 2000, Alaska Department of Fish and Game (ADF&G) estimated that 9,500 ringed seals were being harvested per year, but there is no current estimate of the number of seals being harvested (Allen and Angliss 2010).

Oil and Gas Activities

Offshore oil and gas exploration, development, and production activities, have occurred in the Chukchi and Beaufort Seas since the late 1960s (MMS and NMFS 2008). Oil and gas activities may include artificial island construction, drilling operations, pipeline construction and operation, seismic surveys, and vessel and aircraft support operations. Among these activities, the effects of noise, physical disturbance and potential oil spills have the greatest potential to effect ringed seals. (FR 75:77487). However, long term research and monitoring results on ice seals, including ringed seals, in the Alaskan Arctic have shown no evidence of more than limited and transitory effects, resulting in no detectable injury to individual seals and seal lairs, and no more than a negligible impact on the affected Arctic subpopulation. As a result, NMFS has determined that oil and gas activities are not a foreseeable threat, individually or cumulatively, to the conservation status of the Arctic ringed seal. (FR 75:77489).

Climate Change

The proposed listing of ringed seals as a threatened species is primarily premised upon the potential adverse effects of modification of their sea ice habitat resulting from a warming climate projected out

through the end of the century. (NMFS 2010). Although the Arctic ringed seal remains abundant and there have been no detected effects of climate change on ringed seals to date, NMFS has inferred that future ice and snow conditions threaten this subspecies with becoming endangered by 2100. The effects of climate change may be ameliorated if the Arctic ringed seal retracts northward with sea ice habitats; however, NMFS has projected that snow depths will be insufficient for lair formation and maintenance throughout most of the subspecies' range by the end of the century. (75 Fed. Reg. 77490). The timing for the onset of potential impacts from climate change on the Arctic ringed seal is uncertain.

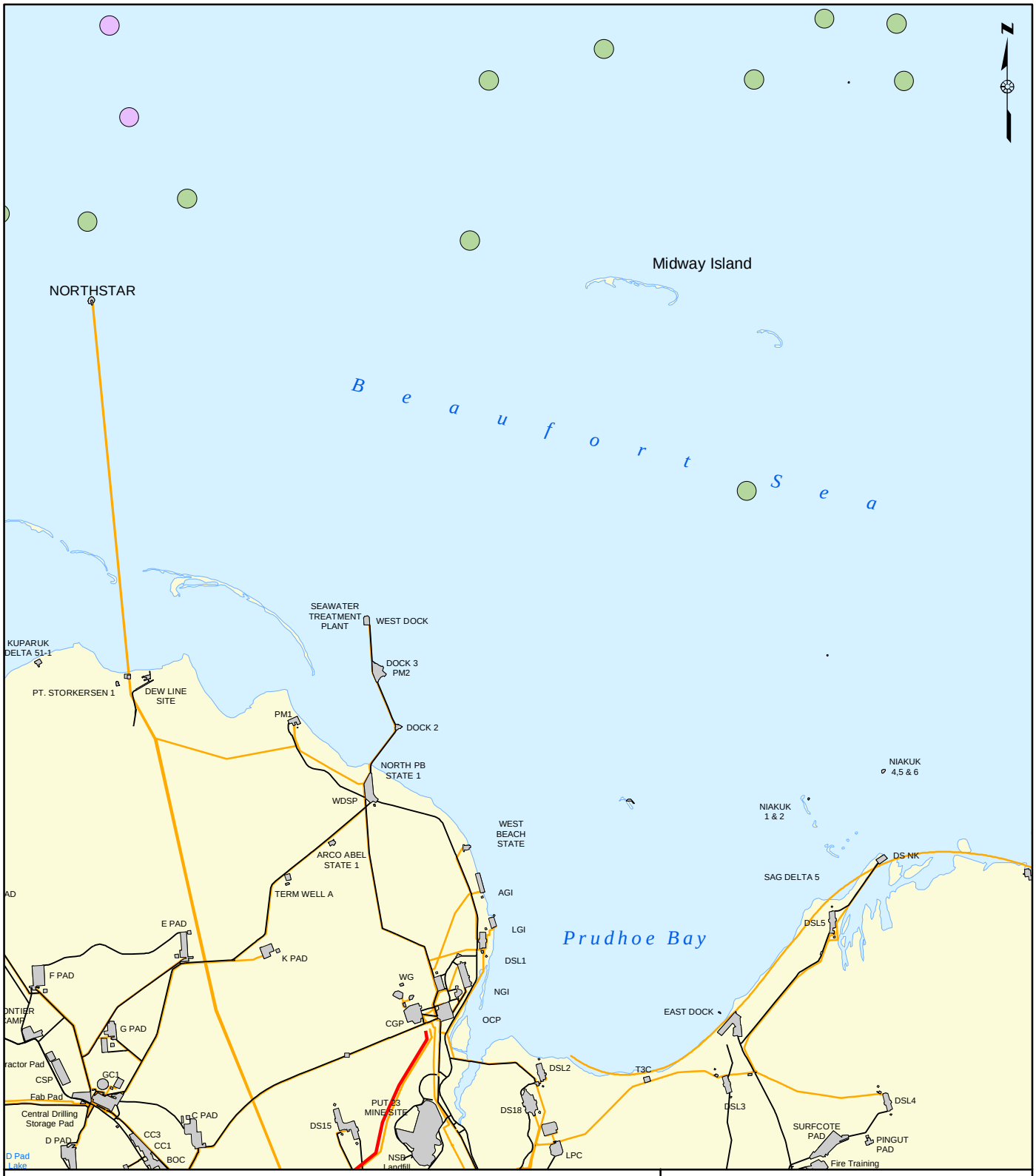
3.3.3 Bearded Seal

Biological Populations and Listing Status

The bearded seal is a circumpolar, ice-associated seal. There are two widely recognized subspecies of bearded seals, one (*Erignathus barbatus barbatus*) inhabiting the Atlantic sector of the species range, and the other (*Erignathus barbatus nauticus*) occupying the Pacific sector (Rice 1998). There is not a discrete geographical gap between the distributions of the two subspecies, but the general determination is that the Pacific sector subspecies is found to the west of longitude 112 degrees in the Canadian archipelago (NMFS 2010), and the only subspecies found in Alaska. In response to a petition, NMFS conducted a status review of the bearded sea, in which the Biological Review Team further delineated the subspecies found in the Pacific sector into an Okhotsk DPS and a Beringia DPS. The Okhotsk DPS is found in the Sea of Okhotsk and the Beringia DPS is found in the Bering, Chukchi, and Beaufort Seas, and is therefore, the DPS of interest described below. NMFS subsequently promulgated a proposed rule to list the Beringia DPS and the Okhotsk DPS of bearded seals as threatened throughout their ranges under the ESA on 10 December 2010 (FR 75:77496). Listing of the Atlantic sector subspecies was determined to be unwarranted. NMFS has not proposed to designate critical habitat for either the Beringia DPS or the Okhotsk DPS of bearded seals, because it is not currently determinable. A detailed comprehensive description of the distribution, life history, and abundance of bearded seals is included in the status review of the bearded seal recently published by NMFS (2010).

Populations Status, Trends, and Abundance

While no accurate estimates of the worldwide population of bearded seals exist, various authors have suggested populations of 500,000 to 1,000,000 (Bychkov 1971; Burns et al. 1981; Stirling and Archibald 1979; Blix 2005 in NMFS 2010b). Perhaps 450,000 of these are *Erignathus barbatus nauticus* in the Pacific sector (NMFS 2010b). Early estimates of the Beringian DPS in Alaska range from 250,000 to 300,000 (Popov, 1976; Burns J. 1981). There are no reliable estimates of the bearded seal population in the Beaufort Sea because correction factors to account for bearded seals not seen due to their submerged state in the water have not been developed (Angliss and Allen 2009). Uncorrected estimates of bearded seals in the eastern Beaufort Sea averaged 2,100 seals in 1974–1979 (Stirling et al. 1982 in NMFS 2010). These are considered to be substantial underestimates due to the lack of correction factors (NMFS 2010) and the limited area that was surveyed (Kelly 1988). There are also no reliable quantitative estimates of population trends due to the imprecision and incompleteness of the surveys (Taylor et al. 2007 in NMFS 2010)



Species

- Bearded Seal
- Ringed Seal
- Alaska Stand Alone Gas Pipeline Route

- Pipeline
- Road
- Facility

Sighting data obtained from Minerals Management Service Bowhead Whale Aerial Survey Project Historical Database, 1979-2007.

NAD83, Alaska Albers Equal Area.

ASRC Energy Services
a subsidiary of Arctic Slope Regional Corporation
Regulatory and Technical Services

Alaska Gasline Development Corp.
Gas for Alaskans

RINGED AND BEARDED SEAL SIGHTINGS IN THE BEAUFORT SEA 1979-2007
Alaska Stand Alone Gas Pipeline/***ASAP***
Biological Assessment

SCALE: 0 1 2 3 Miles

FIGURE: 3.3-2

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Range

Bearded seals, the largest of the ice seals, are associated with sea ice (Burns et al. 1981, Smith 1981, Kelly 1988, NMFS 2010b, Angliss and Allen 2009). In Alaska, their range extends from the Bering Sea north and east through the Chukchi and Beaufort Seas. Bearded seals are found in the Beaufort Sea year-round but in fewer numbers during the winter when habitat is limited to areas of open leads and active ice pack. Seasonal movements of bearded seals are related to the advance and retreat of sea ice (Kelly 1988). Ice platforms are needed for resting, reproduction, and molting (Fay 1974, Burns and Frost 1979, Burns 1981, Nelson et al. 1984, NMFS 2010.) They migrate throughout the year following the pack ice edge south into the Bering Sea in the winter and north into the Chukchi and Beaufort Seas in areas with high ice coverage in the summer (Burns et al. 1981; Simpkins et al. 2003; Bengston et al. 2000).

Life History and Habitat Use

Bearded seals primarily feed on benthic organisms on or in the sediments on the seafloor, including crabs, shrimp, and clams (Kelly 1988; Reeves et al. 1992; Finley and Evans 1983; Antonelis et al. 1994; NMFS 2010). They are therefore typically distributed in areas with sea ice cover over water less than 656 feet where they can effectively reach the seafloor to forage (Burns and Frost 1979; Fedoseev 2000; Kovacs 2002; NMFS 2010b), although they are also seen swimming in open water (Burns et al. 1981). Surveys in the Beaufort Sea indicated that bearded seals prefer areas with relatively open ice cover over water depths of less than 246 feet (Stirling 1977; Stirling et al. 1982). Preferred bearded seal habitat in the summer months in the Beaufort Sea is in water with fragmented multi-year ice over the continental shelf seaward of the scour zone (LGL 2007).

Bearded seals are the largest of the northern seals, weighing up to 750 pounds. They give birth to a single pup. Pupping occurs on drifting ice flows between late March through May (Kovacs et al. 1996). Pups are typically weaned when they are around 24 days old (Kovacs et al. 1996).

Bearded Seals in the Action Area

Aerial surveys indicated that bearded seals of the Beringia DPS are commonly found in Beaufort Sea waters offshore and, therefore, could approach the action area at West Dock (Refer to Figure 3.3-2). However, they would not be expected to occur there commonly due to the lack of ice, and the normal level of industrial activity. Bearded seals in the Beaufort Sea have been found to prefer areas close to the pack ice over water between 82 and 246 feet deep (Stirling 1977, Sterling et al. 1982). However, when the pack ice recedes north to areas over water depths greater than 656 feet, bearded seals tend to move further inshore to areas where they have access to the seafloor where they forage.

In the summer, the preferred habitat is in the central and northern Chukchi Sea. Habitat in the Beaufort Sea is more limited, because the edge of the pack ice is often over waters depths that are too deep for foraging (greater than 656 feet) (LGL 2007).

During spring seal surveys conducted in Prudhoe Bay, nine bearded seals were seen hauled-out on ice, only two of which were seen south of the barrier islands (Moulton et al. 2002). Several bearded seals were recorded during surveys in Prudhoe Bay between 1999 and 2001, but none were seen during surveys between 1997 and 1998 (Moulton et al. 2002). Although bearded, ringed, and spotted seals were observed during a marine mammal survey for an ocean bottom cable survey west of the Liberty Satellite Drilling Island (SDI) site and approximately 14 miles west of West Dock, only 7 percent of those seals were bearded seals. LGL estimated an average summer density of .0214 seals per square kilometer for bearded seals near Liberty (LGL 2002). Few bearded seals are expected to be near West Dock during vessel-related activities associated with the proposed project.

Threats

Pollution and Contaminants

There is little information available regarding contaminants in bearded seals. Contaminant loads of organochlorine compounds in bearded seals are lower in the U.S. and Canadian Arctic than in the European Arctic (Borga et al. 2005). High levels of mercury have been found in the liver and muscles of bearded seals, although no toxic effect of the metal was observed (Smith and Armstrong 1978). The rate of accumulation of heavy metals in bearded seals, appear to be higher than that seen in ringed seals (Smith and Armstrong 1978). Mercury concentration becomes higher as seals age (Dehn et al. 2005).

Oil and Gas Activities

Offshore oil and gas exploration, development, and production activities, have occurred in the Chukchi and Beaufort Seas since the late 1960s (MMS and NMFS 2008). Oil and gas activities may include artificial island construction, drilling operations, pipeline construction and operation, seismic surveys, and vessel and aircraft support operations. Among these activities, the effects of noise, physical disturbance and potential oil spills have the greatest potential to effect ringed seals (FR 75:77509). However, long-term research and monitoring results on ice seals, including ringed seals, in the Alaskan Arctic have shown no evidence of more than limited and transitory effects, resulting in no detectable injury to individual seals and seal lairs, and no more than a negligible impact on the affected subpopulation. As a result, NMFS has determined that oil and gas activities are not a foreseeable threat, individually or cumulatively, to the conservation status of the bearded seal (FR 75:77510).

Offshore oil and gas operations often require support operations, such as ice-breaking, aircraft traffic, and vessel traffic, which can also cause impacts to bearded seals.

More information on the history of oil and gas activity between 1979 to 1999 in the Beaufort Sea can be found in the MMS Study 2002-071 Geographic Information System (GIS) Geospatial Data Base of Oil-Industry and Other Human Activity (1979–1999) in the Alaskan Beaufort Sea (MMS 2002).

Climate Change

The proposed listing of bearded seals as a threatened species is primarily premised upon the potential adverse effects of modification of their sea ice habitat resulting from a warming climate projected out through the end of the century (NMFS 2010). Although the bearded ringed seal remains abundant and there have been no detected effects of climate change on bearded seals to date, NMFS has inferred that future ice and snow conditions threaten this subspecies with becoming endangered by 2100. The effects of climate change may be ameliorated if the bearded seal retracts northward with sea ice habitats; however, NMFS has projected that snow depths will be insufficient for lair formation and maintenance throughout most of the subspecies' range by the end of the century. The timing for the onset of potential impacts from climate change on the bearded seal is uncertain.

4.0 EFFECTS OF THE ACTION

The following sections provide an analysis of the potential effects of the proposed action on the threatened and endangered species, critical habitat, and proposed or candidate species identified in Section 3.0. The analyzed effects include direct, indirect, and cumulative effects. Direct and indirect effects are discussed in Section 4.1 and cumulative effects are analyzed in Section 4.2.

4.1 *Direct and Indirect Effects*

Direct effects are the immediate effects of the proposed project in the action area. Disturbance stemming from noise and habitat loss associated with construction, operation, and maintenance are considered direct effects. Indirect effects are reasonably foreseeable results from activities associated with the project that occur at a later time or at a distance removed from the immediate project area, such as effects on a prey species or changes in a pattern of land use.

4.1.1 Threatened and Endangered Species

4.1.1.1 Spectacled and Steller's Eiders

The proposed action would result in construction, maintenance, and operation of a pipeline with raised and buried sections through potential breeding habitat of spectacled and Steller's eiders.

Habitat Loss

Suitable breeding habitat for spectacled and Steller's eiders is found within the action area from the shoreline of Prudhoe Bay south for a distance of approximately 50 miles. Project facilities and appurtenances that would occur within this area during construction and operation are listed below in Table 4.1-1.

TABLE 4.1-1 PROJECT COMPONENTS WITHIN THE ACTION AREA

Project Phase	Facilities	Land Development/ Habitat Disturbance
Construction	Laydown Yards	6 acres
	Camp - 250 Persons	existing
	Fuel storage	existing
	Airport	existing
	West Dock	existing
	Right-of-way	5 acres (44 miles x 100 feet)
	Gas Conditioning Facility	70 acres
Operation	Right-of-way	158 acres (44 miles x 30 feet)
	Pipeline	2 acres buried, elevated
	Gas Conditioning Facility	70 acres

Construction of the ASAP and associated GCF may result in the disturbance of a maximum of 81 acres of potential eider breeding habitat within the action area. This is a conservative worst case

estimate based on an assumption that all habitats within the right-of-way (ROW) would be disturbed. Construction in this area is expected to take place during a single winter; however, the effects on habitat would remain until any areas that are not to be maintained through operations would revegetate and recover sufficiently to provide breeding or nesting habitat for the birds.

Most (72 acres) of these habitat losses would be permanent as they consist of the footprint of the GCF and the buried and elevated portions of the pipeline, which would be operated for at least the lifetime of the project (possibly in excess of 50 years). Some of the remaining habitat losses would be regained over time as the permanent operations ROW is narrowed to approximately 30 feet or less, and disturbed areas outside of this ROW would be restored and become available to the birds as they are revegetated.

The habitat loss is not likely to adversely affect the spectacled eider or Steller's eider. There are scattered reports of Steller's eiders using habitats in the area in the past, but they have not been known to use the area for breeding or nesting in recent years. The only location on the North Slope where Steller's eider's are known to nest consistently is the Barrow area. The use of the Prudhoe Bay area by spectacled eiders has been documented in recent years; however, observed densities of breeding spectacled eiders in the area have been relatively low, with most observed breeding pairs being reported west of the Colville River. Suitable habitat is found across the North Slope so any eiders that are displaced could use habitats in the same area or elsewhere. The habitats that would be disturbed are within the Prudhoe Bay oilfield and the corridor of the TAPS and the Dalton Highway, and therefore have undergone some disturbance.

Construction will occur in the winter. Winter-time construction and the use of special methods for pipeline installation in wetlands will minimize the area of habitat that is affected.

Disturbance

Disturbance could potentially occur in the portion of the action area encompassed by coastal waters near West Dock in Prudhoe Bay, and in the portions of the action area that hold terrestrial breeding or nesting habitats.

Spectacled eiders are known to use the coastal waters of the Beaufort Sea for staging and migration. Males and non-breeding or unsuccessful females may be found in the waters from June to August; successful females and their broods may be found in these waters from August to early October. Construction of the ASAP would involve nine trips with barges through the Beaufort Sea to West Dock during these same open-water periods. Disturbance could result from the movement and noise associated with the barge traffic, and with the human and equipment activity at the dock; however, observed densities of spectacled eider's and Steller's eiders in these coastal waters are so low that disturbance from these barge trips is unlikely. Any disturbance that would occur is expected to consist of flushing and brief displacement from the path of the barge, and would not be expected to have deleterious effects on the birds.

Construction of the proposed pipeline and appurtenances in this portion of the action area would occur during a single winter. Spectacled and Steller's eiders are absent from the Beaufort Sea and North Slope breeding habitats (including the action area) from October through May. Therefore construction of the ASAP would not result in any disturbance effects on spectacled eiders or Steller's eiders.

Activities associated with the Operations and Maintenance (O&M) of ASAP could result in the disturbance and or displacement of spectacled or Steller's eiders from available breeding, nesting,

or brooding habitat. However, research conducted at oil and gas facilities on the North Slope indicate that any such effects would be minimal. The distribution of spectacled eiders in the Kuparuk Oilfield has been investigated annually since 1993. Disturbance associated with noise, vehicle traffic on roads, and general human activity associated with O&M could result in discontinued use of some available habitats adjacent or near facilities, roads, or other sites where the activities occur.

Equipment contained within the GCF will generate continuous noise over the life of the proposed action. Birds, and particularly nesting birds, can be negatively impacted by noise emitted at continuous or irregular intervals during sensitive times of the year (Drewitt and Langston 2006; Burton et al. 2002). The impacts of noise from the BP Endicott oil production facilities on nearby birds have been minimal, likely due to individuals becoming habituated to the sound (Noel et al. 2003). The noise levels at the GCF are anticipated to be much lower, as equipment will be housed within the facility and fitted with sound baffles to minimize noise generation.

Collisions and Direct Mortality

Land-clearing and habitat disturbance associated with construction of the GCF and proposed pipeline in portions of the action area where there is potential spectacled and Steller's eiders nesting habitat, would take place during a single winter. Neither species of eider occurs on the tundra during the months that construction or land clearing would take place. Therefore there is no opportunity for destruction of eider nests, eggs, broods, or nesting adults.

Eider mortalities due to potential collisions between the birds and vehicles, vessels, or structures may occur. The presence of the GCF will increase the potential for spectacled and Steller's eiders to collide with a structure within their habitat over the life of the proposed action. Collisions are most likely to occur during migrations and periods of low visibility; however, collisions are expected to be rare events because of the very low densities of both these species in the project area.

Increased Predation

Increased human activity from the operation of the GCF may attract predators such as Arctic foxes and ravens. It has been hypothesized that increases in subsidized predators are due to availability of anthropogenic food subsidies (i.e., dumpsters and landfills) and also to increased availability of nesting and den sites (NAS 2003). Foxes and ravens are known to feed on the eggs or newborn chicks of sea ducks. Currently, facilities near the action area in Prudhoe Bay adhere to strict protocols to minimize waste that may attract predators and monitor areas that provide nesting habitat. The proposed GCF will operate under these protocols and workers will be trained to remain in compliance. These measures will ensure that O&M activities that increase human activity at the GCF and along the pipeline are not likely to adversely affect spectacled and Steller's eiders. In recent years, the availability of food subsidies to nest predators have been curtailed by the oil industry and are probably not as large a problem as they were previously (Liebezeit 2010).

Spectacled and Steller's eider nesting habitat may be disturbed by trenching that is required to bury the pipeline within the continuous permafrost of the ACP. Site clearance and trenching may alter permafrost present in the action area over time, which could lead to drying of wetland areas (Walker and Everett 1987). Significant drying of small ponds or lakes could lead to a loss of foraging habitat, which is important for breeding spectacled and Steller's Eiders and their fledglings.

The effect of trenching in potential spectacled and Steller's eiders breeding habit will be minimal. As discussed above, spectacled eiders have not been observed south of TAPS MP 12, and the proposed buried section of pipeline begins approximately three miles north of this point. Combined with the low densities of both species in the action area, potential drying of small ponds and lakes from trenching is unlikely to have an adverse effect on Spectacled or Steller's eiders.

To mitigate the impact of permafrost thaw and subsequent wetland drying, the buried sections of pipeline are engineered with chilling units. This will ensure that the buried pipeline will remain very close to the ambient soil temperature and minimize any effects on the habitats of listed species.

4.1.1.2 Whales

The proposed action would result in vessel transit and noise associated with vessel traffic in known beluga, fin, humpback, and bowhead whale habitat. The potential direct and indirect effects of the proposed action on these listed species are discussed together in this section.

Vessel traffic during the two-year construction phase will be the primary cause of effect on whales in the action area. Because O&M will have no effect, construction is the only phase that will be discussed in this section.

In addition to the visual disturbance a transiting vessel may cause, low frequency sound energy from transiting vessels may result in avoidance behaviors from whales in the vicinity of the vessel. All disturbances as a result of vessel transit and associated noise are expected to be minor, temporary, and localized to the immediate area of the transiting vessel (MMS 2009a).

There are a number of factors that influence how a species hears a sound. The fate of sound resulting from vessel transit is site-, season-, and weather-specific (USDOC, NOAA, NMFS 2008). Oceanographic differences in bathymetry and seafloor characteristics play an enormous role in how a sound is carried. In addition, the frequency, intensity, and pressure of a sound will affect its propagation and resulting effects, meaning that the same sound could in fact differ greatly among different sites (USDOC, NOAA, NMFS 2008). These variables make it extremely difficult to estimate how vessel transit sound will be heard by and effect whales in the area. However, noise from a transiting vessel is relatively minimal and all data suggests that, in general, impacts will be limited to temporary deflection away from the transiting vessel (MMS 2009a).

Collisions with whales during vessel transit are also a concern. While increased vessel traffic in habitats occupied by endangered whales has the potential to increase vessel collisions, all available data indicates that vessel collisions are not an important source of injury or mortality (USDOC, NOAA, NMFS 2008). The proposed actions would not represent a significant increase in the volume of marine traffic.

Transiting vessels will take several proactive steps to mitigate any adverse effects and reduce the sound energy received by any marine mammal. Speed will be reduced when marine mammals come within a short distance of a transiting vessel, and in such a case the vessel will refrain from making multiple course changes in an attempt to avoid separating members of a group. Additionally, vessel speed will be reduced during inclement weather to avoid the chance of an accidental collision with a marine mammal. Transiting vessels will also never intentionally approach a marine mammal. Lastly, the transiting vessels will abide by all state and federal

regulations regarding safety radii and maintaining a safe distance between the transiting vessel and any know marine mammals when operating under the scope of the proposed activities.

Fin, Humpback, and Bowhead Whale

Baleen whales are expected to have very similar reactions to transiting vessels and the associated noise, and as such fin, humpback, and bowhead whales will be discussed collectively. Bowhead reactions may be a bit more intense than fin or humpback because they are still hunted annually for subsistence. In addition, bowhead whales have been commercially hunted within some individuals' lifetimes. The typical reaction of a baleen whale to a vessel is to swim away, though a bowhead whale may begin swimming away at a further distance from the vessel than fin or humpback generally do. Bowhead avoidance of a vessel may begin at 0.6 to 2.5 miles, while fin and humpback avoidance of a vessel may begin at 1.2 to 2.5 miles away (MMS 2009b).

Endangered whales have been shown to react more strongly to vessels with outboard motors than those with diesel motors, as well as to vessels that approach quickly and directly rather than slower vessels moving in a direction other than toward the whale (MMS 2009a). Additionally, fin, humpback, and bowhead whales have fewer or less intense avoidance reactions when they are actively engaged in feeding or another activity (USDOC, NOAA, NMFS 2008).

In the event of fin, humpback, or bowhead whale disturbance, feeding or other behaviors resume relatively quickly after the disturbance event, usually within minutes or hours. Some individuals may return to the exact same location, though scattering may last a little longer, but displacement should also be short-term (MMS 2009a).

Data from past studies have indicated that behavioral effects on bowhead whales from oil and gas activities have been "primarily, but not exclusively avoidance." No such data have indicated that "such avoidance is long-lasting after cessation of the activity" (USDOC, NOAA, NMFS 2008). Bowhead whales in the vicinity of a transiting vessel are expected to slightly change their swimming speed and direction in an effort to avoid closely approaching the vessel or noise source (USDOC, NOAA, NMFS 2008).

Data from a study that Wartzok et al. (1989) did in the Canadian Beaufort showed that bowheads generally ignore small vessels at distances greater than 547 yards. In the bowheads tagged and studied, 180 whales voluntarily approached within 547 yards of small vessels. Little response was observed in these cases unless there was a sudden change in sound level resulting from a vessel accelerating. A separate Canadian study also found that data do not support the theory of decreased use of a zone due to oil and gas activities, including vessel transit (USDOC, NOAA, NMFS 2008).

Sound energy coming from transiting vessels does have the potential to mask whale sounds that would otherwise be heard. Masking may disrupt communication and detection of important resources. Due to the transient nature of the vessels in the area, this would be temporary and localized, and would thus not significantly effect the exposed whales (MMS 2009b).

No mortalities or injuries are likely as a result of ASAP activities. At most, vessel traffic associated with the proposed action may result in undetectable transitory avoidance behavior by very small numbers of whales with no biological consequence. Thus, the proposed actions are not likely to adversely affect fin, humpback, or bowhead whales.

Cook Inlet Beluga Whale

Disturbance

Noise from barging activities associated with ASAP could affect whale behavior by causing temporary avoidance. Startle responses were observed when vessels moved in areas with high concentrations of beluga whales (Fraker et al. 1978).

The extent of disturbance or harassment effects on the Cook Inlet beluga whale DPS by vessel traffic associated with the construction phase of the proposed project are likely to be temporary and localized. Noise from vessel traffic may affect, but is not likely to adversely affect, the Cook Inlet DPS of beluga whales.

Increased shipping could displace beluga whales from the Port of Anchorage area due to noise and disturbance. However, barges move slowly, and injuries to beluga whales from strikes by ships calling at the Port of Anchorage would be highly unlikely. Furthermore, barge traffic associated with the proposed project is temporary, and the relatively small increase in vessel traffic will span a two-year period. The number of vessel calls per year to the Port of Anchorage between 2002 and 2008 averaged 219 (USDOT 2009).

Noise from vessels at the Port of Anchorage could interfere with behavior and communications by masking natural sounds or calls from other beluga whales. However, vessel activity associated with the proposed project would be low and within the current scope of normal activities in the area.

Beluga whales may habituate to constant noises when the noise is not associated with hunting (Huntington et al. 1999). The additional noise from the relatively low number of barges expected to be added to existing vessel traffic in Cook Inlet will not likely cause more masking than what already may be occurring in the area.

Indirect Effects

Projects that cause changes in anadromous fish runs in streams that feed into Cook Inlet could also adversely affect beluga whales (NMFS 2008b). Anadromous streams are important to beluga whales, because they provide habitat that supports salmon species. Construction of the proposed pipeline could adversely affect anadromous streams if habitat or hydrology is altered, water quality is degraded, fish passage is impeded, or if fish are injured or killed.

All state and federal laws will be followed to mitigate potential negative effects from crossing anadromous streams. Therefore, no indirect effects from crossing anadromous streams are anticipated on beluga whales in Cook Inlet.

4.1.1.3 Polar Bears

Habitat Loss

Project facilities located within the terrestrial nearshore range of the polar bear within the ACP are identified above in Table 4.1-1. The proposed action would result in construction, maintenance, and operation of both the GCF and a segment of pipeline with raised and buried sections within the terrestrial range of the polar bear. Habitat losses within the footprint of the GCF and the buried and elevated portions of the pipeline would be permanent; however, suitable alternative terrestrial habitat is widespread across the North Slope and not a limiting factor for the species.

The location of the GCF and the proposed pipeline have not been surveyed to determine whether any areas contain the features necessary for polar bear denning. However, the proposed GCF facility location was selected within the existing Prudhoe Bay oilfield based upon its close proximity to existing oil and gas infrastructure and activity, and its relatively flat terrain, and the pipeline route closely follows the existing TAPS and Dalton Highway corridor. Accordingly, the area is unlikely to exhibit necessary macrohabitat characteristics for maternal denning, such as steep slopes (e.g., coastal bluffs and river banks), unobstructed access to the coast and the absence of disturbance from humans and human activities. No material dens are known to have been previously located within the proposed project footprint.

The habitat loss associated with the proposed ASAP project is not likely to adversely affect the polar bear species.

Disturbance

The construction and operation of the GCF and the proposed pipeline, and associated traffic, may cause temporary behavior changes in polar bears, due to loud noise and temporary or permanent physical obstruction. Disturbance from activities resulting from the proposed project could elicit several different responses in polar bears. Noise may act as a deterrent or attraction to bears. However, there is evidence that disturbance from stationary sources results in minor changes in behavior of polar bears. Observations to-date include numerous instances of polar bears who encounter facilities and then change their direction of movement and leave the area. Bears are frequently observed climbing over and crossing gravel roads and causeways in Prudhoe Bay oilfields, and appear to have little fear of manmade structures (USFWS 2009a). The proposed facilities in the action area may present a small-scale, local obstruction to some individual bears' movements but the effect on the species would be negligible.

Denning females are expected to avoid the construction and operations areas due to the lack of suitable habitat and human presence. Although denning females are not expected to occur in close proximity to ASAP project construction and operations activities, the potential to disturb a denning female exists.

The best available scientific information indicates that female polar bears entering dens, or females in dens with cubs, are more sensitive to noise than other age and sex groups (USFWS 2009a). According to Smith et al. (2007) noise from stationary activities may potentially deter females from denning nearby; however, polar bears have been known to den near industrial activities without any observed effect. On average, female polar bears den in the Beaufort Sea area in mid-November and emerge in early April (Amstrup and Gardner 1994); however, these dates can vary year-to-year depending upon sea ice, snow, and weather conditions. (Messier et al.

1994). The oil and gas industry, operating pursuant to MMPA authorizations, has successfully conducted annual den detection surveys and has implemented appropriate monitoring and protection measures, including maintenance of a one-mile radius buffer around maternal dens, such that effects on polar bears have been minimal. Similar measures will be implemented for the ASAP project activities through the MMPA authorization process and, accordingly, no more than a negligible effect is anticipated to occur.

Human-Bear Interactions

The proposed action may result in human-polar bear interactions that occur in the action area. Bears may be attracted or repelled by industry actions, depending on the circumstances. Industry activities are subject to the MMPA which prohibits the taking of polar bears without authorization. Mitigation measures required for all oil and gas projects include a site-specific plan of operation and human-bear interaction plan, to minimize impacts on both species.

There are several mechanisms through which the incidental takes of small numbers of polar bears can be authorized under the MMPA. The most commonly used is through the issuance of ITRs. Before USFWS can provide ITRs for polar bears under the ESA, take of marine mammals must first be authorized under the MMPA (MMS 2009a). For example, under this authorization the deterrence of bears from the facilities and structures is allowed, so that bear-human interactions are prevented. This type of deterrent or “harassment” may include using vehicles to make noise, using flashing lights, or firing cracker shells.

Under the MMPA, the oil and gas industry has received LOAs for development operations on the North Slope and the Beaufort Sea, regarding protection of polar bears. These LOAs have required mitigation measures, such as Polar Bear Interaction Plans, which include a range of measures such as:

- Use of detection systems, such as bear monitors
- Use of safety gates and fences
- Implementation of appropriate garbage, hazardous waste, and snow management plans
- Identifying the chain of command for responding to a polar bear sighting
- Employee training programs to educate field personnel regarding bear safety procedures

The above measures will be implemented prior to construction activities and followed during construction and operation activities to minimize human interactions with polar bears. As a result, small numbers of incidental interactions with polar bears, resulting in no mortality or injury, and causing only temporary deflection and minor changes in behavior, are likely to occur. The effects of these interactions, individually and cumulatively, is likely to be negligible.

Indirect effects to polar bears are not expected as a result of the proposed project during development or operation. Polar bears are expected to occur in the action area during the lifetime of the project and will not be adversely effected by project activities, except for temporary and minor disturbances to some individual bears, during construction.

4.1.2 Critical Habitat

4.1.2.1 Cook Inlet Beluga Whale

The NMFS has proposed but not yet designated critical habitat for the Cook Inlet DPS of beluga whales on April 11, 2011, effective May 11, 2011 (76FR 20180). The Port of Anchorage was excluded from the final rule in consideration of national security interests.

The proposed project activities in the action area in Cook Inlet will include vessel transit and docking at the Port of Anchorage. Several barge companies regularly use the Port of Anchorage for the transfer of products. The number of vessel calls per year to the Port of Anchorage between 2002 and 2008 averaged 219 annually (USDOT 2009). Transportation of ASAP materials via barge to the Port of Anchorage is within the scope and present volume of normal daily activities at this facility. Noise from transiting barges is not expected to cause beluga whales to abandon areas within the critical habitat.

The proposed project is not likely to have a detectable adverse effect on beluga whale critical habitat. Accordingly, beluga whale critical habitat will not be adversely modified or destroyed as a consequence of the proposed project.

4.1.2.2 Polar Bear Critical Habitat

Marine transportation activities associated with GCF and pipeline construction will occur during the summer open water season within the boundaries of Unit 1 (sea ice) of designated polar bear critical habitat, and in close proximity to the boundaries of Unit 3 (barrier island) critical habitat. However, polar bears are not expected to be present during open water conditions or in close proximity to West Dock facilities and activities during the summer, and no effects to these critical habitat units are anticipated.

As previously addressed above, the GCF and a portion of the pipeline will be located within the boundaries of Unit 2 (maternal denning) critical habitat. However, the areas directly affected by construction and operation are not known to have been used for maternal denning and are not likely to contain the essential macrohabitat elements for polar bear denning because of the flat terrain, prior disturbance, and ongoing human activity characteristics of these areas. Moreover, the availability of suitable denning habitat is widespread across the ACP and is not a limiting factor for polar bear recruitment and survival.

Although a small proportion of the Unit 2 area will be altered by construction and operations activities associated with the proposed project, such activities are not likely to adversely modify or destroy polar bear critical habitat.

No indirect effects are expected to occur to polar bear designated critical habitat, as a result of this project.

4.1.3 Candidate and Proposed Species - Pinnipeds

Vessel traffic during the two year construction phase is the only project activity that may effect pinnipeds in the action area. Because O&M will have no effect, construction is the only phase that will be discussed in this section.

4.1.3.1 Steller Sea Lion

The only project activity with the potential to effect Steller sea lions will be noise from the transit of a small number of vessels to and from the Port of Seward.

Calkins and Pitcher (1982) found that disturbance from aircraft and vessel traffic has variable effects on hauled-out Steller sea lions. Steller sea lion reaction to occasional disturbances ranges from no reaction at all to complete and immediate departure from the haul-out area. Low levels of occasional disturbance may have little long-term effect on sea lions. (Kenyon and Rice 1961).

Since Steller sea lions were afforded ESA protection in 1990, regulations have been in place to minimize disturbance of animals by humans. There are no sea lion haul-outs within, or in the immediate vicinity of, the action area at the Port of Seward. Moreover, vessel traffic associated with the Port of Seward is not known to have adverse effects on Steller sea lions. Due to limited vessel traffic associated with this project, and concurrent with the existence of vessel traffic already in the action area at the Port of Seward, the potential for adverse effects is discountable and, accordingly, proposed action is not likely to adversely affect Steller sea lions.

4.1.3.2 Pacific Walrus

Vessel noise associated with marine transportation of construction materials to West Dock has the potential to result in transient disturbance of very small numbers of Pacific walrus. However, the presence of Pacific walrus in the action area is rare, and no detectable effects are likely to occur.

Pacific walrus are known to use the central Beaufort Sea; however, their presence within the action area has been rare. Richardson et al. (1995) found that vessel noise does not seem to strongly affect pinnipeds (seals, sea lions, fur seals, and walruses) that are already in the water. Walruses may avoid moving vessels, with most reactions occurring within 0.29 miles (Richardson et al. 1995) or they may approach vessels out of curiosity. The impact of vessel traffic on marine mammals generally is expected to be transient and localized. Because of the low number of walrus expected to occur in the central Beaufort Sea, and the limited amount of vessel transit occurring in the proposed action area from project activities, the potential for effects from vessel traffic are discountable. Moreover, were there to be any effect, the consequences are expected to result in no detectable adverse impact on the Pacific walrus. Therefore, the ASAP may affect, but is not likely to adversely affect, the Pacific walrus.

There are no indirect effects on Pacific walrus anticipated as a result of the proposed project.

4.1.3.3 Ringed and Bearded Seals

Because the effects of vessel traffic are similar for all ice seals, effects on ringed and bearded seals will be addressed together in this section.

Direct effects on ringed and bearded seals could result from the presence of vessels at West Dock. However, no more than temporary and localized disturbance effects would occur. Disturbance effects exhibited by seals due to vessel traffic include moving away from the vessel or diving into the water if hauled-out on floating ice. Local effects would not change seal abundance or distribution near West Dock.

Vessels associated with the proposed project will only be at West Dock during summer months when water is typically ice-free in the action area. Seals prefer water near ice platforms on which

they can haul-out. However, seals do also swim in areas of open water. Seals swimming in the water are not strongly affected by vessel noise (Richardson et al. 1995). Seals hauled-out respond more strongly to vessel noise and often respond by diving into the water (Richardson et al. 1995). It is not likely that there will be ice available for seals at West Dock during the summer when vessels associated with the project will be transiting. MMS has previously determined that increasing vessel traffic in the entire Beaufort Sea has no more than a negligible effect on ice seals (MMS 2008).

Although the potential for disturbance of very small numbers of ringed or bearded seals from vessel traffic exists, the effects, if any, are likely to be so negligible as to be undetectable individually or cumulatively. Vessel activity associated with the proposed project would be low and within the current scope of normal activities at West Dock. Accordingly, while the proposed project may affect ringed and bearded seals, it is not likely to adversely affect these species.

There are no likely indirect effects on seals anticipated as a result of the proposed action.

4.2 *Cumulative Effects*

Cumulative effects include the effects of future state, tribal, local or private actions, not involving federal activities, that are reasonably certain to occur in the action area for the proposed federal project (50 C.F.R. 402.02). Future federal actions that are unrelated to the proposed action are not considered in this section because such action will require separate consultation pursuant to Section 7 of the ESA.

All of the activities occurring within the action area are present actions that contribute to the existing environmental baseline and that are expected to continue into the future. These activities include oil and gas exploration and development on and adjacent to the North Slope; human habitation and development; vessel transportation into and use of the Port of Anchorage, the Port of Seward and West Dock; subsistence activities on the North Slope; and tourism. Oil and gas development activities are not subject to this cumulative effects analysis because they would be subject to federal permitting requirements and, thus, would require future Section 7 consultation. There are no data or information indicating that the extent or magnitude of the other identified state, tribal, local or private activities are likely to increase beyond their current levels. Accordingly, future state, tribal, local and private actions are likely to consist of a continuation of those currently contributing to the environmental baseline in the action area, and the effects are expected to remain stable and within the range of effects experienced in the past and present. Because there is no indication that the extent or magnitude of state, tribal, local or private actions will increase in the foreseeable future within the action area beyond their current levels, cumulative effects are not likely to adversely affect any of the listed or proposed for listing species, or any designated critical habitat occurring within the action area.

4.2.1 Climate Change

4.2.1.1 Global Climate Change

Global Climate Change, sometimes referred to as “Global Warming,” refers to long-term fluctuations in temperature and other elements of the Earth’s climate system. Natural processes such as solar-irradiance and volcanic activity can produce variations in climate. However, the IPCC has linked global climate change and the “greenhouse effect” to steep rises in atmospheric concentrations of CO_2, methane (CH_4), nitrous oxide (N_20), and synthetic halocarbons (chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, halons and sulphur hexafluoride) (IPCC 2007). Although scientific debate continues regarding the contributing factors to observed climate change and projections of trends and effects under various future scenarios, there is a

current scientific consensus that increasing levels of carbon dioxide and other atmospheric greenhouse gases are a significant cause and ongoing contributing factor (IPCC 2007). At current rates of greenhouse gas release, average global surface temperatures could increase by 2.5 to 10 ºF (1.4 to 5.8 ºC) by the year 2100 (IPCC 2007).

General predictions of increasing climate change include, in addition to an increase in average surface temperatures, a rise in sea level, changes in oceanography (including changes in temperature, salinity, pH and sea ice), and increases in the severity of storms, floods, droughts, rainfall, heat waves and other weather anomalies. Some areas are expected to experience greater effects than other areas, however, prediction models are not sophisticated enough at the present time to make accurate regional predictions of such effects.

4.2.1.2 Arctic Climate Change

Although regional predictions of climate change based upon existing climate models are not considered reliable, there is a scientific consensus that the Arctic is already experiencing important climate changes and is expected to be one of the regions where climate change effects may be greatest. To date, many of the documented and most important effects have concerned reductions in sea ice extent and thickness in recent years. Analysis of long-term data sets indicates substantial reductions in both the extent and thickness of the arctic sea ice cover during the past 20-40 years, with record minimums in several recent years. Within the Artic, the Beaufort Sea has experienced some of the largest declines in ice extent during the summer. Other observed Arctic changes include decreased precipitation (particularly drier summers and falls), forest decline, permafrost degradation, increased storms and coastal erosion, and changes in ocean salinity, pH and temperature.

4.2.1.3 Potential Effects of the ASAP Project on Climate Change

In 2005, the U.S. emissions of CO_2 equivalent (CO_2 eq) totaled 7,147.2 million metric tons. Alaska currently emits approximately 53 million metric tons of CO_2 eq, and by the year 2020 is expected to emit 60 million metric tons (ADEC 2007).

There is no present scientific or policy (local, state, national or global) consensus regarding methodology, reliability, or relevance of estimating project-specific contributions to global climate change, or of attributing environmental impact significance to project-specific emissions of greenhouse gases. Accordingly, projected ASAP emissions cannot be quantified or causally linked in any scientifically accepted way to global climate change generally, or to climate change effects in the action area on listed species and critical habitat.

Qualitatively, probable effects of the ASAP project are likely to be indiscernible given projected emissions, the uniform distribution of greenhouse gas concentrations globally, and the absence of any meaningful nexus between the ASAP project and global oil and gas production and consumption rates. Moreover:

- The proposed project facilities would combust natural gas which is a lower emitter of carbon CO_2 with a rate of 117 lbs/(million British thermal units (MMBtu) versus 161 lbs/MMBtu for fuel oil combustion or 215 lbs/MMBtu for coal combustion (Energy Information Administration 2008).
- The proposed project would likely facilitate conversion from wood-, coal- and fuel-oil-based residential comfort heating in the Fairbanks North Star Borough, thus reducing overall greenhouse gas (GHG) emissions locally.

- The proposed project facilities will likely require air quality permits which incorporate emissions reduction control technology evaluations as part of the permitting process. EPA has currently promulgated Best Available Control Technology (BACT) requirements for GHG emissions for new sources (EPA 2010).
- Stricter EPA regulation of criteria pollutants (NOx) and certain hazardous air pollutants (HAP's) that also contribute to climate change would affect the proposed project facilities and require BACT.
- Newer technologies for emissions control of GHGs are being developed and may become available at the time the proposed project facilities are permitted and constructed.

There are no generally-applicable requirements, policies or guidance regarding appropriate mitigation measures for GHG emissions on a project-specific basis. In significant part, this is because there are no established Alaska or federal climate change or GHG emissions reduction or mitigation plans. Currently available information does not establish that solutions to these global problems may be effectively managed on an ad hoc, project-by-project, basis. Moreover, currently, there are no legal requirements or specific policies that impose restrictions on the ASAP project regarding GHG emissions, that limit or discourage production and consumption of domestic natural gas reserves, or that limit the production and consumption of natural gas from other domestic and foreign sources were the ASAP project not approved, for the purpose of limiting or mitigating global climate change effects.

Emissions from the proposed project are not expected to contribute in any discernable way to climate change, to climate change effects within the action area, or to effects upon listed species or critical habitat. Construction and operation of project facilities, and transiting vessel traffic in support of the proposed activities, is expected to contribute an extremely small amount of the overall GHG emissions into the planet's atmosphere and may, in some respects, ameliorate or reduce GHG emissions and climate effects that might otherwise result from the use of energy sources that produce larger amounts of GHGs than natural gas.

5.0 DETERMINATION OF EFFECT

5.1 *Steller's and Spectacled Eiders*

The construction and O&M of the ASAP are likely to adversely affect Steller's and spectacled eiders at the individual level of a very small number of takes as defined in the ESA, but with no detectable population level effects. Bird collisions with pipeline facilities, vehicles, and vessels are likely to occur in very small numbers during periods of migration and low visibility over the life of the project. Construction activities associated with the project are expected to produce very temporary and local disturbances to eiders and eider habitat, and are expected to occur primarily in winter outside of nesting season. During the operation and maintenance phase of the proposed project, strict protocols will be enforced that reduce waste and deter predators from facilities, thus minimizing disturbance to breeding and nesting eiders. No detectable effects to Steller's or spectacled eider populations are expected to occur from this proposed project.

5.2 *Whales*

5.2.1 Bowhead, Fin, and Humpback Whales

The construction and O&M of the proposed ASAP may affect but is not likely to adversely affect bowhead, fin, or humpback whales in the Beaufort Sea in the action area around West Dock. Vessel traffic associated with the proposed project will fall within the range of normal activity on the North Slope and at West Dock. Permit stipulations and mitigation measures will minimize any effects of disturbance from vessel traffic associated with the proposed project. Stipulations required by the NMFS as a result of the Section 7 consultation process will also be adhered to.

5.2.2 Cook Inlet Beluga Whale

Transportation activities associated with construction of the proposed ASAP may affect but are not likely to adversely affect the Cook Inlet beluga whale. Barging activities in and near the Port of Anchorage will be within the range of existing vessel traffic and are not likely to result in any detectable direct adverse effects. In addition, no indirect adverse effects through changes in prey access are likely as a result of anadromous stream crossings by the proposed pipeline. Permit stipulations will be adhered to and mitigation measures will be implemented to eliminate or reduce potential impacts to salmon runs in anadromous streams that will be crossed by the proposed pipeline.

5.2.3 Cook Inlet Beluga Whale Critical Habitat

The proposed project will not destroy or adversely modify critical habitat. Vessel traffic from the proposed project will occur within the range of existing vessel traffic. Although vessel traffic generates noise that has the potential to disturb marine mammals, vessel traffic at the Port of Anchorage is not expected to alter the suitability or use of the area by beluga whales. Because there will be no alteration or modification of habitat in Cook Inlet associated with the proposed project, there will be no effect on the beluga whale critical habitat.

5.3 *Pinnipeds*

5.3.1 Steller Sea Lion

Vessel traffic associated with transportation of construction materials for the proposed ASAP may affect, but is not likely to adversely affect Steller sea lions in or near the Port of Seward. Vessel traffic associated with the proposed project will fall within the range of normal activity near the Port of Seward and the action area does not encompass rookeries or other sensitive areas. Although noise from vessel traffic within the action area has the potential to transitorily disturb individual sea lions, not detectable adverse effects are known to occur in this area due to routine vessel traffic and none are likely as a result of the proposed project. The action area is not located within Steller sea lion designated critical habitat.

5.3.2 Pacific Walrus

As the Pacific walrus does not occur frequently in the Beaufort Sea, the construction and O&M activities associated with the proposed ASAP may affect but are not likely to affect walruses. Vessel traffic associated with the proposed project will fall within the range of normal activity in the action area around West Dock. The probability of a vessel within the action area interacting with an individual or group of walrus and/or adversely affecting the walrus is extremely low and, therefore, discountable. Mitigation practices will be followed to reduce any potential disturbance vessel traffic may have if interaction with walrus occurs, but no detectable adverse effects are anticipated.

5.3.3 Ringed and Bearded Seals

Marine vessel traffic associated with construction of the proposed ASAP may affect but is not likely to adversely affect ringed and bearded seals in the action area around West Dock. Small numbers of seals may be present in the area around West Dock and could be temporarily disturbed by noise associated with project vessel traffic. However, vessel traffic associated with the proposed project will fall within the range of normal activity near West Dock, and such activity is not known to have had adverse impacts on ringed and bearded seals. The NMFS will require certain stipulations be followed to reduce potential disturbance effects on ringed and bearded seals from vessel traffic associated with the proposed project. No detectable adverse effect to ringed or bearded seals is likely to occur.

5.4 *Polar Bears*

The proposed ASAP and the activities associated with the construction and O&M of this project are likely to adversely affect small numbers of individual polar bears at the level of a “take” by harassment as defined in the MMPA and the ESA. Over the life of the project, hazing of a small number of polar bears, resulting in a “take,” will likely occur for personnel safety purposes at some point during the lifetime of the ASAP project, however, the effects are likely to be limited to temporary changes in behavior, such as deflection. No injuries or mortality is likely. Polar bear mitigation measures will be adhered to throughout the lifetime of the project and, accordingly, no significant adverse effects on polar bears and polar bear habitat are likely.

5.4.1 Polar Bear Critical Habitat

Construction of the proposed ASAP is likely to adversely affect but not adversely modify or destroy polar bear critical habitat. The proposed project will not affect designated sea ice or barrier island critical habitat for the polar bear. However, construction activities and permanent project facilities will occupy a small proportion of the area designated as polar bear denning critical habitat (Unit 2). The areas affected

by the proposed project are not likely to exhibit the essential habitat requirements for actual polar bear denning, and are not known to have been the location of maternal dens in the past. Moreover, maternal denning habitat is plentiful and widely distributed across the ACP.

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APPENDIX A

USFWS Correspondence - - Species List Letter dated 17 December 2010

NMFS Correspondence - - Species List Letter dated 10 December 2010

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United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Fairbanks Fish and Wildlife Field Office
101 12th Avenue, Room 110
Fairbanks, Alaska 99701

December 17, 2010

U.S. Army Corps of Engineers
Regulatory Division
Attn: Serena Sweet
P.O. Box 6898
Elmendorf AFB, AK 99506-0898

Re: Request for Endangered Species or Critical Habitat list for POA-2009-651 ASAP Project

Dear Ms. Sweet:

Thank you for your November 2, 2010 letter requesting information on endangered and threatened species, and designated critical habitats pursuant to Section 7 of the Endangered Species Act of 1973, as amended (Act).

Based on your letter, we understand the Alaska Gasline Development Corporation (AGDP) is proposing to construct a 24-inch diameter, high pressure natural gas pipeline from Alaska's North Slope to Cook Inlet. North Slope natural gas would be transported to in-state Alaska markets from take-off points in the Fairbanks area and other locations along the route. We also understand that you are preparing an Environmental Impact Statement (EIS) for the project.

This project is within the range of three species listed as threatened under the Act. Spectacled eiders (*Somateria fischeri*), Alaska-breeding Steller's eider (*Polysticta stelleri*), and polar bears (*Ursus maritimus*) occur on the North Slope. Critical habitat for the polar bear was recently designated in the action area (December 7, 2010), and includes sea-ice habitat, terrestrial denning habitat, and barrier island habitat.

This list applies only to endangered and threatened species under the jurisdiction of the Alaska U.S. Fish and Wildlife Service. It does not preclude the need to comply with other environmental legislation or regulations such as the Clean Water Act. Please contact the National Oceanic and Atmospheric Administration to determine the status of listed and proposed species under their jurisdiction in the project area.

Thank you for your cooperation in meeting our joint responsibilities under the Act. If you need further assistance, please contact me at (907) 456-0324.

Sincerely,

Jewel Bennett
Branch Chief
Conservation Planning Assistance

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

December 10, 2010

Colonel Reinhard W. Koenig
U.S. Army Corps of Engineers, Alaska District
P.O. Box 6898
Elmendorf AFB, AK 99506-0898

Re: POA- 2009-651
Alaska Stand Alone Pipeline (ASAP)
Project Request for Species List

Attn: Serena Sweet

Dear Colonel Koenig:

The National Marine Fisheries Service (NMFS) received your letter requesting information on threatened or endangered species and Essential Fish Habitat (EFH) associated with the Alaska Stand Alone Pipeline (ASAP) Proposed Project Area. The Corps of Engineers also provided NMFS with a CD of updated project documents which describe the proposed project in detail.

Background

NMFS provided scoping comments to the Corps for the ASAP project on March 8, 2010. After having recent discussions with the Corps and reviewing updated project descriptions, it is apparent that some aspects of the proposed project have changed and/or may still change somewhat.

The current proposed project involves construction of a 737 mile long, 24-inch diameter pipeline designed to transport natural gas consisting of either a highly conditioned natural gas highly enriched in non-methane hydrocarbons or conditioned natural gas containing mostly methane. The pipeline would start at Prudhoe Bay and follow the Trans-Alaska Pipeline System (TAPS) and Dalton Highway corridors, generally paralleling the highway corridor from the North Slope to near Livengood, northwest of Fairbanks. The pipeline would head south at Livengood and join the Parks Highway corridor west of Fairbanks near Nenana. From Nenana it would continue south to milepost 39 (near Wasilla) of the Beluga Pipeline (ENSTAR's distribution system) providing access to tidewater at Cook Inlet. There would also be a 12-inch diameter lateral pipeline to Fairbanks (Fairbanks Lateral) which would take off from the main pipeline just a few miles north of Nenana at Dunbar. The Fairbanks Lateral would travel approximately 35 miles northeast to Fairbanks.

The Corps has designated ASRC Energy Services, Inc. as the point of contact for the project EIS and biological assessment. In a recent phone conversation with ASRC Energy Services, they noted that marine interactions will be limited to transport. They also stated that existing facilities at West Dock and an existing port in Southcentral Alaska (possibly Anchorage or Seward) would be used for the transport (via barge).

The following information is based on the above project description and accounts for species that may be present in the marine areas off of Prudhoe Bay, Cook Inlet, Anchorage, and Seward.

Essential Fish Habitat

Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with NMFS on all actions or proposed actions authorized, funded, or undertaken by the agency that may adversely affect EFH. If a federal action agency determines that an action will not adversely affect EFH, no consultation is required, and the action agency is not required to contact NMFS about their determination.

EFH has been designated in waters used by anadromous salmon and various life stages of marine fish under NMFS' jurisdiction. Six fishery management plans exist for fisheries in Alaska. They cover groundfish in the Gulf of Alaska, groundfish in the Bering Sea and Aleutian Islands, crab in the Bering Sea and Aleutian Islands, salmon, scallops and federally managed species in the Arctic. Please visit our web site at http://www.fakr.noaa.gov/habitat/efh.htm and our National EFH Mapper at http://www.habitat.noaa.gov/protection/efh/habitatmapper.html for additional information on habitat and EFH.

Threatened and Endangered Species

NMFS has management responsibility for all marine mammals in Alaska except sea otter, walrus, and polar bear and for sea turtles, anadromous fish, marine fish, marine plants, and corals. Section 7(a)(2) of the Endangered Species Act (ESA) directs federal interagency cooperation "to insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species" or result in the destruction or adverse modification of critical habitat. Please visit our web site http://www.nmfs.noaa.gov/pr/species/esa/, for additional information regarding protected species and the ESA and critical habitat within Alaska.

Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) of 1972 prohibits, with few exceptions, injury, harm or harassment of marine mammals. Under the 1994 Amendments to the MMPA, harassment is defined as any act of pursuit, torment, or annoyance which has the potential to injure or disturb a marine mammal causing disruption of behavioral patterns including migration, breathing, nursing, breeding, feeding or sheltering.

Prudhoe Bay

Endangered bowhead whales may be found in or adjacent to the proposed ASAP Project area and their presence would be considered seasonal or occasional occurrences.

NMFS is currently proposing to list a subspecies of ringed seals found in the Arctic and a distinct population segment of bearded seals in the Pacific Ocean (which may be found in this area) as

threatened under ESA. Please visit our web site at http://alaskafisheries.noaa.gov/protectedresources/seals/ice.htm or 50 CFR Part 223 for further information.

Gray, beluga, and killer whales may also be present in the area and are protected under the MMPA.

Cook Inlet

Endangered Cook Inlet beluga whales, endangered fin whales, endangered humpback whales, and endangered Steller sea lions may be found within Cook Inlet.

Minke, gray, and killer whales, Pacific white-sided dolphins, dall's and harbor porpoises, and harbor seals may also be present in the area and are protected under the MMPA.

Anchorage

Endangered Cook Inlet beluga whales may be found in this area.

Harbor seals may also be present in the area and are protected under the MMPA.

Seward

Endangered fin whales, endangered humpback whales, and endangered Steller sea lions may be found in this area

Minke, gray, and killer whales, Pacific white-sided dolphins, dall's and harbor porpoises, and harbor seals may also be present in the area and are protected under the MMPA.

Critical Habitat

On December 1, 2009, NOAA proposed critical habitat for Cook Inlet beluga whales which may be located in or adjacent to possible project areas in waters near Anchorage or within Cook Inlet. A listing of these areas and further information may be found on our website at http://www.fakr.noaa.gov/protectedresources/whales/beluga.htm.

NMFS has designated rookeries, major haul outs, and marine foraging areas of the Steller sea lion in Alaska as critical habitat. A listing of these areas and further information may be found on our website at http://www.fakr.noaa.gov/protectedresources/stellers/habitat.htm, or in 50 CFR 226.202.

Critical habitat has also been proposed for the northern right whale in the Bering Sea and Gulf of Alaska, but appears to be outside the area associated with the subject plan.

Marine/Anadromous Fish

Several Pacific salmon stocks are also listed under the ESA and occur within Alaskan waters. These include the following Evolutionarily Significant Units (ESA): Lower Columbia River spring Chinook, Upper Columbia River spring Chinook, Lower Columbia River steelhead, Middle Columbia River steelhead, Upper Columbia River steelhead, Puget Sound Chinook, Snake River spring/summer Chinook, Snake River fall Chinook, Snake River basin steelhead, and Upper Willamette River steelhead. These stocks range throughout the North Pacific.

We hope this information is useful in fulfilling your requirements under section 7 of the ESA and section 305(b)(2) of the Magnuson-Stevens Act. Should you have any questions, please contact LT Amy Cox by email at amy.b.cox@noaa.gov, or by telephone at (907) 271-6620.

Sincerely,

James W. Balsiger, Ph.D
Administrator, Alaska Region

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APPENDIX B

AGDC Plan of Development, Rev. 1

The AGDC Plan of Development (POD) appended to the Biological Assessment has not been reproduced here. The POD may be viewed at www.asapeis.com.

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APPENDIX C

Mitigation Measures

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The USACE will consult with NMFS and USFWS to determine additional mitigation measures that may be required to ensure that the ASAP is not likely to jeopardize the continued existence of any ESA-listed species or result in the destruction or adverse modification of critical habitat. Mitigation will include application for an LOA and/or IHA for polar bears and walruses, and mitigation measures will be specified in such approvals.

Typical mitigation measures that will likely be required of ASAP vessel operators and construction crews by the USFWS and the NMFS.

Mitigation Measures	Species
Avoid concentrations of groups of whales by all vessels.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear
Maintain the maximum practicable distance from concentrations of marine mammals.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear
Not approach Pacific walruses or polar bears on ice or land closer than 805 m (.5 mi).	Pacific Walrus, polar bear
Reduce vessel speed to below 10 knots when within 300 yards (274 m) of whales and those vessels capable of steering around such groups should do so.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale
Vessels may not be operated in such a way as to separate members of a group of marine mammals from other members of the group.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear
Avoid multiple changes in direction and speed when within 300 yards (274 m) of whales. In addition, operators should check the waters immediately adjacent to a vessel to ensure that no whales will be injured.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale
Reduce vessel speed when weather conditions require, such as when visibility drops, to avoid the likelihood of injury to marine mammals.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear
Implement a 24-hour monitoring plan to record and observe polar bears in the area to minimize polar bear and human interactions, thereby reducing the potential for take.	polar bear

Mitigation Measures	Species
Reduce/eliminate polar bear attractants.	polar bear
Store food waste and other associated waste in containers until transferred for disposal at an approved disposal site.	Polar bear
Transfer sanitary waste from bathrooms, sewage sludge, and kitchen-associated garbage on a regular basis to ensure control of attractants.	Polar bear
Identify kitchen grease for treatment as spoilable waste.	Polar bear
Transport hazardous wastes off vessel for disposal at an approved facility.	Polar bear
Strictly prohibit employees from directly feeding animals, throwing food to animals, or improperly disposing of food wastes.	Polar bear
Ensure bear has escape route(s) prior to conducting harassment activity.	Polar bear
Choose the method that will have the least effect on the bear and increase the intensity of the method or use additional methods of harassment only if necessary.	Polar bear
Shout at the bear as a method of harassment before using a projectile.	Polar bear
Monitor bear movement after harassment	Polar bear
Designate a qualified individual or individuals to observe, record, and report on the effects of their activities on polar bears and Pacific walruses.	Pacific Walrus, polar bear
Have an approved polar bear and/or walrus interaction plan on file with the USFWS and onsite.	Pacific Walrus, polar bear
Train operation and construction crews regarding polar bear awareness.	Polar bear
Provide USFWS and NMFS with a Plan of Cooperation that ensures that activities will not interfere with subsistence hunting and that adverse effects on the availability of marine mammals are minimized.	Bowhead whale, ringed seal, bearded seal, polar bear, Pacific walrus
Contact affected subsistence communities to discuss potential conflicts caused by location, timing, and methods of proposed operations.	Bowhead whale, ringed seal, bearded seal, polar bear, Pacific walrus
Make efforts to locate occupied polar bear dens within and near proposed areas of operation, utilizing appropriate tools, such as, forward looking infrared (FLIR) imagery and/or polar bear scent-trained dogs and report polar bear dens to the USFWS prior to the initiation of activities.	Polar bear
Observe a 1-mile operational exclusion zone around all known polar bear dens during the denning season (November-April) or until the female and cubs leave the areas.	Polar bear

Mitigation Measures	Species
Cease work in the immediate area of previously unknown occupied polar bear dens and contact the USFWS for guidance.	Polar bear
Restrict the timing of activity to limit disturbance around polar bear dens.	Polar bear
Consult with potentially affected communities and appropriate subsistence user organizations to discuss potential conflicts with subsistence marine mammal hunting caused by the location, timing, and methods of proposed operations and support activities.	Bowhead whale, ringed seal, bearded seal, polar bear, Pacific walrus
Develop and implement a site-specific, USFWS- and NMFS-approved, marine mammal monitoring and mitigation plan to monitor and evaluate the effects of authorized activities on marine mammals and the subsistence use of these resources.	Pacific Walrus, polar bear
Maintain trained Marine Mammal Observers aboard vessels to alert crew of the presence of marine mammals and initiate adaptive mitigation responses and to carry out specified monitoring activities identified in the marine mammal monitoring and mitigation plan necessary to evaluate the impact of authorized activities on marine mammals and the subsistence use of these resources.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear
Cooperate with the USFWS, NMFS, and other designated Federal, State, and local agencies to monitor the impacts of oil and gas activities in the Beaufort Sea on marine mammals.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear
Report the results of specified monitoring activities to the USFWS and NMFS.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear
Report all observations of polar bears during any Industry operation.	Polar bear
Report any incidental lethal take or injury of a marine mammal immediately to USFWS or NMFS, depending upon the species injured or killed.	Cook Inlet beluga whale, bowhead whale, fin whale, humpback whale, ringed seal, bearded seal, Steller sea lion, Pacific walrus, polar bear

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BIOLOGICAL OPINION

for the

ALASKA STAND ALONE GAS PIPELINE

Consultation with the
U.S. Army Corps of Engineers
Anchorage, Alaska

Prepared by:
Fairbanks Fish and Wildlife Field Office
U. S. Fish and Wildlife Service
101 12th Ave, Room 110
Fairbanks, AK 99701

July 10, 2012

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1. INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (BO) on a proposal by the Alaska Gasline Development Corporation (AGDC) to construct the Alaska Stand Alone Gas Pipeline (ASAP), a 24-inch diameter, high pressure natural gas pipeline from Alaska's North Slope to Cook Inlet, and associated infrastructure. Because the project will impact waters of the United States, the AGDC has requested a section 404 permit from the U.S. Army Corps of Engineers (USACE). The USACE is the lead Federal agency preparing an Environmental Impact Statement (EIS) for the ASAP project pursuant to the National Environmental Policy Act (NEPA). Cooperating Federal agencies are the U.S. Environmental Protection Agency, the Bureau of Land Management, the National Park Service, and the Alaska Pipeline Coordinator's Office. On June 7, 2011, the USACE submitted a Biological Assessment for the ASAP EIS (BA; AGDC 2011) to the Service.

This BO describes the effects of the proposed action on Alaska-breeding Steller's eiders (*Polysticta stelleri*), spectacled eiders (*Somateria fischeri*), polar bears (*Ursus maritimus*), and polar bear critical habitat pursuant to section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). A brief conference report on Pacific walrus (*Odobenus rosmarus divergens*), a candidate species, is also included in the document. We used information provided in the project BA; project-specific communications with the USFWS Alaska Region Marine Mammal Management (USFWS MMM) office; other Service documents; and published and unpublished literature to develop this BO.

Section 7(a)(2) of the Act states that Federal agencies must ensure that their activities are not likely to:

- Jeopardize the continued existence of any listed species, or
- Result in the destruction or adverse modification of designated critical habitat.

The Service has determined the proposed action may affect but is *not likely to adversely affect* Steller's eiders and *may adversely affect* spectacled eiders, polar bears, and polar bear critical habitat. We have also determined the proposed action is *not likely to jeopardize the continued existence* of the Pacific walrus.

Following review of the status and environmental baseline of spectacled eiders, polar bears, and polar bear critical habitat, and analysis of the potential effects of the proposed Action to these listed entities, the Service has concluded the proposed action, as described, is *not likely to jeopardize the continued existence* of spectacled eiders or polar bears, and is *not likely to destroy or adversely modify* polar bear critical habitat.

Re-initiation may be required if subsequent modifications of the proposed action would change the effects analysis presented in this BO. Examples include the addition of overhead transmission lines or communication towers and changes in the size or location of affected tundra habitat. If there are changes to the proposed project, we recommend that you contact the Fairbanks Fish and Wildlife Field Office to determine whether

additional consultation may be appropriate. Conditions under which re-imitation may be required are described further in section 14.

If you have comments or concerns regarding this BO, please contact Ted Swem, Endangered Species Branch Chief, Fairbanks Fish and Wildlife Field Office at (907) 456-0441.

2. DESCRIPTION OF THE PROPOSED ACTION

Project Overview

The purpose of the project is to provide a long-term, stable supply of up to 500 million standard cubic feet per day (MMscfd) of conditioned natural gas and natural gas liquids from North Slope gas fields to markets in Fairbanks and Cook Inlet areas by 2016. The proposed pipeline would originate in Prudhoe Bay and follow the Trans Alaska Pipeline System (TAPS) and Dalton Highway corridors, generally paralleling the highway corridor from the North Slope to near Livengood, northwest of Fairbanks. At Livengood, the pipeline route turns south, joining the Parks Highway corridor west of Fairbanks near Nenana. From there it continues south and terminates at pipeline mile post (MP) 737. The ASAP then connects to ENSTAR Natural Gas Company's existing natural gas distribution system at MP 39 of the Beluga Pipeline near Wasilla. The Fairbanks Lateral, a 35-mile lateral pipeline spur from MP 458 to Fairbanks, would provide 60 MMscfd of utility-grade gas to Fairbanks.

The proposed main pipeline is 24 inches in diameter with a natural gas flow rate of 500 MMscfd at peak capacity. A gas conditioning facility (GCF) would also be constructed at Prudhoe Bay, AK. The proposed pipeline would be aboveground from MP 0 to 6. For the remainder of the route, the pipeline would be buried, except at elevated-bridge stream crossings, compressor stations, possible fault crossings, pigging facilities, and off-take valve locations.

Construction is planned for a 2.5-year period. Pre-construction activities such as ROW development and construction of access roads, laydown yards, and camps would begin in the summer prior to the first season of pipeline construction. Pipeline construction is planned to begin in late 2014 and be completed in late September 2016. A detailed project description is provided in the AGDC's Plan for Development, dated March 2011.

Action Area

The action area is the area in which direct and indirect effects of the action to listed species and designated critical habitat may occur. The area directly affected by the proposed project is the total footprint of the GCF, the pipeline, access roads, and associated permanent and construction support facilities up to 25 miles[1] inland from the Beaufort Sea coast. The area indirectly affected by the proposed project is delineated by a zone of influence surrounding new infrastructure within which listed species may be

[1] The assumed inland extent of the polar bear range for consultation purposes. The inland extent of breeding spectacled eiders and polar bear critical habitat are also encompassed in this range.

affected by disturbance resulting from construction activities and project operations. This zone of influence is assumed to be 200 m (656 ft) for spectacled eiders and 1.6 km (1 mi) for polar bears. Potential effects to spectacled eiders and polar bears within these zones are discussed further in Section 7, *Effects of the Action*.

Project Components within the Action Area

Listed eiders, polar bears, and polar bear critical habitat occur in the portion of the project area north of the Brooks Range in Alaska. The southern extent of the Action Area is 25 miles inland from the coast at Prudhoe Bay or approximately MP 28 of the pipeline. The primary structures, facilities, and related project components that are located within this area are summarized below. Note that the proposed Action, as described in the BA, does not include overhead transmission lines or communication towers.

Gas conditioning facility

The GCF will be constructed on a 70-acre gravel pad within an existing industrial area at Prudhoe Bay. Access will be via a permanent gravel road accessible from existing Prudhoe Bay roads. Module sections of the GCF will be transported to the facility site via barge to West Dock, then transported on existing roads and assembled on-site.

The GCF will provide conditioning necessary to remove carbon dioxide (CO_2), hydrogen sulfide (H_2S), and other impurities from the source gas stream. Natural gas will be piped from the existing Central Gas Facility located approximately 1,000 (305 m) feet north of the planned GCF. Natural gas liquids (propane, butane, and pentanes) will be injected to enrich the gas. The enriched gas will then be compressed and cooled to maintain the existing thermal regime in permafrost soils, and injected into the ASAP. The applicant's Plan of Development indicates two mixing towers will be used for the gas conditioning process

Aerial pipeline mode

The first six miles of the 24-inch-diameter pipeline will be constructed aboveground on steel vertical support members (VSMs) spaced at ~20-foot increments supporting the pipe ≥7 feet above the tundra. This section of the pipeline is slated for winter construction. Once the necessary right-of-way (ROW) preparations have been made VSM locations will be surveyed, marked, and foundations drilled. Installation of VSMs will include standing and bracing the member, then backfilling around the VSM column with concrete slurry. Once VSMs have been installed, welded sections of pipe will be lifted and placed using sidebooms.

Buried pipeline mode

Most of the pipeline south of MP 6 will be buried. The pipeline from MP 6 to the Atigun River Valley at MP 163 (approximately 100 miles south of the range of listed species) is slated for winter construction. The construction ROW will be cleared to remove vegetation and graded. Sections of pipe will be hauled from storage yards and distributed along the construction ROW, strung and placed into a trench before the trench is backfilled.

Material and water sources
Material sites (gravel pits) will be distributed along the route to minimize hauling distances. Existing material sites will be used whenever possible. Attachment 6 in the AGDC's Plan of Development identified five existing material sites along the pipeline route between Prudhoe Bay and MP 25.

Water used for construction needs will be collected from surface water sources.

Other permanent facilities
Operations and maintenance facilities will be located in Prudhoe Bay. A pig launcher will be located at the GCF. A separate gravel pad with camp and administrative facilities is located ~600m west of the GCF (see Attachment 1 of the Plan of Development). Permanent access roads will be constructed at MP 5.5 (length = 0.46 mile) and MP 20 (length = 0.1 mile; see Attachment 5 in the AGDC's Plan for Development,).

Construction support facilities
Construction support facilities include project offices; logistics support sites; personnel housing and support; port facilities (West Dock); access roads and construction workpads (gravel and ice/snow); laydown yards and storage facilities; and airports and airstrips.

A single 6-acre laydown yard is planned within the action area at MP 4 (see Plan for Development).

Materials and equipment needed for construction of the GCF will be shipped via marine transport to West Dock at Prudhoe Bay. The existing West Dock facilities are thought to be sufficient to receive materials without additional construction or dredging activities beyond the currently permitted maintenance. The applicant estimates that approximately 9 shipments will be required to complete material delivery to West Dock.

Mitigation measures
Section 11.0 (Wildlife Resources) of the Draft Environmental Impact Statement for the ASAP project[2] identifies several mitigation measures that will be implemented to address wildlife resources. Measures that are likely to reduce adverse effects to spectacled eiders and polar bears include:

- Avoid locating pipeline facilities in sensitive wildlife habitats to the maximum extent practicable.
- Schedule construction activities to avoid effects during sensitive periods in the life cycle of wildlife to the extent practicable.
- Ensure construction camp operations and pipeline facility construction activities comply with measures that avoid attracting wildlife.
- Adopt motor vehicle and aircraft procedures that minimize disturbances to wildlife.
- Avoid or minimize construction and operational activities during sensitive periods in life cycles of wildlife, including nesting migratory birds.

[2] Released for public comment on January 20, 2012

- Developing a Wildlife Interaction and Habitat Protection Plan and Bear Avoidance and Human Encounter/Interaction Plan to be followed during construction and operations to minimize human interactions with wildlife.
- Developing Comprehensive Waste Management Plan to assure the appropriate handling and disposal of wastes, minimize human/carnivore interaction, and discourage wildlife presence and feeding opportunities the following plans will be developed.

3. EFFECT DETERMINATION FOR STELLER'S EIDER

In Alaska, Steller's eiders breed almost exclusively on the Arctic Coastal Plain (ACP), migrating to the breeding grounds in late spring and remaining in the region as late as mid-October. However, nesting is concentrated in tundra wetlands near Barrow, AK and Steller's eiders occur at very low densities elsewhere on the ACP (Larned et al. 2010). USFWS aerial surveys for breeding eiders conducted on the ACP from 1992–2010 detected only 5 Steller's eiders east of the Colville River, with the most recent observation in 1998 (USFWS Alaska Region Migratory Bird Management, unpublished data). Because available data indicate Steller's eiders are unlikely to nest near or migrate through the project area, we conclude that adverse effects to the species will be discountable and that the proposed action is *not likely to adversely affect* Steller's eiders.

4. CONFERENCE REPORT ON PACIFIC WALRUS

The Pacific walrus was listed as a candidate species under the Act with the publication of the 12-month petition finding on February 10, 2011 (USFWS 2011a). Pacific walruses occur in the Beaufort Sea in extremely low numbers because the continental shelf is relatively narrow along the Beaufort Sea and its deeper, less productive waters provide limited food resources. In years of low ice concentrations in the Chukchi Sea, some animals range east of Point Barrow into the Beaufort Sea (Fay 1982). However, from 1994 to 2004, oil industry monitoring programs recorded only 10 animals in the Beaufort Sea (USFWS 2011a). The U.S. Geological Survey also reported that only a few tagged walruses entered the extreme western portion of the Beaufort Sea near Barrow during studies of Pacific walrus movement in 2007–2009 (USGS 2011).

A conference on a candidate species results in a determination of whether the proposed action is likely to jeopardize the continued existence of the species. Because walruses are rarely observed in the Beaufort Sea, we conclude that effects from the proposed action will be discountable and the proposed action is *not likely to jeopardize the continued existence* of Pacific walruses.

5. STATUS OF THE SPECIES AND CRITICAL HABITAT

This section presents biological and ecological information relevant to formation of the BO. Appropriate information on the species' life history, habitat and distribution, and other factors necessary for their survival is included for analysis in later sections.

Spectacled Eider

Spectacled eiders (Figure 3.1A) were listed as threatened throughout their range on May 10, 1993 (USFWS 1993) based on indications of steep declines in the two Alaska-breeding populations. There are three primary spectacled eider populations, each corresponding to breeding grounds on Alaska's North Slope, the Yukon–Kuskokwim Delta (YKD), and northern Russia. The YKD population declined 96% between the early 1970s and 1992 (Stehn et al. 1993). Data from the Prudhoe Bay oil fields (Warnock and Troy 1992) and information from Native elders at Wainwright, AK (R. Suydam, pers. comm.in USFWS 1996) suggested concurrent localized declines on the North Slope, although data for the entire North Slope breeding population were not available. Spectacled eiders molt in several discrete areas (Figure 3.1B) during late summer and fall, with birds from the different populations and genders apparently favoring different molting areas (Petersen et al. 1999). All three spectacled eider populations overwinter in openings in pack-ice of the central Bering Sea, south and southwest of St. Lawrence Island (Petersen et al. 1999; Figure 3.2), where they remain until March–April (Lovvorn et al. 2003).

Life History

Breeding – In Alaska, spectacled eiders breed primarily on the North Slope (ACP) and the YKD. On the ACP, spectacled eiders breed north of a line connecting the mouth of the Utukok River to a point on the Shaviovik River about 24 km (15 miles) inland from its mouth. Breeding density varies across the ACP (Figure 3.2). Although spectacled eiders historically occurred throughout the coastal zone of the YKD, they currently breed primarily in the central coast zone within about 15 km (~9 miles) of the coast from Kigigak Island north to Kokechik Bay (USFWS 1996). However, a number of sightings on the YKD have also occurred both north and south of this area during the breeding season (R. Platte, USFWS, pers. comm. 1997).

Spectacled eiders arrive on the ACP breeding grounds in late May to early June. Numbers of breeding pairs peak in mid-June and decline 4–5 days later when males begin to depart from the breeding grounds (Smith et al. 1994, Anderson and Cooper 1994, Anderson et al. 1995, Bart and Earnst 2005). Mean clutch size reported from studies on the Colville River Delta was 4.3 (Bart and Earnst 2005). Spectacled eider clutch size near Barrow has averaged 3.2–4.1, with clutches of up to eight eggs reported (Quakenbush et al. 1995, Safine 2011). Incubation lasts 20–25 days (Kondratev and Zadorina 1992, Harwood and Moran 1993, Moran and Harwood 1994, Moran 1995), and hatching occurs from mid- to late July (Warnock and Troy 1992).

Nest initiation on Kigigak Island on the YKD occurs from mid-May to mid-June (Lake 2007). Incubation lasts approximately 24 days (Dau 1974). Mean spectacled eider clutch

size is higher on the YKD compared to the ACP. Mean annual clutch size ranged from 3.8–5.4 in coastal areas of the YKD (1985–2011; Fischer at al. 2011), and 4.0–5.5 on Kigigak Island (1992–2011; Gabrielson and Graff 2011), with clutches of up to eight eggs reported (Lake 2007).

On the breeding grounds, spectacled eiders feed on mollusks, insect larvae (craneflies, caddisflies, and midges), small freshwater crustaceans, and plants and seeds (Kondratev and Zadorina 1992) in shallow freshwater or brackish ponds, or on flooded tundra. Ducklings fledge approximately 50 days after hatch, and then females with broods move directly from freshwater to marine habitat to stage prior to fall migration.

Survivorship – Nest success is highly variable and thought to be influenced by predators, including gulls (*Larus* spp.), jaegers (*Stercorarius* spp.), and red (*Vulpes vulpes*) and arctic (*Alopex lagopus*) foxes. In arctic Russia, apparent nest success was calculated as <2% in 1994 and 27% in 1995; low nest success was attributed to predation (Pearce et al. 1998). Apparent nest success in 1991 and 1993–1995 in the Kuparuk and Prudhoe Bay oil fields on the ACP was also low, varying from 25–40% (Warnock and Troy 1992, Anderson et al. 1998). On Kigigak Island in the YKD, nest survival probability ranged from 0.06–0.92 from 1992–2007 (Lake 2007); nest success tended to be higher in years with low fox numbers or activity (i.e., no denning) or when foxes were eliminated from the island prior to the nesting season. Bowman et al. (2002) also reported high variation in nesting success (20–95%) of spectacled eiders on the YKD, depending on the year and location.

Available data indicates egg hatchability is high for spectacled eiders nesting on the ACP, in arctic Russia, and at inland sites on the YKD, but considerably lower in the coastal region of the YKD. Spectacled eider eggs that are addled or that do not hatch are very rare in the Prudhoe Bay area (Declan Troy, TERA, pers. comm. 1997), and Esler et al. (1995) found very few addled eggs on the Indigirka River Delta in Arctic Russia. Additionally, from 1969 to 1973 at an inland site on the Yukon Delta National Wildlife Refuge, only 0.8% of spectacled eider eggs were addled or infertile (Dau 1974). In contrast, 24% of all nests monitored in a coastal region of the YKD during the early to mid-1990s contained inviable eggs and ~10% of eggs in successful nests did not hatch due to either embryonic mortality or infertility (Grand and Flint 1997). This relatively high occurrence of inviable eggs near the coast of the YKD may have been related to exposure to contaminants (Grand and Flint 1997). It is unknown whether hatchability of eggs in this region has improved with decreased use of lead shot in the region and natural attenuation of existing lead pellets (Flint and Schamber 2010) in coastal YKD wetlands.

Recruitment rate (the percentage of young eiders that hatch, fledge, and survive to sexual-maturity) of spectacled eiders is poorly known (USFWS 1999) because there is limited data on juvenile survival. In a coastal region of the YKD, duckling survival to 30 days averaged 34%, with 74% of this mortality occurring in the first 10 days, while survival of adult females during the first 30 days post hatch was 93% (Flint and Grand 1997).

(A)

(B)

Figure 3.1. (A) Male and female spectacled eiders in breeding plumage. (B) Distribution of spectacled eiders. Molting areas (green) are used July –October. Wintering areas (yellow) are used October –April. The full extent of molting and wintering areas is not yet known and may extend beyond the boundaries shown.

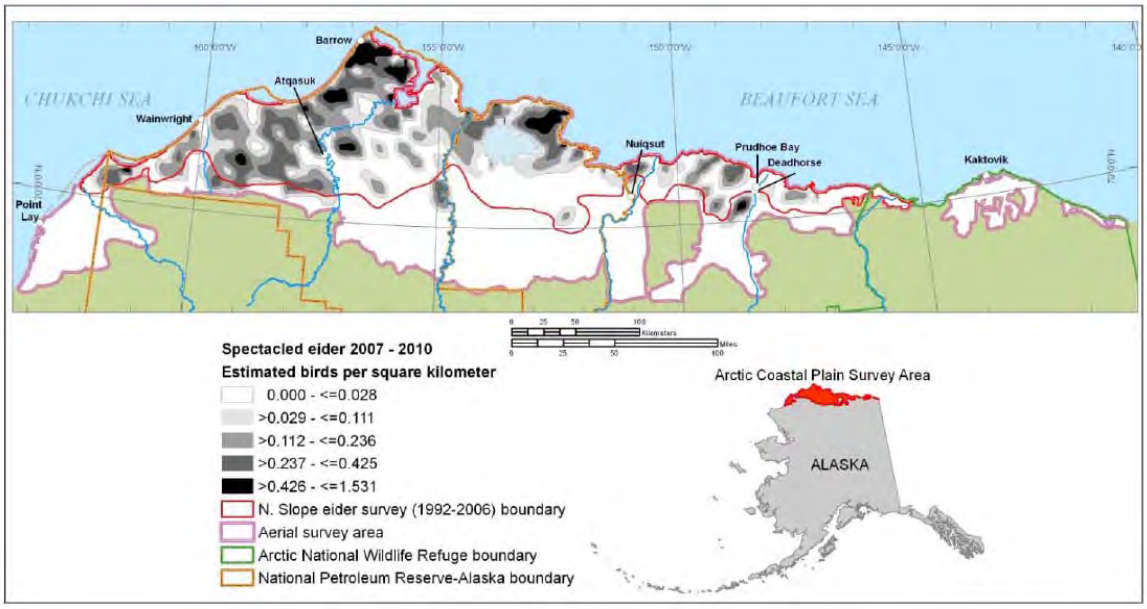

Figure 3.2. Density distribution of spectacled eiders observed on aerial transects sampling 57,336 km^2 of wetland tundra on the North Slope of Alaska during early to mid-June, 2007–2010. From Larned et al. 2011.

Fall migration and molting – As with many other sea ducks, spectacled eiders spend the 8–10 month non-breeding season at sea, but until recently much about the species' life in the marine environment was unknown. Satellite telemetry and aerial surveys led to the discovery of spectacled eider migrating, molting, and wintering areas. These studies are summarized in Petersen et al. (1995), Larned et al. (1995), and Petersen at al. (1999). Results of recent satellite telemetry research (2008–2011) are consistent with earlier studies (Matt Sexson, USGS, pers. comm.). Phenology spring migration and breeding, including arrival, nest initiation, hatch, and fledging, is 3–4 weeks earlier in western Alaska (YKD) compared to northern Alaska (ACP); however, phenology of fall migration is similar between areas. Individuals depart breeding areas July–September, depending on their breeding status and molt in September–October. (Matt Sexson, USGS, pers. comm.).

Males generally depart breeding areas on the North Slope (ACP) when the females begin incubation in late June (Anderson and Cooper 1994, Bart and Earnst 2005). Use of the Beaufort Sea by departing males is variable. Some appear to move directly to the Chukchi Sea over land, while the majority moved rapidly (average travel of 1.75 days), over near shore waters from breeding grounds to the Chukchi Sea (TERA 2002). Of 14 males implanted with satellite transmitters, only four spent an extended period of time (11–30 days), in the Beaufort Sea (TERA 2002). Preferred areas for males appeared to be near large river Deltas such as the Colville River where open water is more prevalent in early summer when much of the Beaufort Sea is still frozen. Most adult males marked in northern and western Alaska in a recent satellite telemetry study migrated to northern Russia to molt (USGS, unpublished data). Results from this study also suggest that male

eiders are likely follow coast lines but also migrate straight across the northern Bering and Chukchi seas in route to northern Russia (Matt Sexson, USGS, pers. comm.).

Females generally depart the breeding grounds later, when much more of the Beaufort Sea is ice-free, allowing for more extensive use of the area. Females spent an average of two weeks in the Beaufort Sea (range 6-30 days) with the western Beaufort Sea the most heavily used (TERA 2002). Females also appeared to migrate through the Beaufort Sea an average of 10 km further offshore than the males (Petersen et al. 1999). The greater use of the Beaufort Sea and offshore areas by females was attributed to the greater availability of open water when females depart the area (Petersen et al. 1999, TERA 2002). Recent telemetry data indicates that molt migration of failed/non-breeding females from the Colville River Delta through the Beaufort Sea is relatively rapid, 2–weeks, compared to 2–3 months spent in the Chukchi Sea (Matt Sexson, USGS, pers. comm.).

Spectacled eiders use specific molting areas from July to late October/early November. Larned et al. (1995) and Petersen et al. (1999) discussed spectacled eiders' apparently strong preference for specific molting locations, and concluded that all spectacled eiders molt in four discrete areas (Table 3.1). Females generally used molting areas nearest their breeding grounds. All marked females from the YKD molted in nearby Norton Sound, while females from the North Slope molted in Ledyard Bay, along the Russian coast, and near St. Lawrence Island. Males did not show strong molting site fidelity; males from all three breeding areas molted in Ledyard Bay, Mechigmenskiy Bay, and the Indigirka/Kolyma River Delta. Males reached molting areas first, beginning in late June, and remained through mid-October. Non-breeding females, and those that nested but failed, arrived at molting areas in late July, while successfully-breeding females and young of the year reached molting areas in late August through late September and remained through October. Fledged juveniles marked on the Colville River Delta usually staged in the Beaufort Sea near the delta for 2–3 weeks before migrating to the Chukchi Sea.

Avian molt is energetically demanding, especially for species such as spectacled eiders that complete molt in a few weeks. Molting birds must have ample food resources, and the rich benthic community of Ledyard Bay (Feder et al. 1989, 1994a, 1994b) likely provides these for spectacled eiders. Large concentrations of spectacled eiders molt in Ledyard Bay to use this food resource; aerial surveys on 4 days in different years counted 200 to 33,192 molting spectacled eiders in Ledyard Bay (Petersen et al. 1999; Larned et al. 1995).

Wintering – Spectacled eiders generally depart all molting sites in late October/early November (Matt Sexson, USGS, pers. comm.), migrating offshore in the Chukchi and Bering Seas to a single wintering area in openings in pack-ice of the central Bering Sea south/southwest of St. Lawrence Island (Figure 3.1). In this relatively shallow area, > 300,000 spectacled eiders (Petersen et al. 1999) rest and feed, diving up to 70 m to eat bivalves, other mollusks, and crustaceans (Cottam 1939, Petersen et al. 1998, Lovvorn et al. 2003, Petersen and Douglas 2004).

Table 3.1 Important staging and molting areas for female and male spectacled eiders from each breeding population.

Population and Sex	Known Major Staging/Molting Areas
Arctic Russia Males	Northwest of Medvezhni (Bear) Island group
	Mechigmenskiy Bay
	Ledyard Bay
Arctic Russia Females	unknown
North Slope Males	Ledyard Bay
	Northwest of Medvezhni (Bear) Island group
	Mechigmenskiy Bay
North Slope Females	Ledyard Bay
	Mechigmenskiy Bay
	West of St. Lawrence Island
YKD Males	Mechigmenskiy Bay Northeastern Norton Sound
YKD Females	Northeastern Norton Sound

Spring migration – Recent information about spectacled and other eiders indicates they probably make extensive use of the eastern Chukchi spring lead system between departure from the wintering area in March and April and arrival on the North Slope in mid-May or early June. Limited spring aerial observations in the eastern Chukchi have documented dozens to several hundred common eiders (*Somateria mollissima)* and spectacled eiders in spring leads and several miles offshore in relatively small openings in rotting sea-ice (W. Larned, USFWS; J. Lovvorn, University of Wyoming, pers. comm.). Woodby and Divoky (1982) documented large numbers of king eiders (*Somateria spectabilis*) and common eiders using the eastern Chukchi lead system, advancing in pulses during days of favorable following winds, and concluded that an open lead is probably requisite for the spring eider passage in this region. Preliminary results from an ongoing satellite telemetry study conducted by the USGS Alaska Science Center (Figure 3.3; USGS, unpublished data) suggest that spectacled eiders also use the lead system during spring migration.

Adequate foraging opportunities and nutrition during spring migration are critical to spectacled eider productivity. Like most sea ducks, female spectacled eiders do not feed substantially on the breeding grounds, but produce and incubate their eggs while living primarily off body reserves (Korschgen 1977, Drent and Daan 1980, Parker and Holm 1990). Clutch size, a measure of reproductive potential, was positively correlated with body condition and reserves obtained prior to arrival at breeding areas (Coulson 1984, Raveling 1979, Parker and Holm 1990). Body reserves must be maintained from winter or acquired during the 4-8 weeks (Lovvorn et al. 2003) of spring staging, and Petersen and Flint (2002) suggest common eider productivity on the western Beaufort Sea coast is influenced by conditions encountered in May to early June during their spring migration through the Chukchi Sea (including Ledyard Bay). Common eider female body mass increased 20% during the 4-6 weeks prior to egg laying (Gorman and Milne 1971, Milne 1976, Korschgen 1977, Parker and Holm 1990). For spectacled eiders, average female

body weight in late March in the Bering Sea was 1,550 ± 35 g (n = 12), and slightly (but not significantly) more upon arrival at breeding sites (1,623 ± 46 g, n = 11; Lovvorn et al. 2003), indicating that spectacled eiders must maintain or enhance their physiological condition during spring staging.

Abundance and trends

The most recent rangewide estimate of the total number of spectacled eiders was 363,000 (333,526–392,532 95% CI), obtained by aerial surveys of the known wintering area in the Bering Sea in late winter 1996–1997 (Petersen et al. 1999). Winter/spring aerial surveys were repeated in 2009 and 2010. Preliminary results from 2009 indicate an estimate of 301,812 spectacled eiders, but this value will be updated when surveys from both years are analyzed (Larned et al. 2009).

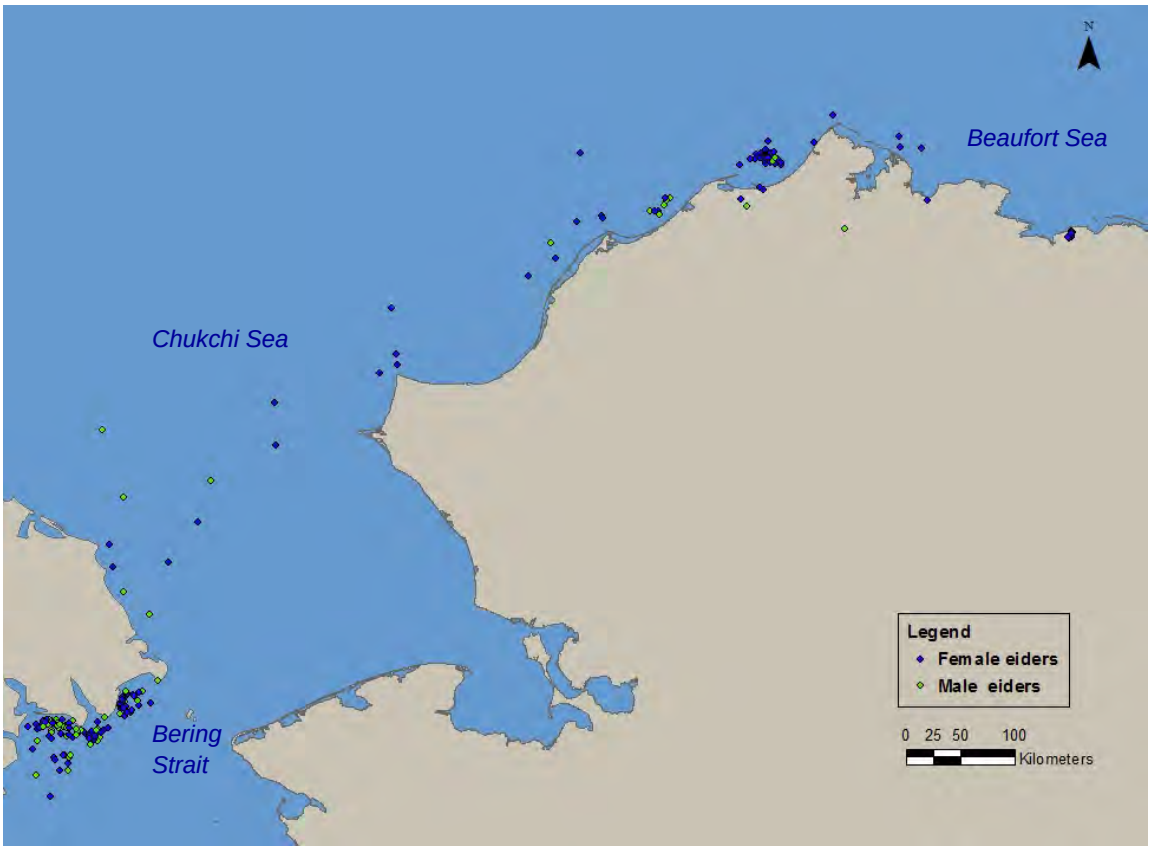

Figure 3.3. Spectacled eider satellite telemetry locations for 12 female and 7 male spectacled eiders in the eastern Chukchi Sea from 1 April – 15 June 2010 and 1 April – 15 June 2011. Additional locations from the northern coast of Russia are not shown. Eiders were tagged on the North Slope during the 2009 and 2010 breeding seasons. Data provided by Matt Sexson, USGS Alaska Science Center (USGS, unpublished).

Population indices for North Slope-breeding spectacled eiders are unavailable prior to 1992. However, Warnock and Troy (1992) documented an 80% decline in spectacled

eider abundance from 1981 to 1991 in the Prudhoe Bay area. Since 1992, the Service has conducted annual aerial surveys for breeding spectacled eiders on the ACP. The 2010 population index based on these aerial surveys was 6,286 birds (95% CI, 4,877–7,695; unadjusted for detection probability), which is 4% lower than the 18-year mean (Larned et al 2011). In 2010, the index growth rate was significantly negative for both the long-term (0.987; 95% CI, 0.974–0.999) and most recent 10 years (0.974; 95% CI, 0.950–0.999; Larned et al. 2011). Stehn et al. (2006) developed a North Slope-breeding population estimate of 12,916 based on the 2002–2006 ACP aerial index for spectacled eiders and relationships between ground and aerial surveys on the YKD. If the same methods are applied to the 2007–2010 ACP aerial index reported in Larned et al (2011), the resulting population estimate for North Slope-breeding spectacled eiders is 11,254 (8,338–14,167, 95% CI).

The YKD spectacled eider population was thought to be about 4% of historic levels in 1992 (Stehn et al. 1993). Evidence of the dramatic decline in spectacled eider nesting on the YKD was corroborated by Ely et al. (1994). They documented a 79% decline in eider nesting between 1969 and 1992 for areas near the Kashunuk River. Aerial and ground survey data indicated that spectacled eiders were undergoing a decline of 9–14% per year from 1985–1992 (Stehn et al. 1993). Further, from the early 1970s to the early 1990s, the number of pairs on the YKD declined from 48,000 to 2,000, apparently stabilizing at that low level (Stehn et al. 1993). Before 1972, an estimated 47,700–70,000 pairs of spectacled eiders nested on the YKD in average to good years (Dau and Kistchinski 1977).

Fischer et al. (2011) used combined annual ground-based and aerial survey data to estimate the number of nests and eggs of spectacled eiders on the coastal area of the YKD in 2011 and evaluate long-term trends in the YKD breeding population from 1985 to 2011. The estimated total number of nests measures the minimum number of breeding pairs in the population in a given year and does not include potential breeders that did not establish nests that year or nests that were destroyed or abandoned at an early stage (Fischer et al. 2011). The total number of nests in 2011 was estimated at 3,608 (SE 448) spectacled eiders nests on the YKD, the second lowest estimate over the past 10 years. The average population growth rate based on these surveys was 1.049 (90% CI = 0.994–1.105) in 2002–2011 and 1.003 (90% CI = 0.991–1.015) in 1985–2011 (Fischer et al. 2011). Log-linear regression based solely on the long-term YKD aerial survey data indicate positive population growth rates of 1.073 (90% CI = 1.046–1.100) in 2001–2010 and 1.070 (90% CI = 1.058–1.081) in 1988–2010 (Platte and Stehn 2011).

Spectacled eider recovery criteria

The Spectacled Eider Recovery Plan (USFWS 1996) presents research and management priorities with the objective of recovery and delisting so that protection under the Act is no longer required. Although the cause or causes of the spectacled eider population decline is not known, factors that affect adult survival are likely to be the most influential on population growth rate. These include lead poisoning from ingested spent shotgun pellets, which may have contributed to the rapid decline observed in the YKD (Franson et al. 1995, Grand et al. 1998), and other factors such as habitat loss, increased nest

predation, over harvest, and disturbance and collisions caused by human infrastructure. Under the Recovery Plan, the species will be considered recovered when each of the three recognized populations (YKD, North Slope of Alaska, and Arctic Russia): 1) is stable or increasing over 10 or more years and the minimum estimated population size is at least 6,000 breeding pairs, or 2) number at least 10,000 breeding pairs over 3 or more years, or 3) number at least 25,000 breeding pairs in one year. Spectacled eiders do not currently meet these recovery criteria.

Polar Bear

The Service listed the polar bear (*Ursus maritimus*) as threatened throughout its range on May 15, 2008 (USFWS 2008a). Sea-ice provides a platform for hunting and feeding, for seeking mates and breeding, for denning, for resting, and for long-distance movement. Polar bears primarily hunt ringed seals, which also depend on sea-ice for their survival, but they also consume other marine mammals (USFWS 2008a). Because the principal habitat of polar bears is sea-ice, it is considered a marine mammal, and is therefore protected under the Marine Mammal Protection Act of 1972 (MMPA).

Distribution and status

Polar bears are distributed throughout regions of arctic and subarctic waters where the sea is ice covered for large portions of the year. The total number of polar bears worldwide is estimated to be 20,000–25,000 bears (Schliebe et al. 2006). Although movements of individual polar bears overlap extensively, telemetry studies have demonstrated spatial segregation among groups or stocks of polar bear in different regions of their circumpolar range (Schweinsburg and Lee 1982, Amstrup 2000, Garner et al. 1990 and 1994, Messier et al. 1992, Amstrup and Gardner 1994, Ferguson et al. 1999, Carmack and Chapman 2003). Patterns in spatial segregation suggested by telemetry data, along with information from surveys, marking studies, and traditional knowledge, resulted in recognition of 19 partially discrete polar bear groups by the International Union for the Conservation of Nature (IUCN) Polar Bear Specialist Group (PBSG). These 19 groups have been described as management subpopulations (or stocks) in the scientific literature and regulatory actions (IUCN 2006).

Two stocks of polar bears occur in Alaska: the Chukchi/Bering seas (CBS) and Southern Beaufort Sea (SBS) stocks (Figure 3.4). Unlike polar bears in eastern Canada, the Alaskan stocks do not currently spend extended periods of time on land (Garner et al. 1990), with the exception of females that choose to den on land rather than pack-ice.

Movement patterns

Telemetry studies indicate polar bear movements are not random, nor do they passively follow ocean currents on the ice as previously thought (Mauritzen et al. 2003) Movement data come almost exclusively from adult female polar bears because male anatomy (their neck is larger than their skull) will not accommodate radio collars. The movements of seven male polar bears surgically implanted with transmitters in 1996 and 1997 were compared to movements of 104 females between 1985 and 1995 (Amstrup et al. 2001). The data indicated males and females had similar activity areas on a monthly basis, but males traveled farther each month (Amstrup et al. 2000). Activity areas have not been

determined for many populations, and available information reflects movement data collected prior to recent changes wrought by retreating ice conditions. In the Beaufort Sea, annual activity areas for individually monitored female bears averaged 149,000 km^2 (range 13,000–597,000 km^2, Amstrup et al. 2000). Total annual movements by female bears in the Beaufort Sea averaged 3,415 km and ranged up to 6,200 km, with a movement rate of > 4 km/ hr sometimes sustained for long periods, and movements of > 50 km/day observed (Amstrup et al. 2000). Mean activity area in the Chukchi Sea, which is characterized by highly dynamic ice conditions, was 244,463 km^2 (Garner et al. 1990). Average annual distance moved by CBS female bears was 5,542 km.

Radio-collared females indicate some individuals occupy home ranges (multi-annual activity areas), which they seldom leave (Amstrup 2003). The size of a polar bear's home range is determined, in part, by the annual pattern of freeze-up and break-up of sea-ice, and therefore by the distance a bear must travel to access prey (Stirling 1988, Durner et al. 2004). A bear with consistent access to ice, leads, and seals may have a relatively small home range, while bears in areas such as the Barents, Greenland, Chukchi, Bering or Baffin seas may have to move many hundreds of kilometers each year to remain in contact with sea-ice from which to hunt (Born et al. 1997, Mauritzen et al. 2001, Ferguson et al. 2001, Amstrup 2003, Wiig et al. 2003).

The CBS population is widely distributed on the pack-ice of the northern Bering, Chukchi, and eastern portions of the Eastern Siberian seas (Garner et al. 1990, Garner et al. 1994, Garner et al. 1995). Polar Bears are seasonably abundant in the Chukchi Sea and their distribution is influenced by the movement of seasonal pack-ice. Polar bears in the Chukchi and Bering seas move south with advancing ice during fall and winter, and move north in advance of receding ice in late spring and early summer (Garner et al. 1990). Polar bears are dependent upon sea-ice for foraging and the most productive areas are near ice edges, leads, or polynyas where ocean depth is minimal (Durner et al. 2004). Polar bears can be present along the Alaskan shoreline as they opportunistically scavenge on marine mammal carcasses.

The SBS population occurs between Icy Cape, Alaska on the western boundary and Pearce Point, NWT (Amstrup et al. 1986, Amstrup and DeMaster 1988, Stirling et al. 1988). It is thought that nearly all bears in the central coastal region of the Beaufort Sea are from the SBS population, and that proportional representation of SBS bears decreases to both the west and east. For example, only 50% of polar bears occurring in Barrow, Alaska and Tuktoyaktuk, NWT are SBS bears, with the remainder being from the CBS and Northern Beaufort Sea populations.

Feeding

Polar bears derive essentially all their sustenance from marine mammal prey and have evolved a strategy that utilizes the high fat content of marine mammals (Best 1985, Amstrup et al. 2007). Over half the caloric content of a seal carcass occurs in the layer of fat between the skin and underlying muscle (Stirling and McEwan 1975) and polar bears quickly remove the fat layer from beneath the skin after they catch a seal. High fat intake

from specializing on marine mammal prey allows polar bears to thrive in the harsh Arctic environment (Stirling and Derocher 1990, Amstrup 2003).

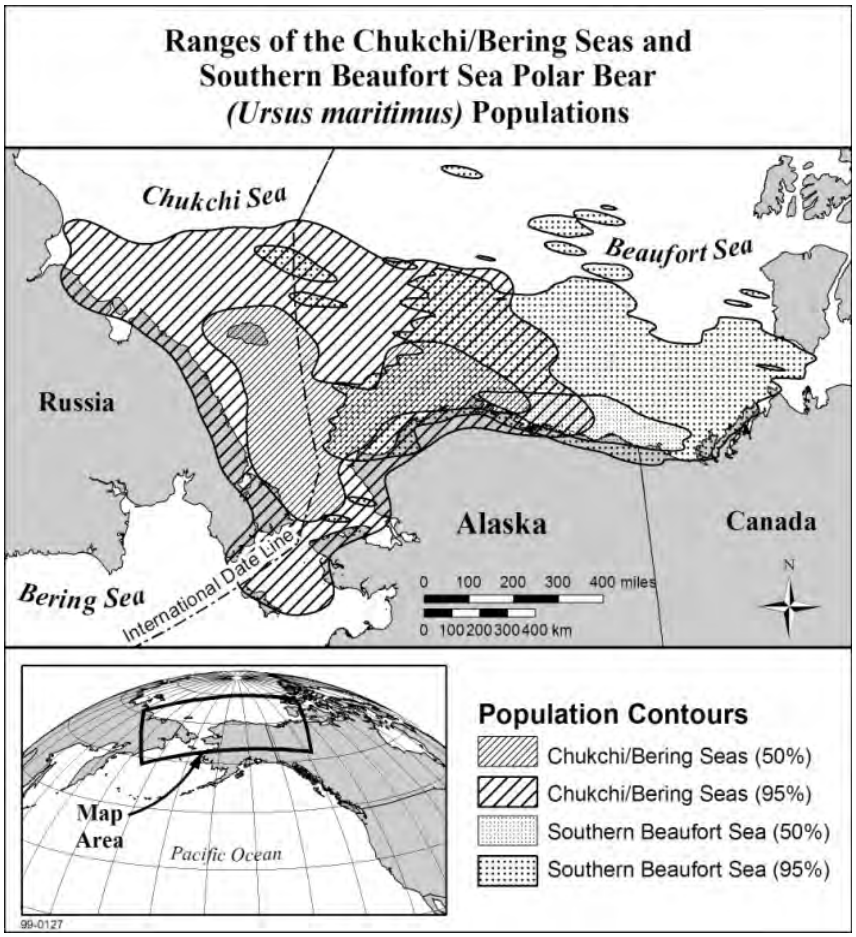

Figure 3.4. Ranges of polar bear stocks in Alaska (USFWS 2009)

Over much of their range, polar bears are dependent on one species of seal, the ringed seal (*Phoca hispida*) (Smith and Stirling 1975, Smith 1980). The relationship between ringed seals and polar bears is so close that the abundance of ringed seals in some areas appears to regulate the density of polar bears, while polar bear predation in turn regulates density and reproductive success of ringed seals (Hammill and Smith 1991, Stirling and Øritsland 1995). Polar bears occasionally catch belugas (*Delphinapterus leucas*), narwhals (*Monodon monoceros*), walrus (*Odobenus rosmarus divirgens*), and harbor seals (*P. vitulina*) (Smith 1985, Calvert and Stirling 1990, Smith and Sjare 1990, Stirling and Øritsland 1995, Derocher et al. 2002). Where common, bearded seals (*Erignathus barbatus*) can be a large part of polar bear diets, and are probably the second most common prey item (Derocher et al. 2002), and walrus can be seasonally important in some parts of the polar bear's range (Ovsyanikov 1996).

Polar bears rarely catch seals on land or in open water (Furnell and Oolooyuc 1980); rather they catch seals and other marine mammals at the air-ice-water interface, where aquatic mammals come to breathe (Amstrup et al. 2007). Although there are local exceptions (e.g. Bentzen et al. 2007, Schliebe et al. 2008), it appears that polar bears gain little overall benefit from alternate foods (Amstrup et al. 2007). Therefore, maintenance of polar bear populations is dependent upon marine prey, largely seals, and polar bears are tied to the surface of the ice for effective access to that prey (Amstrup et al. 2007).

Reproduction

Polar bears have an intrinsically low reproductive rate characterized by late age of sexual maturity, small litter sizes, and extended maternal investment in raising young. Female polar bears enter a prolonged estrus between March and June, when breeding occurs. Ovulation is thought to be induced by mating (Wimsatt 1963, Ramsay and Dunbrack 1986, Derocher and Stirling 1992). Implantation is delayed until autumn, and gestation is 195–265 days (Uspenski 1977), with active development of the fetus suspended for most of that time. The timing of implantation, and hence birth, is likely dependent upon body condition of the female, which in turn is dependent upon a variety of environmental factors (Schliebe et al. 2006).

Throughout their range, most pregnant female polar bears excavate dens in snow located on land during September–November after drifts large enough to excavate a snow cave have formed (Harington 1968, Lentfer and Hensel 1980, Ramsay and Stirling 1990, Amstrup and Gardner 1994). In the southern Beaufort Sea a portion of the population dens in snow caves located on pack and shorefast-ice. Successful denning by polar bears requires an accumulation of sufficient snow combined with winds to cause snow accumulation leeward of topographic features that create denning habitat (Harington 1968). The common characteristic of all denning habitat is topographic features that catch snow in the autumn and early winter (Durner et al. 2003). Polar bear denning habitat in Alaska includes areas of low relief topography characterized by tundra with riverine banks within approximately 50 km of the coast (Amstrup 1993, Amstrup and Gardner 1994, Durner et al. 2001, 2003), and offshore pack-ice pressure ridge habitat. Although the northern Alaskan coast gets minimal snow fall, because the landscape is flat the snow is blown continuously throughout the winter creating drifts in areas of relief.

Fidelity to denning habitat was investigated by Amstrup and Gardner (1994), who located 27 females at up to four successive maternity dens. Bears that denned once on pack-ice were more likely to den on pack-ice than on land in subsequent years. Similarly, bears were faithful to general geographic areas – those that denned once in the eastern half of the Alaska coast were more likely to den there than to the west in subsequent years. Annual variations in weather, ice conditions, prey availability, and the long-distance movements of polar bears (Amstrup et al. 1986, Garner et al. 1990) make recurrence of exact denning locations unlikely.

Satellite telemetry studies determined mean dates of den entry in the Beaufort Sea were 11 and 22 November for land (n = 20) and pack-ice (n = 16), respectively; however, many pregnant females did not enter dens until late November or early December

(Amstrup and Gardner 1994). Female bears foraged until den entry. Mean date of emergence was 26 March for pack-ice dens (n = 10) and 5 April for land dens (n = 18). Messier et al. (1994) reported mean date of den entry and exit varied among years depending upon sea-ice, snow and weather conditions. For bears denning on sea-ice or moving from sea-ice to land denning habitat, time of sea-ice consolidation can alter the onset of denning. Sea-ice dens must be in ice stable enough to stay intact for up to 164 days while possibly moving hundreds of kilometers by currents (Amstrup 2003, Wiig 1998).

Data suggests that an increasing number of SBS females are denning on land. Sixty percent of radio-collared females denned on land from 1996–2006, compared to forty percent in the previous 15 years (Fishbach et al. 2007). The geographic distribution of terrestrial dens also appears to have shifted to the west (USFWS 2006).

Insufficient data exist to accurately quantify polar bear denning locations along the Alaskan Chukchi Sea coast; however, dens in the area are less concentrated than for other areas in the Arctic. The majority of denning of Chukchi Sea polar bears occurs on Wrangel Island, Herald Island, and other locations on the northern Chukotka coast of Russia.

Polar bears give birth in the dens during mid-winter (Harington 1968, Ramsay and Dunbrack 1986). Survival and growth of the cubs depends on the warmth and stable environment within the maternal den (Blix and Lentfer 1979). Family groups emerge from dens in March and April when cubs are about three months old and able to survive outside weather conditions (Blix and Lentfer 1979, Amstrup 1995).

Newborn polar bears are very small, weighing approximately 0.6 kg (Blix and Lentfer 1979), and nurse from their hibernating mothers. Cubs grow quickly and may weigh 10-12 kg by the time they emerge from the den about three months later. Young bears stay with their mothers until weaned, which occurs most commonly in early spring when the cubs are 2.3 years of age. Female polar bears are available to breed again after cubs are weaned. Therefore, in most areas, the minimum successful reproductive interval for polar bears is 3 years (Schliebe et al. 2006).

Age of maturation of mammals is often associated with a threshold body mass (Sadleir 1969), and in polar bear populations it appears to be largely dependent on numbers and productivity of ringed seals. In the Beaufort Sea, ringed seal densities are lower in some areas of the Canadian High Arctic and Hudson Bay. As a possible consequence, female polar bears in the Beaufort Sea usually do not breed for the first time until they are 5 years of age (Lentfer and Hensel 1980), giving birth for the first time at 6 years of age.

Litter size and reproduction rates vary by geographic area and may change in response to hunting pressure, environmental factors, and other population perturbations. Litters of two cubs are common (Schliebe et al. 2006), with litters of three cubs occurring sporadically across the Arctic and most commonly reported in the Hudson Bay region (Stirling et al. 1977, Ramsay and Stirling 1988, Derocher and Stirling 1992). Average

litter size across the species' range varied from 1.4 to 1.8 cubs (Schliebe et al. 2006), and several studies have linked reproduction to availability of seal prey, especially in the northern portion of their range. Body weights of mother polar bears and their cubs decreased markedly in the mid-1970s in the Beaufort Sea following a decline in ringed and bearded seal pup production (Stirling et al. 1976, 1977, Kingsley 1979, DeMaster et al. 1980, Stirling et al. 1982, Amstrup et al. 1986). Declines in reproductive parameters varied by region and year with ice conditions and the corresponding reduction in numbers and productivity of seals (Amstrup et al. 1986). In the Beaufort Sea, female polar bears produce a litter of cubs at an annual rate of 0.25 litters per adult female (Amstrup 1995).

Polar bear reproduction lends itself to early termination without extensive energetic investment by the female (Ramsay and Dunbrack 1986, Derocher and Stirling 1992). Female polar bears may defer reproduction in favor of survival when foraging conditions are difficult (Derocher et al. 1992). Repeated deferral of reproduction could cause a decline in populations with an intrinsically low rate of growth (Schliebe et al. 2006).

Life span and survivorship

Polar bears are long-lived animals; the oldest known female polar bear in the wild was 32 years and the oldest known male was 28, although few bears in the wild live beyond 20 years (Stirling 1990). Taylor and colleagues (unpublished data) described survival rates that generally increased by age class up to approximately 20 years of age (cubs-of-the-year, 35–75%; subadults 1–4 years, 63–98%; adults 5–20 years, 95–99%; and adults > 20 years 72–99%).

Survival of cubs is dependent upon their weight when they exit maternity dens (Derocher and Stirling 1992), and most cub mortality occurred early in the period immediately following emergence from the den (Amstrup and Durner 1995, Derocher and Stirling 1996), with early mortality generally associated with starvation (Derocher and Stirling 1996). Survival of cubs to the weaning stage (generally 27–28 months) is estimated to range from 15% to 56% of births (Schliebe et al. 2006). Subadult survival rates are poorly understood because telemetry collars cannot be used on rapidly growing individuals. Population age structure indicates subadults 2–5 years survive at lower rates than adults (Amstrup 1995), probably because their hunting and survival skills are not fully developed (Stirling and Latour 1978).

Eberhardt (1985) hypothesized adult survival rates must be in the upper 90% range to sustain polar bear populations. Studies using telemetry monitoring of individual animals (Amstrup and Durner 1995) estimated adult female survival in prime age groups may exceed 96%, and survival estimates are a reflection of the characteristics and qualities of an ecosystem to maintain the health of individual bears (Schliebe et al. 2006).

Abundance and Trends – Alaska Stocks

A reliable population estimate for the CBS stock currently does not exist (USFWS 2010a); however, the best available information at this time suggests a minimum population estimate of 2,000 (USFWS 2010a), based on extrapolation from multiple years of denning data for Wrangel Island in Russia and an assumed population denning

rate (IUCN 2006 in USFWS 2010a). Reliable estimates of population size based upon mark and recapture studies are not available for this region. The combined Alaska–Chukotka polar bear harvest is currently believed to exceed sustainable levels, and the status of the CBS polar bear population is considered uncertain or declining (Schliebe et al. 2006).

Estimates of the population size of the SBS were 1,778 from 1972 to 1983 (Amstrup et al. 1986), 1,480 in 1992 (Amstrup 1995), and 2,272 in 2001 (Amstrup, USGS unpublished data). Most recently, Regehr et al. (2006) estimated the SBS to be 1,526 (95% CI = 1,211–1,841), the most current and valid estimate of the SBS population (USFWS 2010c). Declining survival, recruitment, and body size (Regehr et al. 2006, 2007), low growth rates during years of reduced summer and fall sea-ice (2004 and 2005), and an overall declining growth rate of 3% per year from 2001–2005 (Hunter et al. 2007), indicate the SBS stock population is declining (USFWS 2010c).

Declines in sea-ice have occurred in optimal polar bear habitat in the southern Beaufort and Chukchi seas between 1985 to 1995 and 1996 to 2006, and the greatest declines in 21st century optimal polar bear habitat are predicted to occur in these areas (Durner et al. 2009). These stocks are vulnerable to large-scale dramatic seasonal fluctuations in ice movements which result in decreased abundance and access to prey, and increased energetic costs of hunting. The CBS and the SBS stocks are currently experiencing the initial effects of changes in sea-ice conditions (Rode et al. 2010, Regehr et al. 2010, and Hunter et al. 2007). Regehr et al. (2010) found that the vital rates of polar bear survival, breeding rates, and cub survival declined with an increasing number of ice-free days/year over the continental shelf, and suggested that declining sea-ice affects these vital rates via increased nutritional stress.

Polar bear critical habitat

The Service designated polar bear critical habitat on December 7, 2010 (USFWS 2010a). The Primary Constituent Elements (PCEs) of critical habitat for the polar bear are:

1) Sea-ice habitat used for feeding, breeding, denning, and movement, which is further defined as sea-ice over waters 300 m (984.2 ft) or less in depth that occurs over the continental shelf with adequate prey resources (primarily ringed and bearded seals) to support polar bears.
2) Terrestrial denning habitat, which includes topographic features, such as coastal bluffs and river banks, with suitable macrohabitat characteristics. Suitable macrohabitat characteristics are:
    a) Steep, stable slopes (range 15.5–50.0°), with heights ranging from 1.3 to 34 m (4.3 to 111.6 ft), and with water or relatively level ground below the slope and relatively flat terrain above the slope;
    b) Unobstructed, undisturbed access between den sites and the coast;
    c) Sea-ice in proximity to terrestrial denning habitat prior to the onset of denning during the fall to provide access to terrestrial den sites; and

d) The absence of disturbance from humans and human activities that might attract other polar bears.

3) Barrier island habitat used for denning, refuge from human disturbance, and movements along the coast to access maternal den and optimal feeding habitat, including all barrier islands along the Alaska coast and their associated spits, within the range of the polar bear in the United States, and the water, ice, and terrestrial habitat within 1.6 km (1 mi) of these islands.

The Service designated three polar bear critical habitat units, which correspond to each of the three PCEs described above. The Sea Ice Unit covers approximately 179,508 mi^2 of primarily marine habitat extending from the mean high tide line of the Alaska coast seaward to the 300 m depth contour, and spans west to the international date line, north to the Exclusive Economic Zone, east to the US–Canada border, and south to the known distribution of the CBS polar bear population. Sea-ice is used by polar bears for the majority of their life cycle for activities such as hunting seals, breeding, denning, and traveling (USFWS 2010a).

The Terrestrial Denning Unit covers approximately 5,657 mi^2 of land along the northern coast of Alaska from near Point Barrow east to the Canadian border. It encompasses approximately 95% of the known historical terrestrial den sites from the Southern Beaufort Sea (SBS) population (Durner et al. 2009). The inland extent of denning distinctly varies between two longitudinal zones, with 95% of the dens between the Kavik River and the Canadian border occurring within 20 miles of the mainland coast, and 95% of the dens between the Kavik River and Barrow occurring within 5 miles of the mainland coast.

The Barrier Island Unit covers approximately 4,083 mi^2 of barrier islands and the associated complex of spits, water, ice, and terrestrial habitats within one mile of barrier islands. There is significant overlap between this unit and both the terrestrial denning and sea-ice units. The Barrier Island Unit follows a similar coastal extent as the Sea Ice Unit, from near Hooper's Bay in southwestern Alaska to near the Canadian Border.

Critical habitat does not include manmade structures (e.g., houses, gravel roads, generator plants, sewage treatment plants, hotels, docks, seawalls, pipelines) and the land on which they are located existing within the boundaries of designated critical habitat on the effective date of the rule.

Sea-ice, including ice designated as critical habitat, is rapidly diminishing. Terrestrial denning locations in Alaska do not appear to be a limiting factor. However, rain-on-snow events may decrease den quality, and later onset of freeze-up in the fall may limit sea-ice in proximity and therefore access to terrestrial denning habitat (USFWS 2008a). Erosion of barrier islands and the Arctic shoreline, presumably caused by climate change (Mars and Houseknecht 2007), may be changing terrestrial denning habitat by creating or destroying bluffs.

Human activities such as ground-based vehicular traffic and low-flying aircraft occur in polar bear critical habitat. These activities may temporarily create disturbance between den sites and the coast (e.g., disturbance from ice roads), and may temporarily degrade the ability of barrier island habitat from being a refuge from human disturbance. For example, vessels may need to use barrier islands to weather out a storm, and this may interfere with a polar bear's ability to use barrier islands for the same purpose. However, these activities are usually infrequent and have short-term effects.

6. ENVIRONMENTAL BASELINE

This section provides an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species or critical habitat within the action area.

Spectacled eiders

Status of spectacled eiders within the Action Area

Although the majority of North Slope-breeding spectacled eiders nest in tundra wetlands west of the proposed pipeline, the Prudhoe/Kuparuk area is one of the primary breeding areas along the Beaufort Coast (Figure 4.1; Larned et al. 2011). Spectacled eiders are present in the Action Area from late May through late October. The factors that have potentially contributed to the current status of spectacled eiders in the Action Area are discussed below and include environmental contaminants, increased predation, collisions with structures, and long-term habitat loss through development and disturbance.

Environmental contaminants

The deposition of lead shot in tundra or nearshore habitats used for foraging is considered a threat to spectacled eiders. Lead poisoning of spectacled eiders has been documented on the YKD (Franson et al. 1995, Grand et al. 1998) and Steller's eiders on the ACP (Trust et al. 1997; Service unpublished data). Female Steller's eiders nesting at Barrow in 1999 had blood lead concentrations that reflected exposure to lead (>0.2 ppm lead), and six of the seven tested had blood lead concentrations that indicated poisoning (>0.6 ppm lead) (Pattee and Pain 2003). Additional lead isotope tests confirmed the lead in the Steller's eider blood was of lead shot origin, rather than natural sources such as sediments (Matz, USFWS, unpublished data). Use of lead shot for hunting waterfowl is prohibited statewide, and for hunting all birds on the North Slope, and the Service reports good compliance in most areas with the lead shot prohibitions. Further, we expect the availability of lead shot in spectacled eider foraging habitat near Prudhoe Bay to be substantially lower than areas of the North Slope used more frequently for waterfowl hunting.

Other contaminants, including petroleum hydrocarbons from local sources and globally distributed heavy metals, may also affect spectacled eiders. For example, Trust et al. (2000) reported high concentrations of metals and subtle biochemical changes in spectacled eiders wintering near St. Lawrence Island. Spectacled eiders breeding in the Prudhoe Bay area may have experienced varying levels of exposure to petroleum

hydrocarbons, heavy metals, and other contaminants; however, it is difficult to assess the impacts of this exposure to eiders.

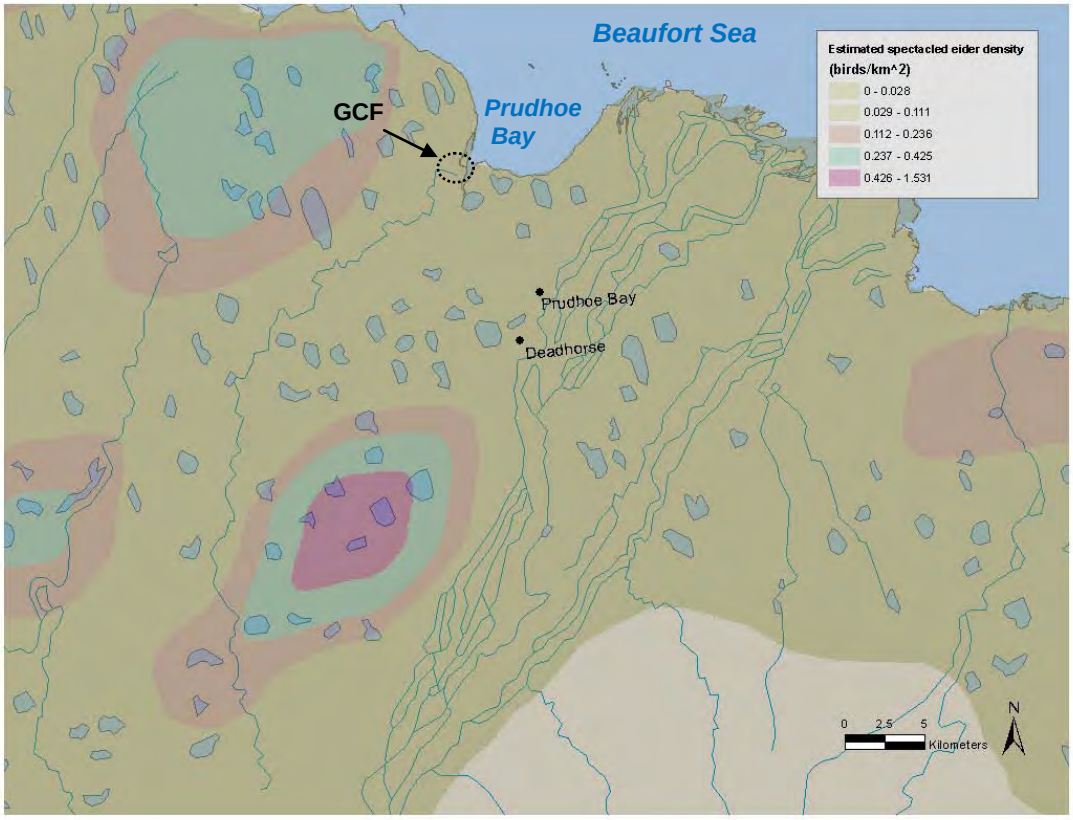

Figure 4.1. Estimated spectacled eider density in the northern portion of the Alaska Stand Alone Gas Pipeline project area. Density polygons are based on data collected during the 2007–2010 Arctic Coastal Plain aerial surveys (USFWS Migratory Bird Management, unpublished data). GCF indicates the proposed location of the Gas Conditioning Facility at milepost 0 of the ASAP.

Increased predator populations

There is some evidence that predator and scavenger populations have increased on the ACP near villages and industrial infrastructure (Eberhardt et al. 1983; Day 1998; Powell and Bakensto 2009). Researchers have proposed that reduced fox trapping, anthropogenic food sources in villages and oil fields, and nesting/denning sites on human-built structures have resulted in increased fox, gull, and raven numbers (R. Suydam and D. Troy, pers. comm. in USFWS 2010, Day 1998). Although we expect corresponding increases in predation rates have also occurred, studies to substantiate the influence of increased predation on spectacled eiders are lacking. However, studies of Steller's eiders near Barrow have suggested a relationship between predation rates and breeding success (Quakenbush et al. 1995, Obritschkewitsch et al. 2001, Rojek 2008, Safine 2011).

Extensive oil and gas development within the East and West Operating Areas of the Prudhoe Bay Unit since the 1970s may have influenced predator populations in the Action Area. Although efforts by industry to manage food waste and discourage nesting on infrastructure have mitigated increases in predator population to an extent, it is likely that spectacled eiders have experienced increased predation rates associated with development in the Prudhoe Bay area.

Habitat loss through development and disturbance
Existing oil and gas industry developments in the Prudhoe Bay Unit and construction of the Trans Alaska Pipeline System (TAPS) have resulted in long-term loss of spectacled eider breeding habitat in the Action Area directly through gravel fill and indirectly through disturbance from oilfield activities. Given the extent of development in the Prudhoe Bay area, it is likely that eiders have experienced loss of production resulting from direct and indirect habitat loss. However, the degree to which spectacled eiders can reproduce in disturbed areas or move to other less disturbed areas to reproduce, and the potential population level consequences of previous development in the Action Area, are unknown.

Climate change
Arctic landscapes are dominated by lakes and ponds (Quinlan et al. 2005), such as those used by spectacled eiders for feeding and brood rearing on Alaska's North Slope. Arctic regions are thought to be especially sensitive to the effects of climate change (Quinlan et al. 2005, Schindler and Smol 2006, and Smol et al. 2005). Productivity of some lakes and ponds appears to have increased as a result of nutrient inputs from thawing soil and increased annual degree days (Quinlan et al. 2005, Smol et al. 2005, Hinzman et al. 2005, and Chapin et al. 1995). Changes in water chemistry and temperature regimes have also altered the algal and invertebrate communities that form the basis of the food web in these systems (Smol et al. 2005, Quinlan et al. 2005) and may have resulted in mismatched timing between migration and the availability of food in Arctic ponds (Callaghan et al. 2004).

Regional activities requiring formal section 7 consultation
Activities on the eastern ACP that required formal section 7 consultations, and the estimated incidental take of listed eiders, is presented in Table 4.1. The table illustrates the number and diversity of actions that required consultation in the region. We believe these estimates have overestimated, possibly significantly, actual take. Actual take is likely reduced by the implementation of terms and conditions in each biological opinion, is spread over the life-span of a project (often 50 years), and is dominated by the potential loss of eggs/ducklings, which we expect to have substantially lower population-level effects compared to adult mortality for this species (see further discussion in the conclusion).

Table 4.1 - Activities on the eastern Arctic Coastal Plain that required formal section 7 consultations and the amount of incidental take provided. Listed activities include those where effects to listed eiders may occur in the Colville River Delta east to the Sagavanirktok River.

Project Name	Impact Type	Estimated Incidental Take
Beaufort Sea Planning Area Lease Sale 186, 195, & 202 (2002)	Collisions	5 adult spectacled eiders 1 adult Steller's eider
Intra-Service, Issuance of Section 10 permits for spectacled eider (2000)	Disturbance Collection	10 spectacled eiders 10 spectacled eider eggs 25 spectacled eiders
Alpine Development Project (2004)	Habitat loss Collisions	4 spectacled eider eggs/ducklings 3 adult spectacled eiders
ABR Avian Research/USFWS Intra-Service Consultation (2005)	Disturbance	5 spectacled eider eggs/ducklings
Pioneer's Oooguruk Project (2006)	Habitat loss Collisions	3 spectacled eider eggs/ducklings 3 adult spectacled eiders
Intra-Service Consultation on MBM Avian Influenza Sampling in NPR-A (2006)	Disturbance	7 spectacled eider eggs/ducklings
KMG Nikaitchuq Project (2006)	Habitat loss Collisions	2 spectacled eiders/year 7 adult spectacled eiders
BP 69kV powerline between Z-Pad and GC 2 (2006)	Collisions	10 adult spectacled eiders
BP Liberty Project (2007)	Habitat loss Collisions	2 spectacled eider eggs/ducklings 1 adult spectacled eider
Intra-service on Subsistence Hunting Regulations (2007)	No estimate of incidental take provided	
BLM Programmatic on Summer Activities in NPR-A (2007)	Disturbance	21 spectacled eider eggs/ducklings
Intra-Service Consultation on MBM Avian Influenza Sampling in NPR-A (2007)	Disturbance	6 spectacled eider eggs/ducklings
Intra-service on Subsistence Hunting Regulations (2008)	No estimate of incidental take provided	
BLM Programmatic on Summer Activities in NPR-A (2008)	Disturbance	56 spectacled eider eggs/ducklings
BLM Northern Planning Areas of NPR-A (2008)	Disturbance Collision	87 spectacled eider eggs/ducklings/year 12 Steller's eider eggs/ducklings/year < 7 adult spectacled eiders < 1 adult Steller's eider
MBM/USFWS Intra-Service, Shorebird studies and white-fronted goose banding in NPR-A (2008)	Disturbance	21 spectacled eider eggs/ducklings
BP Alaska's Northstar Project (2009)	Collisions	≤ 2 adult spectacled eiders/year ≤ 1 adult Steller's eider/year
Intra-Service, Section 10 permit for USGS telemetry research on spectacled eider use of the Bering, Chukchi, and Beaufort Seas (2009; North Slope field sites)	Loss of Production Capture/surgery	130 spectacled eider eggs/ducklings 4 adult spectacled eiders
Intra-service on Subsistence Hunting Regulations (2009)	No estimate of incidental take provided	

BLM Programmatic on Summer Activities in NPR-A (2009)	Disturbance	49 spectacled eider eggs/ducklings
Minerals Management Service Beaufort and Chukchi Sea Program Area Lease Sales (2009)	Collision	12 adult spectacled eiders <1 adult Steller's eider
Intra-Service, Migratory Bird Subsistence Hunting Regulations (2010)	No estimate of incidental take provided	
Intra-Service, Section 10 permit for USGS telemetry research on spectacled eider use of the Bering, Chukchi, and Beaufort Seas (2010; North Slope field sites)	Loss of Production Capture/handling/ surgery	130 spectacled eider eggs/ducklings 7 adult/juvenile spectacled eiders (lethal take) 108 adult/juvenile spectacled eiders (non-lethal take)
BLM Programmatic on Summer Activities in NPR-A (2010)	Disturbance	32 Spectacled eider eggs
Intra-Service, USFWS Migratory Bird Management goose banding on the North Slope of Alaska (2010)	Disturbance	4 spectacled eider eggs/ducklings
Intra-Service, Section 10 permit for ABR Inc.'s eider survey work on the North Slope and at Cook Inlet (2010)	Disturbance	35 spectacled eider eggs/ducklings
Intra-Service, Migratory Bird Subsistence Hunting Regulations (2011)	Shooting	400 adult spectacled eiders (lethal take) 4 adult Steller's eiders (lethal take)
Intra-Service, Section 10 permit for ABR Inc.'s eider survey work on the North Slope and at Cook Inlet (2011)	Disturbance	20 spectacled eider eggs/ducklings
Intra-Service, Section 10 permit for USGS telemetry research on spectacled eider use of the Bering, Chukchi, and Beaufort Seas (2011; Colville River Delta field site)	Capture/handling/ surgery	65 juvenile + 13 adult spectacled eiders (non-lethal take) 7 adult/juvenile spectacled eiders (lethal take)
ConocoPhillips Alaska, Inc's CD-5 Project (Alpine reinitiation; 2011)	Habitat loss	59 spectacled eider eggs/ducklings

Polar bear

Status of polar bears in the action area

Polar bears spend the majority of their time on ice in waters over the productive continental shelf. Polar bears are generally widely and sparsely distributed across the Beaufort Sea. The SBS is distributed across the northern coasts of Alaska, Yukon, and Northwest territories of Canada. Declining survival, recruitment, and body size (Regehr et al. 2006, Regehr et al. 2010, Rode et al. 2010), and low population growth rates during years of reduced sea-ice (2004 and 2005), and an overall declining population growth rate of 3% per year from 2001 to 2005 (Hunter et al. 2007) suggest that the SBS is now declining. The status of this stock is listed as 'reduced' by the IUCN (Obbard et al. 2010) and 'depleted' under the MMPA.

Only pregnant female polar bears den; other members of the population (males, solitary females, and females with older cubs) remain active throughout winter. Unlike polar bears in eastern Canada, the Alaskan stocks do not currently spend extended periods of time on land (Garner et al. 1990), except land-denning females. However, non-denning bears are known to travel through the Action Area, particularly along the coast of

Prudhoe Bay. No maternal dens have been reported from the Action Area. The closest reported den was located approximately 13 km (8 mi) west of the proposed GCF site on the Sagavanirktok River delta.

Oil and gas development, environmental contaminants and climate change are the primary factors that have contributed to the environmental baseline for polar bears in the Action Area. These factors are discussed further below.

Oil and gas development

Extensive oil and gas development in the Prudhoe Bay area over the past several decades has likely altered the use of the area by polar bears. Assessing the magnitude of these effects is difficult. It is reasonable to assume that some bears have been excluded from habitat that they may have otherwise used for movements along the coast and denning. However, documented impacts on polar bears by the oil and gas industry in Alaska during the past 30 years have been minimal. Polar bears have been encountered at or near most coastal and offshore production facilities, or along roads and causeways that link these facilities to the mainland. Interactions have been minimized by implementation of Incidental Take Regulations (ITRs) for the Beaufort Sea (USFWS 2006, 2011) and Chukchi Sea (USFWS 2008b) and the associated Letters of Authorization (LOAs) issued under the MMPA. The ITRs only authorize non-lethal incidental take. As part of the LOAs issued pursuant to these regulations, the oil and gas industry is required to report the number of polar bears observed, their response, and if deterrence activities were required (see below). Recent data from the region regulated under the Beaufort Sea ITRs indicate an average of 306 polar bears were observed annually by the oil and gas industry (range 170–420; 2006–2009). About 81% of these bears showed no change in their behavior, 4% altered their behavior by moving away from (or towards) the industrial activity, while the remaining 15% were intentionally harassed (hazed) to actively deter the bears.

Lethal take associated with the oil and gas industry has occurred on only one occasion during the periods covered by the Chukchi Sea (1991–1996 and 2008–present) and Beaufort Sea (1993–present) ITRs, when a polar bear was accidentally killed in August 2011 due to the misuse of a firecracker round. Prior to issuance of these regulations, lethal takes of adults by industry in Alaska were also rare with two known occurrences since 1968.

Formal section 7 consultations have been conducted for the Chukchi Sea and Beaufort Sea ITRs, which authorize the incidental, unintentional taking of a small number of polar bears in these seas and the adjacent western and northern coasts of Alaska during oil and gas activities in arctic Alaska. These consultations and their conclusions were considered in the jeopardy analysis of this BO.

Environmental contaminants

Three main types of contaminants in the Arctic are thought to present the greatest potential threat to polar bears and other marine mammals: petroleum hydrocarbons, persistent organic pollutants (POPs), and heavy metals.

Potential exposure of polar bears to petroleum hydrocarbons comes from direct contact and ingestion of crude oil and refined products from acute and chronic oil spills. Polar bear range overlaps with many active and planned oil and gas operations within 40 km (25 mi) of the coast or offshore (Schliebe et al. 2006). Polar bears occurring in the Action Area may have been exposed to petroleum hydrocarbons associated with oil and gas industry operations in the Prudhoe Bay area.

Contamination of the Arctic and sub-Arctic regions through long-range transport of pollutants has been recognized for over 30 years (Bowes and Jonkel 1975, Proshutinsky and Johnson 2001, Lie et al. 2003). The Arctic ecosystem is particularly sensitive to environmental contamination due to the slower rate of breakdown of POPs, including organochlorine compounds (OCs), relatively simple food chains, and the presence of long-lived organisms with low rates of reproduction and high lipid levels. The persistence and lipophilic nature of organochlorines increase the potential for bioaccumulation and biomagnification at higher trophic levels (Fisk et al. 2001). The highest concentrations of OCs have been found in species at the top of the marine food chains such as glaucous gulls, which scavenge on marine mammals, and polar bears, which feed primarily on seals (Braune et al. 2005). Consistent patterns between OC and mercury contamination and trophic status have been documented in Arctic marine food webs (Braune et al. 2005).

Climate change

Warming-induced habitat degradation and loss are negatively affecting some polar bear stocks, and unabated global warming will ultimately reduce the worldwide polar bear population (Obbard et al. 2010). Loss of sea-ice habitat due to climate change is identified as the primary threat to polar bears (Schliebe et al. 2006, USFWS 2008a, Obbard et al. 2010). Patterns of increased temperatures, earlier spring thaw, later fall freeze-up, increased rain-on-snow events (which can cause dens to collapse), and potential reductions in snowfall are also occurring. In addition, positive feedback systems (i.e., sea-ice albedo) and naturally occurring events, such as warm water intrusion into the Arctic and changing atmospheric wind patterns, can amplify the effects of these phenomena. As a result, there is fragmentation of sea-ice, reduction in the extent and area of sea ice in all seasons, retraction of sea-ice away from productive continental shelf areas throughout the polar basin, reduction of the amount of heavier and more stable multi-year ice, and declining thickness and quality of shorefast-ice (Parkinson et al. 1999, Rothrock et al. 1999, Comiso 2003, Fowler et al. 2004, Lindsay and Zhang 2005, Holland et al. 2006, Comiso 2006, Serreze et al. 2007, Stroeve et al. 2008). These climatic phenomena may also affect seal abundances, the polar bear's main food source (Kingsley 1979, DeMaster et al. 1980, Amstrup et al. 1986, Stirling 2002). However, threats to polar bears will likely occur at different rates and times across their range, and uncertainty regarding their prediction makes management difficult (Obbard et al. 2010).

In 2007, a USGS science team released 9 reports[3] to the Service that included (1) new observational data on polar bears, including updated information on the current status of

[3] Reports are available at: http://www.usgs.gov/newsroom/special/polar_bears/.

3 of the world's 19 subpopulations of polar bears, and (2) projections of the future distribution and abundance of polar bears in the rest of the 21st century, given changes expected in future sea-ice conditions. The overall conclusion of the USGS research effort was that if projected changes in future sea-ice conditions are realized, approximately two-thirds of the world's current polar bear population will be lost by the mid-21st century. Because the observed trajectory of Arctic sea-ice decline appears to be underestimated by currently available models, this assessment of future polar bear status may be conservative (Amstrup et al. 2007).

While climate change will have the largest impact on polar bears in the marine environment, it may also lead to changes in use and vulnerability of polar bears in the terrestrial environment. An estimated > 60% of females from the SBS stock den on land, with the remaining bears denning on drifting pack-ice (Fischbach et al. 2007). Durner et al. (2006) noted that ice must be stable for ice-denning females to be successful. As climate change continues, the quality of sea-ice may decrease, forcing more females to den on land (Durner et al. 2006). However, if large areas of open water persist until late winter due to a decrease in the extent of the pack-ice, females may be unable to access land to den (Stirling and Andriashek 1992).

Climate change may affect the availability and quality of denning habitat on land. Durner et al. (2006) found that 65% of terrestrial dens found in Alaska between 1981 and 2005 were on coastal or island bluffs. These areas are suffering rapid erosion and slope failure as permafrost melts and wave action increases in duration and magnitude. In all areas, dens are constructed in autumn snowdrifts (Durner et al. 2003). Changes in autumn and winter precipitation or wind patterns (Hinzman et al. 2005) could significantly alter the availability and quality of denning habitat.

Polar bears' use of coastal habitats in the fall during open-water and freeze-up conditions has increased since 1992 (USFWS 2006). This may increase the number of human – polar bear interactions if bears occur close to human settlements or development. Amstrup (2000) observed that direct interactions between people and bears in Alaska have increased markedly in recent years. The number of bears taken for safety reasons, based on three-year running averages, increased steadily from about 3-per-year in 1993, to about 12 in 1998, and has averaged about 10 in recent years. There are several plausible explanations for this increase. It could be an artifact of increased reporting, or of increased polar bear abundance and corresponding probability of interactions with humans. Alternatively, or in combination, polar bears from the SBS population typically move from the pack-ice to the near shore environment in the fall to take advantage of the higher productivity of ice seals over the continental shelf. In the 1980s and early 1990s, the near shore environment would have been frozen by early or mid-October, allowing polar bears to effectively access seals in the area. Since the late 1990s, the timing of ice formation in the fall has occurred later in November or early December, resulting in an increased amount of time that the area was not accessible to polar bears. Consequently, bears spent a greater amount of time on land and not feeding. The later formation of near-shore ice increases the probability of bear-human interactions occurring in coastal

villages (Schliebe et al. 2006). Some experts predict the number of polar bear–human interactions will increase as climate change continues (Derocher et al. 2004).

Summary
Primary threats to polar bears in the Action Area relate to increased use of coastal habitats by non-denning bears and increased use of maternal denning habitat on land resulting from climate change, which exposes polar bears to the effects of human activities in these areas with greater frequency. While other stressors exist and are managed, they are not currently thought to be significant threats to polar bear populations; however, each of these factors could become more significant in combination with future effects of climate change and the resultant loss of sea-ice.

Polar bear critical habitat
Within the Action Area, habitat within 5 miles of the Beaufort Sea coast is within the Terrestrial Denning Unit (Figure 4.2). The GCF, pipeline, and associated structures up to approximately one mile of the proposed pipeline is within the Barrier Island Unit, which is delineated by a 1 mile (1.6 km) zone of influence surrounding barrier islands (Figure 4.2).

Habitat loss and disturbance from oil and gas development
Most of polar bear critical habitat has not been subject to oil and gas development; however, the Action Area has experienced extensive development in recent decades. Manmade structures existing on the effective date of the final critical habitat rule, January 6, 2011, and the land on which they are located are excluded from critical habitat. However, human activities (e.g., noise produced by equipment and visual stimuli) at these facilities may interfere with the capability of critical habitat adjacent to facilities to provide their intended function. For example, polar bears may alter travel routes to avoid contact with these facilities, and avoid denning, hunting, and resting near existing structures. Interactions and adverse effects to polar bears from these existing oil and gas activities have been minimized by implementation of the Beaufort Sea ITRs (USFWS 2006, 2011) promulgated under the MMPA. We expect that measures implemented to minimize incidental take of polar bears have also minimized effects to the conservation role of polar bear critical habitat in the Action Area.

Environmental contaminants
Exposure to environmental contaminants may affect polar bear survival or reproduction. Thus, the presence of contaminants within polar bear critical habitat could affect the conservation value of the habitat. Three main types of contaminants in the Arctic are thought to pose the greatest potential threat to polar bears: petroleum hydrocarbons, persistent organic pollutants (POPs), and heavy metals.

Petroleum hydrocarbon contamination from oil and gas development has had a limited effect on the environmental baseline of polar bear critical habitat. A single large spill has been reported for the Chukchi and Beaufort seas. In August 1988, 68,000 gallons (1,619 barrels) of heating fuel were spilled 3–6 miles north of the barrier islands off Brownlow Point by a barge tanker enroute to Kaktovik. No large oil spills from oil and gas

activities have occurred in arctic Alaska. Small spills have occurred in terrestrial areas, but have affected a limited area, and unlikely to have compromised the conservation function of the Terrestrial Denning Unit.

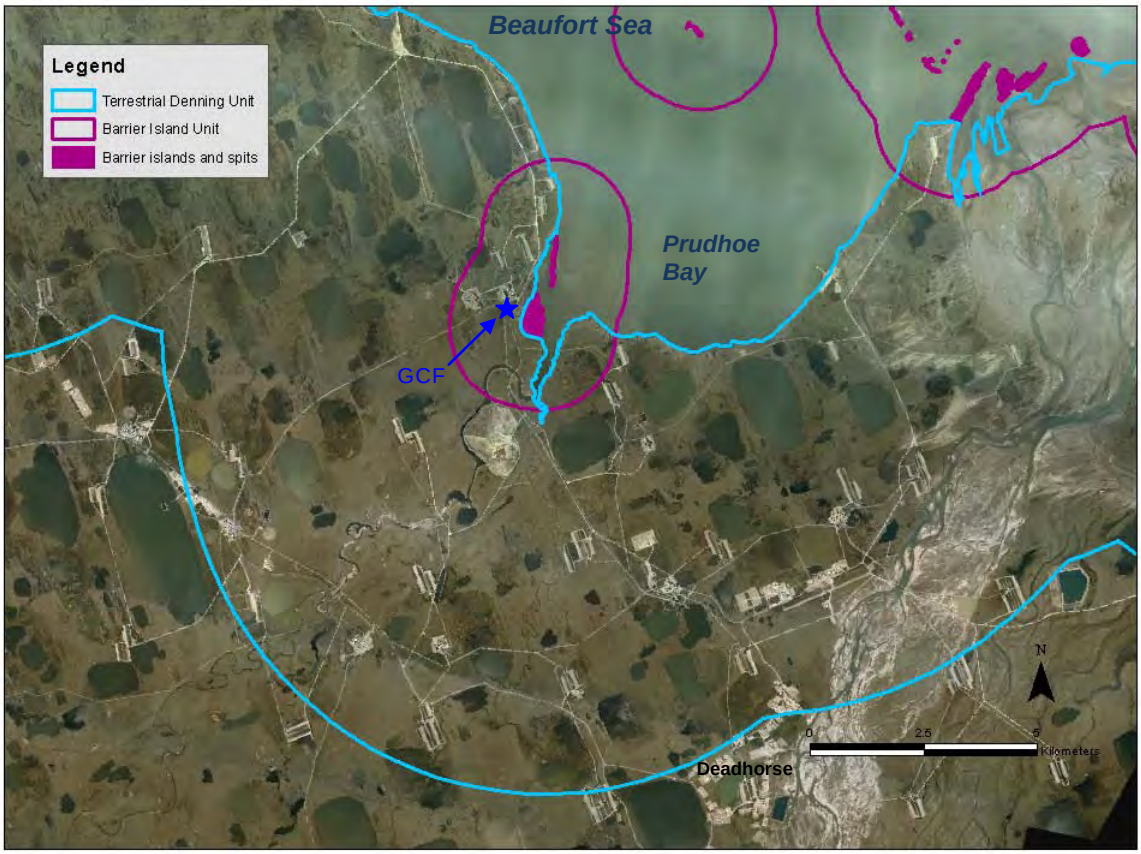

Figure 4.2. Designated polar bear critical habitat in the vicinity of Prudhoe Bay. The Terrestrial Denning Unit, as delineated in the Prudhoe Bay area, includes terrestrial habitat within 8 km (5 mi) inland from the Beaufort Sea coast. The Barrier Island Unit includes barrier islands, spits, and a 1.6 km zone of adjacent aquatic and terrestrial habitats. The Sea Ice Unit is not shown. GCF indicates the approximate location of the proposed Gas Conditioning Facility at milepost 0 of the ASAP.

Contamination of the Arctic and sub-Arctic regions through long-range transport of pollutants has been recognized for over 30 years (Bowes and Jonkel 1975, Proshutinsky and Johnson 2001, Lie et al. 2003). Arctic ecosystems are particularly sensitive to environmental contamination due to the slower rate of breakdown of POPs, including organochlorine compounds (OCs), relatively simple food chains, and the presence of long-lived organisms with low rates of reproduction and high lipid levels that favor bioaccumulation and biomagnification. Consistent patterns between OC and mercury contamination and trophic status have been documented in Arctic marine food webs (Braune et al. 2005). Presumably, these characteristics have affected the capacity of

polar bear critical habitat to support polar bears, although is difficult to estimate the extent of impairment.

Climate change
Climate change is contributing to the rapid decline of sea-ice throughout the arctic, and some of the largest declines are predicted to occur in the Chukchi and southern Beaufort Seas (Durner et al. 2009 *in* USFWS 2009). This directly affects the sea-ice PCE, which provides feeding, breeding, denning, and traveling habitat for polar bears. The decrease in the quality and quantity of sea ice may increase the importance of barrier island and terrestrial habitat for foraging, denning, and resting. For example, Schliebe et al. (2006) demonstrated an increasing trend in the number of observed polar bears using terrestrial habitats in the fall. Additionally, Fischbach et al. (2007) hypothesized that reduced availability of older, more stable sea-ice is contributing to the observed decrease in the proportion of female polar bears denning on sea-ice in northern Alaska.

Climate change may also affect the availability and quality of denning habitat on land. Durner et al. (2006) found that 65% of terrestrial dens found in Alaska between 1981 and 2005 were on coastal or island bluffs. These areas are suffering rapid erosion and slope failure as permafrost melts and wave action increases in duration and magnitude. In all areas, dens are constructed in autumn snowdrifts (Durner et al. 2003). Changes in autumn and winter precipitation or wind patterns (Hinzman et al. 2005) could significantly alter the availability and quality of snow drifts for denning.

Summary of the status of polar bear critical habitat in the Action Area
Localized effects to critical habitat in the Action Area (Figure 4.2) have been small in scale, including potential disturbance from existing oil and gas infrastructure in the Prudhoe Bay area and the effects of small oil spills. At a larger spatial scale, globally distributed pollutants and climate change have diminished the quality of polar bear critical habitat; however, estimating the magnitude of these effects within the Action Area is difficult.

7. EFFECTS OF THE ACTION ON LISTED SPECIES

This section of the BO provides an analysis of the effects of the action on listed species and, where appropriate, critical habitat. Both direct effects (effects immediately attributable to the action) and indirect effects (effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur) are considered. Interrelated and interdependent effects of the action are also discussed.

Effects to spectacled eiders
Adverse effects to spectacled eiders could occur through collisions with structures, long-term habitat loss, and increased predator populations; each of these factors is evaluated below.

Collisions with structures
Migratory birds suffer considerable mortality from collisions with man-made structures (Manville 2004). Birds are particularly at risk of collision when visibility is impaired by darkness or inclement weather (Weir 1976). There is also evidence that lights on structures increase collision risk (Reed et al., 1995; Russell, 2005; numerous authors cited by Manville 2000). Anderson & Murphy (1988) monitored bird behavior and strikes to a 12.5km power line in the Lisburne area (the southern portion of the Prudhoe Bay oil fields) during 1986 and 1987. They observed 25 different species of birds including spectacled eiders. Results indicated that strike rate was related to flight behavior, in particular the height of flight. Johnson and Richardson (1982) in their study of migratory behavior along the Beaufort Sea coast reported that 88% of eiders flew below an estimated altitude of 10 m (32 ft) and well over half flew below 5 m (16 ft). This tendency to fly low puts eiders at risk of striking objects in their path. A literature review by Day et al. (2005) also suggested that eider species maybe particularly susceptible to collisions with offshore structures as they fly low and at relatively high speed (~ 45 mph).

Eiders migrating east during spring and west during summer/fall migration periods would be at risk of colliding with ASAP structures. However, we expect most eiders to remain offshore during spring migration because they are thought to follow open water leads in the pack ice during their spring migration to the breeding grounds (Woodby and Divoky 1982; Johnson and Richardson 1982, Oppel et al. 2009, M. Sexson, USGS, pers. comm.). During post-breeding migration in summer and fall, we anticipate that male eiders would have the greatest collision risk in the Action Area. Satellite telemetry data from the eastern ACP, including Prudhoe Bay, indicated that male spectacled eiders departed early in the summer and generally remained close to shore, sometimes crossing overland, during westward migration (TERA 2002; see also Petersen et al. 1999). However, we anticipate that the collision risk for spectacled eiders migrating through the Action Area in early summer would be greatly reduced by the improved visibility of structures during the 24 hours of daylight in the Prudhoe Bay area from mid-May through late July. When females and juveniles migrate during late summer/fall, decreasing daylight and more frequent exposure to foggy weather conditions could increase collision risk. Longer nights increase the time that eiders are vulnerable to collision with unseen structures, and may increase susceptibility to disorientation from lights. However, we anticipate that these birds are also more likely to migrate over open water in the Beaufort Sea (Petersen et al. 1999, TERA 2002), avoiding the Action Area. Thus we anticipate there is a very low risk of spectacled eider mortality from collisions with project infrastructure.

Overhead transmission lines and communication towers would increase collision risk to migrating and breeding spectacled eiders in the Action Area because these structures are more difficult for eiders to detect and avoid; however, overhead transmission lines and communication towers are not included in the current proposed Action.

In summary, we anticipate the likelihood of collisions of spectacled eiders with proposed structures would be very low given 1) improved visibility of structures in late-spring and early summer; 2) the tendency of migrating eiders to fly further offshore in late summer

and fall, when eiders would be more vulnerable to collisions; and 3) overhead transmission lines and communication towers are not included in the proposed action.

Increased predator populations
There is some evidence that predator and scavenger populations have increased near villages and industrial infrastructure on the ACP (Eberhardt et al. 1983; Day 1998; Powell and Bakensto 2009). Researchers have proposed that reduced fox trapping, anthropogenic food sources in villages and oil fields, and nesting/denning sites on human-built structures have resulted in increased numbers of arctic foxes (*Vulpes lagopus*), common ravens (*Corvus corax*), and glaucous gulls (*Larus hyperboreus*) in developed areas of the ACP (R. Suydam and D. Troy, pers. comm. in USFWS 2010, Day 1998). Foxes are important predators of ground-nesting birds in the Prudhoe Bay Oilfield (Liebezeit and Zack 2008, 2010) and appear to occur at higher densities in the Prudhoe Bay region compared to adjacent areas outside of the oil fields (see review in Burgess 2000). Ravens appear to have expanded their breeding range on the North Slope by utilizing buildings and other manmade structures for nest sites (Day 1998). Day (1998) interviewed a number of biologists who work on the North Slope and many felt that ravens may be highly efficient egg predators. Ravens were observed depredating 5 Steller's eider nests near Barrow during 5 nesting years[4] between 1992 and 1999 (Quakenbush et al. 2004). In 2010, Liebezeit and Zack (2010) observed the highest number of ravens since their long-term studies of tundra-nesting birds in the Prudhoe Bay Oilfield began in 2003.

Estimating the effects of predators on spectacled eider production in the Action Area is extremely difficult; however, we anticipate that structures associated with the ASAP would increase the number of potential nesting and perching sites for ravens in the Prudhoe Bay area and may increase the availability of food for ravens and foxes, potentially increasing predator productivity and depredation of spectacled eider nests. The BA indicates that ASAP project operations will follow protocols to minimize waste that may attract predators and monitor areas that provide nesting habitat. These protocols would be consistent with those used at other facilities in Prudhoe Bay to limit anthropogenic food resources and the availability of nest sites. If these measures are implemented, we anticipate adverse effects to spectacled eiders from increased predator populations would be minimal.

Long-term habitat loss
Direct habitat loss will result from placement of gravel to construct the GCF (70 acres), the camp and administrative facilities pad (~11.3 acres), the laydown yard at MP 4 (6 acres), and the access road at MP 5.5 (~3.2 acres). This area of gravel fill would be rendered permanently unavailable as breeding habitat for eiders. Additionally, activities within the construction right of way (242.4 acres based on 100-foot width along MP 0–20) may permanently alter spectacled eider breeding habitat. We also anticipate that indirect habitat loss will occur within a 200-m (656.17-ft) zone of influence surrounding new development through disturbance from on pad activities and pipeline maintenance.

[4] Steller's eiders have highly variable nesting effort among years and nests are not detected near Barrow in about 50% of years.

The two principal mechanisms through which disturbance can adversely affect eiders on their breeding grounds are:
1. Displacing adults and/or broods from preferred habitats during pre-nesting, nesting, brood rearing, and migration; and
2. Displacing females from nests, exposing eggs or young to inclement weather or predators.

In the discussion below, we provide an assessment of potential loss of production resulting from the proposed ASAP project. This assessment uses updated estimates of spectacled eider density in the Action Area based on recent waterfowl breeding population survey data from the region (Larned et al. 2011). These estimates were developed at a coarse, regional scale and are not site-specific; however, they reflect the best available data on the density of the Action Area by breeding spectacled eiders. Distributions on a local scale may vary based on the availability of preferred habitats.

Direct loss of habitat would occur by placement of gravel onto approximately 333 acres (1.35 km^2) of tundra wetlands during construction of the pads and access road. We expect indirect habitat loss will occur through displacement of eiders within a 200-m zone of influence surrounding gravel pads and along each side of the access road and the pipeline. The area encompassed by the zone of influence, the area of total habitat loss, is estimated to be 3,511 acres (14.21 km^2). Although we expect the zones of influence associated with the access road and the pipeline to overlap considerably, we do not have enough information to accurately assess the extent of overlap and included both areas in our calculation of total habitat loss to ensure we have not underestimated potential effects to spectacled eiders. Additional details on estimation of total habitat loss are presented in Appendix A.

Spectacled eider density polygons constructed from data collected during the 2007–2010 waterfowl breeding population survey of the ACP (Larned et al. 2011; Figure 4.1) provide our best estimate of spectacled eider nesting effort in the Action Area because comparable site-specific data are not available from the Action Area. These surveys were conducted at a broad spatial scale relative to the Action Area. Eider counts were not corrected for visibility. Predicted spectacled eider density in the Action Area ranged from 0 to 0.425 birds/km^2 (Figure 4.1). We multiplied the median predicted density in the Action Area (0.2125 birds/km^2) by the estimated affected area (14.21 km^2) to estimate the potential number of spectacled eider pairs displaced by the proposed Action per year. We assume the estimated number of pairs displaced is equivalent to the number of nests or young broods that may be affected. We also assume that spectacled eiders will be present and attempt to nest annually in the Action Area. The potential loss of production in terms of numbers of eggs or ducklings lost was based on an average clutch size of 3.9 for spectacled eiders in northern Alaska (Petersen et al. 2000, Bart and Earnst 2005, Johnson et al. 2008).

Loss of production of up to two nests or 8 eggs/ducklings per year was estimated as follows:

0.2125 birds/km^2 × 0.5 nests/pair × 14.21 km^2 = 1.51 nests per year

2 nests × 3.9 eggs per nest = 7.8 eggs per year

Loss of production of 80 nests or 316 eggs over an assumed 50-year project life[5] was estimated as follows:

0.2125 birds/km^2 × 0.5 nests/pair × 14.21 km^2 × 50 years = 75.52 nests over 50 years

76 nests × 3.9 eggs or ducklings per nest = 296.4 eggs over 50 years

To summarize, we estimate that the proposed action will result in the loss of 8 spectacled eider eggs or ducklings per year or 297 eggs or ducklings over an assumed 50-year project life through direct loss of breeding habitat and disturbance within a 200-m zone of influence surrounding the project infrastructure within the Action Area. These estimates are based on a series of inclusive assumptions and represent the maximum potential impact to spectacled eiders.

Polar Bears

Adverse effects polar bears could result from the proposed Action primarily through disturbance, increased polar bear–human interactions, and habitat loss.

Denning polar bears

Durner et al. (2006) found approximately 50% of pregnant females in the Beaufort Sea came ashore to construct maternity dens, while Amstrup and Gardner (1994) found 42% of females observed in the Alaskan Chukchi and Beaufort seas and Canadian Beaufort Sea from 1983–1991 denned on land. The most recent data (Fishbach et al. 2007) suggests 60% of females in these areas den on land. In Alaska, dens are sparsely distributed along a narrow coastal strip with sightings reported up to 48 km inland (Lentfer and Hensel 1980) and 61 km inland (Amstrup and Gardner 1994).

Female polar bears entering dens, or females in dens with cubs, are more sensitive than other age and sex groups to noises (USFWS 2011c). Females appear more likely to abandon their dens in the fall before cubs are born and relocate if disturbed (Lentfer and Hensel 1980, Amstrup 1993), than in the spring when young cubs are less likely to survive if they leave the maternal den early (Amstrup 1993). Industrial noise and activities that commence after the female has denned may cause a female to abandon the den site prematurely, before the altricial cubs have developed enough to survive outside the den. Post-emergence, females and cubs spend an average of 8 days in the area before the den site is abandoned (USGS data cited by USFWS 2006). These family groups may be particularly susceptible to disturbance.

[5] The project BA (page 80) states the lifetime of the project is “possibly in excess of 50 years”.

Behavioral responses of individual denning females and family groups to disturbance is variable. While observations of den abandonment associated with industry activities have been reported from northern Alaska (see review in USFWS 2011c), available data indicates such events have been infrequent and isolated (USFWS 2011c) and some studies have reported individual denning polar bears to be tolerant of human disturbance (e.g., Amstrup 1993, Smith et al. 2007). Additionally, USFWS (2011c) reported three examples (2006, 2009, and 2010) of pregnant female bears establishing dens prior to the onset of oil industry activity within 400 m (1,312 ft) of the den site and remaining in the den through the normal denning cycle.

Polar bears are not known to den in the Action Area; however, suitable denning habitat is available in the area and there is a possibility female polar bears would attempt to den in the area. We anticipate that the level disturbance associated with ongoing oil and gas industry activities in the area would allow a denning polar bear to either become habituated to or relocate to a less disturbed area, significantly reducing the likelihood of potential effects.

Disturbance to non-denning bears

Operations at the GCF and along the pipeline may disturb and displace individual polar bears from the immediate area. There is, however, some evidence that polar bears exposed to routine industrial noises may acclimate to those noises and show less vigilance than bears not exposed to such stimuli (e.g., Smith et al. 2007). Polar bears regularly travel along the coast of Prudhoe Bay north of the proposed location for the GCF (C Perham, pers. comm.); however, the proposed site is adjacent to existing processing facilities and we do not anticipate the new facility to further alter movement patterns of polar bears in the area.

The Service expects that potential adverse effects to polar bears will be reduced further by the applicant's compliance with existing and future authorization issued under the MMPA, such as LOAs issued under the Beaufort Sea ITRs. Disturbance that disrupts behavioral patterns of polar bears is classified as take under the MMPA. The MMPA prohibits incidental take of marine mammals unless specific ITRs have been promulgated under section 101(a)(5) of the MMPA and a subsequent LOA has been issued. Under the MMPA, incidental take is only permitted provided the total of such taking will have no more than a negligible impact[6] on the marine mammal species (or stock in the case of the Beaufort Sea ITRs), and does not have an unmitigable adverse impact[7] on the availability

[6] Negligible impact - an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.

[7] Unmitigable adverse impact - is an impact resulting from the specified activity (1) that is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by (i) causing the marine mammals to abandon or avoid hunting areas, (ii) directly displacing subsistence users, or (iii) placing physical barriers between the marine mammals and the subsistence hunters; and (2) that cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

of these species for subsistence uses. Additional information on measures implemented under these regulations to reduce effects to polar bears from oil and gas industry activities can be found in the BO for the 2011 Beaufort Sea ITRs (USFWS 2011).

Routine aircraft traffic is not anticipated to adversely affect polar bears in the Action Area. Amstrup (1993) studied the response of denning bears to research aircraft and found no detectable motion among collared bears in their dens when flights took place. Reactions of non-denning polar bears appear limited to short-term changes in behavior. Hence, no long-term adverse impacts to individuals from aircraft activities are anticipated.

Increased polar bear–human interactions

Polar bear–human encounters can be dangerous for both the polar bear and human. For the bear, a human encounter may result in the bear being hazed away from the area or, in the worst case, being killed in defense of life and property. While loud noises may deter bears from entering an area of operation, polar bears are curious and commonly approach noise sources, such as industrial sites (Stirling 1988).

Polar bear deterrence activities associated with oil and gas and other activities occur regularly in the Action Area. From August 2006 through July 2010, the oil and gas industry working in the Beaufort Sea or its adjacent coast reported the sightings of 1,414 polar bears, of which 209 (15%) were intentionally harassed, or deterred (C. Perham, pers. comm.). Annually, the percent of total bears sighted that were deterred ranged from ranged from 9% in 2010 to 43% in 2006, with an average of 15%.

Authorization to harass (haze) polar bears may be requested under section 112(c), and/or 101(a)(4)(A) of the MMPA, which allows the Service to set up cooperative agreements with industry or other publics, and under sections 109(h) which states that a person may take a marine mammal in a humane manner if such taking is for: (a) protection or welfare of the mammal; (b) protection of public health and welfare; or (c) non-lethal removal of nuisance animals. This type of action is considered Level B Harassment[8]. Although hazing may have some short term adverse effects by displacing a bear, the safe removal of a bear to non-industrial areas may prevent more serious impacts to the bear possibly including lethal take in defense of life and property. Since the implementation of ITRs, LOAs, and authorization of intentional take, only two polar bears are known to have been killed due to encounters with industry on the North Slope of Alaska. In contrast, 33 polar bears were killed in the Canadian Northwest Territories from 1976 to 1986 during encounters with industry (Stenhouse et al. 1988).

The Service also consulted previously on a Final Rule regarding passive and preventative deterrence measures that any person can use (e.g., acoustical and vehicular deterrence) when working in polar bear habitat (USFWS 2010d). The Service concluded that these

[8] Level B Harassment - has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild.

methods are likely to cause, at most, only short-term changes in behavior, such as bears running away from the disturbance (USFWS 2010d).

Habitat Loss
The pipeline, gravel pads, access road, and other components of the Action would impact approximately 333 acres (1.35 km^2) of tundra habitat within the Action Area. Polar bears use coastal areas for denning, hunting, and travel corridors, and we suspect with changing ice patterns more polar bears will be encountered on land in the future. Oil infrastructure in the Prudhoe Bay area is not though to significantly interfere with movements of non-denning bears.

Terrestrial dens in Alaska are sparsely distributed along a narrow coastal strip, with observations up to 61 km (37.9 mi) inland (Amstrup and Gardner 1994). Denning habitat includes coastal bluffs, along river banks, and bluffs where snow accumulates early (Durner et al. 2003). It is possible a small amount of potential denning habitat may be destroyed or altered by project activities; however, denning habitat is not limiting population size, and adverse effects from habitat loss are not anticipated (C. Perham, pers. comm. in USFWS 2008).

Polar Bear Critical Habitat
In our effects analysis, we analyzed how the PCEs are likely to be affected and how that is likely to influence the function and conservation role of each PCE at the unit scale. We assumed if the function of any one PCE at the individual critical habitat unit scale was not likely to be appreciably reduced, then it follows that adverse modification for the total polar bear critical habitat would not likely occur.

Effects on sea ice habitat
Activities will primarily occur on land within and south of the Prudhoe Bay oil fields. Accordingly, we do not expect adverse effects to the Sea Ice Unit.

Effects on terrestrial denning habitat
The proposed Action may alter the physical features of terrestrial denning habitat through the construction of ~7 miles of pipeline, ~87 acres of gravel pads, ~5.5 miles of gravel road within the Terrestrial Denning Unit (Figure 4.2). Temporary effects to terrestrial denning habitat could result from construction of ice/snow roads and pads in support of construction and operations. Additionally, activities that may occur in the Action area could be a source for disturbances that may affect the conservation role of terrestrial denning habitat.

Topographic features – The terrestrial denning PCE is characterized by steep, stable slopes that accumulate snow. Certain areas such as barrier island, river banks, and coastal bluffs that occur at the interface of mainland and marine habitat receive proportionally greater use for denning (Durner et al. 2004, 2006), with coastal bluffs providing the most preferred topographic relief. For example, of 35 terrestrial dens found on the ACP in 2001, >80% were along coastal bluffs (Durner et al. 2003).

The proposed Action could result in modifications of some slopes and limit their capability to catch snow. We expect that alteration of slopes during construction is likely to be minimal, and, in fact, largely avoided because construction and use of steep terrain is more difficult than flat areas. Therefore, we expect only a small area containing suitable topographic features for denning would be affected.

Features related to polar bear movement and absence of disturbance – A disturbance may affect critical habitat if it persists and affects the critical habitat's conservation role. Features of the terrestrial denning habitat PCE that relate to disturbance include: 1) unobstructed, undisturbed access between den sites and the coast; and 2) the absence of disturbance from humans and human activities that might attract other polar bears (i.e., non-denning polar bears which may kill females and cubs in dens).

Given the limited extent of development anticipated in polar bear critical habitat, it is unlikely the proposed Action will significantly hinder movement between den sites and the coast through physical obstructions or disturbance.

Human activity could also reduce the quality of terrestrial denning habitat by providing attractants (such as food and scents) that could attract adult male bears, which may kill females and cubs, to nearby dens. Disturbance and attractants resulting from the Action would be most likely to occur where human presence is concentrated or prolonged, such as camp facilities and the GCF. However, we expect that these effects will be reduced by following protocols to minimize waste that may attract predators, as stated in the BA, and the applicant's compliance with existing and future authorizations issued under the MMPA (see *Polar Bears* section, page 36), which include terms and conditions to minimize effects to denning bears and manage human food waste. Thus, both the level of human activity within preferred denning habitat and the presence of attractants to non-denning polar bears will be limited.

Summary of potential effects to the Terrestrial Denning Unit –Adverse effects of the Action are not expected to substantially impact the conservation role of the Terrestrial Denning Unit because: 1) we expect development in areas where topographic relief produces optimal denning habitat, such as river and coastal bluffs to be limited; 2) terms and conditions associated with authorizations under the MMPA would minimize the level of persistent disturbance that may result from the Action; and 3) the scale of the potentially affected area would be small relative to the extent of the Terrestrial Denning Unit such that the function of the unit as a whole would not be compromised.

Effects on barrier island habitat
The proposed GCF and associated facilities and approximately one mile of gas pipeline will occur within the Barrier Island Unit. This area is within the 1.6-km zone surrounding the designated barrier island near the mouth of the Putuligayuk River in Prudhoe Bay (Figure 4.2). Approximately 93 acres of habitat will be rendered unavailable for denning, refuge from human disturbance, and movements along the coast to access maternal den and optimal feeding habitat.

As discussed above, disturbance may affect critical habitat if it persists and affects the critical habitat's conservation role. The Service has identified refuge from human disturbance as a feature of the barrier island habitat PCE essential to the conservation of polar bears. Because human activities are expected to routinely occur within the footprint of the project during and after construction, we anticipate that the proposed action would result in persistent human disturbance that is likely to adversely affect the intended conservation role of the Barrier Island Unit. However, we anticipate that adverse effects related to disturbance would be minor because the affected area does not include optimal denning habitat, the area is already subject to disturbances from existing oil and gas infrastructure and the spatial scale of the project is not large enough to substantially interfere with polar bear movements along the coast to access maternal den and optimal feeding habitat.

Summary of effects to the Barrier Island Unit – The proposed Action will permanently affect ~93 acres of the Barrier Island Unit through long-term habitat loss along the southwest coast of Prudhoe Bay and persistent human disturbance associated with construction and operation the GCF and other proposed facilities. Adverse effects of the Action are not expected to substantially impact the conservation role of the Barrier Island Unit because adverse effects are expected to be minor and the scale of the potentially affected area would be small relative to the extent of the Barrier Island Unit such that the function of the unit as a whole would not be compromised.

Interdependent and Interrelated Effects

An interrelated action depends on the proposed action for its justification; an interdependent action has no independent utility apart from the action under consultation. Implementation of the proposed Action may facilitate the additional development related to gas extraction on the North Slope by providing infrastructure needed to transport natural gas to potential markets; however, the Service has not identified specific actions that are interdependent on or interrelated to the proposed action.

8. CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the Action Area considered in this BO. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. When analyzing cumulative effects of a proposed action, it is important to define both the spatial (geographic), and temporal (time) boundaries. Within these boundaries, the types of actions that are reasonably foreseeable are considered.

Future development by the State of Alaska or the North Slope Borough may occur in the area through developments like improved roads, transportation facilities, utilities or other infrastructure. However, the entire Action Area, and the undeveloped lands surrounding are wetlands, and are therefore subject to Section 404 permitting requirements by the

U.S. Army Corps of Engineers. This permitting process would serve as a federal nexus, and hence trigger a review of any major state or borough construction project in the area.

9. CONCLUSION

Regulations (51 CFR 19958) that implement section 7(a)(2) of the ESA define "jeopardize the continued existence of" as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 C.F.R. 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete our analysis with respect to critical habitat.

Spectacled eiders

In evaluating the impacts of the proposed project to spectacled eiders, the Service identified direct and indirect adverse effects that could result from habitat loss and disturbance. Using methods and logic explained in the *Effects of the Action* section, the Service estimates that 76 nests would be lost resulting from long-term habitat loss over an assumed 50-year project life. Loss of production over the life of the project is estimated at 297 spectacled eider eggs, based on these 76 nests. However, we expect this loss of production will not have a significant effect at the population level because only a small proportion of spectacled eider eggs or ducklings on the North Slope would eventually survive to recruit into the breeding populations. Thus, the loss of eggs or ducklings is of much lower significance for survival and recovery of spectacled eiders than the death of an adult bird. For example, spectacled eider nest success recorded on the YKD ranged from 18-73% (Grand and Flint 1997). From the nests that survived to hatch, spectacled eider duckling survival to 30-days ranged from 25-47% on the YKD (Flint et al. 2000). Over-winter survival of one-year old spectacled eiders was estimated at 25% (P. Flint pers. comm.), with annual adult survival of 2-year old birds (that may enter the breeding population) of 80% (Grand et al. 1998). Using these data (in a very simplistic scenario) we estimate that 0.9–6.6% of eggs/ducklings would be expected to survive and recruit into the breeding population.

If we also apply these rates to the estimated loss of production for the ASAP project, we would expect the project to preclude 3–21 adults (or 1.5–10.5 breeding pairs) from entering the North Slope population over a 50-year project life. The population of North Slope-breeding spectacled eiders was last estimated at 12,916 (10,942–14,890, 95% CI; Stehn et al. 2006) for the period of 2002– 2006. Applying the methods of Stehn et al. (2006) to more recent aerial survey data from the North Slope results in an estimate of 11,254 (8,338–14,167, 95% CI) for the period of 2007– 2010. Given the potential loss of recruitment of ≤21 eiders is a small percentage of the estimated population size and this loss would be distributed across ~50 years, we believe the population-level effects of loss of production from the ASAP project will not significantly affect the likelihood of survival and recovery of spectacled eiders. Accordingly, it is the Services' biological

opinion that the proposed action is *not likely to jeopardize the continued existence* of the spectacled eider.

Polar bears
We have assessed potential impacts to polar bears to ensure activities that may result from the action do not jeopardize the continued existence of the species as required under section 7(a)(2) of the ESA. As described in the *Effects of the Action*, activities that may result from the action could adversely affect polar bears through disturbance, an increase in polar bear-human interactions, and habitat loss. A small numbers of polar bears may be adversely affected through disturbance or polar bear-human interactions which may include intentional take. These adverse effects are expected to impact only the Southern Beaufort Sea polar bear stock and population level impacts to the species are not anticipated. Therefore, the Service concludes that the proposed action is *not likely to jeopardize the continued existence* of the polar bear.

Polar Bear Critical Habitat
After considering the status of polar bear critical habitat, the environmental baseline, cumulative effects, and effects of the proposed Action on each PCE, we conclude the proposed Action may adversely affect but *is not likely to destroy or adversely modify polar bear critical habitat*. This conclusion was based on the following factors:

Activities will primarily occur on land within and south of the Prudhoe Bay oil fields. Accordingly, we do not expect adverse effects to the Sea Ice Unit. Adverse effects of the Action are not expected to substantially impact the conservation role of the Terrestrial Denning Unit because: 1) we expect development in areas where topographic relief produces optimal denning habitat, such as river and coastal bluffs to be limited; 2) terms and conditions associated with authorizations under the MMPA would minimize the level of persistent disturbance that may result from the Action; and 3) the scale of the potentially affected area would be small relative to the extent of the Terrestrial Denning Unit such that the function of the unit as a whole would not be compromised. Adverse effects of the action are not expected to substantially impact the conservation role of the Barrier Island Unit because these effects are expected to be minor and the scale of the potentially affected area would be small relative to the extent of the Barrier Island Unit such that the function of the unit as a whole would not be compromised.

Future Consultation
This BO's determination of non-jeopardy is based on the assumption that the USACE and their agents will consult with the Service on future activities related to the ASAP project that are not evaluated in this document.

In addition to listed eiders and polar bears, the area affected by the ASAP project may now or hereafter contain plants, animals, or their habitats determined to be threatened or endangered. The Service, through future consultation may recommend alternatives to future developments within the project area to prevent activity that will contribute to a need to list such a species or their habitat. The Service may require alternatives to proposed activity that is likely to result in jeopardy to the continued existence of a

proposed or listed threatened or endangered species or result in the destruction or adverse modification of designated or proposed critical habitat. The Federal action agencies should not authorize any activity that may affect such species or critical habitat until it completes its obligations under applicable requirements of the ESA as amended (16 U.S.C. 1531 et seq.), including completion of any required procedure for conference or consultation.

10. INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. "Harm" is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action, is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS).

Spectacled Eiders

As described in Section 7, *Effects of the Action*, the activities described and assessed in this BO may adversely affect spectacled eiders through direct and indirect long-term habitat loss. Long-term habitat loss would occur directly from placement of gravel fill and indirectly through disturbance associated with facility operations and pipeline maintenance. Methods used to estimate loss of spectacled eider production resulting from long-term habitat loss are described in the *Effects of the Action* section. Based on these estimates of loss of spectacled eider production, the Service anticipates that *297 spectacled eider eggs* are likely to be taken as a result of the proposed Action through long-term direct and indirect habitat loss (harm).

While the incidental take statement provided in this consultation satisfies the requirements of the ESA, it does not constitute an exemption from the prohibitions of take of listed migratory birds under the more restrictive provisions of the Migratory Bird Treaty Act. However, the Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703–712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668–668d), if such take is in compliance with the terms and conditions specified herein.

Polar Bears
The Service cannot provide incidental take authorization for polar bears for those activities that may occur as a result of an action where incidental take of marine mammals has not been authorized under section 101(a)(5) of the MMPA. We anticipate authorizing incidental take of polar bears through consultation on the issuance of ITRs and LOAs under the MMPA. Similarly, this document cannot issue incidental take for activities that may result in intentional take of polar bears as defined under sections 101(a)(4)(A), 109(h), and 112(c) of the MMPA. Authorization of intentional harassment will be subject to subsequent review under the ESA.

USACE has a continuing duty to regulate the activity covered by this Incidental Take Statement (ITS). If USACE (1) fail to assume and implement the terms and conditions or (2) fail to require any applicant to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse.

11. REASONABLE AND PRUDENT MEASURES

These reasonable and prudent measures (RPMs) and their implementing terms and conditions (T&Cs) aim to minimize the incidental take anticipated from activities described in this BO.

We have not identified RPMs or terms and conditions for polar bears. However, the Service anticipates that AGDC would obtain and comply with the terms and conditions of a LOA under the Beaufort Sea ITRs, pursuant to the MMPA.

As described in *Section 8 – Incidental Take Statement*, activities conducted by the USACE and their agents are anticipated to lead to incidental take of spectacled eiders through long-term habitat loss and disturbance of nesting females during the life of the project.

RPM 1 – Breeding spectacled eiders may remain on tundra in the action area through late August, but are considered to be most vulnerable to the effects of disturbance through the early brood-rearing stage. Accordingly, off-pad activities and pipeline maintenance within the action area should not be scheduled between June 1 and July 31 to the extent practicable.

12. TERMS AND CONDITIONS

To be exempt from the prohibitions of Section 9 of the Act, MBM Office must comply with the following terms and conditions, which implement the RPMs described above. These terms and conditions are non-discretionary.

T&C 1 – The AGDC has scheduled all construction activities outside of the eider breeding window. Changes to this schedule that affect the timing of proposed activities relative to spectacled eider nesting and brood-rearing periods should be reported to USFWS so that potential effects to eiders can be evaluated.

13. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We recommend the following actions be implemented:

1. Ravens are known to depredate eider nests near Barrow, AK (Quakenbush et al. 2004, Rojek 2008) and are potentially significant predators of spectacled eider eggs elsewhere on the North Slope, including oil fields. The Service recommends that AGDC remove any nest materials from accessible raven nest locations prior to egg laying, in addition to developing and implementing techniques designed to render their structures unattractive to breeding ravens.

2. While no collisions between spectacled eiders and project structures are anticipated, the Service recommends reporting all sea duck collisions to the Endangered Species Branch, Fairbanks Fish and Wildlife Field Office to improve our understanding of potential collision risks to eiders in the Prudhoe Bay area. Please contact Ted Swem at 907-456-0441.

14. RE-INITIATION NOTICE

This concludes formal consultation for the Alaska Stand Alone Pipeline project. As provided in 50 CFR 402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if:

1. The amount or extent of incidental take is exceeded;
2. New information reveals effects of the action agency that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion;
3. The agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat not considered in this opinion; or
4. A new species is listed or critical habitat is designated that may be affected by the action.

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United States Department of Commerce
National Oceanic and Atmospheric Administration

Section 7 Letter of Concurrence

for

Alaska Stand Alone Gas Pipeline

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

January 11, 2012

Colonel Reinhard W. Koenig
U.S. Army Corps of Engineers, Alaska District
P.O. Box 6898
Elmendorf AFB, AK 99506-0898

Attn: Serena Sweet

Dear Colonel Koenig:

The National Marine Fisheries Service (NMFS) received your letter dated 7 June 2011 requesting consultation under Section 7 of the Endangered Species Act of 1973 for project reference POA- 2009-651. The Corps of Engineers (USACE) also provided NMFS with two CD's of updated project documents and a Biological Assessment. NMFS concurs with the USACE determination of Not Likely to Adversely Affect, and that formal consultation is not necessary for the Alaska Stand Alone Pipeline given the details provided in the Biological Assessment (BA) and Project Description.

NMFS staff have reviewed updated project descriptions online at www.asapeis.com and www.gasline.us.com and the BA provided by the USACE to complete this letter of concurrence for the endangered western distinct population segment (DPS) of Steller sea lion *Eumetopias jubatus;* endangered bowhead whales *Balaena mysticetus;* endangered Cook Inlet DPS beluga whale *Delphinapterus leucas;* proposed ringed seal *Phoca hispida;* endangered fin whale *Balaenoptera physalus;* endangered humpback whale *Megaptera novaengliae; and* proposed bearded seal *Erignathus barbatus.* This letter of concurrence also includes an analysis of any direct and indirect effects on designated critical habitat.

Background
NMFS provided scoping comments on March 8, 2010 and a threatened and endangered species list on December 10, 2010, to the USACE for the Alaska Stand Alone Gas Pipeline (ASAP) project.

The current proposed project involves construction and operation of a 737-mile long, 24-inch diameter pipeline designed to transport natural gas consisting of either a highly conditioned natural gas highly enriched in non-methane hydrocarbons or conditioned natural gas containing mostly methane. The pipeline would start at Prudhoe Bay and follow the Trans-Alaska Pipeline System (TAPS) and Dalton Highway corridors, generally paralleling the highway corridor from the North Slope to near Livengood, northwest of Fairbanks. The pipeline would head south at Livengood and join the Parks Highway corridor west of Fairbanks near Nenana. From Nenana it would continue south to milepost 39 (near Wasilla) of the Beluga Pipeline (ENSTAR's

distribution system) providing access to tidewater at Cook Inlet. There would also be a 12-inch diameter lateral pipeline to Fairbanks (Fairbanks Lateral) which would take off from the main pipeline just a few miles north of Nenana at Dunbar. The Fairbanks Lateral would travel approximately 35 miles northeast to Fairbanks. The operation of the proposed terrestrial pipeline will have no effects on marine mammal stocks listed as endangered or threatened, or proposed to be listed stocks.

The most relevant portion of the action for NMFS species relates to port and transiting vessel operations during construction. ASAP estimates approximately 35 vessel shipments to deliver pipe into Alaska via either the port of Anchorage or the port of Seward and 9 vessel shipments to deliver materials to West Dock at Prudhoe Bay during the 2-year construction season. In addition, the biological assessment describes concerns due to noise and the development and implementation of a Noise Abatement Program as mitigation of potential effects on the environment. ASAP describes in their biological assessment several proactive vessel operational steps that will be taken to mitigate sound energy exposure and the probability of vessel collisions with marine mammals. The noise mitigation measures described by ASAP include speed reductions, minimization of multiple course changes, and no approach when marine mammals are observed by vessel crew (i.e., known to be present). We assume these measures are part of the proposed action, and believe they would be practical, effective, realistic, and appropriate to include in the proposed action as part of the Noise Abatement Program.

Action Area

The Action Area for this project consists of a 737-mile north-south and 35-mile west-east terrestrial pipeline corridor and the ports of Anchorage and Seward and West Dock in Prudhoe Bay plus a ¼ mile seaward extension. The ¼ mile seaward extension from the ports of Anchorage, Seward and West Dock in Prudhoe Bay represent the only area of potential direct and indirect effects on proposed, threatened, or endangered species under NMFS jurisdiction.

Effects of the Action

The ESA section 7 implementing regulations (50 CFR 402.02) define "effects of the action" as:

"the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur (50 CFR 402.02)."

There are three possible determinations of effects under the ESA. The determinations and their definitions are:

No Effect – The proposed action or interrelated or interdependent actions will not affect (positively or negatively) listed species or their habitat.

May affect, not likely to adversely affect – The proposed action or interrelated or interdependent actions may affect listed species or their habitat, but the effects are expected to be insignificant, discountable, or entirely beneficial. *Insignificant effects* relate to the size of the impact and should never reach the scale where a take will occur. *Discountable effects* are those that are extremely unlikely to occur. Based on best judgment, one would not 1) be able to meaningfully measure, detect, or evaluate insignificant effects; or 2) expect discountable effects to occur. *Beneficial effects* are contemporaneous positive effects with no adverse effects to listed species.

May affect, likely to adversely affect – The proposed action or interrelated or interdependent actions may have measurable or significant adverse effects on listed species or their habitat. Such a determination requires formal ESA section 7 consultation.

Determinations are also required of the effects of a federal action on any designated critical habitat for listed species.

Determination of Effect

Direct Effects

The USACE has concluded that the ASAP project may affect, but is not likely to adversely affect any of the endangered, threatened or marine mammals proposed for listing under NMFS jurisdiction within the Action Area. NMFS has analyzed the project description and biological assessment and determined the majority of the effects of the action will occur in the terrestrial environment. Western DPS Steller sea lions, endangered Cook Inlet DPS beluga whales, and proposed to be listed ringed seals are most frequently observed in shallow nearshore waters and most likely to experience the direct effects of vessel traffic and the associated underwater noise. Bowhead, fin, and humpback whales as well as proposed to be listed bearded seals are all commonly found in deeper offshore waters not near the ports or docks identified in the Action Area (Bengtson et al. 2005; Calambokidis et al. 2008; Moore et al. 2006; Moore and Reeves 1993; Simpkins et al. 2003) and therefore we do not consider them likely to be exposed to direct effects from the action.

Marine mammals may hear underwater sounds above background sound levels from transiting barge and vessel traffic. Underwater sounds from vessels can travel long distances and may be heard by a distant marine mammal some time after the vessel has passed; however their received levels at longer distances are often so low they are difficult to detect and attribute to a singular source. Underwater sound levels attenuate with distance and therefore the potential for marine mammals to detect sounds and respond behaviorally to a particular sound is reduced.

Bowhead whales, fin whales, bearded seals and humpback whales are found more frequently in offshore waters (see references above) and subject to noise exposure from transiting vessels in the offshore marine waters. Bowheads migrate offshore north of this project at West Dock

(Bockstoce et al. 2007). Most transiting vessels would be closer to shore or approaching West Dock and passing bowhead whales would be unlikely to receive noise within the migratory corridor or the received levels of such noise would be so low it would not be expected to cause a significant change in whale behavior (Moulton et al. 2003). Bowhead whales, fin whales, bearded seals and humpback whales may hear noise from ship traffic associated with the proposed action and might move further offshore or away from the source, but continue their behavior (Richardson et al. 1995a). Monitoring studies of the Northstar Island oil and gas production facility in the Beaufort Sea (Richardson and Williams 2003) found that offshore displacement of bowhead whales occurred at times of loudest noise (which was predominately due to vessel activity near Northstar Island ~6 miles north of West Dock) during its construction in 2001. However, no significant displacement was observed in subsequent years when vessel traffic noise was reduced (Richardson et al. in press). Bowhead whales are known to avoid small boats at distances up to 4 km, but most reactions have been observed at ranges of less than 1.9 km (Richardson et al. 1985; 1995b). Richardson et al. (1985; 1995b) postulated a whale's response was more closely related to sudden changes in vessel direction and whale's exposure to and experience with small vessels. Whales tend to show little response to larger vessels that move slowly and are not heading towards them (Richardson et al. 1995a). NMFS believes any effects on humpback, fin or bowhead whales due to vessel noises delivering materials and equipment through the Gulf of Alaska, Bering, Chukchi and Beaufort seas associated with construction of this project would be insignificant.

Cook Inlet belugas, ringed seals and Steller sea lions could all be exposed to low level transiting vessel noise within and outside the action area. Beluga whales, ringed seals, or Steller sea lions are the only species likely to be directly affected by vessel sound exposure from the proposed action in the Action Areas. These three species may hear and respond to underwater sound associated with barge departures and arrivals in the ports identified in the Action Area. However, few beluga whales, ringed seals, or Steller sea lions would be expected within the action area, and these species are not known to consistently respond in predictable ways to vessel traffic or underwater sounds associated with large vessels or barges that would reach the scale where direct effects would be observed or "taking" occurs (Richardson et al. 1995a; Moulton et al. 2003). There are no records of beluga whales, ringed seals or Steller sea lions being struck by large vessels, and vessels arriving or departing from ports or docks are moving slowly and vessel speed is the most important predictor of vessels striking and killing large whales (Laist et al. 2001; Silber et al. 2010).

Given the action area consists of shallow nearshore marine waters associated with each of two ports and West Dock, there is little likelihood that a bowhead, fin, humpback whale, or bearded seal will be present in these areas (Bengtson et al. 2005; Calambokidis et al. 2008; Moore et al. 2006; Moore and Reeves 1993; Simpkins et al. 2003) and subject to direct effects of the proposed action (Moulton et al. 2003).

The ASAP project includes several proactive vessel operational steps that will be taken to mitigate sound energy exposure and the probability of vessel collisions with marine mammals. ASAP vessels and barges will implement speed reductions, minimize multiple course changes, and not approach marine mammals when they are observed by vessel crew. Vessel speed reductions and minimization of multiple course changes in the presence of marine mammals will

reduce underwater sound levels emanating into the marine environment. The reduction in underwater sound levels will further reduce the probability that sound exposure levels will exceed behavioral response thresholds of the nearest marine mammals. The implementation of the ASAP Noise Abatement Program will ensure that any potential direct effects from at sea vessel traffic are insignificant.

The ports of Anchorage and Seward and West Dock are all active marine traffic hubs with near continuous summer vessel traffic. No effects that would be considered "taking" under the ESA on listed species are anticipated from the current or anticipated inconsequential changes in marine traffic levels due to the ASAP project. Cook Inlet beluga whales, ringed seals and Steller sea lions may at most experience insignificant direct effects (Moulton et al. 2003; Prevel Ramos et al. 2006), whereas the remaining listed species will not experience direct effects.

Effects from Interdependent and Interrelated Actions:
Interdependent actions are defined as actions with no independent use apart from the proposed action. Interrelated actions include those that are part of a larger action and depend on the larger action for justification. We did not identify any interdependent/interrelated actions associated with the ASAP construction or operation.

Indirect Effects
Indirect effects of the ASAP project are those which occur later in time and may affect marine mammals. During the construction of the ASAP project only minor increases in vessel and barge traffic will occur and the resulting underwater sounds will not persist in the marine environment to result in indirect effects. There are no proposed marine activities during operation of the terrestrial pipeline and therefore no indirect effects are anticipated from operation of the ASAP. There does not appear to be any potential indirect effects from the ASAP project.

Critical Habitat
Critical habitat for Cook Inlet beluga whales was designated on April 11, 2011 (see 76 FR 20180). The Port of Anchorage was excluded from the Cook Inlet beluga critical habitat designation. Further information may be found on our website at http://www.alaskafisheries.noaa.gov/protectedresources/whales/beluga.htm, or in 50 CFR 226.220. We did not identify any direct or indirect effects to this critical habitat due to the proposed project.

NMFS has designated rookeries, major haul outs, and marine foraging areas of the Steller sea lion in Alaska as critical habitat. A listing of these areas, the associated three-mile no entry marine zones and further information may be found on our website at http://www.alaskafisheries.noaa.gov/protectedresources/stellers/habitat.htm, or in 50 CFR 226.202. We did not identify any direct or indirect effects to this critical habitat due to the proposed project.

No CH has been designated in Alaska for bowhead, fin, or humpback whales.

Conclusion

Under section 7(a)(2) of the Endangered Species Act of 1973, as amended, NMFS concurs with the Army Corps of Engineers determination that this work is not likely to adversely affect the endangered western DPS of Steller sea lion *Eumatopias jubatus;* endangered bowhead whales *Balaena mysticetus;* endangered Cook Inlet DPS beluga whale *Delphinapterus leucas;* proposed ringed seal *Phoca hispida;* endangered fin whale *Balaenoptera physalus;* endangered humpback whale *Megaptera novaengliea; or* proposed bearded seal *Erignathus barbatus* nor any designated critical habitat. Because ringed and bearded seals have not been designated under the ESA, this document will serve as conference under the provisions of section 7. Upon issuance of a determination regarding listing these stocks, NMFS will issue a letter confirming this conference as the section 7 consultation for this action. Under section 7(a)(2) of the Endangered Species Act of 1973, as amended, NMFS has further determined that formal consultation is not necessary due to its concurrence with the USACE determination of not likely to adversely affect.

Reinitiating consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) take of a listed species occurs, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not previously considered, or (4) a new species is listed or critical habitat designated that may be affected by the action.

We hope this information is useful in fulfilling your requirements under section 7 of the ESA. Should you have any questions, please contact Michael Williams by email at michael.williams@noaa.gov, or by telephone at (907) 271-5117.

Sincerely,

James W. Balsiger, Ph.D.
Administrator, Alaska Region

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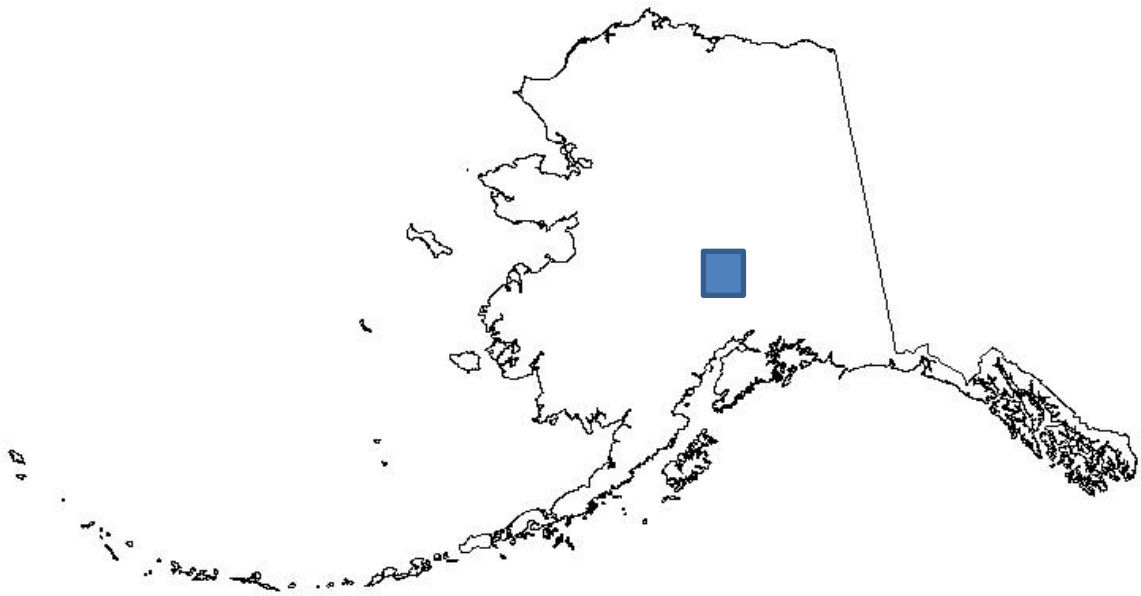
Appendix J

ASAP Wilderness Characteristics Inventory

U.S. Department of the Interior
Bureau of Land Management

Glennallen Field Office
Milepost 186.5 Glenn Highway
Glennallen, Alaska 99586
http://www.blm.gov/ak/st/en/fo/gdo.html

Wilderness Chacteristic Inventory
Case File Number: FF-95641
AK-A020-2011-ASAP-Wilderness Characteristics Inventory



Prepared By:
Glennallen Field Office
December 14, 2011

Documentation of BLM Wilderness Characteristics Inventory Findings from Previous Inventory on Record

1. **Is there existing BLM wilderness characteristics inventory information on all or part of this area?** There is no wilderness inventory characteristics inventory available for any of the three units identified in this evaluation.

No X **Yes** _____
(go to Form 2) (If yes, and if more than one area is within the area, list the unique identifiers for those areas.)

a) Inventory Source: _____
b) Inventory Area Unique Identifier(s): _____
c) Map Name(s)/Number(s): _____
d) BLM District(s)/Field Office(s): _____

2. **BLM Inventory Findings on Record:**

Existing inventory information regarding wilderness characteristics (if more than one BLM inventory area is associated with the area, list each area and answer each question individually for each inventory area): N/A

Inventory Source:

Area Unique Identifier	*Sufficient Size? Yes/No (acres)*	*Naturalness? Yes/No*	*Outstanding Solitude? Yes/No*	*Outstanding Primitive & Unconfined Recreation? Yes/No*	*Supplemental Values? Yes/No*

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Unique Identifier: AKA020-ASAP-Unit 1-Wilderness Inventory

Acreage: 3995 acres (T. 18 S., R. 8 W., Fairbanks Meridian)

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No X _____

This unit is located south of Cantwell on the George Parks Highway at the west end of the Denali Highway, 211 miles north of Anchorage and 28 miles south of Denali National Park and Preserve. Lands within this unit are currently under the administration of the Bureau of Land Management. Units 1 boundary consists of the Alaska Rail Road to the south and Denali National Park and Preserve to the north. This unit does not meet the size requirement therefore no further review is required.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No _____ N/A X _____

Vegetation consists mainly of dwarf birch, willows, grasses and sedges. Vegetation and soils are predominantly natural but localized areas of disturbance exist. Topography consists of rolling tundra, interspersed with many small lakes and boggy areas.

This area has substantial noticeable human impacts that would be apparent to the average visitor. The area is accessible to OHVs but, generally, is not accessible to most street four-wheel drive vehicles. Primary human uses/activities include hunting, hiking, and wildlife viewing, snowmachining and off-highway vehicle use along established multiple use trails in the area. Sights and sounds of the road system and other existing man-made features are dominant.

The George Parks Highway and the Alaska Railroad Right of Way are within sight and sound. All of these man-made developments/disturbances are substantially noticeable within close proximity and are less noticeable from further distances. The total man-made disturbances within the unit cumulatively detract from the natural quality of the area.

Does the area have outstanding opportunities for solitude?

Yes _____ No _____ N/A X _____

The Parks Highway and Alaska Railroad ROW are dominant man-made features within this unit. The area does not offer vegetative and topographic screening that would provide the seclusion needed to reduce the presence of sights, sounds and evidence of other people or human-made features in the area.

Does the area have outstanding opportunities for primitive and unconfined recreation? Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes _____ No _____ N/A X _____

Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

This unit offers potential for some types of primitive recreation activities such as hiking, backpacking, hunting, and dispersed camping. However, these opportunities are similar to those available throughout much of the surrounding BLM-administered lands. Additionally the activities within this unit would generally require the use of motorized equipment. The motorized activities include snowmachining opportunities and off highway vehicle use.

Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes _____ No _____ N/A X _____

Summary of Analysis*

Area Unique Identifier: AKA020-ASAP-Unit 1

Results of analysis: This area has substantial noticeable human impacts that would be apparent to the average visitor. The area is accessible to OHVs but, generally, is not accessible to most street four-wheel drive vehicles. Sights and sounds of the Alaska Railroad and road system are dominate man made feature within this unit. The total man-made disturbances within the unit cumulatively detract from the natural quality, solitude and primitive recreation opportunities of the area.

1. Does the area meet any of the size requirements?	Yes		No	X	
2. Does the area appear to be natural?	Yes		No		N/A X
3. Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation?	Yes		No	X	N/A X
4. Does the area have supplemental values?	Yes		No		N/A X

Check one:

The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

X The area does not have wilderness characteristics.

Prepared by:

Name: Denton Hamby
Title: Outdoor Recreation Planner
Date: 11/8/2011

Reviewed by: (District or Field Manager):

Name: Beth Maclean
Title: Glennallen Field Manager
Date: 11/8/2011

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Unique Identifier: AKA020-ASAP-Unit 2-Wilderness Characteristics Inventory

Acreage: 1210 acres (T. 18 S., R. 8 W., Fairbanks Meridian)

1. **Is the area of sufficient size?** (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No X _____

Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

This unit does not meet the size requirement therefore no further review is required.

Unit 2 is located south of Cantwell on the George Parks Highway at the west end of the Denali Highway, 211 miles north of Anchorage and 28 miles south of Denali National Park and Preserve. Lands within this unit are currently under the administration of the Bureau of Land Management. There is a mix of duel selected lands by the State of Alaska and Ahtna Native Corporation. Units 2 boundaries consist of the Alaska Rail Road to the north and the Parks Highway to the South.

2 **.Does the area appear to be natural?** Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No _____ N/A X _____

Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

3**. Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?**

Yes _____ No _____ N/A X _____

Description (describe the area's outstanding opportunities for solitude):

The Parks Highway, Alaska Energy Authority Transmission Line and Alaska Railroad ROW are dominant man-made features within this unit. The area does not offer vegetative and topographic screening that would provide the seclusion needed to reduce the presence of sights, sounds and evidence of other people or human-made features in the area.

Standing on its own merits, these opportunities are similar to those available throughout much of the surrounding lands. In addition, the existing primitive motorized routes extending into the interior of the unit increase the likelihood of encountering others within portions the unit. The AEA power line, within this unit, is visible from a majority of the unit and detracts from the solitude experience.

4**. Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation?** Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes _____ No _____ N/A X _____

Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

This unit offers potential for some types of primitive recreation activities such as hiking, backpacking, hunting, and dispersed camping. However, these opportunities are similar to those available throughout much of the surrounding BLM-administered lands. Additionally the activities within this unit would generally require the use of motorized equipment. The motorized activities include snowmachining opportunities and off highway vehicle use.

5. **Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?**

Yes _____ No _____ N/A X _____

Description:

Summary of Analysis*

Area Unique Identifier: AKA020-ASAP-Unit 2

Results of analysis: Unit 2 does not meet the size criteria for consideration of Wilderness Characteristics. Additionally Unit 2 has substantial noticeable human impacts that would be apparent to the average visitor. The George Parks Highway and the Alaska Railroad Right of Way are within sight and sound of this unit. All of these man-made developments/disturbances are substantially noticeable and within close proximity (¼ mile). The total man-made disturbances within the unit cumulatively detract from the natural quality, solitude and primitive recreation opportunities of the area.

1. Does the area meet any of the size requirements?	Yes		No	X	
2. Does the area appear to be natural?	Yes		No		N/A X
3. Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation?	Yes		No		N/A X
4. Does the area have supplemental values?	Yes		No		N/A X

Check one:

The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

X The area does not have wilderness characteristics.

Prepared by :

Denton Hamby
Title: Outdoor Recreation Planner
Date: 11/8/2011

Reviewed by: (District or Field Manager):

Name: Beth Maclean
Title: Glennallen Field Manager
Date: 11/8/2011

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Unique Identifier: AKA020-ASAP-Unit 3-Wilderness Characteristics Inventory
Acreage: 6886 acres (Unit 3) T. 18 S., R. 8 W., Fairbanks Meridian

Is the area of sufficient size?

Yes x No _____
Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

This unit is located south of Cantwell on the George Parks Highway at the west end of the Denali Highway, 211 miles north of Anchorage and 28 miles south of Denali National Park and Preserve. Lands within this unit are currently under the administration of the Bureau of Land Management. There is a mix of duel selected lands by the State of Alaska and Ahtna Native Corporation. The George Parks Highway and Alaska Rail railroad rights of way (ROW)makes up the northern boundary while the Alaska Electric Authority (AEA)transmission line are the southern boundary.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No X N/A _____
Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

The Alaska Energy Authority Transmission Line (AEA), the George Parks Highway and the Alaska Railroad Right of Way are within sight and sound within Unit 3. These man-made developments/disturbances are substantially noticeable within close proximity and are less noticeable from further distances. The total man-made disturbances within the unit cumulatively detract from the natural quality of the area.

This area has substantial noticeable human impacts that would be apparent to the average visitor. The area is accessible to OHVs but, generally, is not accessible to most street four-wheel drive vehicles. Primary human uses/activities include hunting, hiking, and wildlife viewing, snowmachining and off-highway vehicle use along an established multiple use trails in the area. Sights and sounds of the road system, the Alaska Railroad and the AEA transmission line are dominant man-made features within this unit.

Vegetation consists mainly of dwarf birch, willows, grasses and sedges. Vegetation and soils are predominantly natural but localized areas of disturbance exist. Topography consists of rolling tundra, interspersed with many small lakes and boggy areas.

1. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for**

solitude?

Yes _____ No _____ N/A X_____

Description: The Parks Highway, Alaska Energy Authority Transmission Line and Alaska Railroad ROW are dominant man-made features within this unit. The area does not offer vegetative and topographic screening that would provide the seclusion needed to reduce the presence of sights, sounds and evidence of other people or human-made features in the area. The AEA power line, George Parks Highway and the Alaska Railroad Right of Ways within this unit, are visible from a majority of the unit and detracts from the solitude experience.

Standing on its own merits, these opportunities are similar to those available throughout much of the surrounding lands. In addition, the existing motorized routes extending into the interior of the unit increase the likelihood of encountering others within portions the unit.

2. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation?** Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes _____ No X_____ N/A _____

Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

This unit offers potential for some types of primitive recreation activities such as hiking, backpacking, hunting, and dispersed camping. However, these opportunities are similar to those available throughout much of the surrounding BLM-administered lands. Additionally the activities within this zone would generally require the use of motorized equipment. Depending on user tolerances, a truly primitive recreation experiences may be impeded upon by the existence of the George Parks Highway, Transmission lines and Pass Creek OHV Trail.

Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes _____ No _____ N/A X_____

Summary of Analysis*

Area Unique Identifier: AKA020-ASAP-Unit 3

SUMMARY: The Alaska Energy Authority Transmission Line (AEA), the George Parks Highway and the Alaska Railroad Right of Way are pervasive and Omni -present within Unit 3. These man-made developments/disturbances are substantially noticeable. The total man-made disturbances within the unit cumulatively detract from the natural quality, opportunities for solitude and primitive recreation of the area.

1. Does the area meet any of the size requirements?	Yes	X	No			
2. Does the area appear to be natural?	Yes		No	X	N/A	
3. Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation?	Yes		No		N/A	X
4. Does the area have supplemental values?	Yes		No		N/A	X

Check one:

	The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.
X	The area does not have wilderness characteristics.

Prepared by:

Name: Denton Hamby
Title: Outdoor Recreation Planner
Date: 11/8/2011

Reviewed by:

Name: Beth Maclean
Title: Glennallen Field Manager
Date: 11/8/2011

Wilderness Characteristics Inventory
Appendix C – Route Analysis[1]

Wilderness Characteristics Inventory Area Unique Identifier: AK020-ASAP-Wilderness Characteristic Inventory (Unit 3)

Route or Route Segment[3] Name and/or Identifier: (Include Transportation Plan Identifier, if known, and include route number supplied by citizen information, when available.)

I. LOCATION: Alaska Electric Authority (Right-Of-Way)

- Pass Creek Trail

Describe: The Pass Creek trail system begins immediately to the south of MP 206 on the east side of the Parks Highway. The southwestern (right) spur is in excellent shape until its end below a large hillside on the tundra at 3.75 miles. The NE spur (left) follows the ROW, crossing Pass Creek, then turns south into a small forest. At .61 miles on this spur a small creek with steep entry and exit points is crossed. At 1.19 miles this spur becomes badly rutted, with deep tree-rooted muck holes. These conditions persist until mile 1.50. The remainder of the trail is very bumpy and in some sections rutted and braided as it ascends a ridge. Near the ridge crest a small outfitter camp is located by a small lake (2 cabins/tents). 3 Spurs leave the camp accessing different camping/hunting sites.

II. ROUTE CONTEXT

A. Current Purpose[4] (if any) of Route: (Examples: Rangeland/Livestock Improvements (stock tank, developed spring, reservoir, fence, corral), Inholdings (ranch, farmhouse), Mine Site, Concentrated Use Site (camp site), Recreation, Utilities (transmission line, telephone, pipeline), Administrative (project maintenance, communication site, vegetation treatment)).

Describe: Recreational and hunting OHV, snowmachine, and hiking use.

B. Right-of-Way (ROW):

1. Is there a ROW associated with this route? Yes x No ____ Unknown ____

2. If yes, what is the stated purpose of the ROW?

This ROW accesses the AEA power transmission line.

3. Is the ROW still being used for this purpose? Yes x No Unknown

Explain: The ROW provides access to the transmission line for annual and regular maintenance of the line.

III. WILDERNESS INVENTORY ROAD CRITERIA

A. Evidence of construction or improvement using mechanical means:

Yes X (if either A.1 or A.2 is checked "yes" below)

No ____ (if both A.1 and A.2 are checked "no" below)

1. Construction: (Is there evidence that the route or route segment was originally constructed using

Yes x No ____ Unknown ____

mechanical means?)

Examples: The ¼ to ½ mile of this route appear to have been initially created using mechanized equipment.

Paved ___ Bladed x Graveled x Roadside Berms ____ Cut/Fill ____ Other _____

Describe: The first section of this trail show signs of gravel work and bladed grade.

2. Improvements: (Is there evidence of improvements using mechanical means to facilitate access?)

Yes x No _____

If yes, By handtool _____ By machine x

Examples:

Culverts ____ Hardened Stream Crossings _____ Bridges _____ Drainage _____ Barriers _____

Other _____

Describe:

B. **Maintenance:** (Is there evidence of maintenance that would ensure relatively regular and continuous use?):

Yes x (if either B.1 or B.2 is checked "yes" below)

No _____ (if both B.1 and B.2 are checked "no" below)

1. Is there Evidence or Documentation of Maintenance using hand tools or machinery?

Yes x No _____

If yes, By handtool _____ By machine x

Explain:

2. If the route or route segment is in good[5] condition, but there is no evidence of maintenance, would mechanical maintenance with hand tools or machines be approved by BLM to meet the purpose(s) of the route in the event this route became impassable?

Yes X No _____

Explain: Maintenance by mechanical means would be approved within the existing ROW to help maintain the transmission line.

C. **Relatively regular and continuous use:** (Does the route or route segment ensure relatively regular and continuous use?)

Yes X No _____

IV. CONCLUSION

Does the route or route segment[7] meet the definition of a wilderness inventory road (i.e., are items III.A and III.B and III.C all checked yes)?

Yes _____ = Wilderness Inventory Road
No x = Not a road for wilderness inventory purposes

Explanation[8]: This route shows evidence of being constructed by the use of mechanical means. The first section of trail that departs from the Parks highway has had additional gravel brought to the location and worked with a dozer to improve access route.

Evaluator(s): Denton Hamby

Date: 11/9/2011

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[1] This form documents information that constitutes and inventory finding on wilderness characteristics. It does not represent a formal land use allocation or a final agency decision subject to administrative remedies under either 43 CFR parts 4 or 1610.5-3.
[2] .Road: An access route which has been improved and maintained by mechanical means to insure relatively regular and continuous use. A way maintained solely by the passage of vehicles does not constitute a road.
a. Improved and maintained – Actions taken physically by people to keep the road open to vehicle traffic. "Improved" does not necessarily mean formal construction. "Maintained" does not necessarily mean annual maintenance.
b. Mechanical means – Use of hand or power machinery or tools.
c. Relatively regular and continuous use – Vehicular use that has occurred and will continue to occur on a relatively regular basis. Examples are: access roads for equipment to maintain a stock water tank or other established water sources, access roads to maintained recreation sites or facilities, or access roads to mining claims.
[3] If a portion of a route is found to meet the wilderness inventory road criteria (see Part III) and the remainder does not meet these criteria (e.g., a cherrystem road with a primitive route continuing beyond a certain point), identify each segment and explain the rationale for the separate findings under pertinent criteria. [1] The purpose of a route is not a deciding factor in determining whether a route is a road for wilderness characteristics inventory purposes. The purpose of a route does provide context for factors on which such a determination may be based, particularly the question of whether maintenance of the route ensures relatively regular and continuous use.
[4] The purpose also helps to determine whether maintenance that may so far have been unnecessary to ensure such use would be approved by BLM when the need arises.
[5] Good condition would be a condition that ensures regular and continuous use relative to the purposes of the route. Consider whether the route can be clearly followed in the field over its entire course and whether all or any portion of the route contains any impediments to travel
[6] Include estimate of travel rates for the stated purposes, e.g., trips/day or week or month or season or year or even multiple years in some facility maintenance cases.
[7] .If part of the route meets the wilderness inventory road definition and the remainder does not, describe the segment meeting the definition and any remaining portion not meeting the definition and why.
[8] Describe and explain rationale for any discrepancies with citizen proposals.

Appendix D - Photo Log Form

Photographer(s): Dann Gunn, Recreation Technician
Inventory Area Name & No.: Unit 1

Date	Frame #	Camera Direction	Description	GPS/UTM Location	Township	Range	Section
8/2006	2844		Pass Creek Trail				
8/2006	2845		Pass Creek Trail				

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Unique Identifier: AKA020-ASAP-Unit 4-Wilderness Characteristics Inventory
Acreage: 6112 acres (Unit 4) T. 18 S., R. 8 W., Fairbanks Meridian

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes x No _____

Description:

This unit is located south of Cantwell on the George Parks Highway. Lands within this unit are currently under the administration of the Bureau of Land Management. There is a mix of duel selected lands by the State of Alaska and Ahtna Native Corporation. The Alaska Electric Authority (AEA) transmission line is the northern boundary.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No X N/A _____

Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

The Alaska Energy Authority Transmission Line (AEA), the George Parks Highway and the Alaska Railroad Right of Way are within sight and sound within Unit 4. These man-made developments/disturbances are substantially noticeable within close proximity and are less noticeable from further distances. The total man-made disturbances within the unit cumulatively detract from the natural quality of the area.

This area has substantial noticeable human impacts that would be apparent to the average visitor. The area is accessible to OHVs but, generally, is not accessible to most street four-wheel drive vehicles. Primary human uses/activities include hunting, hiking, and wildlife viewing, snowmachining and off-highway vehicle use along an established multiple use trails in the area. Sights and sounds of the road system, the Alaska Railroad and the AEA transmission line are dominant man-made features within this unit.

Vegetation consists mainly of dwarf birch, willows, grasses and sedges. Vegetation and soils are predominantly natural but localized areas of disturbance exist. Topography consists of rolling tundra, interspersed with many small lakes and boggy areas.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?

Yes _____ No X N/A _____

Description (describe the area's outstanding opportunities for solitude):

The Parks Highway, Alaska Energy Authority Transmission Line and Alaska Railroad ROW are dominant man-made features within this unit. The area does not offer vegetative and topographic screening that would provide the seclusion needed to reduce the presence of sights, sounds and evidence of other people or human-made features in the area. The AEA power line, George Parks Highway and the Alaska Railroad Right of Ways within this unit, are visible from a majority of the unit and detracts from the solitude experience.

Standing on its own merits, these opportunities are similar to those available throughout much of the surrounding lands. In addition, the existing motorized routes extending into the interior of the unit increase the likelihood of encountering others within portions the unit.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation? Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes _____ No X N/A _____

Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

This unit offers potential for some types of primitive recreation activities such as hiking, backpacking, hunting, and dispersed camping. However, these opportunities are similar to those available throughout much of the surrounding BLM-administered lands. Additionally the activities within this zone would generally require the use of motorized equipment. Depending on user tolerances, a truly primitive recreation experiences may be impeded upon by the existence of the George Parks Highway, Transmission lines and Pass Creek OHV Trail.

Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes _____ No _____ N/A X

Summary of Analysis*

Area Unique Identifier: AKA020-ASAP-Unit 4

SUMMARY: The Alaska Energy Authority Transmission Line (AEA), the George Parks Highway and the Alaska Railroad Right of Way are pervasive and Omni -present within Unit 4. These man-made developments/disturbances are substantially noticeable. The total man-made disturbances within the unit cumulatively detract from the natural quality, opportunities for solitude and primitive recreation of the area.

1. Does the area meet any of the size requirements?	Yes	X	No			
2. Does the area appear to be natural?	Yes		No	X	N/A	
3. Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation?	Yes		No		N/A	X
4. Does the area have supplemental values?	Yes		No		N/A	X

Check one:

	The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.
X	The area does not have wilderness characteristics.

Prepared by:

Name: Denton Hamby
Title: Outdoor Recreation Planner
Date: 11/8/2011

Reviewed by:

Name: Beth Maclean
Title: Glennallen Field Manager
Date: 11/8/2011

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Unique Identifier: AKA020-ASAP-Units-5-9 Cantwell South-Wilderness Inventory

Acreage: Sections 24-25 (1280 acres), and 34-35 (1110.25 acres), T. 19 S., R. 9 W., Fairbanks Meridian. Totals 2390.25 acres.

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No X _____

Units 5-8 do not meet the size requirement therefore no further wilderness review is required.

This unit is located south of Cantwell on the George Parks Highway. Lands within this unit are currently under the administration of the Bureau of Land Management.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No _____ N/A X _____

Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

Vegetation consists mainly of dwarf birch, willows, grasses and sedges. Vegetation and soils are predominantly natural but localized areas of disturbance exist. Topography consists of rolling tundra, interspersed with many small lakes and boggy areas.

This area has substantial noticeable human impacts that would be apparent to the average visitor. Primary human uses/activities include hunting, hiking, and wildlife viewing, snowmachining and off-highway vehicle use along established multiple use trails in the area. Sights and sounds of the road system and other existing man-made features are dominant.

The George Parks Highway and the Alaska Railroad Right of Way are within sight and sound. All of these man-made developments/disturbances are substantially noticeable within close proximity and are less noticeable from further distances. The total man-made disturbances within the unit cumulatively detract from the natural quality of the area.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness

and the remainder is of sufficient size) **have outstanding opportunities for solitude?**

Yes _____ No _____ N/A X _____

Description (describe the area's outstanding opportunities for solitude):

The Parks Highway and Alaska Railroad ROW are dominant man-made features within this unit. The area does not offer vegetative and topographic screening that would provide the seclusion needed to reduce the presence of sights, sounds and evidence of other people or human-made features in the area.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation? Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes _____ No _____ N/A X _____

Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes _____ No _____ N/A X _____

Summary of Analysis*

Area Unique Identifier: AKA020-ASAP-Unit(s) 5-8 Cantwell South

Results of analysis: This area has substantial noticeable human impacts that would be apparent to the average visitor. Sights and sounds of the Alaska Railroad and road system are dominate man made feature within this unit. The total man-made disturbances within the unit cumulatively detract from the natural quality, solitude and primitive recreation opportunities of the area.

1. Does the area meet any of the size requirements?	Yes		No	X	
2. Does the area appear to be natural?	Yes		No		N/A X
3. Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation?	Yes		No	X	N/A X
4. Does the area have supplemental values?	Yes		No		N/A X

Check one:

The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

X The area does not have wilderness characteristics.

Prepared by:

Name: Denton Hamby
Title: Outdoor Recreation Planner
Date: 11/8/2011

Reviewed by:

Name: Beth Maclean
Title: Glennallen Field Manager
Date: 11/8/2011

U.S. Department of the Interior
Bureau of Land Management

Central Yukon Field Office
1150 University Avenue
Fairbanks, AK 99709
http://www.blm.gov/ak/st/en/fo/fdo/central_yukon_field.html

Wilderness Characteristics Inventory

Case File Number: FF-95641

Alaska Stand-Alone Pipeline Wilderness Characteristics Inventory

Prepared By:

Central Yukon Field Office

December 5, 2011

Wilderness Characteristics Assessment - ASAP

This action is being analyzed under the Secretary of Interior's Order 3310 of December 22, 2010, as a project level decision.

The basis for this evaluation is the 1980 Nonwilderness Assessment conducted by BLM along portions of the trans-Alaska oil pipeline system (TAPS) corridor (U.S. Department of Interior, BLM, 1980). This was a special project approved by the Director, BLM. The assessment identified lands under BLM administration that lacked wilderness characteristics as defined in the Wilderness Act of 1964 and was conducted in a manner that met the requirements of Section 603 of the Federal Land Policy and Management Act of 1976 (FLPMA).

The nonwilderness assessment area was divided into nine segments. Four of these segments include BLM managed land located near the TAPS corridor north of Dalton Highway milepost 56 (Yukon River).

The ASAP proposed alignment bisects the four BLM managed segments. Location and a brief summary of the study findings for each of the segments are discussed below. If alternatives to the proposed alignment fall outside these segments, or fall outside the lands determined to be nonwilderness, additional analysis will be required for those alternatives.

Yukon Segment

The Yukon Segment covers the area from T14N R12W/13W Fairbanks Meridian (Milepost 76 (approximate) Dalton Highway) into T3N R2W/3W Fairbanks Meridian (Milepost 16 (approximate) Elliott Highway). BLM management authority in this segment occurs between approximately Milepost 76-56 (Yukon River) of the Dalton Highway and extends to the east/west limits of BLM managed land.

Portions of this segment meet the 5,000 acre minimum size. Lands identified within the nonwilderness boundary line were deemed as not meeting naturalness standards due to roads, camps, airfields, pipelines and material sites. The presence of the Yukon River bridge affects the naturalness of the area. These disturbances bisect the entire length of the segment. The proposed action is located within the nonwilderness portion of this segment.

Prospect Segment

The Prospect Segment covers the area from T28N (two miles south of the T29N/T28N boundary) R11W/12W/13W Fairbanks Meridian (Milepost 175.5 (approximate) Dalton Highway) through T15N R12W/13W Fairbanks Meridian (Milepost 76 (approximate) Dalton Highway). BLM management authority in this segment occurs between approximately Milepost 175.5-76 of the Dalton Highway and extends to the east/west limits of BLM managed land.

Portions of this segment meet the 5,000 acre minimum size. Lands identified within the nonwilderness boundary line were deemed as not meeting naturalness standards due to roads, camps, airfields, pipelines and material sites. Cabins and mining activities are also noted as affecting the naturalness of

the area. These disturbances bisect the entire length of the segment. The proposed action is located within the nonwilderness portion of this segment.

Atigun Segment

The Atigun Segment covers the area from T12S R11E/12E Umiat Meridian (Milepost 269 (approximate) Dalton Highway) to T28N (two miles south of the T29N/T28N boundary) R11W/12W/13W Fairbanks Meridian (Milepost 175.5 (approximate) Dalton Highway). BLM management authority in this segment occurs between approximately Milepost 175.5-269 of the Dalton Highway and extends to the east/west limits of BLM managed land.

Portions of this segment meet the 5,000 acre minimum size. Lands identified within the nonwilderness boundary line were deemed as not meeting naturalness standards due to roads, camps, airfields, pipelines and material sites. These disturbances bisect the entire length of the segment. The proposed action is located within the nonwilderness portion of this segment.

Sagavanirktok Segment

The Sagavanirktok Segment covers the area from T11S R11E/12E Umiat Meridian (Milepost 269 (approximate) Dalton Highway) through T1N R13/R14E/15E/16E Umiat Meridian (Milepost 360 (approximate) Dalton Highway). BLM management authority in this segment occurs between approximately Milepost 269-300 of the Dalton Highway and extends to the east/west limits of BLM managed land.

Portions of this segment meet the 5,000 acre minimum size. More than half of the segment was deemed as not meeting naturalness standards due to roads, camps, airfields, pipelines and material sites. These disturbances bisect the entire length of the segment. The proposed action is located within the nonwilderness portion of this segment.

Finding:

The BLM managed land encompassed by the proposed action does not contain wilderness characteristics. The 1980 Nonwilderness Assessment showed the area lacked naturalness. Recent in the field observations have confirmed that the 1980 assessment is still valid. In addition, the lands that were determined to be nonwilderness are reserved as a Utility and Transportation Corridor under PLO 5150, so would not be suitable for management as wild lands.

Reference:

U.S. Department of Interior, BLM, 1980. Nonwilderness Assessment: The Alaska Natural Gas Transportation System. Final Decision. Anchorage, Alaska.

FORM 1
Documentation of BLM Wilderness Characteristics Inventory Findings on Record
1. Is there existing BLM wilderness characteristics inventory information on all or part of this area?
No (Go to Form 2)**Yes YES____** (If yes, and if more than one area is within the area, list the unique identifiers for those areas.):
a) Inventory Source: _
U.S. Department of Interior, BLM, 1980. Nonwilderness Assessment: The Alaska Natural Gas Transportation System. Final Decision. Anchorage, Alaska.

b) Inventory Area Unique Identifier(s):
Sagavanirktok Segment
Atigun Segment
Prospect Segment
Yukon Segment

c) Map Name(s)/Number(s): See Area Unique Identifiers, above.

d) BLM District(s)/Field Office(s): Central Yukon Field Office, Fairbanks District.

2. BLM Inventory Findings on Record:
Existing inventory information regarding wilderness characteristics (if more than one BLM inventory area is associated with the area, list each area and answer each question individually for each inventory area):
Inventory Source: U.S. Department of Interior, BLM, 1980. Nonwilderness Assessment: The Alaska Natural Gas Transportation System. Final Decision. Anchorage, Alaska.

Area Unique Identifier	**Sufficient Size? Yes/No (acres)**	**Naturalness ? Yes/No**	**Outstanding Solitude? Yes/No**	**Outstanding Primitive & Unconfined Recreation? Yes/No**	**Supplemental Values? Yes/No**
Sagavanirktok Segment	**Yes**	**No**	**No**	**No**	**No**
Atigun Segment	**Yes**	**No**	**No**	**No**	**No**
Prospect Segment	**Yes**	**No**	**No**	**No**	**No**
Yukon Segment	**Yes**	**No**	**No**	**No**	**No**

FORM 1 – ASAP Line, Livengood to Denali National Park

Documentation of BLM Wilderness Characteristics Inventory Findings from Previous Inventory on Record

1. Is there existing BLM wilderness characteristics inventory information on all or part of this area?

No____X_____ (Go to Form 2) **Yes _____** (If yes, and if more than one area is within the area, list the unique identifiers for those areas.):

a) Inventory Source: _____

b) Inventory Area Unique Identifier(s):__ _____

c) Map Name(s)/Number(s):_____

d) BLM District(s)/Field Office(s):___ _____

2. BLM Inventory Findings on Record:

Existing inventory information regarding wilderness characteristics (if more than one BLM inventory area is associated with the area, list each area and answer each question individually for each inventory area):
Inventory Source: _____

Area Unique Identifier	**Naturalness? Yes/No**	**Outstanding Solitude? Yes/No**	**Outstanding Primitive & Unconfined Recreation? Yes/No**	**Supplemental Values? Yes/No**

Form 2

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Name: *Livengood Scattered Parcels*

Total BLM Inventory Acreage: approximately 408 acres

Area Unique Identifiers

- CYFO-ASAP-001, 160 acres
- CYFO-ASAP-002, 20 acres
- CYFO-ASAP-003, 15 acres
- CYFO-ASAP-004, 110 acres
- CYFO-ASAP-005, 10 acres
- CYFO-ASAP-006, 92 acres
- CYFO-ASAP-007, < 1 acre

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No **X**_____
Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

This inventory unit consists of scattered parcels, none of which are individually greater than 5,000 acres. Primarily bordered by State of Alaska and Native lands, none of these parcels are contiguous to lands which have been formally determined to have wilderness or potential wilderness values. Many of these parcels are State-selected and some are likely to be conveyed. Because none of the inventory units listed in this section meet the 5,000 acre size requirement, no further evaluation is needed.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No _____ N/A **X**_____
Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

1. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?**

Yes _____ No _____ N/A **X**_____
Description (describe the area's outstanding opportunities for solitude):

2. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation?** Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

   Yes _____ No _____ N/A **X**_____
   Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

   Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

   Yes _____ No _____ N/A X_____
   Description:

Form 2

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Name: *Denali North Scattered Parcels*

Total BLM Inventory Acreage: 3,595 acres

Area Unique Identifiers

- CYFO-ASAP-016, 2,120 acres
- CYFO-ASAP-017, 133 acres
- CYFO-ASAP-018, 62 acres
- CYFO-ASAP-019, 1,280 acres

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No **X**

Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

This inventory unit consists of scattered parcels, none of which are individually greater than 5,000 acres. Units ASAP-016, 017 and 018 are adjacent or close to the George Parks Highway and other man-made structures such as power transmission lines. Unit ASAP-019 is one mile south of the Suntrana-Nenana River road and has a power transmission line crossing it.

These parcels are bordered by State of Alaska-patented lands. None of these parcels are contiguous to lands which have been formally determined to have wilderness or potential wilderness values. Because none of the inventory units listed in this section individually meet the 5,000 acre size requirement, no further evaluation is needed.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No _____ N/A **X**

Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

3. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?**

Yes _____ No _____ N/A **X**

Description (describe the area's outstanding opportunities for solitude):

4. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation?** Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes _____ No _____ N/A **X**_____

Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes _____ No _____ N/A X_____

Description:

Check one:

_____ The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

X_____ The area does not have wilderness characteristics.

Prepared by:

Name: Lisa Shon Jodwalis

Title: Park Ranger - Interpretation

Date: 12/05/11

Reviewed by:

Name: Nichelle Jacobson

Title: Central Yukon Field Manager

Date:

Form 2

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Name: *Anderson North*

Total BLM Inventory Acreage: 7,680 acres

Area Unique Identifiers

- CYFO-ASAP-14

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes X No _____

Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

The east side is bordered by state and patented lands and touches the Golden Valley Electric Association transmission line and touches the George Parks Highway north of the town of Anderson. On the west, the Alaska Railroad and lands conveyed to the railroad form the boundary of this unit. To the south the boundary is formed by state-patented lands and to the north by state-conveyed lands.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No X N/A _____

Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

The George Parks Highway, the major road between Anchorage and Fairbanks and the Alaska Railroad are within sight and sound for a considerable distance due to the flat topography. The Golden Valley Electric Association (GVEA) transmission line cuts through the SE and NE corners of the unit and scattered private parcels occur to the east.

Vegetation consists mainly of boreal forest mixed with many wetlands and discontinuous permafrost. It is predominantly natural but there are substantial noticeable human impacts that are readily apparent to visitors. The transmission line supports are tall, massive and dominate the landscape. The area beneath them is kept clear of vegetation by heavy equipment. Since the region is mostly flat, the noise from both the railroad and highway can be loud and audible at quite a distance. Even at its widest point, a person would be at most one mile from the railroad and one mile from the highway.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?

Yes _____ No X _____ N/A _____

Description (describe the area's outstanding opportunities for solitude):

There are numerous casual ATV trails that are used by local residents. In winter there is probably some snowmachine use by local residents. Solitude is possible but certainly not an "outstanding" feature of this unit.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation? Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes _____ No X _____ N/A _____

Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

This unit offers a limited opportunity for primitive recreation activities such as riding off-road vehicles and/or hunting. Hiking is virtually impossible. Some snowmachine and dog-mushing use by area residents might occur in winter. The generally flat and unremarkable terrain, with its mixed areas of dense vegetation and extensive wetlands, precludes an "outstanding " designation for primitive and unconfined recreation.

Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes _____ No _____ N/A X _____

Description:

Summary of Analysis*

Area Unique Identifier: CYFO-ASAP-14

SUMMARY: The Golden Valley Electric Association (GVEA) transmission line, the George Parks Highway and the Alaska Railroad Right of Way have visual and audible effects on the unit. These man-made developments/disturbances are substantially noticeable. The total man-made disturbances within the unit cumulatively detract from the natural quality, opportunities for solitude and primitive recreation of the area.

1. Does the area meet any of the size requirements?	Yes	X				
2. Does the area appear to be natural?	Yes		No	X	N/A	
3. Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation?	Yes		No	X	N/A	
4. Does the area have supplemental values?	Yes		No		N/A	X

Check one:

	The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.
X	The area does not have wilderness characteristics.

Prepared by:

Name: Lisa Shon Jodwalis
Title: Park Ranger - Interpretation
Date: 12/05/11

Reviewed by:

Name: Nichelle Jacobson
Title: Central Yukon Field Manager
Date:

George Parks Hwy
N
9024 ft
Image © 2011 DigitalGlobe
Image © 2011 TerraMetrics
© 2011 Google
Google
Imagery Dates: Aug 3, 2002 - Jun 20, 2008 64°24'38.77" N 149°07'36.83" W elev 443 ft
Eye alt 32181 ft

Form 2

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Name: *Anderson South*

Total BLM Inventory Acreage: 6,080 acres

Area Unique Identifiers

- CYFO-ASAP-15

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes X No _____

Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

The east boundary is Alaska Railroad patented land and the road to the town of Anderson. Much of this unit is in the Clear Air Force Base withdrawal. Land on the west, north and south is state-patented land.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No X N/A _____

Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

This area contains an Air Force base with its roads and facilities, which have substantial noticeable human impacts that are readily apparent to visitors. Since the region is mostly flat, the man-made noise from these roads and facilities can be loud and audible at quite a distance.

Vegetation consists mainly of boreal forest mixed with wetlands and discontinuous permafrost.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?

Yes _____ No X N/A _____

Description (describe the area's outstanding opportunities for solitude):

Because of the proximity of the air force base and the town of Anderson, solitude is unlikely, and certainly not an "outstanding" feature of this unit.

Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation? Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes _____ No X_____ N/A _____

Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

This unit offers a limited opportunity for primitive recreation activities such as hunting. There are informal ATV trails in the area used by local residents. Some snowmachine and dog-mushing use by area residents might occur in winter. The generally flat and unremarkable terrain, with its mixed areas of dense vegetation and extensive wetlands, precludes an "outstanding " designation for primitive and unconfined recreation.

Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes _____ No _____ N/A X _____

Description:

Check one:

_____ The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.

X_____ The area does not have wilderness characteristics.

Prepared by:

Name: Lisa Shon Jodwalis

Title: Park Ranger - Interpretation

Date: 12/05/11

Reviewed by:

Name: Nichelle Jacobson

Title: Central Yukon Field Manager

Date:

Summary of Analysis*

Area Unique Identifier: CYFO-ASAP-14

SUMMARY: Most of this unit is a military withdrawal for Clear Air Force Base. The Alaska Railroad Right of Way and the road to the town of Anderson are in close proximity. These man-made developments/disturbances are substantially noticeable. The total man-made disturbances within the unit cumulatively detract from the natural quality, opportunities for solitude and primitive recreation of the area.

1. Does the area meet any of the size requirements?	Yes	X				
2. Does the area appear to be natural?	Yes		No	X	N/A	
3. Does the area offer outstanding opportunities for solitude or a primitive and unconfined type of recreation?	Yes		No	X	N/A	
4. Does the area have supplemental values?	Yes		No		N/A	X

Check one:

	The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.
X	The area does not have wilderness characteristics.

Prepared by:

Name: Lisa Shon Jodwalis
Title: Park Ranger - Interpretation
Date: 11/18/2011

Reviewed by:

Name: Nichelle Jacobson
Title: Central Yukon Field Manager
Date:

Clear Air Force Base
George Parks Hwy
8994 ft
Clear
Image © 2011 DigitalGlobe
Image © 2011 TerraMetrics
© 2011 Google
Google
Imagery Dates: Aug 3, 2002 - Aug 4, 2002 64°17'26.29" N 149°10'40.38" W elev 591 ft
Eye alt 32181 ft

Form 2

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Name: *Nenana Scattered Parcels*

Total BLM Inventory Acreage: 3,575 acres

Area Unique Identifiers

- CYFO-ASAP-008, 10 acres
- CYFO-ASAP-009, <5 acres total estimated for 7 Railroad Reserve parcels within the City of Nenana
- CYFO-ASAP-010, 40 acres
- CYFO-ASAP-011, 1280 acres
- CYFO-ASAP-012, 1920 acres
- CYFO-ASAP-013, 320 acres

Is the area of sufficient size? (If the area meets one of the exceptions to the size criterion, check Yes and describe the exception in the space provided below), Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No **X**_____

Description (describe the boundaries of the area--wilderness inventory roads, property lines, etc.):

This inventory unit consists of scattered parcels, none of which are individually greater than 5,000 acres. Several are located in the City of Nenana and consist of small lots. Except for the latter, these units are bordered by state-selected lands. None of these parcels is contiguous to lands which have been formally determined to have wilderness or potential wilderness values. Because none of the inventory units listed in this section meet the 5,000 acre size requirement, no further evaluation is needed.

Does the area appear to be natural? Note: If "No" is checked the area does not have wilderness characteristics; check NA for the remaining questions below.

Yes _____ No _____ N/A **X**_____

Description (include land ownership, location, topography, vegetation, and summary of major human uses/activities):

5. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for solitude?**

Yes _____ No _____ N/A **X**_____
Description (describe the area's outstanding opportunities for solitude):

6. **Does the area (or the remainder of the area if a portion has been excluded due to unnaturalness and the remainder is of sufficient size) have outstanding opportunities for primitive and unconfined recreation?** Note: If "No" is checked for both 3 and 4 the area does not have wilderness characteristics; check "N/A" for question 5.

Yes _____ No _____ N/A **X**_____
Description (describe the area's outstanding opportunities for primitive and unconfined recreation):

Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)?

Yes _____ No _____ N/A X_____
Description:

Check one:

_____ The area, or a portion of the area, has wilderness characteristics and is identified as lands with wilderness characteristics.
X_____ The area does not have wilderness characteristics.

Prepared by:

Name: Lisa Shon Jodwalis
Title: Park Ranger - Interpretation
Date: 12/05/11

Reviewed by:

Name: Nichelle Jacobson
Title: Central Yukon Field Manager
Date:

Appendix K

Visual Impact Analysis Report for Denali National Park

A Visual Impact Analysis Report

of the

Alaska Stand Alone Gas Pipeline Project

in the Area of the

Denali National Park and Preserve

May 30, 2012

Design Alaska

A Visual Impact Analysis Report

of the

Alaska Stand Alone Gas Pipeline Project

in the Area of the

Denali National Park and Preserve

May 30, 2012

Prepared for:

Alaska Gas Development Corporation

P.O. Box 101020, Anchorage, Alaska 99510

Prepared by:

John R. Rowe II, ASLA, Landscape Architect

State of Alaska License # 10152

Design Alaska, Inc.

601 College Road, Fairbanks, Alaska 99701

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List of Acronyms

AGDC ..... Alaska Gasline Development Corporation
ARRC ..... Alaska Railroad Corporation
ASAP ..... Alaska Stand Alone Gas Pipeline
BLM ..... Bureau of Land Management
DNPP ..... Denali National Park and Preserve
EIS ..... Environment Impact Statement
KOP ..... Key Observation Point
MP ..... Milepost
NPS ..... National Park Service
RMP ..... Resource Management Plan
ROW ..... Right-of-way
USACE ..... US Army Corps of Engineers
VRM ..... Visual Resource Management
WAC ..... Wilderness Access Center

1.0 Executive Summary

The visual impact analysis evaluates the potential visual impact to resources surrounding the Denali National Park and Preserve (DNPP) as a result of the Alaska Stand Alone Gas Pipeline (ASAP) project proposed by Alaska Gasline Development Corporation (AGDC). The project will construct a 24-inch diameter natural gas pipeline stretching from the North Slope to the Cook Inlet Area of Southcentral Alaska. The routing of ASAP from Prudhoe Bay generally parallels established transportation and existing infrastructure corridors from the North Slope. At the entrance to DNPP, the pipeline follows the Parks Highway.

Observation points are locations within DNPP from which the pipeline route would likely be seen. In a joint meeting between the National Park Service (NPS), DNPP, AGDC, and Design Alaska, the observation points were chosen to evaluate concerns regarding the visual impacts of the proposed gasline route on the surrounding landscape. After the initial observation points were evaluated, six Key Observation Points (KOPs) were accepted by the stakeholders and subjected to in-depth analysis using the BLM contrast rating system. The basis of the visual impact assessment is to analyze the degree to which the project affects existing landscape features using the following KOPs:

- KOP 1 – Government Hill is located on the Park Road. It provides an informal scenic view of the Riley Creek Bridge and the surrounding natural landscape.
- KOP 2 – Alaska Railroad Depot is a main destination for many visitors to the DNPP. It is the information hub of the park and in the center of the project KOPs.
- KOP 3 – Wilderness Access Center is where visitors go to obtain backcountry information. Of all the KOPs in the analysis, it is situated closest to the proposed pipeline route.
- KOP 4 – Parks Highway South of Entrance represents the most direct view of the project route from the highway heading northbound. It is the only KOP on the Parks Highway considered for the proposed alignment.
- KOP 5 – Mt. Healy Overlook Trail leads from the DNPP Visitor Center to Mt. Healy Overlook at 3500 feet elevation. It is the location where the project has the highest degree of visibility.
- KOP 6 – Alaska Railroad Corridor shows the unique, moving view from the Alaska Railroad.

In addition, this visual analysis addresses a route variation ("DNPP route variation") that, unlike the proposed pipeline route, traverses through portions of DNPP adjacent to the Parks Highway. This route variation is one of the alternatives considered in the ASAP project environmental impact statement (EIS). The following two KOPs were investigated for this NEPA alternative alignment:

- KOP 7 – Parks Highway MP 234 is a typical view of the driving surface and surrounding landscape from the highway.
- KOP 8 – Mt. Healy Overlook Trail is the same view as from KOP 5. The change in alignment of the pipeline does not result in a significant change in the potential impacts.

Utilizing visual simulations and the contrast rating worksheets in the analysis, as summarized in Table 2, the two KOPs with the most potential impacts are KOP 1 (moderate) and KOP 4 (moderate/strong). Considering the views from all KOPs, the visual impacts of the ASAP project appear to be primarily between MP 538.5 and MP 540.2 of the pipeline route. The potential impacts might be mitigated by using such methods as directional boring on that section of the pipeline or rerouting the ASAP to avoid the area entirely if otherwise practicable.

The majority of the report details the analysis of the proposed alignment. The discussion of DNPP route variation is presented where appropriate to compare this NEPA alternative in regard to the potential visual impacts.

This report does not imply that mitigation alternatives are required and does not analyze either the practicability of such mitigation or the probable adverse impacts of such mitigation on other environmental values. Mitigation solutions are presented to fulfill the contrast rating system requirement to identify mitigation possibilities whenever they exist. The contrast rating system is to be used as a guide, applied with common sense, to identify and minimize potential visual impacts.

2.0 Introduction

This report is a visual impact analysis for the ASAP project in the area of DNPP from MP 438 to MP 552 of the pipeline along the George Parks Highway. The purpose of the visual impact analysis is to measure the project's potential disturbance to the visual landscape. This report addresses both the proposed ASAP project route and the DNPP route variation presented as a NEPA alternative in the ASAP EIS.

2.1 Background

The need for a visual impact analysis is based on the NPS request to more thoroughly analyze the potential visual impacts of the ASAP project. The NPS has stated their concern over visual impacts of the project in the area of DNPP in the form of written comments during their review of the Preliminary Draft EIS. During a meeting held with the NPS, the US Army Corps of Engineers (USACE), and the AGDC team on July 6, 2011, it was agreed that AGDC would conduct a visual analysis in the area of the Park. Design Alaska has prepared this analysis at the request of AGDC. At the request of USACE, AGDC and Design Alaska subsequently amended this report to also address the DNPP route variation.

3.0 Project Summary

The proposed project consists of the construction of ASAP from the North Slope to the Cook Inlet Area in Southcentral Alaska. The purpose of the project is to provide a long-term, stable supply of up to 500 million standard cubic feet per day of natural gas and natural gas liquids from North Slope gas fields to markets in the Fairbanks and Cook Inlet areas by 2019.

The proposed ASAP is a 24-inch diameter natural gas pipeline which will be buried except in the following areas: MP 0 to MP 6, elevated bridge stream crossings, compressor stations, possible fault crossings, pigging facilities, and offtake valve locations. The pipeline system will be designed to transport a highly-conditioned natural gas highly-enriched in non-methane hydrocarbons.

The routing of ASAP is from Prudhoe Bay following the Trans-Alaska Pipeline System and Dalton Highway corridors, generally paralleling the highway corridor from the North Slope to near Livengood, northwest of Fairbanks. At Livengood, the pipeline route heads south, joining the Parks Highway corridor west of Fairbanks near Nenana. From there it continues south and terminates at MP 737 near Wasilla. It will connect at MP 39 of the Beluga Pipeline (ENSTAR's distribution system). A lateral pipeline to Fairbanks (Fairbanks Lateral) will take off from the main pipeline just a few miles north of Nenana at Dunbar. The Fairbanks Lateral will travel northeast to Fairbanks, a distance of approximately 35 miles.

DNPP is visited by more than 400,000 visitors annually, most of whom visit between late May and early September. The main attraction to the park is the 20,320 foot tall Mt. McKinley (Denali). However, there are many activities throughout the 6-million-acre park that attract international visitors looking to experience DNPP.

The project area is adjacent to the park entrance and visible from various vantage points within DNPP. AGDC's proposed ASAP project route is situated so that it bypasses the park while continuing in a north-south direction.

AGDC's proposed ASAP mainline route comes within a quarter of a mile of DNPP along the Parks Highway, but does not enter the park boundaries. The NPS and USACE are interested in graphical depictions and visual analysis for the potentially-affected area of DNPP. This visual impact analysis report will support the visual impacts analysis in the ASAP EIS and will be used to inform decision-makers and the public about the visual effects of construction and operation of ASAP through land surrounding DNPP.

One of the NEPA alternatives identified during the planning stages of the ASAP project locates the proposed pipeline directly adjacent to the Parks Highway and within DNPP for 15 miles. This DNPP route alternative is included in the analysis to provide a comparison of one alternative route to the proposed alignment. All alignment alternatives considered for the proposed pipeline are discussed in the EIS.

4.0 Analysis Methodology

Visual resources are coordinated using a document that ensures future decisions and actions are consistent with environmental management objectives, called a Resource Management Plan (RMP). Normally, Visual Resource Management (VRM) objectives are identified using the RMP. However, no current RMP exists for DNPP. Without an RMP in place, this analysis will use interim VRM classes derived from guidelines in the Bureau of Land Management (BLM) Handbook H-8410-1 in addition to input from Paul Schrooten, Landscape Architect, with the NPS.

Lands are classified into one of four visual resource inventory classes (I, II, III, and IV). Class I lands are the most valued, while Class IV are the least valued. The VRM classification is the result of analyzing three factors: scenic quality evaluation, sensitivity level analysis, and delineation of distance zones. VRM classification serves two purposes: first, it is an inventory tool that portrays the relative value of visual resources; and second, it provides a management tool that portrays the visual management objectives.

The VRM classification defines the objectives of preserving the existing character of the land and outlines the level of change that the landscape can support.

The visual resource inventory process provides land managers with a means for determining visual values. The assessment involves four key components. The first is to establish observation points. Observation points are locations in the project area from which proposed actions are potentially visible. The second element is to select a few Key Observation Points (KOPs) from the identified observation points within the project area that might be affected. The criteria for selecting KOPs are detailed in Section 4.2. The third part of the assessment is to prepare visual simulations for each KOP in order to illustrate which activities or aspects of a project could create impacts to visual resources and to evaluate defined impacts at KOPs. The final step is to conduct a visual assessment for each KOP, which compares the contrast rating between existing conditions and the proposed project features.

4.1 Establish Observation Points

Observation points were established through discussion, research, and evaluations accomplished by senior, experienced personnel familiar with the DNPP, including representatives from DNPP, NPS, AGDC, and Design Alaska. Observation points were chosen with the intent to address concerns of the NPS regarding the visual impacts of the proposed gasline route. Criteria for selecting observation points involved considering the perspectives of three levels of users. The first group of users would view the project area from locations of historical and visual significance inside DNPP, such as the DNPP Visitor Center. The second group involved users inside motor vehicles or pedestrians along the Parks Highway who might see the project. The third group consists of passengers traveling by rail on the Alaska Railroad. The observation points were confirmed at an on-site meeting with stakeholder representatives on July 26, 2011. The locations of these observation points are shown in Figure 1 (following page).

The project team and NPS visited these observation points to gather more information. Photos were taken and data collected for each location. Some of the observation points were eliminated from future consideration due to various reasons, such as no line-of-sight to pipeline alignment, lack of importance of maintaining view due to surrounding commercial development, or a combination of factors. The DNPP Visitor Center (OP B on Figure 1), one of the most frequented stops and the information hub of the park, was one observation point eliminated due to lack of visibility of the pipeline alignment. The ARRC Depot (also denoted as OP B on Figure 1) was retained and is discussed in Section 5.2. Other observation points considered for this analysis, which were eliminated, include the DNPP Entrance Sign (OP D), the Park Road at Wilderness Access Center (WAC) Sign (OP E), and the Nenana River Pedestrian Lookout (OP G). Following the reduction of these four observation points, additional observation points were suggested by NPS for evaluation, specifically the Mt. Healy Overlook Trail (OP H), the Parks Highway South of Entrance (OP I), and Alaska Railroad Corridor (OP J).

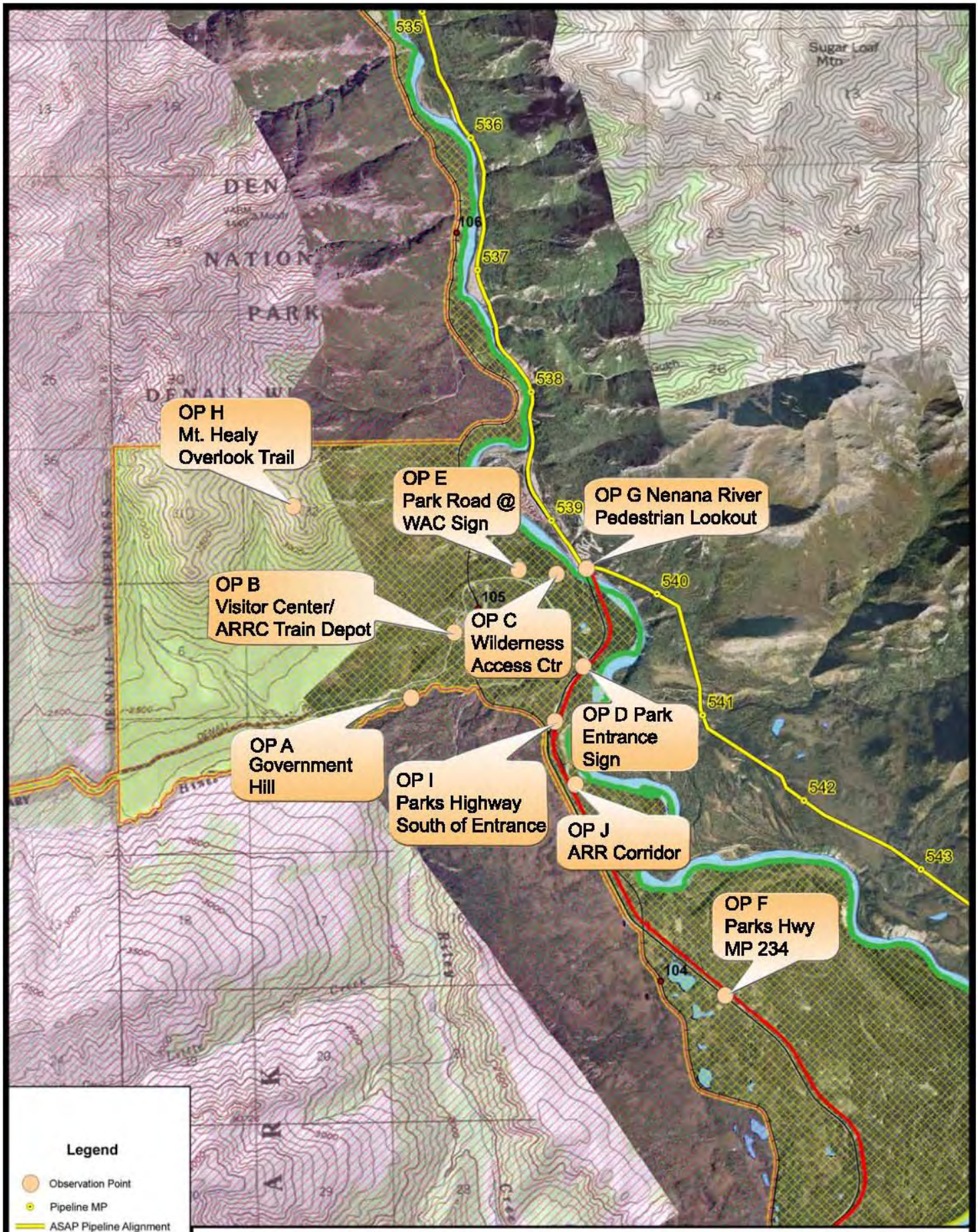

Figure 1: Observation Points

Design Alaska

4.2 Identify Key Observation Points (KOPs)

Following discussions with the NPS and project team site visits, the observation points were evaluated. In selecting KOPs for linear projects (such as ASAP), the BLM *Manual 8431 – Visual Resource Contrast Rating* suggests choosing viewpoints that represent:

- The most critical viewpoints, such as views from communities or road crossings;
- Typical views encountered in representative landscapes, if not covered by critical viewpoints; and
- Any special project or landscape feature, such as skyline, river and roadway crossings.

The contrast rating is done from the most critical viewpoints, usually along commonly traveled routes or at other likely observation points. Factors that should be considered in selecting KOPs are: 1) angle of observation, 2) number of viewers, 3) length of time the project is in view, 4) relative project size, 5) season of use, and 6) light conditions.

Utilizing input from the NPS and data from site visits, four of the original observation points were selected as KOPs. The two additional KOPs mentioned in Section 4.1 were agreed upon and added to the analysis. All KOP locations and associated VRM classifications were accepted by all interested parties for the mainline route. These include:

- KOP 1 – Government Hill
- KOP 2 – ARRC Depot
- KOP 3 – Wilderness Access Center (WAC)
- KOP 4 – Parks Highway South of Entrance
- KOP 5 – Mt. Healy Overlook Trail
- KOP 6 – Alaska Railroad Corridor

The two KOPs for the DNPP route variation have been agreed upon by all interested parties and are discussed in a similar manner to the previous six KOPs. They represent both typical and critical views where the potential impacts might be noticed. The KOPs for DNPP route variation are:

- KOP 7 – Parks Highway MP 234 – DNPP Route Variation
- KOP 8 – Mt. Healy Overlook Trail– DNPP Route Variation

Thorough visual assessments on the KOPs were conducted. The analysis of each KOP is discussed in Section 5.0 of this report. KOPs identified for this project are shown in Figure 2 (following page).

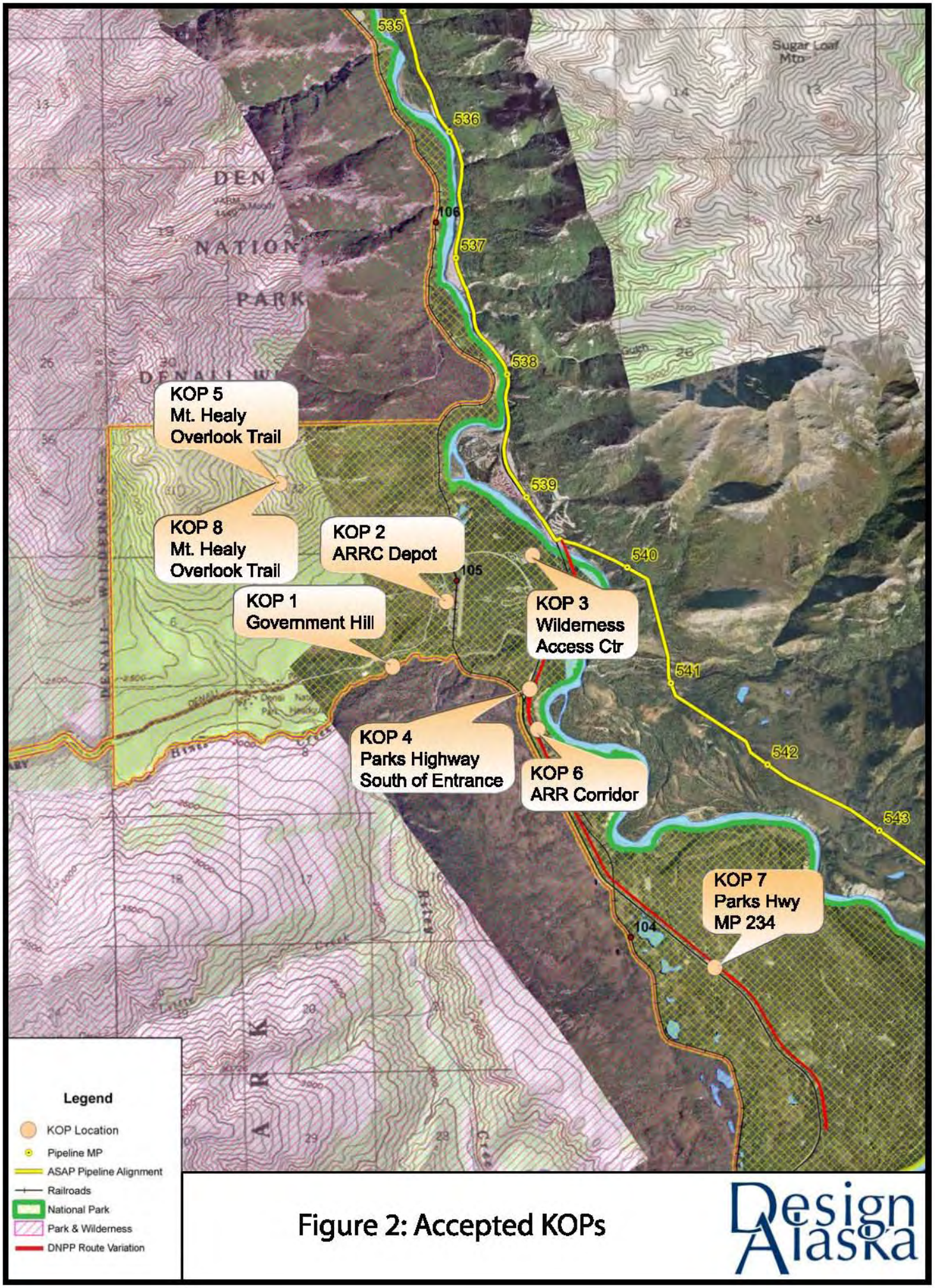

Figure 2: Accepted KOPs

Design Alaska

4.3 Prepare Visual Simulations

Visual simulations are instrumental in determining potential impacts of the proposed project. The visual simulations were prepared to a high level of detail, consistent with the high visual value of DNPP and the surrounding area.

In order to create the visual simulations, a sequence of photos at each KOP was combined using Adobe Photoshop to form a panorama. Then, using Google Earth, a representation of the pipeline alignment was digitized, following the topographical features depicted in the satellite imagery. Each KOP was located in Google Earth and the initial three-dimensional model was manipulated to match the orientation of the photo. This manipulation simplified the visualization of the pipeline's course. In some cases, features in the imagery were measured to achieve a relative scale for the pipeline route. For instance, the width of the Parks Highway is about 100'; so, in some photos, the visual appearance of the highway at different distances would be similar to the proposed pipeline. Paths of approximately 100' were added perpendicular to the pipeline alignment at regular intervals, giving a better grasp of the pipeline limits. Figure 3 shows the manipulated Google Earth digital model for KOP 3.

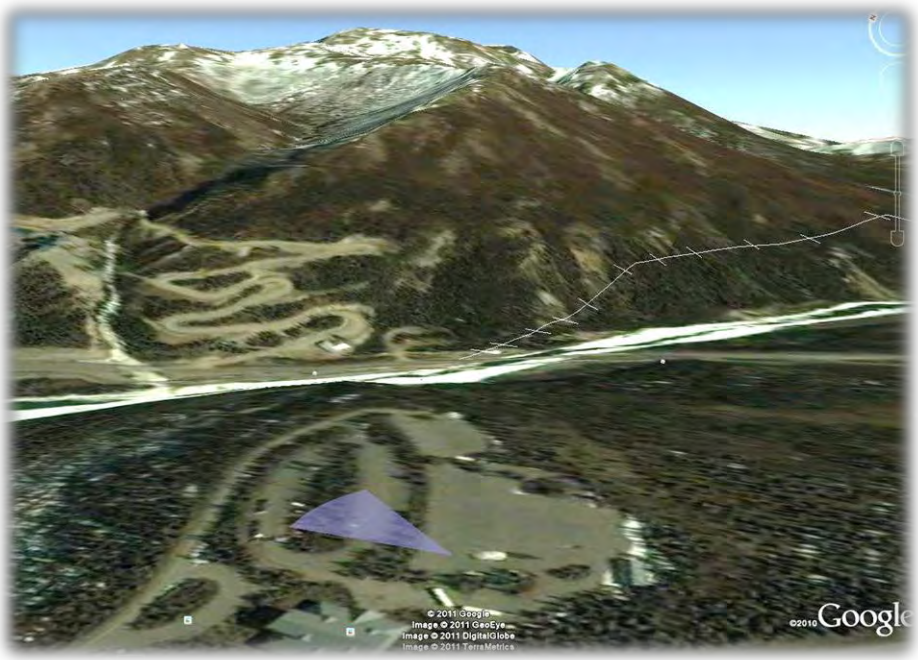

Figure 3: Google Earth Three Dimensional Model

In Adobe Photoshop, features were matched up with the Google Earth satellite imagery. The alignment of the pipeline was sketched in and refined. The pipeline route was digitally painted on top of the existing photo, taking into account vegetative cover as well as the viewing angle. Photos from the different KOPs were referenced against each other to locate distinctive features (rock outcroppings, bare areas) and keep the representation of the pipeline path consistent. After the construction phase of the pipeline route was depicted, a second digital painting with a 50' right-of-way (ROW) and vegetation matched from the surrounding area was completed to represent the operations phase.

Finally, three images were created from the master file showing the existing, construction, and operations phases. The completed visual simulations are shown during the discussion of each KOP. These simulations are extremely important to evaluate the potential impacts of the ASAP project at the KOP locations.

4.4 Evaluate Potential Impacts at KOPs

The following subsections summarize the steps for evaluating impacts at KOPs as explained in the BLM VRM manual 8431.

4.4.1 Select Timeframe

Projects are typically rated on either a short- or long-term basis. Short-term projects are defined as five years or less. The long-term timeframe considers the impacts over the life of the project. The ASAP project could be evaluated for both, but this analysis will consider only the long-term effects due to the lack of significant differences in the scope of construction and operations phases.

4.4.2 Assess Contrast

KOPs provide several reference points for rating the impact of construction activities on visual resources. The project team has visited each of these KOPs and completed a Visual Contrast Rating Worksheet (BLM VRM Form 8400-4) in the field. Appendix A includes copies of the completed worksheets.

The characteristics for each KOP were analyzed using the visual resource inventory process, in order to measure visual impacts. Visual impacts are interruptions in the form, line, color, or texture of the natural landscape. Impacts to the visual scenery as a result of the proposed project may include the following:

- Clearing of native vegetation along proposed gasline alignment.
- Roads and trails caused by construction equipment.
- General construction including open excavation.
- Final condition – involving proposed route of cleared land, sparse vegetation, and operations roads.

Utilizing the matrix in Section D of BLM VRM Form 8400-4, the degree to which visual impacts affect the project area at each KOP was recorded as one of four magnitudes: None, Weak, Moderate, or Strong. The general criteria for the degree of contrast ratings are shown in Table 1.

Table 1: Degree of Contrast Criteria

Degree of Contrast	Criteria
None	The element contrast is not visible or perceived.
Weak	The element contrast can be seen but does not attract attention.
Moderate	The element contrast begins to attract attention and begins to dominate the characteristic landscape.
Strong	The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

Characteristics to keep in mind when classifying the degree of contrast are similar to those used previously when the KOPs were selected (see Section 4.2). In addition to the six factors listed in that section, evaluators should also consider recovery time, spatial relationships, atmospheric conditions, and motion, when evaluating the degree of contrast. The existing VRM classifications were concurred by NPS.

4.4.3 Determine Whether VRM Objectives are Met

The basic philosophy of the contrast rating system is that the effects of a project depend on the degree of contrast between the existing landscape and the final landscape as a result of work done on the project. The contrast is measured by comparing the features of the existing landscape with the proposed project features. The design elements of form, line, color, and texture are used to make the comparison and to describe the visual contrast created by the project.

An understanding of the contrast rating system is important in order to determine whether VRM objectives are met. For comparative purposes, the four levels of contrast (None, Weak, Moderate, and Strong) roughly compare with the BLM visual resource inventory classes (I, II, III, and IV, respectively). Additionally, a combination of ratings may indicate a stronger overall contrast than what the individual ratings show, such as multiple “moderate” ratings or a combination of ratings. In the discussion for each KOP in Sections 5.1 to 5.6, the classes will be identified for each KOP and it will be stated whether the VRM objectives are met.

4.4.4 Develop Potential Mitigating Measures

Since the VRM goal is to minimize visual impacts, mitigating measures will be discussed for all potential adverse contrasts due to the ASAP project. This includes KOPs where the VRM objectives are met, but where impacts can be reduced. Mitigation solutions presented in this report follow the discussion for each KOP.

5.0 KOPs

Each of the identified KOPs is evaluated in the following sections. The discussion for each KOP follows a general outline. First, there is an introduction of the KOP, including VRM classification and a figure establishing the existing view. Next follows a discussion of the potential impacts on the visual landscape as identified from the BLM VRM Form 8400-4. Third, it is stated whether the VRM objectives are met and any possible mitigation that could be implemented. And last, graphic simulations of the project are presented to depict the appearance of the existing landscape during the construction and operations phases. At locations where directional boring is identified as a possible mitigation solution, graphic simulations have been prepared to show the effect this solution could have on the visual landscape. The completed Form 8400-4 for each KOP is included in Appendix A.

5.1 KOP 1 – Government Hill

Although there is no formal pull-off, the observation point provides a view of the Riley Creek Railroad Bridge and the surrounding natural landscape. Other than the rail bridge and a brief glimpse of vehicles on the Parks Highway, there are no man-made features visible. The VRM classification of this view is Class II. Figure 4 shows the existing view from KOP 1.

Figure 4: KOP 1 EXISTING

Figure 5 shows the view from KOP 1 with the simulated 100-foot project route during construction. The 50-foot operations route is shown in Figure 6.

While there are no official VRM objectives for this area, the strong lines and contrast between vegetation and soil color created by clearing the utility alignment could draw viewers' attention and potentially detract from the natural elements. Since there is no formal pullout and due to the limited time that the project is in view, moderate visual impact would be experienced with the proposed pipeline route. The prominent features of this view (the bridge and Riley Creek) remain the focal point. However, the line of the project route on the left side of the view does attract attention. As the pipeline passes the middle of the view and to the right, it disappears from view mostly due to the weak color contrast and the decreased viewing angle.

Mitigation measures for this KOP could include rerouting the pipeline to less visible areas or minimizing the surface disturbance using underground boring. Either of these measures could alleviate the introduction of defined lines seen in the landscape from this KOP (Figures 7 and 8). A reroute of the proposed pipeline from MP 538.5 to MP 540.2 could push the gasline from the south and west side of the slope at Glitter Gulch to the backside (north and east side) of the hill.

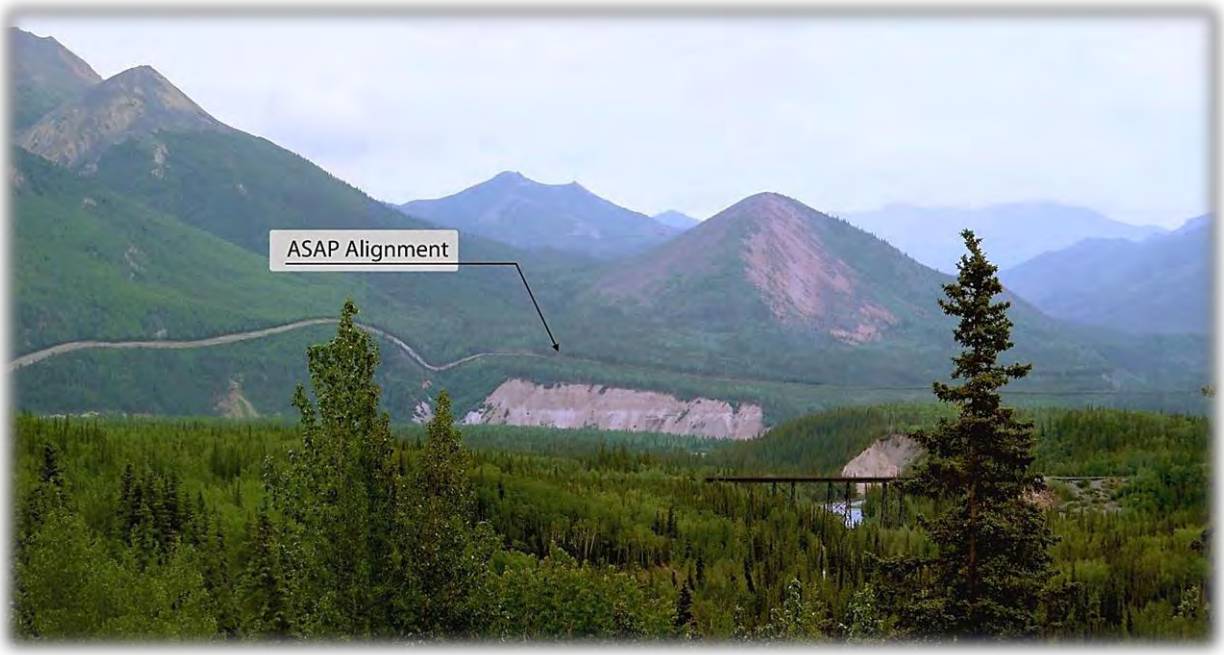

Figure 5: KOP 1 CONSTRUCTION PHASE

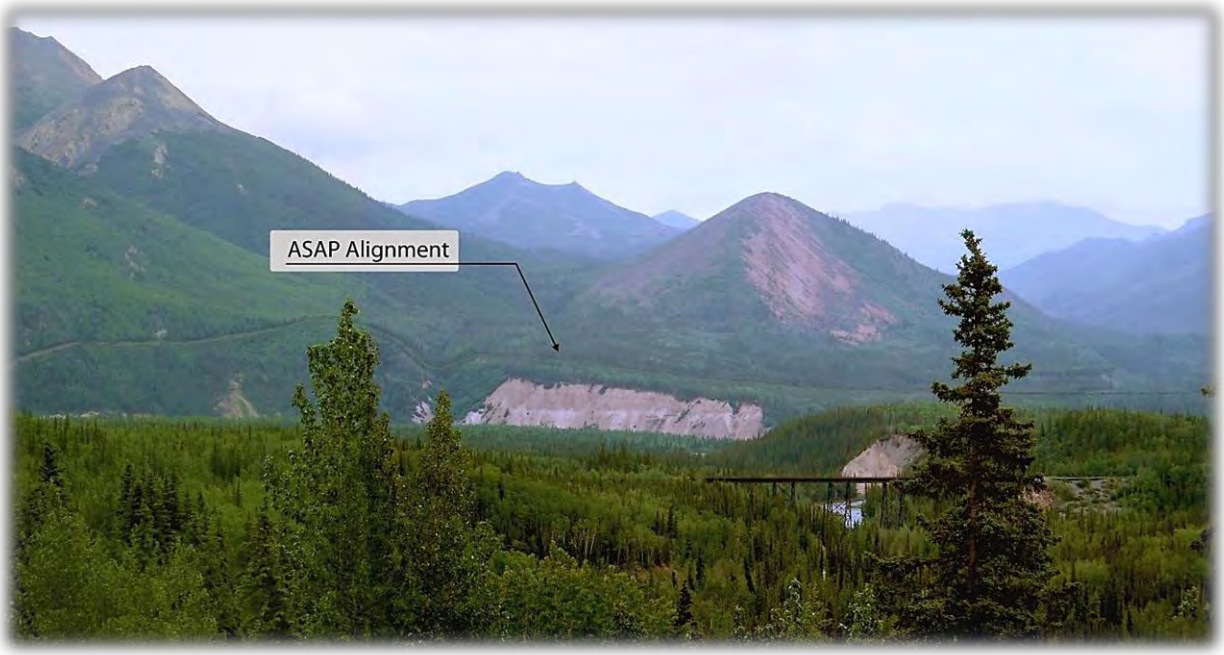

Figure 6: KOP 1 OPERATIONS PHASE

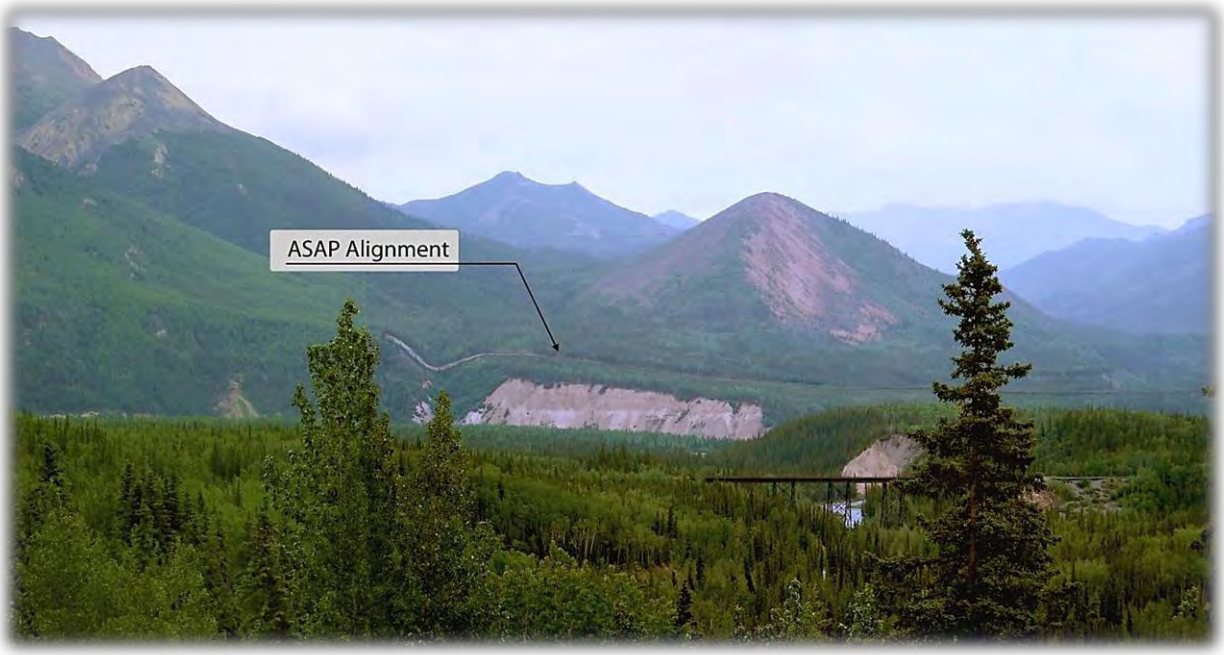

Figure 7: KOP 1 MITIGATED CONSTRUCTION PHASE

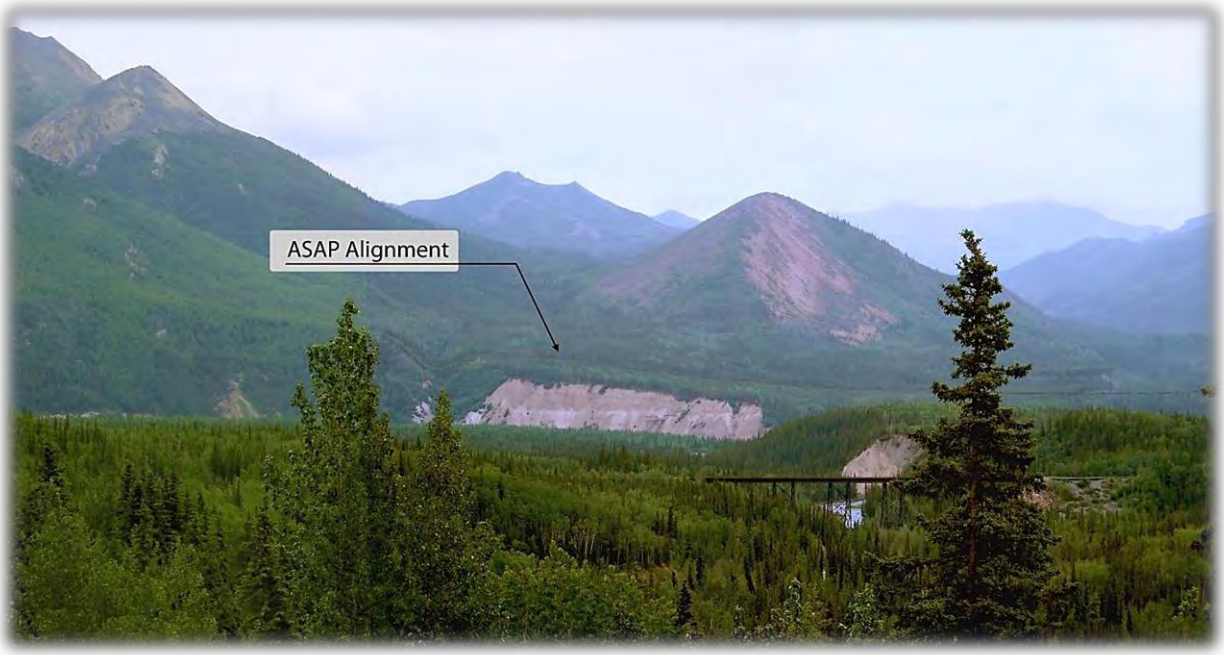

Figure 8: KOP 1 MITIGATED OPERATIONS PHASE

5.2 KOP 2 – Alaska Railroad Depot

As mentioned previously, the DNPP Visitor Center is a major public gathering space. Limited views are provided from the Visitor Center due to surrounding mature vegetation in most directions, including toward the pipeline route. A short distance from the DNPP Visitor Center is the Alaska Railroad (ARRC) Depot, which has an extensive view shed of the project route (shown in Figure 9). The VRM classification for this KOP is Class III.

Figure 9: KOP 2 EXISTING

While there is a more extensive panorama from the ARRC Depot area, the simulations in Figures 10 and 11 show that most of the proposed pipeline route will not be visible. The part that is visible is low on the mountain and partially hidden from view by existing vegetation.

There are no official VRM objectives for this area. With many man-made structures in the foreground, the visual contrast at this location is weak. The impact does not dominate the view of the casual observer.

Any mitigation considered for other KOPs would likely lessen the amount of the project route that remains partially visible at this location. Mitigation measures for this KOP could include rerouting the pipeline to less visible areas or minimizing the surface disturbance using underground directional boring. A reroute of the proposed pipeline from MP 538.5 to MP 540.2 pushing the pipeline to the backside of the hill would mitigate the impacts to the view. Similarly, an underground bore for the gasline from MP 539.5 to MP 540.2 would eliminate most, if not all, of the potential impacts at this KOP. The visual simulations for the effect of mitigation alternatives are illustrated in Figure 12 and Figure 13.

Figure 10: KOP 2 CONSTRUCTION PHASE

Figure 11: KOP 2 OPERATIONS PHASE

Figure 12: KOP 2 MITIGATED CONSTRUCTION PHASE

Figure 13: MITIGATED OPERATIONS PHASE

5.3 KOP 3 – Wilderness Access Center

The WAC is a major public gathering space. Limited views are provided from the southern parking lot looking to the northeast (see Figure 14). The VRM classification for this location is Class III.

Figure 14: KOP 3 EXISTING

Pipeline views that might be observed from this area would be just above the tree line and would be a perpendicular view to the alignment (shown in Figures 15 and 16).

There are no official VRM objectives for this area. The contrast rating is weak as the impact closely follows the break between contrasting textures and lines in the tree line and the mountain. As seen in the two preceding figures, a small portion of the gasline route would be visible just above the tree line, looking to the northeast. The impact does not dominate the view of the casual observer as it is mostly interrupted by RV's and other vehicles using the parking lot.

Any mitigation considered for other KOPs would likely lessen the amount of the project route that remains partially visible at this location. Mitigation measures for this KOP could include rerouting the pipeline to less visible areas or minimizing the surface disturbance using underground directional boring. A reroute of the proposed pipeline from MP 538.5 to MP 540.2 pushing the pipeline to the backside of the hill would mitigate the impacts to the view. Likewise, underground drilling for the gasline from MP 539.5 to MP 540.2 would eliminate all of the potential impacts at this KOP. The view after mitigation at this KOP would remain unchanged from the existing shown previously in Figure 14.

Figure 15: KOP 3 CONSTRUCTION PHASE

Figure 16: KOP 3 OPERATIONS PHASE

5.4 KOP 4 – Parks Highway South of Entrance

The location on the Parks Highway (see Figure 17) was chosen as a representative location for users who experience views near DNPP from the highway. Speeds on this section of the highway are 55 miles per hour (mph) and reduce to 45 mph closer to the DNPP entrance. There is limited pedestrian activity. The VRM classification for this location is Class II.

Figure 17: KOP 4 EXISTING

Figure 18 shows the introduction of the pipeline route on the mountainside. The alignment is a defining feature on the mountain in the construction phase. In the operations phase (Figure 19) the revegetation softens the extents of the route but the cut line is still visible.

The contrast rating for this location is between moderate and strong. The prominent, undulating line created with the clearing of the pipeline route demands attention and will likely not be overlooked by the casual observer in the construction phase. During the operations phase, the impact is moderate as the cleared land begins to be revegetated. Although the route remains noticeable, it does not dominate the view as the focal point.

Possible mitigation for this location could include minimizing the effect on existing vegetation, such as feathering or thinning edges of the cut. Additionally, rerouting to a less visible area may make the cut less prominent in the overall view. Rerouting to blend with topographic forms in shape or placement might also be possible.

The resulting view from mitigation alternatives in the area between MP 539.5 to MP 540.2 is shown on the mitigation visual simulations. Both construction and operations phases are shown in Figure 20 and Figure 21.

Figure 18: KOP 4 CONSTRUCTION PHASE

Figure 19: KOP 4 OPERATIONS PHASE

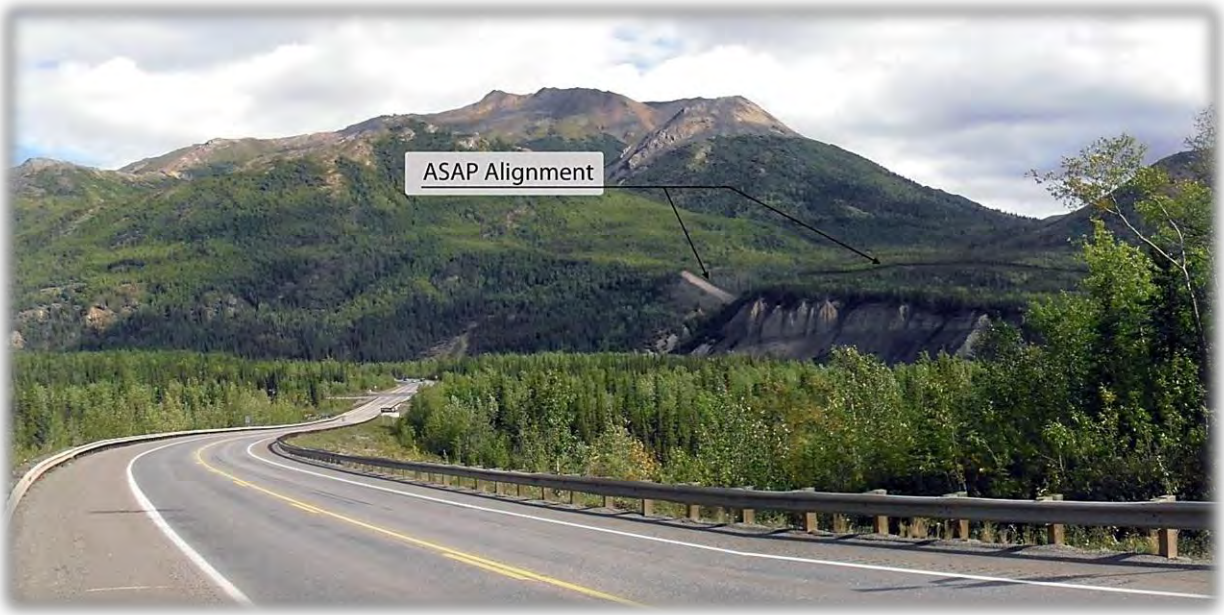

Figure 20: KOP 4 MITIGATED CONSTRUCTION PHASE

Figure 21: KOP 4 MITIGATED OPERATIONS PHASE

5.5 KOP 5 – Mt. Healy Overlook Trail

The Mt. Healy Overlook Trail is a 4.4 mile (round trip) hike that begins near the DNPP Visitor Center parking lot. This KOP was suggested by NPS as a representative location for the recreational trail users who visit the park. The existing view from the summit of the trail is shown in Figure 22. The VRM classification for this location is Class III.

Figure 22: KOP 5 EXISTING

While there are no formal VRM objectives, the contrast rating for this KOP is considered weak. The KOP view is of the pipeline route from a substantial distance. While the proposed route creates a long, narrow, winding ribbon through the landscape, it is camouflaged by the clutter of development in Glitter Gulch. In addition the number of defined lines seen from this KOP (between the Parks Highway, Nenana River, and driveways and other roadways) flow in the same direction as the pipeline alignment. The proposed project does not attract the attention of a casual observer.

Mitigation proposed at other locations will likely reduce the visual impact at this KOP. A directional bore for the gasline between stations 539.5 and 540.2 would eliminate a majority of the visual disturbance created by clearing the route. If the pipeline is rerouted, it should create curved lines in the landscape to be indistinguishable from other lines seen from this KOP.

Figure 23: KOP 5 CONSTRUCTION PHASE

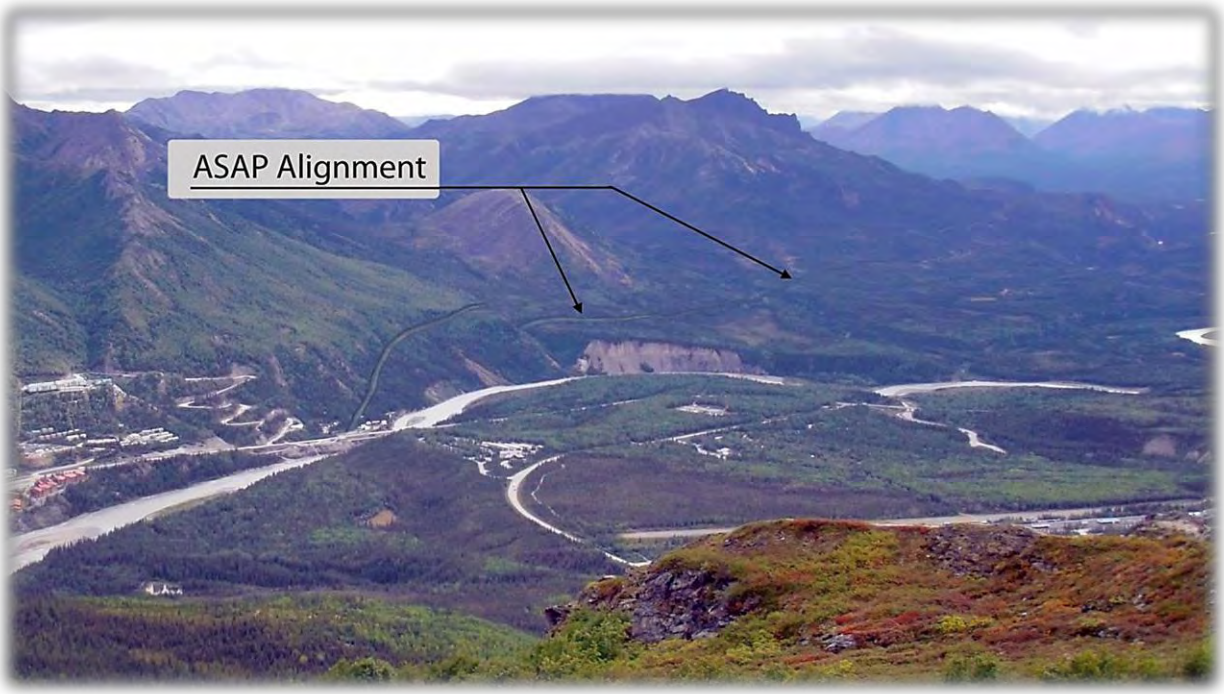

Figure 24: KOP 5 OPERATIONS PHASE

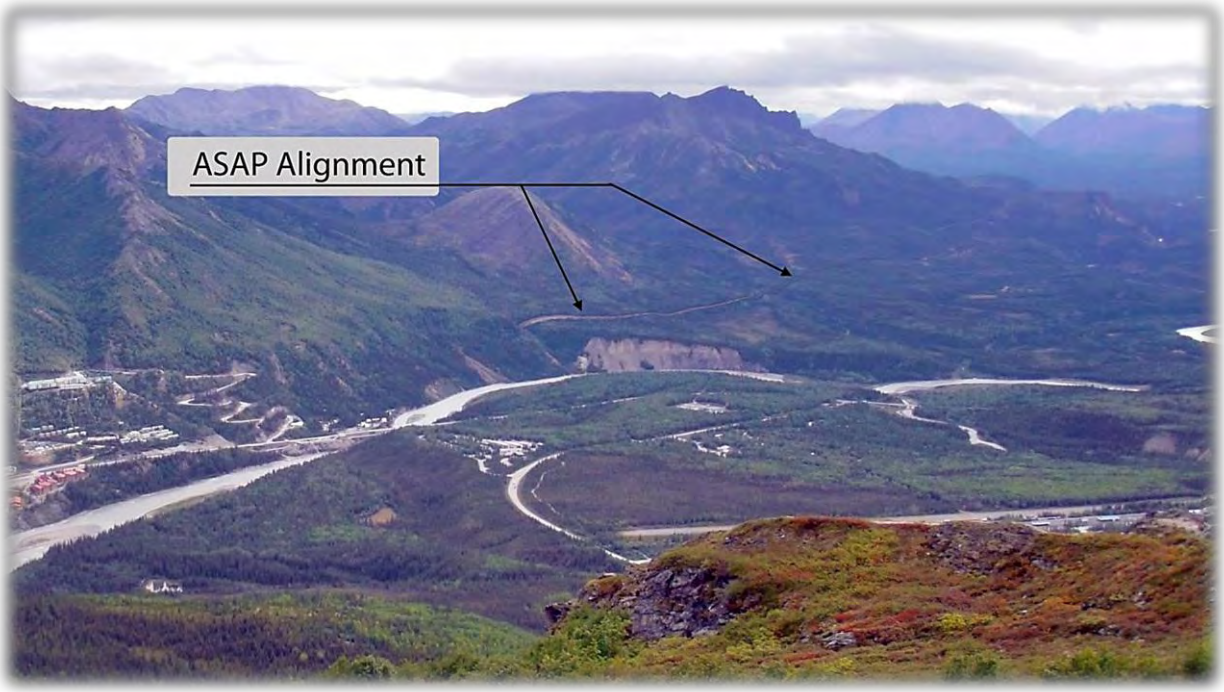

Figure 25: KOP 5 MITIGATION CONSTRUCTION PHASE

Figure 26: KOP 5 MITIGATION OPERATIONS PHASE

5.6 KOP 6 – Alaska Railroad Corridor

The ARRC Corridor in the area of DNPP was recorded as a continuous series of 360° photographs by Immersive Video Solutions, LLC. The footage affords a way of viewing and characterizing the entire ARRC corridor through the DNPP area. The railroad corridor is generally bordered by dense vegetation at the edge of the cleared ARRC ROW. A few locations within the corridor have expansive views of the area surrounding DNPP and of the proposed pipeline route. These infrequent sweeping views of the pipeline alignment are visible for short spans of time. The existing view for KOP 6 is shown in Figure 27. The VRM classification for this location is Class II.

Figure 27: KOP 6 EXISTING

There is no formal railroad stop scheduled at this KOP location. The view of the proposed route is seen for less than 10 seconds by traveling railroad passengers before it is hidden by dense vegetation. Due to the width of the view, the visual simulations are separated into left and right segments. The view from KOP 6 of the proposed pipeline route during the construction phase is simulated in Figures 28 and 29. The operations phase visual simulation is shown in Figures 30 and 31. Similar to the other KOPs in this analysis, no VRM objectives have been formally established.

Potential impacts to KOP 6 are categorized by line and texture interruptions in the existing landscape. The visual contrast is moderate to weak at this location. The pipeline alignment is located at a considerable distance from the railroad corridor. Due to this distance, the potential impacts blend into the existing vegetation to a greater degree than if the pipeline were closer. Additionally, the viewing angle and site topography minimize the appearance of the contrasting features introduced by the proposed project. For three-fourths of the visible width of the view, the pipeline route is indistinguishable from other lines at the base of the surrounding mountains. On the northernmost (photo left) one-fourth of the view, the potential impacts are most pronounced during the construction phase of the proposed project. These potential impacts are a result of the surface clearing required for pipeline construction. During the operations phase, the visual contrast is weak for the entire route as revegetation dulls the defined line of the pipeline alignment.

Possible mitigation solutions for this location include those mentioned previously for other KOPs, specifically rerouting and underground drilling. Either of these solutions would reduce the potential impacts between MP 538.5 and MP 540.2. As the right portion is outside the specified milepost limits, the resulting views showing potential impacts after mitigation during construction and during operations for the northernmost (photo left) half only are shown in Figures 32 and 33, respectively.

Figure 28: CONSTRUCTION PHASE (LEFT)

Figure 29: CONSTRUCTION PHASE (RIGHT)

Figure 30: OPERATIONS PHASE (LEFT)

Figure 31: OPERATIONS PHASE (RIGHT)

Figure 32: MITIGATION CONSTRUCTION PHASE (LEFT)

Figure 33: MITIGATION OPERATIONS PHASE (LEFT)

5.7 KOP 7 – Parks Highway MP 234 – DNPP Route Variation

The Parks Highway MP 234 is a representative view from the main vehicle transportation route surrounding DNPP. The DNPP route variation alignment places the pipeline route offset to the east of the Parks Highway from MP 223 to MP 238. The existing view from this location along the highway is shown in Figure 34. The VRM classification for this location is Class II.

Figure 34: KOP 7 EXISTING

While there are no formal VRM objectives, the contrast rating for this KOP is moderate to weak. The pipeline route generally follows the roadway and introduces a defined width of clearing for approximately 15 miles. There are a number of established lodging facilities to the north upon entering the Carlo Creek area and continuing to DNPP. Scenic views can be seen from either side of the road.

During the construction phase, the vegetation directly adjacent to the shoulder will be disturbed for that installation of the Buried pipeline. The visual corridor along the road will look somewhat unbalanced with the East side of the road cleared and fattened to accept the new Buried Pipeline. The potential impact of the alignment will decrease during the operations phase as vegetation begins to decrease the contrast between the color of the disturbed ground and the color of the grassy areas. The resulting views showing potential impacts after mitigation during construction and operations phases are shown in Figures 35 and 36, respectively.

Figure 35: KOP 7 CONSTRUCTION PHASE

Figure 36: KOP 7 OPERATIONS PHASE

5.8 KOP 8 – Mt. Healy Overlook Trail – DNPP Route Variation

The Mt. Healy Overlook Trail is detailed in Section 5.5 of this report with the existing view from the summit of the trail shown in Figure 22. The VRM classification for this location is Class III.

While there are no formal VRM objectives, the contrast rating for this KOP remains unchanged from KOP 4 and is still considered weak. The pipeline route is seen from a substantial distance and meanders in connection with the Parks Highway, Nenana River, and other roadways that flow in the same direction as the pipeline alignment. The proposed project does not attract the attention of a casual observer. The resulting views during the construction and operations phases for this KOP are shown in Figure 37 and Figure 38.

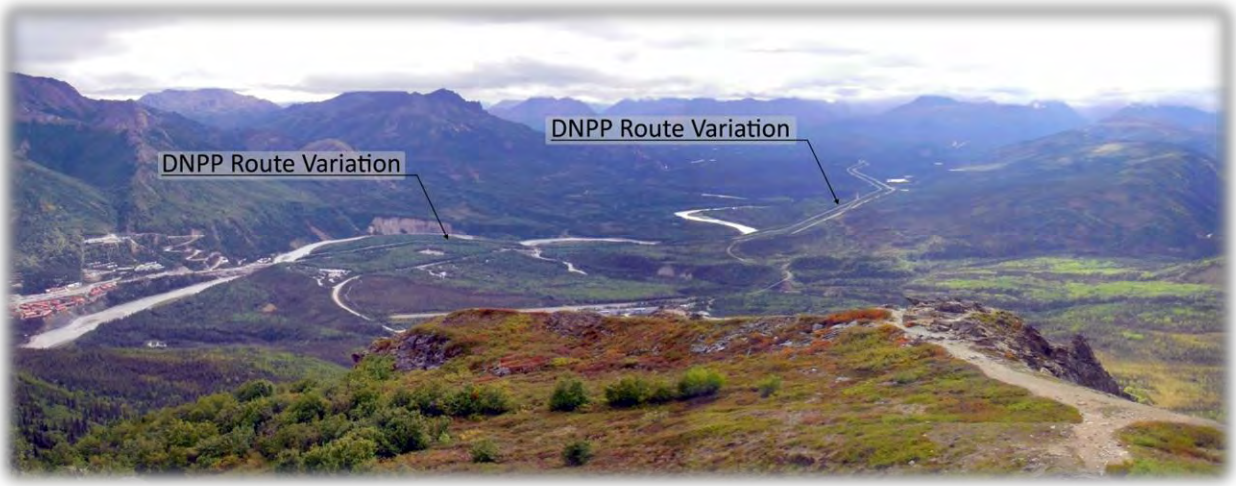

Figure 37: KOP 8 CONSTRUCTION PHASE

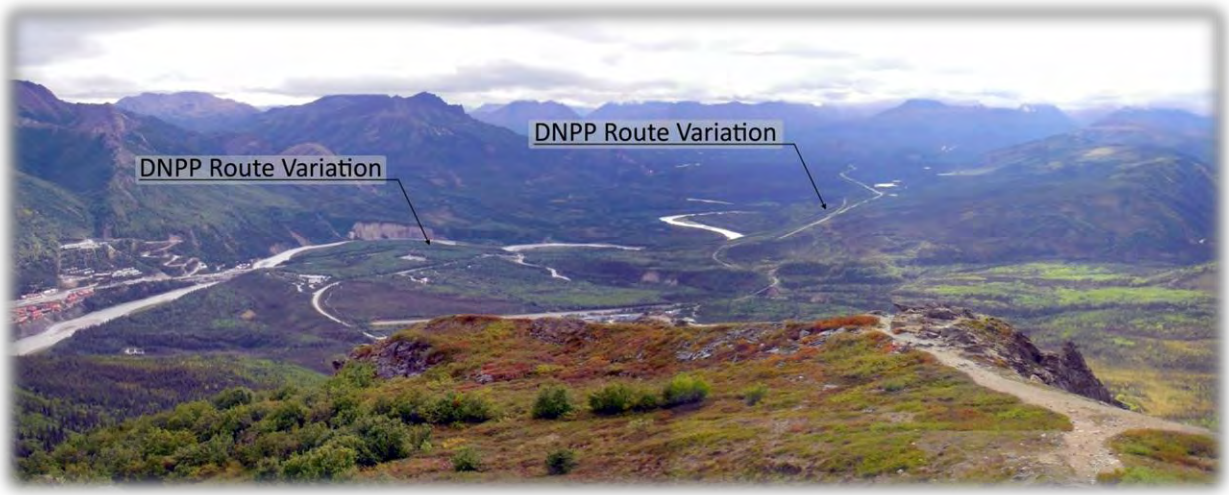

Figure 38: KOP 8 OPERATIONS PHASE

6.0 Summary

The visual impacts of the ASAP project appear to be limited to a less than 2 mile portion of the proposed pipeline route from MP 538.5 to MP 540.2. Table 2 shows the VRM classifications accepted by NPS for each KOP as well as the contrast rating for each KOP as discussed in this report.

Table 2: KOP Summary

KOP No.	Site Name	VRM Classification	Contrast Rating
1	Government Hill	Class II	Moderate
2	Alaska Railroad Depot	Class III	Weak
3	Wilderness Access Center	Class III	Weak
4	Parks Highway South of Entrance	Class II	Moderate/Strong
5	Mt. Healy Overlook Trail	Class III	Weak
6	Alaska Railroad Corridor	Class II	Moderate/Weak
7*	Parks Highway MP 234	Class III	Moderate/Weak
8*	Mt. Healy Overlook Trail	Class III	Weak

*denotes KOP for DNPP route variation

The views from KOP 1 – Government Hill and KOP 4 – Parks Highway South of Entrance have the largest potential for visual impacts. These areas are both Class II in the VRM classification system and are experienced primarily by motorists. The contrast ratings are determined to be between moderate and moderate/strong in severity. KOP 2 – ARRC Depot and KOP 3 – Wilderness Access Center have only brief segments of the pipeline route visible. Both of these areas are classified as Class III and will be viewed by pedestrians. The contrast ratings are determined to be weak at both of these KOPs. KOP 5 – Mt. Healy Overlook Trail has the longest view of the disruption caused by the pipeline clearing and construction. However, the view shed itself is minimally affected due to the distance from the pipeline alignment and the number of both natural and man-made elements that compose the view. Due to the lack of contrast between the existing panorama and the resulting view with the proposed project, the contrast rating is weak.

The visual impacts from the DNPP route variation extend from MP 223 to MP 228 within DNPP. From the perspective of KOPs 7 and 8, the visual impacts from this route variation would be moderate/weak and weak.

Appendix A

Completed Form 8400-4 for Each KOP

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 08/04/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#1 Government Hill

3. VRM Class

4. Location
Township _____
Range _____
Section _____

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep & Diagonal Background. Flat to Rolling Foreground	Smooth in Background Medium to Rough in Foreground	Smooth, Linear Rail Bridge
LINE	Bold Angular Lines at Horizon, Sloping/Broken Lines in middle ground	-Soft, irregular in Background -Irregular, vertical in Foreground	Strong Vertical and Horizontal Lines @ Bridge
COLOR	Gray, Tan, Brownish Red, Blue/Gray Water	Light to Dark Greens	Gray Road, Black/Brown Rail Bridge
TEX-TURE	Smooth and Mottled	-Smooth/Med in Background -Medium/Coarse in Foreground	Smooth/Fine Rail Bridge

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Narrow, Curving and Straight Form created by clearing	N/A
LINE	Curved, Undulating	Strong to Moderate Lines created by edge effect of corridor clearing	N/A
COLOR	Gray, Tan, Brownish-Red	Light Green	N/A
TEX-TURE	Fine to Smooth Clearing Corridor	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form		✓				✓						✓
Line	✓				✓							✓
Color			✓				✓					✓
Texture		✓				✓						✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names
John Rowe, ASLA
Alan Skinner, PE

Date
08/04/2011

Comments from item 2.

While there are no official VRM objective for this area, these strong lines and contrast in vegetation/soil color created by the clearing of the utility corridor will draw viewers attention and detract from the other natural and man made (rail bridge) aesthetics.

Additional Mitigating Measures (See item 3)

1. A directional bore for the gas line from approx. station 539.2 to 540.2 would elevate a majority of the heavy scaring to landscape from this KOP.

2. A reroute of the proposed pipeline from approx. station 538.5 to 540.2. This reroute would push the gasline from the South and West side of the slope at Glitter Gulch to the backside (North and East side) of the hill.

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BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 08/04/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#2 Visitor Center/AK Railroad

3. VRM Class

4. Location
Township _____
Range _____
Section _____

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep/Diagonal Background Flat/Linear Foreground	Smooth in Background Medium to Coarse in Foreground	Rectangular Hotel in Background, Complex structures/Bold, Angular/Flat in Foreground
LINE	Bold Jagged Lines at Horizon, Angular Broken Lines in Middleground, Flat in Foreground	Soft, Flowing in Background Complex, Irregular in Foreground	Regular, Geometric Hotel Building in Background, Complex/Geometric, Hard in Foreground
COLOR	Gray, Tan and Brownish-Red Land/No Water Viewed	Light to Dark Green	Hotel with Green Roof and white exterior in Background/Browns and grays dominate structures Foreground
TEX-TURE	Smooth and Mottled	Smooth in Background Medium to Coarse in Foreground	Hard, Smooth Textures in Both Background & Foreground

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Narrow, Curving, and Straight form created by clearing activities	N/A
LINE	Straight and Curved, Undulating Line	Moderate Lines created by Edge Effect of Clearing Activities	N/A
COLOR	Gray, Tan & Brownish Red Land	Light Green	N/A
TEX-TURE	Fine to Smooth Created by Clearing	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1. DEGREE OF CONTRAST

	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS: Form			✓				✓					✓
ELEMENTS: Line			✓			✓						✓
ELEMENTS: Color				✓				✓				✓
ELEMENTS: Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☑ No (Explain on reverse side)

Evaluator's Names
John Rowe, ASLA
Alan Skinner, PE

Date
08/04/2011

Comments from item 2.

While there is a segment of the proposed gasline corridor that will be visible from the parking/access drive area, the business of the surrounding foreground and background activities dulls the visual impact from this vantage point.

Additional Mitigating Measures (See item 3)

(Same as KOP #1)

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 08/04/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#3 - Wilderness Access Center

3. VRM Class

4. Location
Township _____
Range _____
Section _____

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Jagged to Rolling	Smooth to Medium in Background Coarse in Foreground	Flat parking lot in Foreground
LINE	Bold Angular and Curved Lines at Horizon. Strong Horizontal In Foreground	Soft, Irregular in Background Irregular, vertical in Foreground	Strong, Horizontal and Flat
COLOR	Gray, Tan, Brownish Red	Light to Dark Green	Open gray parking lot with blue and white traffic striping
TEX-TURE	Smooth to Medium Mottled in Background Flat in Foreground	Smooth to Medium in Background Medium to Coarse in Foreground	Flat, Smooth in Foreground

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Short, Narrow, straight and curving form created by clearing of corridor	N/A
LINE	Straight and curved, undulating line	Light to Moderate line created by clearing activities	N/A
COLOR	Gray, Brownish Red Land	Light Green	N/A
TEX-TURE	Fine to Smooth, Created by Clearing	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1. DEGREE OF CONTRAST

	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS: Form			✓				✓					✓
ELEMENTS: Line			✓				✓					✓
ELEMENTS: Color				✓				✓				✓
ELEMENTS: Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☑ No (Explain on reverse side)

Evaluator's Names
John Rowe, ASLA
Alan Skinner, PE

Date
08/04/2011

Comments from item 2.

A small segment of the proposed gasline corridor would be visible amongst the treeline, looking to the Northeast. The view will often be interrupted by RV's and other vehicles using the parking lot.

Additional Mitigating Measures (See item 3)

(Same as KOP#1)

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DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 08/18/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#4 - Parks Highway

3. VRM Class

4. Location
Township _____
Range _____
Section _____

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep with Diagonal Form in Background Flat/Light Rolling in Foreground	Smooth/Flowing in Background Medium to Rough in Foreground	Smooth, Curving Road and guard rail signs and embankment
LINE	Bold angular lines at horizon, sloped broken lines in Background Flat, flowing in Foreground	Soft, Irregular in Background Irregular in Foreground	Strong curving lines from road from Foreground to Middle ground, Complex vertical Foreground
COLOR	Gray, Ran and Brownish-Red	Light to Dark Greens	Gray road and guardrail, white and yellow stripping on the roadway.
TEX-TURE	Smooth, Discontinuous and Mottled	Smooth/Medium in Background Medium/Coarse in Foreground	Smooth road surface and guard rail, Slightly coarse in Foreground due to Posts

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Narrow Curving Band due to Corridor Clearing	N/A
LINE	Curved and Undulating	Strong curved lines created by edge effect of clearing	N/A
COLOR	Gray, Tan and Brownish Red	Light Green	N/A
TEX-TURE	Fine/Smooth	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form		✓				✓						✓
Line	✓				✓							✓
Color			✓				✓					✓
Texture		✓				✓						✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names
John Rowe, ASLA
Alan Skinner, PE

Date
08/18/2011

Comments from item 2.

The strong, undulating line that is created with the clearing of the pipeline corridor will command attention of the motorist as they are traveling north towards the main park entrance.

Additional Mitigating Measures (See item 3)

(Same as KOP#1)

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DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 08/18/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#5 Mt. Healy Trail Outlook

3. VRM Class
Visual Impact

4. Location
Township _____
Range _____
Section _____

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep/Rugged angles with low rolling valley	Smooth/Fine in Background Medium to Fine in Middleground Coarse Complex in Foreground	Multiple, Complex Buildings, Roads and Structures in Mid and Back Ground
LINE	Bold Angular Lines at Horizon. Complex and Irregular series of curves in Middleground	Soft, Broken lines in Background Irregular/Complex lines in Foreground	Complex, Geometric Lines create buildings, roads and other structures
COLOR	Gray, Tan & Brownish-Red/Grayish-Blue Water	Light to Dark Greens, and Red	Red, Blue, White, Grays in Buildings and Structures.
TEX-TURE	Smooth, Mottled Land with Medium to Coarse in Foreground	Smooth to Medium in Background Medium to Coarse in Foreground	Medium to Coarse texture created by scattered development

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat/Curved	Narrow, Curving Form created by Clearing	N/A
LINE	Curved, Undulating	Moderate, Lightly curved line created by corridor clearing	N/A
COLOR	Gray, Tan, Brownish-Red	Light Green	N/A
TEX-TURE	Fine/Smooth Corridor created by Clearing	Fine to Medium Texture in Background	

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1. DEGREE OF CONTRAST

	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS: Form		✓					✓					✓
ELEMENTS: Line			✓				✓					✓
ELEMENTS: Color			✓				✓					✓
ELEMENTS: Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☑ No (Explain on reverse side)

Evaluator's Names	Date
John Rowe, ASLA	08/18/2011
Alan Skinner, PE	

Comments from item 2.

While the proposed corridor clearing does create a long, narrow, winding ribbon through the landscape, it does get lost in the clutter of the development in Glitter Gulch, as well as the rivers and roads that wind through the valley in the same direction as the pipeline corridor.

Additional Mitigating Measures (See item 3)

1. A directional bore for the gasline between stations 539.5 and 540.2 would eliminate a majority of the visual scaring created by clearing the corridor.

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BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 09/13/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#6 AK RR South of Parks Highway

3. VRM Class

4. Location
Township _____
Range _____
Section _____

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep/Diagonal Background Flat to Rolling Foreground	Smooth in Background Medium to Coarse in Foreground	N/A
LINE	Bold Angular Lines at Horizon Broken Lines in Mid ground Curving River	Soft, Irregular in Background Irregular, Vertical in Foreground	N/A
COLOR	Gray, Tan, Brownish Red, Blue/Gray Water	Dark to Light Green, Yellow	N/A
TEX-TURE	Smooth to Mottled	Smooth in Background Medium to Coarse in Foreground	N/A

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Narrow, Curving and Straight Form Created by Clearing Activities	N/A
LINE	Curved and Straight Line Segments	Strong to Moderate Lines Created by Edge Effect from Clearing	N/A
COLOR	Gray, Tan, Brownish Red with Earth Disruption	Strong to Moderate Lines Created by Edge Effect from Clearing	N/A
TEX-TURE	Fine to Smooth, Clearing of Corridor	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☑ LONG TERM

1. DEGREE OF CONTRAST

	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS: Form			✓				✓					✓
ELEMENTS: Line		✓				✓						✓
ELEMENTS: Color			✓			✓						✓
ELEMENTS: Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☑ No (Explain on reverse side)

Evaluator's Names: John Rowe, ASLA

Date: 09/13/2011

Comments from item 2.

While a small segment of the pipeline corridor (Between ASAP MP 589.5 and 540.2) will cause a short term visual impact, the long term maintenance activities are anticipated to have much less impact. The distance from the KOP to the pipeline and the relatively low viewing angle are major factors in the anticipated, low visual impact over the long term.

Additional Mitigating Measures (See item 3)

While no mitigating actions are recommended, the mitigation actions discussed in other KOP's (to the segment between ASAP MP 539.5 and 540.2) would greatly reduce the short term visual impacts on this KOP.

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Form 8400-4
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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 11/15/2011

District N/A

Resource Area DNPP

Activity (program) Visual Impact

SECTION A. PROJECT INFORMATION

1. Project Name
ASAP Pipeline

2. Key Observation Point
#7 Parks Highway - MP 234

3. VRM Class

4. Location
Township _____
Range _____
Section _____

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Steep Mountains in Background Flat to Rolling in Foreground	Smooth/Mottled in Background Coarse in Forground	Flat Road Surface
LINE	Strong Diagonal in Background Horizontal and Undulating in Foreground	Soft/Irregular in Background Irregular, Vertical in Foreground	Straight Lines
COLOR	Gray, Tan, Brownish-Red in Background, Green in Foreground	Medium Green in Background, Light to Medium Green in Foreground	Gray with White and Yellow Stripes, Green Mile Sign
TEX-TURE	Smooth/Mottled in Background Mottled in Foreground	Smooth in Background Medium to Coarse in Foreground	Smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat	Straight, Narrow Form created by Vegetation Clearing	N/A
LINE	Curved and Straight Line Sections	Moderate to Strong Lines created by Edge Effect from Clearing	N/A
COLOR	Gray, Brown with Earth Disruption	Light to Dark Green	N/A
TEX-TURE	Fine to Smooth with Clearing of Corridor	Fine to Medium	N/A

SECTION D. CONTRAST RATING ☐ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS: Form		✓				✓						✓
ELEMENTS: Line		✓				✓						✓
ELEMENTS: Color			✓				✓					✓
ELEMENTS: Texture			✓			✓						✓

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☑ No (Explain on reverse side)

Evaluator's Names: John Rowe, ASLA

Date: 11/15/11

Comments from item 2.

While the Construction Phase of the project will create considerable visual pollution, the long term (maintenance) phase will have considerably less impact with the corridor width being reduced, compared to the construction, and the earth being revegetated.

Additional Mitigating Measures (See item 3)

None

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Appendix L

ANILCA Section 810 Analysis of Subsistence Impacts

Alaska Stand Alone Gas Pipeline
ANILCA Section 810 Analysis of Subsistence Impacts

In 2010, the Alaska Legislature passed House Bill (HB) 269 that, in part, provided for establishing an intrastate natural gas pipeline system. With a shortfall of natural gas supply from the Cook Inlet area to meet current and future anticipated demands from Alaskans, the Alaska Stand Alone Gas Pipeline (ASAP) aims to provide a long-term, stable supply of natural gas and NGLs from North Slope gas fields to markets in the Fairbanks and Cook Inlet areas by 2016. To this end, the Alaska Gasline Development Corporation (AGDC) proposes to develop a 24-inch diameter, 737-mile long, high pressure natural gas pipeline from the North Slope to Cook Inlet.

Chapter 5.14 (Subsistence Affected Environment and Environmental Consequences) of the ASAP Preliminary Final Environmental Impact Statement (PFEIS) provides a detailed description of the affected environment of the planning area and the potential adverse effects of the various alternatives to subsistence. This analysis uses the detailed information presented in the PFEIS to evaluate the potential impacts to subsistence pursuant to Section 810 of the Alaska National Interest Land Conservation Act (ANILCA, P.L. 96-487).

A. Subsistence Evaluation Factors

Section 810(a) of ANILCA requires that an evaluation of subsistence uses and needs be completed for any federal determination to "withdraw, reserve, lease, or otherwise permit the use, occupancy or disposition of public lands." Therefore, an evaluation of potential impacts to subsistence under ANILCA Sec. 810(a) must be completed for the ASAP. ANILCA requires that this evaluation include findings on three specific issues:

- The effect of use, occupancy, or disposition on subsistence uses and needs;
- The availability of other lands for the purpose sought to be achieved; and
- Other alternatives that would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes (16 USC Sec. 3120).

A finding that the proposed action may significantly restrict subsistence uses imposes additional requirements, including provisions for notices to the State of Alaska and appropriate regional and local subsistence committees, a hearing in the vicinity of the area involved, and the making of the following determinations, as required by Section 810(a)(3):

- Such a significant restriction of subsistence uses is necessary, and consistent with sound management principles for the utilization of public lands;
- The proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of use, occupancy, or other disposition; and
- Reasonable steps will be taken to minimize adverse effects upon subsistence uses and resources resulting from such actions.

In order to determine if a significant restriction of subsistence uses and needs may result from any one of the alternatives discussed in the PDEIS, including its cumulative effects, the following three factors in particular are considered:

- The reduction in the availability of subsistence resources caused by a decline in the population or amount of harvestable resources. Forces that might cause a reduction include adverse impacts on habitat, direct impacts on the resource, increased harvest and increased competition from non-rural harvesters.;
- Reductions in the availability of resources used for subsistence purposes caused by alteration of their normal locations, migration, and distribution patterns; and
- Limitations on access to subsistence resources, including but not limited to increased competition for the resources.

A significant restriction to subsistence may occur in at least two instances: 1) when an action substantially reduces populations or their availability to subsistence users, and 2) when an action substantially limits access by subsistence users to resources. The information contained in Chapter 5 of the ASAP PDEIS is the primary data used in this analysis.

B. ANILCA Sec. 810(a) Evaluations and Findings for All Alternatives and the Cumulative Case

The following evaluations are based on information relating to the environmental and subsistence consequences of the proposed Alaska Stand Alone Gas Pipeline. The evaluation and findings focus on the potential impacts to the subsistence resources themselves, as well as access to resources, and economic and cultural issues that relate to subsistence use.

1. Evaluation and Finding for Alternative A: No Action Alternative

a) Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

Under the No Action Alternative, the area would remain available to lawful and permitted activities pursuant to State and Federal regulations. All special areas and site-specific prohibitions would remain in effect.

The analysis of the No Action Alternative on subsistence considers the effects of not undertaking the proposed action. The analysis concludes that the activities would have no significant effects on subsistence species and on access to subsistence resources.

b) Evaluation of the Availability of Other Lands for the Purpose Sought to be Achieved

Other lands are available for the purpose sought to be achieved. Under the No Action Alternative, none will be affected. Therefore, there are no significant effects on subsistence species and on access to subsistence resources.

c) Evaluation of Other Alternatives that Would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

No other alternatives are considered. Therefore, there are no significant effects on subsistence species and on access to subsistence resources.

d) Findings

The No Action Alternative would not significantly restrict subsistence uses and needs.

2. Evaluation and Findings for Alternative B: the Proposed Action

Under the Proposed Action, the AGDC proposes to construct, operate, and maintain approximately 737 miles of new 24 inch diameter intrastate natural gas transmission pipeline, approximately 34 miles of new 12 inch diameter pipeline lateral, one or two stand-alone compressor stations (CS), a gas conditioning facility (GCF), a straddle and off-take facility, the Cook Inlet Natural Gas Liquid Extraction Plant (NGLEP) Facility, three meter stations, 37 mainline valves, five pig launcher and/or receiver facilities, and other permanent facilities. The analysis of the proposed activity considers the effects of construction, operation, and of maintenance activities on subsistence uses and needs.

a) Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

As mentioned in Section 5.5, the proposed action will impact wildlife resources via 1) habitat loss, alteration, and fragmentation, and 2) altered hunting mortality patterns due to increase in human access to previously inaccessible areas, among other things. During the construction phase, general disturbance of wildlife and their habitat could result in the unavailability of subsistence resources. Big game animals such as moose and caribou will likely temporarily avoid areas where human disturbance is occurring. Large machinery creates noise, vehicular traffic creates barriers, and the influx of construction workers increase human presence. With general disturbance, subsistence resources may be unavailable at the time and place that federal subsistence users are accustomed to finding them. During construction, the effect of resource displacement on subsistence uses due to disturbance is likely greatest for federal subsistence users in communities that lie directly along the proposed route (e.g. Minto, Nenana, Healy, Wiseman, Coldfoot, Anderson, McKinley Park, and Cantwell). For migratory resources such as caribou, communities that do not lie directly along the proposed route may be affected by the construction of the pipeline.

The effects of the proposed action on resource populations can vary. Here, we analyze these effects in distinct geographic regions.

North Slope. In recent years, caribou herds on the North Slope are relatively stable or have increased in population (Caikoski 2009, Lenart 2009, Parret 2009) while moose populations have fluctuated (Carroll 2008). However, larger ecosystem processes such as

climate, predation, and fire drive population dynamics rather than the pipeline construction.

One concern about the proposed action is competition from non-locals for fish and game that might otherwise be harvested for local subsistence. The construction of up to 60 new access roads to the pipeline will increase access to subsistence resources that are not readily accessible at the current time, potentially increasing competition for those resources.

Several factors may reduce the impacts of increased access by non-subsistence hunters due to the proposed action. Since the ASAP will be co-located with the TAPS on the North Slope, the amount of additional access that access roads provide to subsistence resources is limited because of their short length and the size and configuration of subsistence use areas. Moreover, if vehicular use of access roads will be restricted, then impacts to subsistence uses would be minimized. As part of the proposed action, employees of the ASAP are prohibited from camping, hunting, fishing, and trapping in the ROW. Restrictions on motorized vehicle use and on non-subsistence hunting with firearms within the ten-mile-wide Dalton Highway corridor further limits competition from non-locals. Disturbance of subsistence activities due to competition from non-local hunters is likely limited to the ROW with restrictions imposed on non-locals as discussed above. Therefore, there is no significant effect on subsistence uses and needs.

Brooks Range to the Yukon River. Of the villages potentially affected by the construction of the proposed pipeline, Anaktuvuk Pass has the greatest reported reliance on caribou. Due to annual variation in caribou migration, in some years, caribou may not migrate through Anaktuvuk Pass. Moose and caribou are sensitive to disturbance (Vistnes and Nellemann 2008, Bradshaw *et al*. 1998), although moose may be habituated to disturbance (Westworth *et al*. 1989). During construction, vehicular and human traffic is likely to increase. Traffic can be a physical barrier to caribou in transit (Wolfe *et. al.* 2000). This may cause animals to be displaced or diverted. For example, disturbance that could alter the migration of caribou such that they are inaccessible by residents of Anaktuvuk Pass may affect their food security. Therefore, Anaktuvuk Pass will likely feel the greatest impact from displacement of migratory resources due to construction of the proposed pipeline. However, because most of the pipeline will be co-located with the Trans-Alaska Pipeline System (TAPS) ROW and the construction would be timed to occur in the winter, displacement of caribou due to the construction of the ASAP is likely short-term. Therefore, there is no significant effect on subsistence uses and needs.

One of the concerns about the proposed action is the location of the compressor station #1 approximately 10 miles north of the community of Wiseman. The area where the compressor station is to be located is within a subsistence use area of the community. Disturbance due to noise could affect the subsistence resources in the area.

Yukon River to Cantwell. In this section, there are few federal lands crossed by the proposed action. Therefore, the proposed action will not significantly affect subsistence uses and needs on federal lands. However, user access into the area is likely to increase with the proposed construction of five new roads that are longer than two miles in length.

This increased user access could affect subsistence uses by diverting federally qualified subsistence users in the area to other federal lands outside of the proposed area. Preventive measures in the proposed action will minimize the impacts of increased non-local access to subsistence use areas. Therefore, the proposed action would have no significant effect on subsistence uses and needs.

Cantwell to end. In this section, there are also few federal lands along the proposed pipeline route. Most of the proposed pipeline will be co-located with the Parks Highway ROW and construction is scheduled for the winter. Disruption of subsistence activities due to construction of the buried pipeline is likely short-term. After construction, if vehicular use of access roads will be restricted, then impacts to subsistence uses would be minimized. Therefore, there is no significant effect on subsistence uses and needs.

Common to all segments. The proposed pipeline crosses 516 streams throughout the proposed project area. Eighty-two of the stream crossing provide habitat for anadromous fish. Many others have not been studied for fish presence. The installation of the buried pipeline across fish-bearing streams is likely to have the greatest potential effect on fish resources from the project development. Stream crossings will be achieved via different techniques as to minimize impacts on subsistence fisheries. Section 2.2.3.2 describes the different methods of waterbody crossings. Depending on the type of crossing used, potential temporary impacts to fish resources during construction include in-stream habitat alteration and changes to the channel profile. During pipeline operations, ice dams could occur during the winter if the buried pipe temperature is colder than the ambient temperature. One mitigating measure to prevent this from happening is to maintain the temperature of the pipeline to the surrounding ambient temperature as much as practicable. Therefore, the proposed action would have no significant effect on subsistence uses and needs.

The proposed action would not significantly impact other harvestable resources such as berries, willows, and spruce roots. Most of the construction is within the Dalton and Parks highway ROW. Therefore, the amount of vegetation clearing necessary for the construction of the pipeline is minimized. Mitigating actions such as revegetation of disturbed areas could help lessen the impact on these resources.

The analysis concludes that the proposed action would have no significant effects on subsistence uses and needs, and on access to subsistence resources.

b) Evaluation of the Availability of Other Lands for the Purpose Sought to be Achieved

Other lands are available for the purpose sought to be achieved. According to the applicant, the proposed pipeline route will minimize total pipeline length; reduce the amount of challenging terrain and geologic special design areas; avoid and/or minimize impacts to ROWs; and avoid parks, preserves, refuges, and wilderness areas, thereby reducing construction impacts. To the extent feasible, existing state infrastructure and ROWs, including state/borough highways and road systems and the ARRC railroad, will be used for pipeline installation to minimize project impact.

c) Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

There are no other alternatives to this activity.

d) Findings

The proposed activity would not significantly restrict subsistence uses and needs.

3. Evaluation and Finding for the Cumulative Case

The goal of the cumulative analysis is to evaluate the incremental impact of the proposed action in conjunction with all past, present, and reasonably foreseeable future actions in or near the proposed ASAP system. The cumulative analysis considers in greatest detail activities that are more certain to happen, and activities that are identified as being of great concern during consultation. Chapter 5.20 discusses cumulative effects in greater detail. Actions included in the cumulative analysis include, but are not limited to, the following:

- Previous land use pattern in the proposed activity area
- Current land use activities in the proposed activity area
- Foreseeable future developments and land use activities in the proposed activity area

a) Evaluation of the Effects of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The cumulative effects of the ASAP and other reasonably foreseeable projects is not likely to negatively affect population sizes of subsistence resources. Some of the actions that are considered as contributing to the cumulative impacts are already in place and have not led to population declines in key species. For example, some subsistence resource populations have actually increased since the existence of the TAPS (Lenart 2009).

Both the proposed action and other projects considered in section 5.20 of the EIS will likely impact local abundance, distribution, seasonal habitat use, movement patterns, and habitat integrity (relative to fragmentation, degradation, and conversion), making it more difficult to access by subsistence hunters. Analyzed individually, this impact from the ASAP system may not be significant. However when combined with impacts from other proposals such as the Foothills West Transportation Access road to Umiat, the proposed road to the Ambler Mining District, and the road to the Susitna-Watana Dam, the cumulative impact is likely to be considerably greater. Likewise, competition for resources due to increased access to remote areas is likely to be cumulatively greater than for the ASAP alone. Specific villages that lie in proximity to these proposed future roads will likely be the most affected by future competition for resources. Therefore, the cumulative case may have a significant effect on subsistence uses and needs.

b) Evaluation of the Availability of Other Lands for the Purpose Sought to be Achieved

Same as the proposed action.

c) Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

The No Action Alternative would eliminate impacts due to the ASAP. However it would not alter impacts due to other projects considered in the cumulative impacts.

d) Findings

The cumulative impacts include the potential adverse impacts on the distribution of subsistence resources and the increased competition from sport hunters accessing game on federal lands via proposed roads and ROWs. Additionally, cumulative effects may include increased habitat loss, alteration, and fragmentation, as well as altered big game distribution and hunting mortality pattern on federal lands. Therefore, cumulative impacts associated with the proposed action may significantly affect subsistence uses and needs.

C. Subsistence Determinations Under the ANILCA Sec. 810(a)(3)(A), (B), and (C)

ANILCA Sec. 810(a) provides that no "withdrawal, reservation, lease, permit, or other use, occupancy or disposition of the public lands which would significantly restrict subsistence uses shall be affected" until the federal agency gives the required notice and holds a hearing in accordance with ANILCA Sec. 810(a)(1) and (2), and makes the three determinations required by the ANILCA Sec. 810 (a)(3)(A), (B), and (C). The three determinations that must be made are: 1) that such a significant restriction of subsistence use is necessary, consistent with sound management principles for the utilization of the public lands; 2) that the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other such disposition; and 3) that reasonable steps will be taken to minimize adverse impacts to subsistence uses and resources resulting from such action [16 U.S.C. Sec. 3120(a)(3)(A), (B), and (C)].

The BLM has found in this ANILCA 810 Evaluation that the cumulative impacts in this EIS may significantly restrict subsistence uses. Therefore, the BLM undertook the notice and hearing procedures required by the ANILCA Sec. 810 (a)(1) and (2) in conjunction with release of the Draft EIS in order to solicit public comment from the potentially affected communities and subsistence users.

The determinations below satisfy the requirements of ANILCA 810(a)(3)(A), (B), and (C).

1. Significant Restriction of Subsistence Use is Necessary, Consistent with Sound Management Principles for the Utilization of Public Lands.

This analysis concluded that the cumulative effects of the proposed action and other potential projects may significantly restrict subsistence uses because of potential adverse impacts on distribution of subsistence resources and because of increased competition from sport hunters using proposed roads and ROWs to access federal lands. However, to the extent the proposed action contributes to the cumulative case, the portion attributable to the ASAP is necessary.

2. The proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition

The proposed activity evaluated here concerns the construction, operation, and maintenance of the ASAP and its associated facilities. Approximately 82% of the proposed project route would be co-located with or would closely parallel existing pipeline or highway ROWs. The construction ROW width along underground and aboveground portions of the proposed pipeline would be 100 feet for the proposed mainline. After construction, a permanent ROW width of up to 52 feet will be maintained by the pipeline owner and/or operator through the operational life of the pipeline. Therefore, the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of the proposed action.

3. Reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.

During the scoping for this EIS, the BLM and the public identified subsistence as one of the most important concerns to be evaluated in the NEPA process. As such, an ANILCA 810 hearing was conducted in potentially affected villages and rural communities. Considerable effort was made to examine subsistence concerns and evaluate subsistence impacts under all alternatives considered in the EIS.

One example is the Dalton Highway corridor where the proposed location of compressor station #1 may cause the displacement of wildlife due to noise disturbance in a location regularly used by subsistence hunters from the community of Wiseman. The location of this compressor station should be changed in order to reduce the effects on local subsistence uses and needs.

As noted in Section B, the greatest impacts to subsistence are likely to occur in the form of cumulative impacts. The greatest potential cumulative impacts are those related to wildlife distribution and hunter access under cumulative impacts with other future projects as part of Alaska's economic growth in the larger sense. These potential future projects will need to be analyzed and their potential effects will be evaluated during the environmental evaluation of these projects. However, for the proposed action, reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources. These steps are included in Mitigation Section (Section 5.23) in the EIS.

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Appendix M

Right-of-Way Lease

ADL 418997

RIGHT-OF-WAY LEASE
FOR
THE ALASKA STAND ALONE GAS PIPELINE/*ASAP*

BY AND
BETWEEN
THE STATE OF ALASKA
AND
THE ALASKA GASLINE DEVELOPMENT CORPORATION

ADL 418997
ALASKA STAND ALONE GAS PIPELINE/ASAP
RIGHT-OF-WAY LEASE

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ADL 418997
ALASKA STAND ALONE GAS PIPELINE/ASAP
RIGHT-OF-WAY LEASE

This Right-of-Way Lease (hereinafter "Lease") is entered into this 25th day of July, 2011 (hereinafter "Effective Date"), by the State of Alaska (hereinafter "State"), acting through the Commissioner of the Department of Natural Resources (hereinafter "Commissioner"), and by the Alaska Gasline Development Corporation (hereinafter "AGDC" or "Lessee").

WHEREAS the AGDC was created pursuant to Alaska Statutes 38.34.030(a) and 18.56.086;

WHEREAS AGDC is required by AS 38.34.040(e)(3) to apply for and obtain rights-of-way and other permits for the project route;

WHEREAS AS 38.34.050(c) provides the Commissioner shall grant AGDC a right-of-way lease under AS 38.35 for the gas pipeline transportation corridor if AGDC submits a complete right-of-way lease application under AS 38.35.050, the lease application is made the subject of notice and other reasonable and appropriate publication requirements under AS 38.35.070, and (3) AGDC agrees to be bound by certain right-of-way lease covenants set out in AS 38.35.120; and

WHEREAS AGDC submitted a complete right-of-way lease application, and the lease application was noticed for public comment on March 21, 2011.

Now, in consideration of Lessee's covenants and agreements described hereinafter, and subject to the provisions of this Lease, the State and Lessee agree as follows:

1. <u>Lease of Right-of-Way</u>

(a) Pursuant to the provisions of AS 38.35, the Alaska Right-of-Way Leasing Act, as amended, and for and in consideration of the covenants and conditions contained herein and the Stipulations incorporated by reference and attached as Exhibit A, the State hereby grants to the Lessee, for a limited duration described in Section 2, a non-exclusive right-of-way Lease only for the purposes described in Subsection (c) of this section, across, through, and upon those State Lands and those lands now owned or hereafter acquired, each as shown and described in the incorporated alignment and site locations attached hereto as Exhibit B. If needed upon completion of a title report on the lands listed in Exhibit B, Exhibit B shall be amended.

(b) This Lease conveys a right-of-way interest only in lands in which the State holds or obtains a property interest, including lands selected by the State pursuant to Section 906 of the Alaska National Interest Lands Conservation Act. This Lease does not convey land or interest in lands owned or administered by the University of Alaska, the Alaska Mental Health Trust Authority, or the Alaska Railroad Corporation. Although this Lease applies to State Lands in which the Alaska Department of Transportation and Public Facilities has an interest or which the Alaska Department of Transportation and Public Facilities administers, the Lessee must also secure the written permission of the Alaska Department of Transportation and Public Facilities to enter upon and use such lands through an Highway Use Agreement to be entered into pursuant to Exhibit A Stipulation 4.

(c) This Lease is granted for the purpose of the Construction, Operation, Maintenance, and Termination of a Natural Gas transportation Pipeline, consisting of one 24-inch diameter Pipeline, one 12-inch diameter Pipeline and Related Facilities in compliance with the terms of this Lease and all applicable State laws and regulations.

(d) Except as otherwise provided herein, the Lessee shall not allow or suffer any other Person or entity to use the Leasehold for carrying on activities which are not part of the Lessee's authorized operations pursuant to this Lease. Nothing in this subsection is intended to excuse or preclude the Lessee from complying with its obligations under this Lease, or employing agents, employees, or Contractors to effect the Construction, Operation, Maintenance, or Termination of the Pipeline. This Lease is subject to any valid existing rights including rights of third parties and of State entities with authority over the Leasehold.

2. Duration

(a) This Lease shall expire on the 25th day of July, 2041, at 12 noon (Alaska Time), unless prior thereto it is released, abandoned, or otherwise terminated pursuant to the provisions of this Lease or any applicable law or regulation.

(b) The Lessee shall give written notice to the Commissioner of its intent to seek renewal of this Lease no later than one-hundred eighty (180) days before expiration. The Commissioner shall, upon request of the Lessee, renew the Lease for additional terms of up to thirty (30) years each, but not less than ten (10) years each, so long as the Pipeline is in commercial operation and Lessee is in compliance with:

(1) all terms of the Lease;

(2) all State laws, including but not limited to State law pertaining to regulation and taxation of the Pipeline; and

(3) any agreement(s) between the State and the Lessee pertaining to regulation and taxation of the Pipeline.

(c) The Lessee shall provide three hundred sixty-five (365) days notice to the Commissioner prior to any relinquishment, renewal, abandonment or other Termination of this Lease.

(d) Upon the expiration of the Lease term (including any renewal thereof), or upon its earlier forfeiture, relinquishment, abandonment, or other Termination, the provisions of this Lease, to the extent applicable, shall continue in effect and shall be binding on the Lessee, its successors, and assigns, until they have fully performed their respective obligations and liabilities resulting from that Lessee's tenure as the leaseholder or on account of the expiration, or prior Termination, of the Lease. At any time following the expiration, forfeiture, relinquishment, abandonment, or other Termination of this Lease, upon a determination in writing that the State's best interest shall be served, the Commissioner may release the Lessee from all or a portion of such continuing obligations and liabilities, with the exception of those contained in Section 8(m) and Section 9 herein.

3. Rental

(a) Construction Leasehold:

(1) The Lessee shall pay to the State annual rental payments in the amount of $188,600.00 during the period of Pipeline Construction. However, this rental amount shall be adjusted on the basis of a formal appraisal conducted on or before one (1) year after the Effective Date of this Lease.

(2) The first payment is due on or before the Effective Date of this Lease and all subsequent payments are due on or before each Lease Anniversary Date.

(3) The annual rental payments made during Construction under this subsection shall be adjusted by an amount which reflects any overpayment for the period from the date of the Commissioner's approval of all the requirements under Section 23(e) of this Lease to the next Lease Anniversary Date following the re-appraisal of the Operation and Maintenance Leasehold. The amount of difference shall be calculated on a pro rata acreage basis.

(b) Operation and Maintenance Leasehold:

(1) Upon receipt of the Commissioner's approval of all of the requirements under Section 23(e) of this Lease, and for the remainder of the term of this Lease and any subsequent renewals, Lessee shall pay to the State annual rental payments in the amount of the annual fair market rental of the Leasehold based on the appraised fair market rental value of the Leasehold.

(c) The initial formal appraisal, and all subsequent reappraisals, shall be carried out by an independent appraiser selected by the Lessee from a list of appraisers provided by the Department of Natural Resources. All costs of the initial formal appraisal, and of all subsequent reappraisals, shall be borne by the Lessee.

(d) The annual rental payment is subject to adjustment by the State five years from the first payment date as set out in (a) of this section and every fifth Lease Anniversary Date thereafter. The new rental payment shall be based on the appraised fair market rental value of the Leasehold. Except as set forth in Subsection (a)(3), the new annual rental payment takes effect on the applicable Lease Anniversary Date, regardless of whether the adjustment determination occurs before or after the applicable Lease Anniversary Date.

(e) The Lessee's rental obligations described in this section shall expire upon the expiration, forfeiture, relinquishment, abandonment, or other Termination of this Lease, subject only to the completion of all of Lessee's obligations described in Section 25 of this Lease.

(f) Except as provided in AS 38.34.040(f) and (g), any interest in land acquired under the provisions of AS 38.35.130 for the Pipeline shall become part of the Leasehold, and the costs for the acquisition thereof shall be borne by the Lessee. Rental shall not be charged for any land acquired under AS 38.35.130 and conveyed without cost to the State.

4. <u>Payment</u>

(a) The initial rental payment is due and shall be tendered on or before the Effective Date of the Lease. Subsequent rental payments shall be due annually on or before each Lease Anniversary Date.

(b) All payments to the State under this Lease must be made payable to the State in the manner directed by the State, and unless otherwise specified, shall be tendered to the State at:

Alaska Department of Natural Resources
Attention: Revenue Unit
550 West 7th Avenue, Suite 1410
Anchorage, Alaska 99501-3561

or to any other depository designated by the State. If the State changes the designated depository, it shall give at least sixty (60) days written notice to the Lessee in the manner provided in Section 26 herein.

(c) The Lessee shall pay the fee set forth in 11 AAC 05.010 for any late payment or returned check issued by the Lessee. Interest at the rate set by AS 45.45.010(a) shall be assessed on all past due amounts until payment is tendered to the State.

5. Denial of Warranty

(a) The State makes no representations or warranties, express or implied, as to title to, access to, or quiet enjoyment of the Leasehold. The State is not liable to the Lessee for any deficiency of title to or difficulty in securing access to the Leasehold. The Lessee or any successor in interest to the Lessee is not entitled to any refund of prior rentals paid under this Lease due to deficiency of title.

(b) The State makes no warranty, express or implied, and assumes no liability whatsoever, regarding the social, economic, or environmental aspects of the Leasehold granted herein, including, without limitation, the soil conditions, water drainage, access, natural or artificial hazards that may exist, or the profitability or fitness of the Leasehold granted herein for any use. The Lessee represents that the Lessee has inspected the Leasehold granted herein and determined that the Leasehold is suitable for the use intended, or has voluntarily declined to do so, and accepts the State Lands included in the Leasehold granted herein "as is" and "where is," subject to Section 13 of this Lease.

6. Reservation of Certain Rights to the State

(a) The State reserves and shall have a continuing and reasonable right of access to any part of the Leasehold (including the subsurface of, and the air space above, such Leasehold) and a continuing and reasonable right of physical entry to any part of the Pipeline, including federal and private lands, for inspection or monitoring purposes and for any other purpose or reason that is consistent with any right or obligation of the State.

(b) The right of access and entry reserved in Subsection (a) of this section shall extend to and be enjoyed by any Contractor of the State designated by the Commissioner in writing. Such written designation shall be provided to the Lessee. The Commissioner and the Lessee may mutually develop additional procedures to implement this subsection.

(c) There is reserved to the State the right to grant additional permits, Leases or easements for rights-of-way or other uses to third parties that include lands subject to the Leasehold; provided that such grant shall not unreasonably interfere with the Lessee's rights under this Lease.

(d) This Lease is subject to the reservations set forth in AS 38.05.125 as such statutes exist on the Effective Date of this Lease.

7. Access to Navigable and Public Waters

The State reserves a public access easement to and along all public or navigable water bodies or waterways that border on or are included in the State Lands included in the Leasehold. The State shall make the determinations and provisions required in AS 38.05.127(a) before the first formal appraisal. No public access easement may be obstructed or otherwise rendered incapable of reasonable use for the purposes for which it was reserved. The Lessee shall not petition to vacate, abandon, or extinguish any public access easement without the prior written approval of the Commissioner.

8. Covenants of Lessee

Unless specifically exempted by law, the Lessee expressly covenants, in consideration of the rights acquired by it pursuant to this Lease, that:

(a) Lessee will assume the status of and will perform all of its functions undertaken under this Lease as a common carrier and will accept, convey, and transport without discrimination Natural Gas delivered to it for transportation from fields in the vicinity of the Pipeline throughout its route on State Land obtained under this Lease and on other land; Lessee will accept, convey, and transport Natural Gas without unjust or unreasonable discrimination in favor of one producer or person, including itself, as against another but will take the Natural Gas delivered or offered, without unreasonable discrimination, that the Regulatory Commission of Alaska or its successor with jurisdiction over common carrier pipelines shall, after a full hearing with due notice to the interested Parties and a proper finding of facts, determine to be reasonable in the performance of its duties as a common carrier;

(b) Lessee will interchange Natural Gas with each like common carrier and provide connections and facilities for the interchange of Natural Gas at every locality reached by both pipelines when the necessity exists, subject to rates and regulations made by the appropriate State or federal regulatory agency;

(c) Lessee shall maintain and preserve books, accounts, and records and shall make those reports that the Commissioner may prescribe by regulation or law as necessary and appropriate for the purposes of administering AS 38.35;

(d) Lessee shall accord at all reasonable times to the State and its authorized agents and auditors the right of access to its property and records, of inspection of its property, and of examination and copying of records at Lessee's offices or other location chosen by Lessee;

(e) Lessee will provide connections, as determined by the Regulatory Commission of Alaska or its successor with jurisdiction over common carrier pipelines, under AS 42.06.340, to facilities on the Pipeline subject to this Lease, both on State Lands and other land in the State, for the purpose of delivering Natural Gas to persons (including the State and its political subdivisions) contracting for the purchase at wholesale of Natural Gas transported by the Pipeline when required by the public interest;

(f) Lessee shall, notwithstanding any other provision, provide connections and interchange facilities at State expense at such places the State considers necessary, if the State determines to take a portion of its royalty or taxes in Natural Gas;

(g) Lessee shall construct and operate the Pipeline in accordance with applicable State laws and lawful regulations and orders of the Regulatory Commission of Alaska or its successor with jurisdiction over common carrier pipelines;

(h) Lessee shall, at its own expense, during the term of this Lease

(1) maintain the Leasehold and Pipeline in good repair;

(2) promptly repair or remedy any damage to the Leasehold;

(3) promptly compensate for any damage to or destruction of property for which the Lessee is liable resulting from damage to or destruction of the Leasehold or Pipeline;

(i) As more fully set out in Section 22 of this Lease, Lessee shall not transfer, assign, or dispose of in any manner, directly or indirectly, or by transfer of control of the Lessee, its interest in this Lease, or any rights under this Lease or any Pipeline subject to this Lease to any person other than another owner of the Pipeline (including subsidiaries, parents and affiliates of the owners), except to the extent that the Commissioner, after consideration of the protection of the public interest (including whether the proposed transferee is fit, willing and able to perform the transportation or other acts proposed in a manner that shall reasonably protect the lives, property and general welfare of the people of Alaska), authorizes; the Commissioner shall not unreasonably withhold consent to the transfer, assignment, or disposal;

(j) Lessee shall file with the Commissioner a written appointment of a named permanent resident of the State of Alaska to be its registered agent in Alaska and to receive service of notices, regulations, decisions and orders of the Commissioner; if Lessee fails to appoint an agent for service, service may be made by posting a copy in the office of the Commissioner and filing a copy of it in the Office of the Lieutenant Governor and by mailing a copy to the Lessee's last known address;

(k) the applicable law of the State of Alaska shall be used in resolving questions of interpretation of this Lease;

(l) the granting of this Lease is subject to the express condition that the exercise of the rights and privileges granted under this Lease shall not unduly interfere with the management, administration, or disposal by the State of the State Land affected by this Lease, and that Lessee agrees and consents to the occupancy and use by the State, its grantees, permittees, or other Lessees of any part of the Leasehold not actually occupied or required by the Pipeline for the full and safe utilization of the Pipeline, for necessary operations incident to land management, administration, or disposal;

(m) as more fully set out in Section 9 of this Lease, Lessee shall be liable to the State for damages or injury incurred by the State caused by the Construction, Operation or Maintenance of the Pipeline and Lessee shall indemnify the State for the liabilities or damages;

(n) Lessee shall procure and furnish liability and property damage insurance from a company licensed to do business in the State or furnish other security or undertaking upon the terms and conditions the Commissioner considers necessary if the Commissioner finds that the net assets of the Lessee are insufficient to protect the public from damage for which the Lessee may be liable arising out of the Construction or Operation of the Pipeline.

9. Indemnity

(a) If and when the Lessee is no longer a State entity, then the Lessee shall assume all responsibility, risk, and liability for its Pipeline activities and its use of or contact with the Leasehold. If and when the Lessee is no longer a State entity, the Lessee shall defend, indemnify, and hold harmless the State, its agents and employees, from and against any and all demands, causes of action (whether in the nature of an action for damages, indemnity, contribution, government cost recovery or otherwise), fines, judgments, suits, claims, actions, proceedings, losses, costs (including reasonable attorneys' fees and costs), expenses, charges, forfeitures, liens, liabilities, settlements, penalties, and damages of any kind or nature whatsoever, including, but not limited to those alleging personal injury, wrongful death, nuisance, property damage, environmental contamination (including any disposal, release, spill or discharge or any threatened disposal, release, spill, or discharge of or contamination by Hazardous Materials, but subject to the limitations on Lessee's liabilities expressly provided under Section 13 of this Lease), and environmental noncompliance (including the Lessee's failure to provide all information, make all submissions, and take all steps required by the authority under the environmental laws or any other law concerning any spill, discharge, or contamination), arising out of, in connection with, directly or indirectly from, or otherwise incident to, Lessee's Construction, Operation or Maintenance of the Pipeline or use of or contact with the Leasehold, except to the extent the proximate cause of the injury or damage is due to the action or omission of the State, including any negligence, gross negligence, or reckless or willful misconduct of the State or anyone acting on the State's behalf.

(b) The State shall tender, and the Lessee shall accept the tender by the State of any such cause of action, lawsuit, or other proceeding brought against the State which is covered by Subsection (a) of this section. Subject to the last sentence in this subsection, any reasonable attorneys' fees or costs incurred by the State prior to such tender of defense shall be the complete and sole responsibility of Lessee, so long as the tender is covered by Subsection (a) of this section. If the State tenders such cause of action, lawsuit, or other proceeding later than twenty (20) days after service on the State, and the Lessee informs the State that the delay in tendering shall require Lessee to incur additional costs in order to respond in a competent and timely manner, and the State is unable to obtain an extension of time sufficient to provide Lessee with at least one-half of the number of days which the State originally had to respond, then the State shall reimburse Lessee for documented, reasonable costs incurred by the Lessee that are directly related to the delay in tendering and the State shall bear its attorneys' fees and costs prior to the tender.

(c) The obligations of the Lessee to indemnify the State under the terms of this Lease shall survive the transfer, assignment, or other disposition of the Lessee's interest in this Lease as well as the expiration, forfeiture, relinquishment, abandonment or other Termination of this Lease to the extent the obligation(s) arose during that Lessee's tenure as the leaseholder.

10. Lessee's Contractors, Agents and Employees

(a) Lessee shall require that all of its Contractors conducting Pipeline Activities on the Leasehold:

(1) indemnify the State and extend all its Contractors' indemnities to include the State as an additional named indemnitee;

(2) name the State of Alaska as additional insured on all liability insurance policies maintained under their contracts with Lessee; and

(3) obtain an appropriate waiver of subrogation in favor of the State with respect to all other insurance policies.

(b) Unless clearly inapplicable, the requirements and prohibitions imposed upon the Lessee by this Lease are also imposed upon the company's agents, employees, Contractors, and employees of each of them. The Lessee shall ensure compliance with this Lease by its agents, employees and Contractors, and the employees of each of them.

11. Guaranty and State as Additional Insured

(a) The Commissioner shall not issue a Notice To Proceed for the Lessee to initiate any Construction under this Lease prior to the Commissioner's receipt from the Lessee of an unconditional guaranty, meeting all requirements of this section, guaranteeing the performance of all of Lessee's duties and obligations under and by virtue of this Lease; except that the State shall not require a guaranty from a State entity.

(b) The guarantor's unconditional guaranty shall be in a form approved by the Commissioner, and shall be attached to this Lease as Exhibit C. If the Commissioner determines at any time that the guaranty is insufficient to satisfactorily guarantee the performance of all the Lessee's duties, obligations, and potential liabilities under and by virtue of this Lease, the Commissioner may require the substitution and delivery of a supplementary guaranty or other security from Lessee or from a substitute guarantor or insurer, with any provisions the Commissioner reasonably finds necessary. Lessee shall submit, on an annual basis, guarantor's annual financial statement and balance sheet, or such financial documentation of any required substitute guarantor, that the Commissioner requests.

(c) The Lessee shall procure and furnish liability and property damage insurance from a company licensed to do business in the State or furnish other security or undertaking upon the terms and conditions the Commissioner considers necessary if the Commissioner finds that the net assets of the Lessee are insufficient to protect the public from damage for which the Lessee may be liable arising out of the Construction or Operation of the Pipeline. If the Lessee, at its option or as required by the Commissioner under this section, obtains commercially available insurance coverage for the Leasehold and the Lessee's activities in, on or related to the Leasehold, the Lessee shall cause the State to be named as an additional insured on all such insurance policies obtained and maintained by the Lessee, except that such insurance coverage shall not cover or apply where the proximate cause of the injury or damage is the gross negligence or reckless or willful misconduct of the State or anyone acting on behalf of the State. Any commercially available insurance purchased by Lessee under this section shall not be construed to limit in any way the Lessee's liabilities or responsibilities under this Lease.

12. Conduct of Operations

(a) The Lessee shall perform all Pipeline Activities under this Lease in a lawful, prudent, and skillful manner in compliance with the terms and conditions of this Lease, its incorporated exhibits and all required permits.

(b) Except as set forth in Section 13, the Lessee shall prevent or, if the procedure, activity, event or condition already exists or has occurred, shall abate, as completely as practicable, any physical or mechanical procedure, activity, event or condition:

(1) that is susceptible to prevention or abatement;

(2) that arises out of, or could adversely affect, Pipeline Activities; and

(3) that causes or threatens to cause

a) a hazard to the safety of workers or to the public health or safety (including but not limited to personal injury or loss of life with respect to any person or persons); or

b) immediate, serious, or irreparable harm or damage to the environment (including but not limited to soil, sediments, water and air quality, areas of vegetation, fish or other wildlife populations or their habitats, or any other natural resource).

(c) The Lessee shall provide reasonable protection to public or private improvements on State Land, which may be adversely affected by Pipeline Activities. If the Commissioner determines that the Lessee has caused damage to such public or private improvements, and if the owner of such improvements so requires, then the Lessee shall promptly repair or reimburse the owner for reasonable costs in repairing such improvements to a condition which is reasonably satisfactory to the owner, but which does not exceed the improvements' condition prior to damage. This section does not limit in any way the legal or equitable remedies that may be available to a public or private owner of improvements on State Land.

13. Use of Previously Disturbed Lands

(a) The Commissioner and the Lessee agree that, where possible, the use of previously disturbed lands is desired to reduce impacts to the environment. Both parties recognize that certain sites authorized for use under the Lease may contain releases or threatened releases of Hazardous Substances that are the result of activities prior to the use of such sites by the Lessee. For the purposes of this section, the term "Site" shall mean a specific area of the Leasehold selected for a particular operation or use by the Lessee in accordance with the terms of this Lease, and the term "Existing Contamination" shall mean Hazardous Substances present at the Site prior to Lessee's initial Field Activity on the Site.

(b) The Lessee, the Department of Natural Resources, and the Department of Environmental Conservation will enter into good faith negotiations to reach an agreement that will limit Lessee's liability for Existing Contamination. That agreement may contain additional conditions governing Lessee's activity on Sites where Existing Contamination may be present and/or provide for alternate Site selection in the event that Existing Contamination makes use of a Site undesirable to the Lessee. If, before the start of Field Activity at a Site, there is Existing

Contamination or there is a reasonable possibility that there is Existing Contamination at a Site, the Lessee, in its sole discretion, may choose to work with the Commissioner to amend the Lease to:

(1) remove the Site from the Leasehold, without any further obligation or liability to remove, remediate, minimize or control Existing Contamination, and

(2) identify and add any necessary alternative State Lands to the Leasehold in replacement of the removed Site.

14. Permits

Before any particular activity requiring any federal, State, or municipal permits or authorizations occurs under this Lease, all required federal, State, and municipal permits and other authorizations for that particular activity must be issued to the Lessee. The Lessee shall maintain any such required permits in good standing for so long as such permits are required for activities carried on pursuant to rights granted under this Lease during the term of this Lease.

15. Orders by the Commissioner

(a) The Commissioner may issue any order necessary to enforce or implement any provision of this Lease.

(b) Before delivery of any such order, the Commissioner shall confer with Lessee, if practicable to do so, regarding the required action or actions included in the order. Any such order shall state in detail what is demanded of Lessee and the reasons and basis for such demand.

(c) All decisions, determinations, authorizations, approvals, consents, demands or directions that shall be made or given by the Commissioner to Lessee in connection with the enforcement or administration of this Lease, or in connection with any other agreement, permit or authorization relating in whole or in part to all or any part of the Pipeline shall, except as otherwise provided in Subsection (d) of this section, be in the form of a written order or notice.

(d) All orders, approvals, or notices of the Commissioner shall be in writing; provided, however, that if, in the judgment of the Commissioner, there is an emergency that necessitates the immediate issuance to the Lessee of an order, approval, or notice, such order, approval, or notice may be given orally with subsequent confirmation in writing as soon as possible thereafter, but not later than forty-eight (48) hours.

16. Information

The Commissioner may order the Lessee at any time to furnish any and all information related to Pipeline Activities to the extent necessary to enforce a provision of this Lease or a provision of AS 38.35. If the Lessee desires that records submitted to the State be kept confidential, the Lessee shall submit a request for confidentiality in writing to the Commissioner along with the statutory basis for its claim of confidentiality. The Commissioner shall retain records as confidential to the extent consistent with the Commissioner's authority to do so under applicable State statutes.

17. Right of the State to Perform

(a) The Lessee shall carry out, at the Lessee's expense, all lawful orders and requirements of the State relative to the Lessee's occupation and use of the Leasehold within a reasonable time period under the circumstances. If, after thirty (30) days following the making of a demand by the Commissioner in the manner that is provided in this Lease, the Lessee, or its respective agents, employees, or Contractors, shall fail or refuse to perform any action required by this Lease or by the Commissioner under this Lease, the State shall have the right, but not the obligation, to enter the Leasehold and at the Lessee's expense, consistent with all applicable State and federal laws and regulations, perform any or all of the following:

(1) repair damage;

(2) prevent imminent harm to workers;

(3) protect public health or safety; and

(4) prevent immediate, serious or irreparable harm or damage to the environment.

(b) The Commissioner shall submit to the Lessee a statement of the expenses reasonably incurred by the State of any required action taken pursuant to this section. The Lessee shall pay the amount shown within thirty (30) days of receipt of the statement.

18. Temporary Suspension

(a) The Commissioner may, consistent with applicable State and federal law, order the temporary suspension of any or all Pipeline Activities, if:

(1) an immediate temporary suspension of the activity or the activities is necessary to protect:

a) public health or safety (including but not limited to personal injury or loss of life with respect to any Person or Persons); or

b) the environment from immediate, serious or irreparable harm or damage (including, but not limited to harm or damage to soil, sediments, water and air quality, areas of vegetation, fish or other wildlife population or their habitats, or any other natural resource); or

(2) the Lessee, its agents, employees, or Contractors are failing or refusing, or have failed or refused to comply with or observe:

a) any provision of this Lease intended to protect public health, safety or the environment; or

b) any order of the Commissioner implementing any provision of this Lease or any Notice to Proceed, plan or agreement approved, issued or granted by the Commissioner in connection with all or any part of the Pipeline.

(b) A temporary suspension order shall specify:

(1) the specific activity or activities which must be stopped and the site of such activities;

(2) the reason for the issuance of the order, including a description of the immediate, serious or irreparable harm sought to be avoided that requires suspension of the specific activity or activities;

(3) any Notice to Proceed or other Written Authorizations affected by the order;

(4) the name of the Person issuing the order;

(5) the name of the Lessee's representative to whom the order is issued; and

(6) the time and date of the order.

(c) When a temporary suspension order is issued by any delegate of the Commissioner a copy of the written delegation of authority from the Commissioner must accompany the order. A copy of the temporary suspension order must be provided to the Lessee in a manner specified by Section 26 herein.

(d) A temporary suspension order is effective as of the date and time given, unless it specifies otherwise. A written temporary suspension order shall remain in full force and effect until modified or revoked in writing by the Commissioner.

(e) If the Commissioner finds that an emergency exists, a temporary suspension order may be given orally to the Lessee or a field representative of Lessee. If an oral temporary suspension order is given, a written order consistent with the requirements of Subsection (b) shall be issued as soon as possible, but no later than seventy-two (72) hours, after the oral order is given. An oral temporary suspension order that is not confirmed with a written order within the specified time is vacated.

(f) To the extent practicable, the Commissioner shall give the Lessee prior notice of any temporary suspension order. If circumstances permit, the Commissioner shall discuss with the Lessee before issuing the order measures that would:

(1) immediately abate or avoid the harm or threatened harm that is the reason for the issuance of the order; or

(2) effect compliance with the provision or order, whichever is applicable.

(g) After a temporary suspension order has been given by the Commissioner, the Lessee shall promptly comply with all of the provisions of the order and shall not resume any activity suspended or curtailed thereby except as provided in this Lease, a subsequent order of the Commissioner, or a court order.

(h) When the Commissioner is satisfied that:

(1) the harm or threatened harm has been abated or remedied,

(2) the Lessee has effected, or is ready, willing and able to effect, compliance with the provisions of the temporary suspension order, or

(3) the Lessee has implemented, or is ready, willing and able to implement, mitigating, corrective, or alternative measures approved by the Commissioner, the Commissioner shall promptly authorize in writing the resumption of the suspended activity or activities. The Commissioner shall render a decision within three (3) days of the date that the request from the Lessee to resume suspended activities is received by the Commissioner. The decision shall state whether the request is granted or denied, and the basis for the decision.

(i) Without limiting any other rights available under 11 AAC 02 or any other law, the Lessee may bring to the Commissioner appeals from temporary suspension orders of the Commissioner's delegates, requests for reconsideration of temporary suspension orders of the Commissioner, and requests for reconsideration of denials of requests to resume suspended activities under the provisions of this section. The Lessee may:

(1) appeal directly to the Commissioner for review of any temporary suspension order issued by a Commissioner's delegate under this section; or

(2) request reconsideration from the Commissioner of

a) any temporary suspension order issued by the Commissioner; or

b) any denial by the Commissioner of a request for resumption of activities suspended under such temporary suspension order.

(j) The Lessee shall file with the Commissioner a notice of appeal or a request for reconsideration brought pursuant to this subsection within ten (10) days after the effective date of the order or denial being appealed or being asked to be reconsidered. The notice must set forth with particularity the order or denial being appealed or being asked to be reconsidered and must contain a statement of facts and points of law the Lessee wishes to present to justify modification or reversal of the order or denial. All statements of fact must be under oath.

(k) The Commissioner shall decide an appeal or a request for reconsideration within ten (10) days from the date the Commissioner received the notice of appeal or request for reconsideration from the Lessee. If the Commissioner does not render a decision within that time, the appeal or request for reconsideration shall be considered to have been denied by the Commissioner, and that denial shall constitute a final decision appealable in accordance with the rules of the court, and to the extent permitted by applicable law.

19. Commissioner's Decisions

(a) Except as set forth in Subsection (b) of this section, any decision of the Commissioner as to any matter arising out of this Lease shall constitute the final agency decision appealable in accordance with the rules of the court. The Commissioner shall act in writing upon each required submission for approval of an action by the Lessee. The absence of any comment by the Commissioner on any plan, design, specification, or other document that may be filed by the Lessee with the Commissioner shall not represent in any way whatsoever any assent to, approval of, or concurrence in such plan, design, specification, or other document, or any action proposed therein. Any written approval, instruction or order remains in effect unless and until written notice of the withdrawal or modification of the approval, instruction or order is provided to Lessee. Any written approval or instruction by the Commissioner may be relied upon by the Lessee unless and until rescinded in writing. Any disapproval by the Commissioner, including any requests for additional information, shall state what additional action is necessary to gain approval.

(b) Decisions of a Commissioner's delegate shall not constitute final agency decisions and are subject to the procedures for appeal and reconsideration as set forth in 11 AAC 02, except as otherwise provided in Section 18(i).

20. Reimbursement of State Expenses

(a) Lessee shall reimburse the State for all reasonable costs incurred by the State in the oversight of Pipeline Activities in compliance with AS 38.35.140. The Commissioner shall administer this Lease to reasonably assure that unnecessary employment of personnel and needless expenditure of funds by the State are avoided. The Commissioner shall provide Lessee with an annual estimate of the projected costs and scope of the work.

(b) Reimbursement provided for in this section must be made for each quarter ending on the last day of March, June, September, and December. On or before the ninetieth (90th) day after the close of each quarter, the Commissioner shall submit to the Lessee a written statement describing any reimbursable costs incurred by the State during that quarter. This statement may be supplemented within ninety (90) days after the end of a fiscal year for costs incurred in the State's fiscal year but which, because of reasonable mistake, inadvertence, or unavailability, were not previously submitted. The State shall submit invoices to Lessee in accordance with Section 26.

(c) The Lessee shall pay to the State the total amount shown on each statement submitted under Subsection (b), within thirty (30) days of receipt. If the Lessee disputes any item of a statement for reimbursement, the Lessee shall, on or before the date on which the statement is due and payable, deliver to the Commissioner written notice of each item that is disputed, accompanied by a detailed explanation of its objection. The Commissioner shall provide a written decision regarding the Lessee's objections within thirty (30) days of receipt of the Lessee's objections, and any items determined by the Commissioner to have been in error, improper, unnecessary, or needless shall be reimbursed within thirty (30) days after the date of the Commissioner's written decision.

(d) The Lessee may conduct, at its own expense, and by auditors or accountants designated by the Lessee, reasonable audits of the books, records and documents of the State relating to a statement submitted under Subsection (b) of this section, at the places where such

books, records and documents are usually maintained and at reasonable times. Written notice of intent to conduct an audit must be given to the Commissioner:

(1) at least fifteen (15) days prior to the audit and

(2) not later than the ninetieth (90th) day after the date that the State submits the statement, or supplemental statement, as applicable, under Subsection (b) of this section.

(e) An audit under this subsection must be completed within one hundred eighty (180) days after receipt by the Commissioner of the notice of intent to conduct an audit; provided, however, that if the Commissioner fails to provide the Lessee with reasonably timely access to the relevant books, records and documents necessary to complete the audit, such period shall be extended by an appropriate number of days to be mutually agreed to in writing by the Commissioner and the Lessee. The Lessee may present the results of an audit to the Commissioner in a written notice requesting a timely review by the Commissioner of errors, omissions, or discrepancies noted in the audit, including unnecessary employment of personnel or needless expenditures of funds. The Commissioner shall meet with the Lessee within thirty (30) days of receipt of the notice of results of the audit to discuss and attempt to resolve all items listed in the notice of results. The Commissioner shall promptly provide a written decision to the Lessee setting forth the results of the meeting between the Lessee and the Commissioner. Any items previously reimbursed to the State but found during the audit and concurred in by the Commissioner in the written decision setting forth the results of the meeting to have been in error, improper, unnecessary, or needless shall be reimbursed within thirty (30) days after the date of the Commissioner's written decision.

(f) Nothing herein requires the State to maintain books, records or documents other than those usually maintained by it, provided such books, records and documents reasonably segregate and identify the costs for which reimbursement is required by this section. Such books, records and documents must be preserved for a period of at least two (2) years after the Commissioner submits a statement for reimbursement based on such books, records and documents. The Lessee and auditors or accountants designated by the Lessee shall be given reasonable access to, and the right to copy, at the Lessee's expense, all such books, records and documents.

21. Liability of the State

The Lessee agrees that neither the State nor any of its officials, employees, agents or Contractors shall be liable for money damages for any loss caused to the Lessee, its agents or Contractors, by reason of decisions made in respect to the application and administration of this Lease; provided, however, this section does not excuse the State, its officials, employees, agents or Contractors from liability for damages or injuries resulting from acts (or omissions) of the State officials, employees, agents or Contractors that are negligent, grossly negligent, reckless or willful.

22. Transfer, Assignment, or Other Disposition

(a) The State may convey all or a portion of its ownership of the Leasehold at any time to any entity allowed by law. Any conveyance, transfer or other disposition, subsequent to the execution of this Lease, of any right, title, or interest in any of the Leasehold shall be subject

to this Lease and the Lessee's rights hereunder, including the Lessee's right to renew the Lease under Section 2(b) herein.

(b) Except as set forth in Section 8(i) herein, the Lessee may assign, sublease, or transfer this Lease, or any interest in or rights under this Lease only upon a written finding by the Commissioner that the transferee meets the requirements of AS 38.35.100.

(c) In making the determination whether the proposed transferee is fit, willing, and able under this paragraph, the Commissioner shall not consider the existence of the guaranty by the guarantor, unless specifically requested by the Lessee in the Lessee's request for transfer or assignment. If the Commissioner determines that a guaranty or other security is required to guarantee the performance of all of the duties, obligations, and potential liabilities under and by virtue of this Lease by the proposed assignee, transferee, or other receiving party, the proposed assignee, transferee, or other receiving party shall secure a guaranty or other security satisfactory to the Commissioner, in substantially such form as the Commissioner required from the Lessee under Section 11 of this Lease, as a condition to the Commissioner's approval of the transfer, assignment, or other disposal.

23. <u>Release of Interest</u>

(a) In connection with the relinquishment, abandonment or other Termination before the expiration of this Lease, of any right or interest in the Leasehold, or in the use of all or any part of the Leasehold, the Lessee shall promptly execute and deliver to the State, through the Commissioner, a valid instrument of release in recordable form, which must be executed and acknowledged with the same formalities as a deed. The instrument of release must contain, among other things, appropriate recitals, a description of the pertinent rights and interests, and for the benefit of the State and its grantees or assigns, express representations and warranties by the Lessee that it is the sole owner and holder of the Lease rights or interests described therein and that such Lease rights or interests are free and clear of all liens, equities or claims of any kind, except for such liens, equities or claims that arose before the Effective Date of this Lease. The form and substantive content of each instrument of release must be approved by the Commissioner, but except as otherwise provided for in this subsection; in no event shall any such instrument operate to increase the then-existing liabilities and obligations of the Lessee furnishing the release.

(b) A release under this section must be accompanied by such resolutions and certifications as the Commissioner may reasonably require, including the power or the authority of the Lessee, or of any officer or agent acting on its behalf, to execute, acknowledge or deliver the release.

(c) Notwithstanding any language or provision in the release that operates or could operate to the contrary, neither the tender, nor approval and acceptance, of any such release shall operate as an estoppel or waiver of any claim or judgment against the Lessee or as a relief or discharge, in whole or in part, of the Lessee from any of its then existing liabilities or obligations which accrued during that Lessee's tenure as the leaseholder.

(d) Lessee may relinquish to the State at any time any or all of the Leasehold that the Lessee determines are no longer necessary for the Lessee's Pipeline Activities by filing a release as provided for above. The release shall be effective as of the date the release is approved by the Commissioner, subject to the continued obligations of the Lessee to fulfill all obligations

and resolve all liabilities that arose under this Lease during that Lessee's tenure as the leaseholder.

(e) No later than one year following the date that Natural Gas is first transported through the Pipeline, the Lessee shall execute and deliver to the State a release of interest for all of the Lessee's interest in the Leasehold other than the Operation and Maintenance Leasehold, which is fully described in Exhibit B.

(f) Within one-hundred eighty (180) days of delivery of the release required by Subsection (e) of this section, Lessee shall:

(1) complete the installation of monumentation of the Pipeline to standards required by the Department of Natural Resources for the purposes of locating and describing rights-of-way on State Lands; and

(2) provide a final survey, approved by the Commissioner, showing the final "as built" location of the completed Pipeline, including the final locations and elevations of all buried and above-ground improvements, the centerline of the Operation and Maintenance Leasehold, the boundaries of the Operation and Maintenance Leasehold, and its relationship to existing pipelines and other structures pursuant to survey instructions issued by the Department of Natural Resources.

(g) The State shall have ninety (90) calendar days after delivery of the final survey required by Subsection (f)(2) of this section to record the survey and reduce the rental amount as set forth in Section 3 for that year and all subsequent years by the same proportion as the released acreage bears to the original Lease acreage.

24. Default, Remedies and Forfeiture

(a) Failure of the Lessee to substantially comply with the terms of this Lease shall be grounds for forfeiture of the right-of-way interest of the Lessee in an action brought by the Commissioner in the Anchorage Superior Court. Before the commencement of any action for forfeiture of an interest in the right-of-way under this section, the Commissioner shall give the Lessee notice in writing of the alleged default and shall not commence the proceeding unless the Lessee has failed to initiate good faith efforts to cure the default within sixty (60) days of the notice of the alleged default or fails to diligently continue the same until cured.

(b) No items on the Leasehold, including but not limited to, improvements, structures, machinery, equipment, tools, or materials, may be removed from it by the Lessee while the Lessee is in default except with the Commissioner's prior approval.

(c) After forfeiture, any new right-of-way lease for the Leasehold shall have no effect on the Lessee's rights or on any obligations under this Lease which accrued prior to or as a result of the forfeiture.

25. Lessee's Obligations Upon Termination Not Resulting From Forfeiture

(a) This section shall apply to all terminations of this Lease, whether from expiration, relinquishment, abandonment or otherwise, with the exception of a forfeiture under Section 24.

(b) The deadlines provided for in this section apply only when the Lessee has provided the three hundred and sixty five (365) day notice required by Section 2(c) of this Lease. If the Lessee fails to provide the notice required by Section 2(c), the Commissioner may reasonably alter the deadlines in this section.

(c) Prior to the expiration, relinquishment, abandonment or Termination of this Lease, the Commissioner shall determine in writing whether a public interest exists which requires that all or a portion of the Pipeline be left in place following the expiration, relinquishment, abandonment or Termination of this Lease. The Commissioner's written determination shall:

(1) describe which components of the Pipeline, if any, must remain on the Leasehold following the expiration, relinquishment, abandonment or Termination of this Lease, and,

(2) resolve issues pertaining to title to such components of the Pipeline.

(d) No later than sixty (60) days after receipt of the Commissioner's determination under Subsection (c), the Lessee shall submit the following to the Commissioner for the Commissioner's approval:

(1) A plan for the removal of all items found on the Leasehold, including but not limited to, improvements, structures, machinery, equipment, tools and materials, but excluding those components of the Pipeline described in the Commissioner's determination under Subsection (c); and

(2) A plan to Restore and Revegetate the Leasehold.

(e) The Commissioner shall set a reasonable time, which may be extended, during which the Lessee shall implement the plans in Subsection (d). The Lessee shall be responsible for all costs of implementation of the plans required by this section.

(f) Following completion of the time period for plan implementation under Subsection (e) and any extensions, the Commissioner shall order the disposition of all improvements, structures, machinery, equipment, tools, and materials, if any, that the Lessee failed to remove. The Commissioner's options with respect to any disposition under this subsection include, but are not limited to: sale, transfer, lease, auction, destruction, repair and abandonment in place, retention in State ownership for a public or State use, and removal. The Commissioner may order the Lessee to perform disposition work required under this subsection. The Lessee is responsible for all disposition costs incurred by the State under this subsection.

(g) If the Lessee fails to submit or fully implement the plans required by this section, the State's options include any of the following:

(1) The Commissioner may order the Lessee to submit and fully implement the plans required by this subsection.

(2) The Commissioner may develop the plans required under this section and order the Lessee to fully implement them. The Lessee shall be responsible for all costs incurred by the State in developing such plans.

(3) The State may complete the required work under such plans. The Lessee shall be responsible for all costs incurred by the State for such work.

(h) In the event the Commissioner makes a determination under Subsection (b) that all or a portion of the Pipeline shall remain on the Leasehold following the expiration, relinquishment, abandonment or Termination of this Lease, then Lessee shall be released from all future obligation or liability for the portion of the Pipeline the Commissioner determined shall remain on the Leasehold, including but not limited to, abandonment or removal liability, and from any obligation to Restore and Revegetate the Leasehold after completion of the plan approved under Subsection (c) herein. Upon release, the State or its assignee shall immediately assume all responsibility and obligation for the Pipeline or any part thereof remaining on the State Lands formerly subject to this Lease. Such release shall not discharge Lessee from performance of obligations and other liabilities which arose during that Lessee's tenure as the leaseholder and which accrued prior to the expiration, relinquishment, abandonment or Termination of this Lease.

26. Correspondence

(a) Any notice or demand by the Lessee to the State shall be made in writing and must be given by hand delivery, by email or facsimile during normal business hours, or by registered or certified mail, postage paid, return receipt requested, addressed as follows (or to any new address that the Commissioner designates in writing):

State Pipeline Coordinator's Office
411 W. 4th Avenue, Suite 2
Anchorage, Alaska 99501-2343
Facsimile Number: (907) 272-0690
mike.thompson@alaska.gov

(b) Delivery to the State occurs:

(1) if by hand delivery, email or facsimile, when received by the addressee, and

(2) if by registered or certified mail, when the notice or demand is signed for by the State or State's agent.

(c) Any order, notice or demand by the Commissioner to the Lessee shall be made in writing and must be given by hand delivery, by email or by facsimile during normal business hours with the original to follow in the mail, or by registered or certified mail, postage paid, return receipt requested, addressed as follows (or to any new address that the Lessee designates in writing):

Alaska Gasline Development Corporation
P.O. Box 101020
Anchorage, AK 99510
Facsimile Number: (907) 277-4484
dfauske@ahfc.us

(d) Delivery to the Lessee occurs:

(1) if by hand delivery, email or facsimile, when received by the addressee, and

(2) if by registered or certified mail, when the notice or demand is signed for by the Lessee or Lessee's agent.

(e) Other correspondence may be made by email, mail, hand delivery or facsimile during normal business hours.

(f) The Commissioner or Lessee, by written notice to the other, may change the office address to which written notices, orders, or other written communications may be addressed and delivered thereafter, subject, however, to the provisions of this Lease.

27. Authorized Representatives

The State Pipeline Coordinator and the person executing this Lease on behalf of the Lessee shall be the authorized representatives for their respective principals for the purposes of administering this Lease. This authorized representative is in addition to the registered agent required to be appointed pursuant to Section 8(j) herein. The Commissioner or the Lessee may change the designation of its authorized representative or the address to which notices to that representative are to be sent by a notice given in accordance with Section 26.

28. Waiver not Continuing

The waiver by the State of any breach of any provision of this Lease, whether express or implied, shall not be construed to be a continuing waiver or a waiver of, or consent to, any subsequent or prior breach by the Lessee. The waiver by the Lessee of any breach of any provision of this Lease, whether express or implied, shall not be construed to be a continuing waiver or a waiver of, or consent to, any subsequent or prior breach by the State.

29. No Third Party Beneficiaries

The parties to this Lease do not intend to create any rights under this Lease that may be enforced by third parties for their own benefit or for the benefit of others.

30. Local Hire

The Lessee shall, in the Construction and Operation of the Pipeline, comply with, and require its Contractors to comply with, applicable and valid laws and regulations regarding the hiring of residents of the State then in effect or that take effect subsequently.

31. Nondiscrimination

The Lessee and its Contractors may not discriminate against any employee or applicant for employment because of race, religion, marital status, change in martial status, pregnancy, parenthood, physical handicap, color, sex, age, or national origin as set out in AS 18.80.220. The Lessee and its Contractors, on beginning any Pipeline Activities, must post in a conspicuous place notices setting out this nondiscrimination provision.

32. Rights and Remedies Cumulative

No right or remedy conferred by this Lease upon or reserved to the State or the Lessee is intended to be exclusive of any other right or remedy provided for by this Lease or by law, and each and every right and remedy set forth herein shall be cumulative.

33. Authority to Enter into Lease

The Lessee represents and warrants to the State that:

(a) it is authorized and empowered under the applicable laws of the State and its jurisdiction of formation to enter into and perform this Lease in accordance with the Lease and its provisions;

(b) the Lessee has approved and authorized the execution, delivery and performance of this Lease insofar as it pertains to the obligations of the Lessee;

(c) all action that may be necessary to the approval, execution, and delivery of this Lease by the Lessee, has been taken; and

(d) all of the required and necessary approvals, authorizations, and actions are in effect at the time of the execution and delivery of the Lease.

34. Delegation of Authority

The Commissioner may make delegations of authority and changes to delegations of authority to administer all or a portion of the provisions of this Lease, consistent with AS 38.35.210, at any time. The Commissioner shall notify Lessee in writing of any such delegation of authority or change in delegation of authority that affects this Lease.

35. Interpretation of Lease

(a) The parties acknowledge that this Lease is an "arm's length" agreement, and that each party has had an adequate opportunity to consult with counsel, and has consulted with counsel with respect to this Lease. The parties agree that ambiguities in this Lease shall not be construed either for or against any party.

(b) The language of the terms and conditions of any other pipeline lease may not be used to assist in resolving any disputes arising from the interpretation of this Lease.

36. Compliance with Law and Regulation

Lessee shall conduct all Pipeline Activities in compliance with all applicable federal, State and local laws and regulations.

37. Venue

The venue for any appeal or civil action relating to this Lease shall be in the Third Judicial District, State of Alaska.

38. Recording

Upon execution, acknowledgment, and delivery of this Lease, the Lessee shall at its sole expense cause this Lease to be recorded in all applicable Recording Districts.

39. Severability

A judicial finding that any term or condition of this Lease is unlawful or invalid may not operate to invalidate this Lease or any other term or condition of the Lease.

40. Amendments in Writing

No amendment to this Lease is effective until agreed to in writing by the parties.

41. Exhibits

The following exhibits are attached to this Lease and are, by this reference, incorporated into this Lease as if they were set out in their entirety:

(a) Stipulations for this Lease attached hereto as Exhibit A included pursuant to AS 38.35.120(c) and (d);

(b) a description of the land included in the Construction Leasehold and the Operation and Maintenance Leasehold attached as Exhibit B;

(c) parental guaranty attached as Exhibit C (only for non-State entities); and

(d) definitions attached as Exhibit D.

42. Merger Clause

This Lease, including all exhibits hereto, contains the entire agreement between the parties, and is binding upon the parties.

43. Section Headings

The section headings in this Lease are for convenience only and have no other significance.

IN WITNESS WHEREOF, the parties have executed this lease as of the date first above written.

STATE OF ALASKA

By:
Daniel S. Sullivan
Commissioner
Department of Natural Resources

ALASKA GASLINE DEVELOPMENT CORPORATION

By:
Daniel R. Fauske
President

EXHIBITS:

Exhibit A:	Stipulations
Exhibit B:	Right-of-Way Description
Exhibit C:	Guaranty
Exhibit D:	Definitions

STATE OF ALASKA)
) ss.
THIRD JUDICIAL DISTRICT)

THIS IS TO CERTIFY that on this 29th day of June, 2011, before me personally appeared Daniel R. Fauske, the President of the Alaska Gasline Development Corporation, who executed the foregoing on behalf of said corporation and acknowledged voluntarily signing same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year above written.

April M. Andrews
Notary Public in and for the State of Alaska
My Commission Expires: With Office

STATE OF ALASKA
NOTARY PUBLIC
April M. Andrews
My Commission Expires With Office

MARY KAY RYCKMAN
COMM. #113030
Notary Public - State of Alaska
My Comm. Expires "with office"

STATE OF ALASKA)
) ss.
THIRD JUDICIAL DISTRICT)

THIS IS TO CERTIFY that on this ~~1st~~ 25th day of July, 2011, before me personally appeared Daniel S. Sullivan, the Commissioner of the Department of Natural Resources of the State of Alaska, who executed the foregoing on behalf of the Department of Natural Resources of the State of Alaska and acknowledged voluntarily signing the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year above written.

Mary Kay Ryckman
Notary Public in and for the State of Alaska
My Commission Expires: with office

ADL 418997
ALASKA STAND ALONE GAS PIPELINE/ASAP
RIGHT-OF-WAY LEASE

EXHIBIT A
STIPULATIONS

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RIGHT-OF-WAY LEASE

EXHIBIT A
STIPULATIONS

1. GENERAL

1.1 Responsibilities

1.1.1 Except where the approval of the Pipeline Coordinator is required before the Lessee may commence a particular operation, neither the State nor any of its agents or employees is in any way obligated to examine or review any plan, design, specification, or other document which may be filed with the Pipeline Coordinator by the Lessee pursuant to these Stipulations.

1.1.2 The absence of any comment by the Pipeline Coordinator or any other agent or employee or Contractor of the State with respect to any plan, design, specification, or other document which may be filed by the Lessee with the Pipeline Coordinator shall not be deemed to represent in any way whatever, assent to, approval of, or concurrence in such plan, design, specification, or other document or of any action proposed therein.

1.1.3 With regard to the Construction, Operation, Maintenance, and Termination of the Pipeline:

(1) The Lessee shall ensure full compliance with the provisions of this Lease, including these Stipulations, by its agents, employees, Contractors, and the employees of each of them;

(2) Unless clearly inapplicable, the requirements and prohibitions imposed upon the Lessee by these Stipulations are also imposed upon the Lessee's agents, employees, Contractors, and the employees of each of them;

(3) Failure or refusal of the Lessee's agents, employees, Contractors, or the employees of each of them to comply with the Stipulations shall be deemed to be the failure or refusal of the Lessee; and

(4) The Lessee shall require its agents and Contractors to include the Stipulations in all contracts and subcontracts which are entered into by any of them for work on the Leasehold, together with a provision that the other contracting party, together with its agents, employees, Contractors, and the employees of each of them, shall likewise be bound to comply with the Stipulations.

1.2 Authority of Representatives of the Pipeline Coordinator and Lessee

1.2.1 No order or notice given to the Lessee on behalf of the Pipeline Coordinator or any other Person shall be effective as to the Lessee unless prior written notice of the delegation of authority to issue such order or notice has been given to the Lessee in the manner provided in Section 26 of the Lease.

1.2.2 The Lessee shall comply with each and every lawful order directed to the Lessee by the Pipeline Coordinator or by any duly authorized representative of the Pipeline Coordinator.

1.2.3 The Lessee shall maintain a sufficient number of its duly authorized Field Representatives to allow for the prompt delivery to the Lessee of all notices, orders, and other communications, written or oral, of the Pipeline Coordinator. The Lessee shall notify the Pipeline Coordinator and each of his/her duly authorized representatives of the Lessee's Field Representatives, who shall be appropriately identified in such a manner as the Pipeline Coordinator shall prescribe. The Lessee shall consult with the Pipeline Coordinator regarding the number and location of such representatives.

1.3 Notices to Proceed for Initial Construction of the Pipeline

1.3.1 Permission to Construct

1.3.1.1 The Lessee shall not initiate any Construction on State Land without prior written permission of the Pipeline Coordinator. Such permission shall be given solely by means of a written Notice to Proceed issued by the Pipeline Coordinator. Each Notice to Proceed shall authorize Construction only as therein expressly stated and only for the particular Construction Segment therein described.

1.3.2 Schedule for Notice to Proceed Applications

1.3.2.1 Prior to submission of any Preliminary Design or application for any Notice to Proceed for any Construction Segment on State Land, the Lessee and the Pipeline Coordinator shall agree to a schedule for the time, scope, and quantity of such submissions and applications. The purpose of such schedule is to assure that the Lessee's submissions and applications shall be reasonable in scope, and filed in a reasonable time frame. Submittals and applications shall be filed in accordance with said schedule, and the Pipeline Coordinator may refuse to consider any that are not so filed. The schedule may be reviewed and revised from time to time as may be agreed upon by the Lessee and the Pipeline Coordinator.

1.4 Submissions Required Before First Notice to Proceed Application

1.4.1 Prior to submission of any application for any Notice to Proceed for any Construction Segment on State Land, the Lessee shall submit to the Pipeline Coordinator the documents identified in Stipulations 1.4.2 through 1.4.5 below. These documents shall form the basis for the individual Notice to Proceed applications submitted for specific Construction Segments on State Land.

1.4.2 Design Documents

1.4.2.1 The Lessee shall develop a Design Basis and Criteria document as defined in Stipulation 3.2.1 for acceptance by the Pipeline Coordinator.

1.4.2.2 A Corrosion Plan for corrosion-resistant design and methods for early detection of corrosion, as required by Stipulation 3.6.2, shall be provided to the Pipeline Coordinator.

1.4.2.3 The Lessee shall submit to the Pipeline Coordinator an Engineering Analysis and Report on the Seismic Design of the Pipeline, as required by Stipulation 3.8.2.

1.4.2.4 The Lessee shall identify seismic faults and assess the results of fault movement and ground deformation as required in Stipulation 3.9.2, to the reasonable satisfaction of the Pipeline Coordinator.

1.4.2.5 The Lessee shall submit a Seismic Analysis of Pipeline Communication Systems, as required by Stipulation 3.5.5.

1.4.3 Plans for Construction, Operation, Maintenance, and Termination

1.4.3.1 The Lessee shall submit for approval the following plans, each of which shall cover Construction, Operation, Maintenance, and Termination activities:

(a) Proximity to the Trans Alaska Pipeline System (TAPS) and Other Existing Infrastructure (Stipulation 3.4)

(b) Blasting and Use of Explosives;

(c) Camps;

(d) Timber Clearing, Salvage and Utilization;

(e) Work Pads (Stipulation 3.15);

(f) Erosion and Sedimentation Control;

(g) Fire Control;

(h) Stream, River, and Floodplain Crossings (Stipulation 3.13);

(i) Disposal of Sanitation and Hazardous Waste;

(j) Pipeline Trench Backfill Methods

(k) Disposal of Overburden, and Excess and Excavated Material;

(l) Cultural Resource Preservation;

(m) Groundwater Control;

(n) Restoration and Revegetation of Disturbed Areas;

(o) Fish and Wildlife Protection;

(p) Access to the Pipeline and Methods for Access Road Construction (Stipulation 3.14);

(q) Control, Cleanup, and Disposal of Hazardous Substances;

(r) Use of Pesticides, Herbicides, Preservatives, and Other Chemicals;

(s) River Training Structures;

(t) Construction in Wetlands;

(u) Handling of Solid and Liquid Waste; and

(v) Managing Human/Carnivore Interaction.

1.4.3.2 These plans shall provide sufficient detail and scope to allow the Pipeline Coordinator to determine if they are consistent with the requirements of this Lease. All applicable State and federal requirements shall be incorporated into the plans and programs of this Lease.

1.4.3.3 Any amendments to these plans must be approved by the Pipeline Coordinator before the amendment is implemented.

1.4.4 Quality Assurance Program

1.4.4.1 The Lessee shall submit a Quality Assurance Program for review and approval by the Pipeline Coordinator. The Lessee must have an approved Quality Assurance Program in effect during all phases of Construction, Operation, Maintenance, and Termination activities related to the Pipeline. The Quality Assurance Program shall document the Lessee's compliance with the Lease.

1.4.4.2 The Quality Assurance Program shall be comprehensive and designed to assure safety, Pipeline integrity, and compliance with all Stipulations.

1.4.4.3 Any amendments to the Quality Assurance Program must be approved by the Pipeline Coordinator before the amendment is implemented.

1.4.4.4 The Lessee, including its agents, employees, Contractors, and the employees of each of them, shall comply with the approved Quality Assurance Program.

1.4.5 Project Management Schedule

1.4.5.1 The Lessee shall submit a Project Management Schedule for the entire project to the Pipeline Coordinator. This schedule shall be time-scaled and shall include all activities and contingencies which may reasonably be anticipated in connection with the project. The Project Management Schedule shall include:

(a) Data collection activities;

(b) Submittal and approval activities; and

(c) Pre-Construction, Construction, and post-Construction activities.

1.4.5.2 The Project Management Schedule shall be updated at thirty (30) day intervals, as significant changes occur, or as otherwise approved by the Pipeline Coordinator.

1.5 Submissions Required Before Notice to Proceed Application for a Construction Segment

1.5.1 Prior to submission of an application for a Notice to Proceed for a Construction Segment on State Land, the Lessee shall submit to the Pipeline Coordinator the documents identified in Stipulations 1.5.1 and 1.5.2 below.

1.5.1 Preliminary Design Submissions

1.5.1.1 Prior to applying for a Notice to Proceed for a Construction Segment on State Land, the Lessee shall submit the Preliminary Design for that Segment to the Pipeline

Coordinator for acceptance. The Pipeline Coordinator shall expeditiously review each submission and shall do so within thirty (30) days from the date of his/her receipt of the submission. The Pipeline Coordinator may request additional information if he/she reasonably determines it is necessary.

1.5.1.2 In appropriate cases, the Pipeline Coordinator may waive the requirement that a Preliminary Design be submitted.

1.5.2 Survey

1.5.2.1 Before applying for a Notice to Proceed for a Construction Segment, the Lessee shall, in a manner acceptable to the Pipeline Coordinator, by survey, locate and clearly mark on the ground the proposed centerline of the pipe and the location of all Related Facilities proposed to be constructed.

1.6 Application for Notice to Proceed

1.6.1 The Lessee may apply for a Notice to Proceed on State Land for only those Construction Segments for which the Preliminary Design has been accepted in writing by the Pipeline Coordinator or for which a waiver pursuant to Stipulation 1.5.1.2 has been issued in writing by the Pipeline Coordinator.

1.6.2 Each application for a Notice to Proceed shall be supported by:

(a) A Final Design;

(b) Approved plans as required by Stipulation 1.4.3;

(c) All reports and results of environmental studies conducted or considered by the Lessee;

(d) All data reasonably necessary to demonstrate compliance with the terms and conditions of these Stipulations with respect to that particular Construction Segment.

(e) A Project Management Schedule for the Construction Segment, including: the Lessee's work schedules; consents, permits, or authorizations required by State and federal agencies and their interrelationships; design and review periods; data collection activities; and Construction sequencing.

(f) A map or maps, prepared in a manner acceptable to the Pipeline Coordinator, depicting the proposed location of the Construction Segment, including: (1) the boundaries of all contiguous temporary use areas and (2) all improvements, buried or above-ground, that are to be constructed. The Pipeline Coordinator shall not issue a Notice to Proceed for Construction until he/she has approved all appropriate locations on the ground and the Lessee has set temporary boundary markers to the satisfaction of the Pipeline Coordinator; and

(g) Such other data relevant to the application as may be requested by the Pipeline Coordinator either before submission of the application for a Notice to Proceed or at any time during the review period.

1.6.3 Within ninety (90) days of submittal of an application for a Notice to Proceed, the Pipeline Coordinator shall review such application and all data submitted in connection therewith. Said ninety (90) day period shall begin from the later of the following dates:

(a) Date of receipt by the Pipeline Coordinator of an application for a Notice to Proceed.

(b) Date of receipt by the Pipeline Coordinator of the last submittal of additional data pursuant to this Stipulation.

1.6.4 During review of an application for a Notice to Proceed, discrete portions of the route of the Pipeline may be modified by the Pipeline Coordinator and relocated to another position within the general route if in his/her reasonable judgment the modification is necessary to achieve any of the objectives listed below. Any such modification shall be made without liability or expense to the State.

(a) Protect or maintain stability of geologic materials;

(b) Protect or maintain integrity of the Pipeline;

(c) Prevent serious and irreparable harm to the environment (including but not limited to water and air quality, fish or wildlife populations, or their habitats);

(d) Remove hazards to public health and safety; or

(e) Protect existing infrastructure including TAPS.

1.6.5 If, during Construction, adverse physical conditions are encountered that were not known to exist, or that were known to exist but their significance was not fully appreciated when the Pipeline Coordinator issued a Notice to Proceed for the portion of the Construction Segment in which the physical conditions are encountered, the Pipeline Coordinator may authorize deviations from the initially approved location of the Pipeline to another location within the general route of the Pipeline at the point or points where the physical conditions are encountered, including adequate room for structurally sound transition. Any such modification shall be made without liability or expense to the State in order to achieve any of the objectives listed in Stipulation 1.6.4. A deviation shall not be constructed without the prior approval of the Pipeline Coordinator and, if so approved, shall conform in all respects to the provisions of the approval.

1.7 Written Authorizations

1.7.1 After Initial Construction of the Pipeline, the Pipeline Coordinator may require a Written Authorization for a major activity or significant modification to the Pipeline. Required information shall be project-specific and provided to the Lessee in writing.

1.7.2 Once all project information is received from the Lessee, the Pipeline Coordinator shall have thirty (30) days for review of each complete request, unless the Pipeline Coordinator states, in written notice, that more time is needed.

1.7.3 Any Written Authorization may contain site-specific terms and conditions as deemed reasonably necessary by the Pipeline Coordinator.

1.8 Surveillance and Monitoring

1.8.1 A Surveillance and Monitoring Program for the Pipeline shall be approved by the Pipeline Coordinator prior to start-up of the Pipeline. The program shall be designed to at a minimum:

(a) Provide for and protect public health and safety;

(b) Prevent and mitigate damage to natural resources;

(c) Prevent and mitigate erosion;

(d) Maintain Pipeline integrity and monitor any Pipeline movement that may affect integrity (Stipulation 3.11); and

(e) Protect public and private property.

1.9 Incident Reporting

1.9.1 The Lessee shall give immediate notice in accordance with applicable law of any spill, leakage, or discharge of Natural Gas or other Hazardous Materials in connection with Pipeline Activities to the Pipeline Coordinator.

1.9.2 The Pipeline Coordinator may require notice of events or incidents in addition to those identified in Stipulation 1.9.1. The Pipeline Coordinator shall give the Lessee written notice of such reporting requirements.

1.9.3 The Lessee shall promptly notify the Alyeska Pipeline Service Company of incidents that may threaten TAPS.

1.10 Annual Report

1.10.1 The Lessee shall provide a comprehensive annual report by March 1 of each year this Lease is in effect beginning after the first Lease Anniversary Date unless notified otherwise by the Pipeline Coordinator. The Pipeline Coordinator shall provide a written description of the annual reporting requirements.

1.11 Completion of Use

1.11.1 Upon completion of use of all, or a very substantial part, of the Leasehold, the Lessee shall promptly remove all improvements and equipment, except as otherwise approved by the Pipeline Coordinator, and shall Restore the Leasehold to a condition that is approved in writing by the Pipeline Coordinator or, at the option of the Lessee, pay the cost of such removal and Restoration. Where approved by the Pipeline Coordinator, buried pipe may be left in place provided all residue is removed from the pipe and the ends are suitably capped.

1.11.2 All areas that do not constitute all, or a very substantial part of the Leasehold, or other portion of the Pipeline, utilized pursuant to authorizations issued in connection with the Pipeline, shall be "put-to-bed" by the Lessee upon completion of use unless otherwise directed by the Pipeline Coordinator. "Put-to-bed" is used herein to mean that Access Roads, material sites, and other areas shall be left in such stabilized condition that erosion shall be minimized through the use of adequately designed and constructed waterbars, Revegetation, and chemical surface control; that culverts and bridges shall

be removed by the Lessee in a manner satisfactory to the Pipeline Coordinator; and that Access Roads, sites and areas shall be closed to use. The Lessee's Restoration and Revegetation plans shall be approved by the Pipeline Coordinator prior to Termination of use of any Access Road, or any part thereof.

1.12 Changes in Condition

1.12.1 Unforeseen conditions arising during Construction, Operation, Maintenance, or Termination of the Pipeline may make it necessary to revise or amend these Stipulations to control or prevent damage to the environment or hazards to public health and safety. In that event, the Lessee and the Pipeline Coordinator shall agree as to what revisions or amendments shall be made.

1.13 Lessee Support of State Oversight

1.13.1 During the Design, Construction, Operation, Maintenance, and Termination of the Pipeline, the Lessee shall furnish, without cost, representatives of the State, including Contractors involved in field surveillance of the Leasehold and/or the Pipeline, adequate meals, living quarters, office space, transportation, and use of the Lessee's communication systems. Whenever possible, the Pipeline Coordinator shall give the Lessee advance written notice of the need for such services and facilities, including the number and names of Persons to be accommodated.

1.14 Access

1.14.1 Maintenance Access

1.14.1.1 The Lessee shall provide and maintain Access Roads and airstrips, the number and location of which shall be approved by the Pipeline Coordinator, to ensure that the Lessee's Maintenance crews and State representatives shall have continued access.

1.14.2 Public Access

1.14.2.1 The Lessee shall regulate or temporarily prohibit public access and vehicular traffic on Roads on State Land, which are not managed or owned by the Alaska Department of Transportation and Public Facilities (DOT&PF), as required for activities in the immediate vicinity of the Pipeline and Related Facilities. The Lessee shall provide appropriate warnings, flagging, barricades, and other safety measures when the Lessee is regulating public access.

1.14.2.2 Pipeline Activities shall not interfere with the public's free and unrestricted access to and upon the Leasehold, except that, with the Pipeline Coordinator's approval, the Lessee shall regulate or prohibit access, including vehicular traffic, to and upon the Leasehold to the extent necessary to facilitate Pipeline Activities, maintain Pipeline integrity, or to protect the public and wildlife from hazards associated with Pipeline Activities.

1.14.2.3 The creation of any permanent obstruction to the passage of small craft in streams is prohibited, unless otherwise approved by the Pipeline Coordinator.

1.14.2.4 The Lessee shall make provisions for suitable permanent crossings for the public where the Leasehold or Access Roads cross existing Roads, foot trails, winter trails,

easements or other rights-of-way, unless otherwise authorized by the Pipeline Coordinator.

1.14.2.5 After completion of Construction of the Pipeline, and with the concurrence of the Lessee, the Pipeline Coordinator may designate areas of the Leasehold to which the public shall have free and unrestricted access.

1.15 Public Improvements

1.15.1 The Lessee shall protect existing telephone and other transmission lines, Roads, trails, fences, ditches, and like improvements during Construction, Operation, Maintenance, and Termination of the Pipeline.

1.15.2 Any damages caused by the Lessee to public utilities and/or improvements shall be promptly repaired by the Lessee to a condition which is reasonably satisfactory to the Pipeline Coordinator.

1.16 Fire Prevention and Suppression

1.16.1 The Lessee shall promptly notify the Pipeline Coordinator of any fires on, or which may threaten any portion of, the Pipeline and shall take all measures necessary or appropriate for the prevention and suppression of fires in accordance with applicable law. The Lessee shall comply with the instructions and directions of the Pipeline Coordinator concerning the use, prevention, and suppression of fires on State Land.

1.16.2 Use of open fires in connection with Pipeline Activities is prohibited on State Land unless approved by the Pipeline Coordinator and performed in accordance with State law.

1.17 Health and Safety

1.17.1 The Lessee shall take all measures necessary to protect the health and safety of all Persons affected by its activities performed in connection with the Construction, Operation, Maintenance, or Termination of the Pipeline, and shall immediately abate any health or safety hazards. The Lessee shall immediately notify the Pipeline Coordinator of all serious accidents which occur in connection with such activities.

1.18 Protection of Survey Monuments

1.18.1 The Lessee shall mark and protect all survey monuments encountered during Pipeline Activities. These monuments are not to be disturbed; however, if a disturbance of a monument, or any of its accessories, becomes necessary, the Lessee shall contact the survey section of the Division of Mining Land and Water for current information on the policies regulating the implementation of "Records of Monuments" (AS 38.65.040).

1.18.2 A written report to the Pipeline Coordinator shall be made by the Lessee in the event that any monuments or accessories are inadvertently damaged.

1.19 Use of Existing Facilities

1.19.1 Subject to existing rights vested in other parties, the Lessee shall use existing facilities, to the maximum extent feasible, in all Pipeline Activities associated with the Pipeline. Nothing in this Stipulation shall require the Lessee to use an existing facility if the use of the facility could potentially create a risk to health, safety, or the environment.

1.20 Protection of Cultural Resources

1.20.1 The Lessee shall enter into a programmatic agreement with the State of Alaska Office of History and Archaeology (OHA) related to implementation of Section 106 of the Historic Preservation Act (16 U.S.C. 470 et seq.).

1.20.2 The Lessee shall take affirmative responsibility to require its agents, employees, Contractors, and the employees of each of them to protect cultural resources while conducting Pipeline Activities.

1.20.3 Should any sites or suspected sites be discovered during the course of Pipeline Activities, the activities that may disturb or damage the site shall cease. The OHA and the appropriate Coastal District shall be notified immediately.

1.21 Hunting, Fishing, Trapping, and Camping

1.21.1 With respect to Lessee's agents, employees, Contractors, and the employees of each of them, the Lessee shall prohibit hunting, fishing, trapping, shooting, and camping within the Leasehold.

1.21.2 The Lessee's agents, employees, Contractors, and the employees of each of them shall not use project equipment, including transportation to and from the job site, for the purpose of hunting, fishing, shooting, and trapping.

1.22 Off Right-of-Way Traffic

1.22.1 The Lessee shall not operate mobile ground equipment off the Leasehold, Access Roads, State highways, or authorized areas, unless approved by the Pipeline Coordinator or when necessary to prevent harm to any Person.

1.23 Material Sites

1.23.1 Purchase of Materials

1.23.1.1 If the Lessee requires materials from State Land, the Lessee shall make application to purchase such materials in accordance with appropriate State laws and regulations. No materials shall be removed from State Land by the Lessee without the approval of the Pipeline Coordinator.

1.23.1.2 Insofar as possible, use of existing material sites shall be authorized in preference to new sites.

1.23.1.3 Gravel and other construction materials shall not be taken from streambeds, riverbeds, lakeshores, or outlets of lakes, unless the taking is approved by the Pipeline Coordinator.

1.23.2 Layout of Material Sites

1.23.2.1 Material site boundaries shall be shaped in such a manner as to blend with surrounding natural land patterns. Regardless of the layout of material sites, primary emphasis shall be placed on prevention of soil erosion and damage to vegetation.

2. ENVIRONMENTAL

2.1 Environmental Briefings

2.1.1 The Lessee shall develop and provide environmental briefings for supervisory and field personnel and Field Representatives. The briefings shall communicate, at a minimum, Lease and environmental permit requirements.

2.2 Pollution Control

2.2.1 The Lessee shall conduct all activities associated with the Pipeline in a manner that shall avoid or minimize degradation of air, land, and water quality. In the Construction, Operation, Maintenance, and Termination of the Pipeline, the Lessee shall perform its activities in accordance with applicable air and water quality standards, related facility siting standards, and related plans required by Stipulation 1.4.3.

2.2.2 Mobile ground equipment shall not be operated in or on lakes, streams, or rivers on State Land unless such operation is approved by the Pipeline Coordinator.

2.2.3 The Lessee shall use only non-persistent and immobile types of pesticides, herbicides, preservatives, and other chemicals. Each chemical to be used and its application constraint shall be approved by the Pipeline Coordinator prior to use.

2.2.4 All waste generated in Construction, Operation, Maintenance, and Termination of the Pipeline shall be removed or otherwise disposed of according to all local, State, and federal laws, and in a manner reasonably acceptable to the Pipeline Coordinator.

2.2.5 The Lessee shall utilize and operate all facilities and devices used in connection with the Pipeline so as to avoid or minimize air pollution and ice fog. Facilities and devices which cannot be prevented from producing ice fog shall be located so as not to interfere with airfields, communities, or Roads.

2.3 Disturbance of Natural Waters

2.3.1 All activities of the Lessee in connection with the Pipeline that may create new lakes, drain existing lakes, significantly divert natural drainage and surface runoff, permanently alter stream or groundwater hydrology, or disturb significant areas of streambeds are prohibited unless such activities and necessary mitigation measures are approved by the Pipeline Coordinator.

2.3.2 The temperature of natural surface water or groundwater shall not be significantly changed by the Pipeline or by any Construction, Maintenance, Operation, or Termination related activities so as to adversely affect the natural surface water or groundwater, unless approved by the Pipeline Coordinator.

2.4 Erosion and Sedimentation

2.4.1 Erosion control measures shall be maintained to limit induced and accelerated erosion, limit sediment production and transport, and lessen the possibility of forming new drainage channels during Construction, Operation, Maintenance, and Termination of the Pipeline.

2.5 Excavated Material

2.5.1 Excess excavated material shall be disposed of in accordance with approved Construction plans during Construction and as approved by the Pipeline Coordinator during Operation, Maintenance, and Termination of the Pipeline.

2.5.2 Excavated materials shall not be stockpiled in rivers, streams, floodplains, or Wetlands unless approved by the Pipeline Coordinator.

2.6 Restoration and Revegetation

2.6.1 Revegetation of disturbed areas on State Land shall be conducted as soon as practicable and, if necessary, shall be repeated until Revegetation is successful, unless otherwise approved by the Pipeline Coordinator. All other Restoration shall be completed as soon as possible.

2.6.2 Surface materials taken from disturbed areas shall be stockpiled and utilized during Restoration unless otherwise approved by the Pipeline Coordinator. Stabilization practices, as determined by the needs for specific sites, shall include but shall not be limited to the placement of mat binders, soil binders, rock, or gravel blankets or structures.

2.6.3 All disturbed areas of State Land shall be left in such stabilized condition that erosion in excess of natural rates shall be minimized until the practicable Restoration and Revegetation of the Leasehold can be accomplished in a manner that is reasonably satisfactory to the Pipeline Coordinator.

2.6.4 Areas on State Land disturbed by the Lessee shall be Restored by the Lessee to the reasonable satisfaction of the Pipeline Coordinator as stated in writing.

2.6.5 Vegetation, overburden, and other materials removed during clearing operations shall be disposed of by the Lessee in a manner approved by the Pipeline Coordinator.

2.6.6 Upon completion of Restoration on State Land, the Lessee shall remove all equipment and supplies from the site.

2.7 Timber Clearing, Salvage and Utilization

2.7.1 Prior to initiating clearing operations on State Land, the Lessee shall provide the Pipeline Coordinator with an estimate of the amount of merchantable timber, if any, which shall be cut, removed, or destroyed in the Construction and Maintenance of the Pipeline, and shall pay the State in advance of such Construction or Maintenance activity, such sum of money as the Pipeline Coordinator determines to be the full stumpage value of the timber to be cut, removed, or destroyed.

2.7.2 The Lessee shall, as part of the Timber Clearing, Salvage and Utilization Plan required in Stipulation 1.4.3.1(d), provide an opportunity for residents and local communities to utilize the salvage timber.

2.7.3 All debris resulting from clearing operations and Construction that may block stream flow, delay fish passage, contribute to flood damage, or result in streambed scour or erosion shall be removed.

2.7.4 Logs shall not be skidded or yarded across any watercourse without the approval of the Pipeline Coordinator.

2.7.5 No log storage shall be located within three hundred (300) feet of any watercourse on State Land except with the approval of the Pipeline Coordinator.

2.8 Fish and Wildlife Protection

2.8.1 Fish Passage

2.8.1.1 All Pipeline Activities shall be conducted so as to assure free passage and movement of fish in streams designated by the Pipeline Coordinator in consultation with the Alaska Department of Fish and Game (ADF&G). Temporary blockages of fish necessitated by in-stream activities shall be approved by the ADF&G.

2.8.1.2 Pump intakes shall be screened to prevent harm to fish. Screening specifications shall be approved by the Pipeline Coordinator.

2.8.1.3 When abandoned, water diversion structures shall be removed or plugged and stabilized unless otherwise approved by the Pipeline Coordinator.

2.8.1.4 If material sites are approved adjacent to or in certain lakes, rivers, or streams, the Pipeline Coordinator may require the Lessee to construct levees, berms, or other suitable means to protect fish and fish passage and to prevent siltation of streams or lakes.

2.8.2 Fish Spawning Beds, Rearing Areas, and Overwintering Areas

2.8.2.1 The Lessee shall protect Fish Spawning Beds, Fish Rearing Areas, and Overwintering Areas from sediment where soil material is expected to be suspended in water as a result of Pipeline Activities. Settling basins or other sediment control structures shall be constructed and maintained to intercept sediment before it reaches rivers, streams, or lakes.

2.8.2.2 The Lessee shall comply with site-specific terms and conditions imposed by the Pipeline Coordinator to protect Fish Spawning Beds, Fish Rearing Areas, and Overwintering Areas from the effects of Pipeline Activities. Damage caused by the Lessee's Pipeline Activities shall be repaired to the reasonable satisfaction of the Pipeline Coordinator.

2.8.2.3 The Lessee shall avoid disturbance to Fish Spawning Beds, Fish Rearing Areas, and Overwintering Areas designated by the Pipeline Coordinator. However, where disturbances cannot be avoided, proposed modifications and appropriate mitigation measures shall be designed by the Lessee and approved by the Pipeline Coordinator.

2.8.3 Wildlife

2.8.3.1 The Pipeline shall be maintained to avoid significant alteration of big-game movement patterns. The Pipeline Coordinator may require additional measures to mitigate impacts to big-game movement.

2.8.3.2 The Lessee shall coordinate with the U.S. Fish & Wildlife Service regarding any activity that has the potential to disturb polar bears. Pipeline Activities shall avoid polar

bear dens unless alternative mitigative measures to minimize disturbances are approved by the Pipeline Coordinator and the U.S. Fish and Wildlife Service.

2.8.3.3 Prior to starting Pipeline Activities, the Lessee shall obtain the locations of known brown-bear dens from the ADF&G for the purpose of avoiding both human/bear interactions and disturbance of bear dens.

2.8.4 Zones of Restricted Activity

2.8.4.1 During periods of wildlife breeding, nesting, lambing, or calving activity, and during major migrations of wildlife, the Lessee's activities on State Land may be restricted by the Pipeline Coordinator with written notice. From time to time, the Pipeline Coordinator shall furnish the Lessee a list of areas where such actions may be required, together with anticipated dates of restriction. In addition, no blasting shall be done under water or within one-quarter (1/4) mile of streams or lakes with identified sensitive wildlife habitat without the approval of the Pipeline Coordinator.

2.8.4.2 During periods of fish spawning, rearing, and migration, the Lessee's activities on State Land may be restricted by the Pipeline Coordinator with written notice. From time to time, the Pipeline Coordinator shall furnish the Lessee a list of areas where such actions may be required, together with anticipated dates of restriction. In addition, no blasting shall be done under water or within one-quarter (1/4) mile of streams or lakes with identified sensitive fisheries habitat without the approval of the Pipeline Coordinator.

2.9 Use of Explosives

2.9.1 The Lessee shall submit a plan for use of explosives on State Land, including but not limited to blasting techniques, to the Pipeline Coordinator in accordance with Stipulation 1.4.3.

2.9.2 Any blasting not previously approved in the blasting plan shall be approved by the Pipeline Coordinator.

2.10 Vegetative Screens and Buffers

2.10.1 Where the Leasehold crosses Roads, a screen of native vegetation shall be established over the disturbed areas unless otherwise approved by the Pipeline Coordinator.

2.10.2 The Pipeline shall be located so as to provide a buffer of undisturbed land at least five hundred (500) feet wide between the Pipeline and streams, unless otherwise approved by the Pipeline Coordinator.

2.10.3 Undisturbed vegetative screens at least five hundred (500) feet wide shall be maintained between material sites and highways unless otherwise approved by the Pipeline Coordinator.

2.11 Contingency Plans

2.11.1 It is the policy of the Department of Natural Resources that there should be no discharge of petroleum products or other pollutants into or upon lands or waters of the State. The Lessee must therefore recognize its prime responsibility for the protection of the public and environment from the effects of spillage.

2.11.2 Prior to Pipeline startup, the Lessee shall demonstrate its capability and readiness to execute the Hazardous Substances control, cleanup, and disposal plan referenced in Stipulation 1.4.3 and approved by the Pipeline Coordinator. The Lessee shall update, as appropriate, the plans and methods of implementation, and submit the updates to the Pipeline Coordinator for approval.

2.11.3 If during any phase of the Construction, Operation, Maintenance, or Termination of the Pipeline, any oil or other pollutant should be discharged from the Pipeline or from any storage or refueling facility or equipment, the control and total removal, disposal, and cleaning up of such oil or other pollutant, wherever found, shall be the responsibility of the Lessee. Upon failure of the Lessee to control, dispose of, or clean up such discharge, the Pipeline Coordinator may take measures to control and clean up the discharge at the full expense of the Lessee. Such action by the Pipeline Coordinator shall not relieve the Lessee of any responsibility as provided herein.

3. TECHNICAL

3.1 General

3.1.1 All Design, Construction, Operation, Maintenance, and Termination methods employed with respect to the Pipeline shall be in accordance with sound engineering practice and shall meet or exceed the U.S. Department of Transportation Regulations in 49 CFR, Parts 191, 192 and 199.

3.1.2 Requirements in addition to those set forth in the above minimum standards may be imposed by the Pipeline Coordinator as reasonably necessary to reflect the impact of arctic environments or other specialized situations. The Pipeline Coordinator shall make every effort to identify such additional requirements during the Design phase.

3.1.3 The Lessee shall perform Maintenance in such a manner as to minimize damage to the Leasehold; to minimize environmental deterioration, such as to water or air quality; and to protect public safety. The Lessee shall submit a Maintenance Plan to the Pipeline Coordinator for acceptance prior to start-up and shall submit to the Pipeline Coordinator for acceptance any subsequent major changes to the plan.

3.2 Design Basis and Criteria

3.2.1 The Lessee shall develop a Design Basis and Criteria document for acceptance by the Pipeline Coordinator. The document shall follow the Pipeline Coordinator's standard format modified to encompass the characteristics of the project. In particular, proximity to TAPS shall be given emphasis. After acceptance, any modifications to the contents of the Design Basis and Criteria shall also be accepted by the Pipeline Coordinator.

3.3 Technical Record Keeping

3.3.1 All drawings and primary technical documents shall be kept up-to-date. Changes to the Pipeline shall be documented by final drawings sealed by an engineer registered in the State of Alaska within 180 days of completion, unless otherwise authorized by the Pipeline Coordinator.

3.4 Proximity to TAPS and Other Existing Infrastructure

3.4.1 The Pipeline route and proximity to all existing or planned installations shall be approved by the Pipeline Coordinator. Any subsequent changes in route shall be approved by the Pipeline Coordinator.

3.4.2 All route and proximity analyses, maps, selection, and reports shall consider the potential impact radius.

3.4.3 The Lessee shall not interfere with operations or other activities of TAPS except as may be approved by the Pipeline Coordinator.

3.4.4 The Lessee and the Pipeline Coordinator agree to meet on a regular basis with Alyeska Pipeline Service Company to review all issues associated with proximity, including the opportunity to review and comment on the "proximity to Trans Alaska Pipeline System (TAPS) and Other Existing Infrastructure" (Stipulation 1.4.3.1(a)).

3.5 Electronics and Communications

3.5.1 The Lessee shall screen, filter, or otherwise suppress any electronically operated devices installed as part of the Pipeline which are capable of producing electromagnetic interference radiations so that such devices shall not adversely affect the functioning of the Pipeline communication systems.

3.5.2 Any structures built as part of the communication systems shall not interfere with radiation patterns of existing line-of-site communication systems, navigational aids, or related systems including all systems used in connection with the operation of TAPS.

3.5.3 The Lessee shall provide a reliable voice and data communication system and backup that shall provide information to a control center and be fully usable for an incident command system. This communication system shall provide automated and timely regulatory reporting, timely operational data retrieval, automated trending capabilities, alarming functionality, security, and automated operator notification. Part of the communication system shall be a fully functioning and reliable Supervisory Control and Data Acquisition (SCADA) system.

3.5.4 The Lessee shall maintain two independent communication systems capable of full transmission of voice and data for emergencies. Both the primary and backup systems shall be continuously available for use for incident command.

3.5.5 The Lessee shall ensure that both independent communication systems can be fully functional after a seismic event as defined elsewhere in the Stipulations. This includes all transmission equipment, supporting facilities, power, and other devices needed to make a fully functional communication system. A seismic analysis sealed by an engineer registered in the State of Alaska shall be provided to the Pipeline Coordinator verifying this has been accomplished.

3.6 Corrosion

3.6.1 The Lessee shall provide a plan for corrosion-resistant design and methods for early detection of corrosion in accordance with 49 CFR, Part 192.

3.6.2 The Corrosion Plan shall include consideration of:

(a) Pipeline material to be used and information on its particular suitability for the environment involved;

(b) Details on the external pipe protection to be provided (coating, wrapping, or other means of protection), including information on variations in environmental factors along the Pipeline route;

(c) Plans for cathodic protection if necessary or when appropriate, including details of impressed-current sources and controls to ensure continuous maintenance of adequate protection over the entire surface of the pipe;

(d) Details of plans for monitoring cathodic-protection current, including spacing of current monitors;

(e) Provision for periodic intensive surveys of trouble spots, regular preventive maintenance surveys, and special provisions for abnormal potential patterns, especially those resulting from other pipelines or cables; and

(f) Information on any precautions that may be required to prevent external or internal corrosion of the Pipeline.

3.7 Lightning Protection

3.7.1 Lightning protection and surge suppression shall conform to the requirements of NFPA 780, 2011 Edition, "Standard for the Installation of Lightning Protection Systems."

3.7.2 The Lessee shall provide an engineering summary verifying that all lightning protection is in place and fully functional. The report shall be updated to accommodate subsequent changes to facilities and installation requiring additional protection required under NFPA 780. All reports shall be sealed by an engineer registered in the State of Alaska.

3.7.3 The Lessee shall inspect lightning protection annually and repair damage no later than June 1 unless otherwise authorized by the Pipeline Coordinator.

3.8 Seismic

3.8.1 The Pipeline shall be designed to prevent gas leakage or damage to the Pipeline from the Design Contingency Earthquake (DCE). The DCE is defined as an earthquake with a five (5) percent probability of exceedance in fifty (50) years. Seismic ground-motion parameters shall be based on the U.S. Geological Survey (USGS) national seismic hazard maps for Alaska as appropriate to the particular pipeline or facility application, except for areas of special seismic hazards such as active faults, unstable slopes, or liquefaction zones. An engineer registered in the State of Alaska shall assess the design for each of these special seismic hazards.

3.8.2 An Engineering Analysis and Report on the Design of the Pipeline, sealed by an engineer registered in the State of Alaska, shall be submitted to the Pipeline Coordinator for review and acceptance. The report shall assess and confirm that the Pipeline can withstand the DCE and shall indicate any areas of high hazards, fault zones, and mitigating measure that the Lessee has undertaken. The report shall be

reviewed by a qualified geologist to determine that all identified hazards have been considered and proper geologic parameters (e.g., fault zone location, width, and DCE offset) have been used.

3.8.3 Seismic design provisions shall include an earthquake monitoring system (EMS). The EMS shall be integrated into the University of Alaska statewide seismic monitoring system and shall include the following elements:

(a) A network of ground-motion detectors to continuously detect and instantaneously report events near the Pipeline approaching the level of the DCE;

(b) An automatic programmed shutdown of the Pipeline when an event near the Pipeline approaches the level of the DCE; and

(c) An automatic generation of a post-event inspection checklist targeting the facilities most affected by the location of the event.

3.9 Fault Displacements

3.9.1 Prior to applying for a Notice to Proceed for any Construction Segment on State Land, the Lessee shall demonstrate to the Pipeline Coordinator that all recognizable or reasonably inferred active faults or fault zones along the alignment within that Construction Segment have been identified, delineated, and characterized.

3.9.2 The Lessee shall demonstrate to the Pipeline Coordinator that the risk of leakage resulting from fault movement and ground deformation has been adequately assessed and provided for in the Design of the Pipeline for any Construction Segment. Evaluation of the risk shall be based on geologic, geomorphic, geodetic, seismic, and other appropriate scientific evidence of fault behavior active during the Holocene era and shall be compatible with the DCE and with observed relationships between earthquake magnitude and extent and the amount of deformation and fault slip within the fault zone. Individual fault-rupture parameters used for Pipeline fault-crossing design shall be verified by site-specific geologic field investigation.

3.9.3 In a fault zone that is reasonably interpreted as active, the Pipeline shall meet the following minimum design criteria:

(a) The Pipeline shall resist failure resulting in leakage from displacement in the foundation material resulting from the DCE on that fault zone;

(b) No storage tank or compressor station shall be located within an active fault zone on State Land; and

(c) The manner of pipe installation across the fault zone, location of valves on each side of the fault, and monitoring system shall be included in the design.

3.9.4 Where the Pipeline crosses a fault or lies within a fault zone on State Land that is reasonably interpreted as active, the Lessee shall monitor crustal deformation in the vicinity (e.g., fault creep, seismicity) and report findings to the Pipeline Coordinator at a frequency to be agreed upon by the Pipeline Coordinator and the Lessee.

3.10 Land, Soil, Snow, and Ice Movement

3.10.1 Areas subject to mud flows, landslides, avalanches, rock falls, and other types of mass movements shall be avoided where practicable in locating the Pipeline on State Land. Where such avoidance is not practicable, the Pipeline Design, based upon detailed field investigations and analysis, shall provide measures to prevent the occurrence of, or protect the Pipeline against, the effects of such mass movements. Special emphasis shall be used to find areas of unusual cold-region methods of soil failure, such as transitional permafrost, solifluction, and areas of seasonal groundwater flow.

3.10.2 The Pipeline shall be designed to protect existing facilities, including TAPS, from the effects of mass movement caused by the Lessee's activities, and shall not adversely affect slope stability protection measures of existing structures.

3.11 Land and Surface Disturbance

3.11.1 All Construction, Operation, Maintenance, and Termination activities in connection with the Pipeline shall be conducted to minimize surface modifications. These activities shall be planned and executed in such a way that the resulting alteration of permafrost shall not jeopardize Pipeline integrity or the surrounding environment.

3.11.2 A monitoring program shall be developed by the Lessee to (a) identify any Pipeline movement that may affect Pipeline integrity, resulting from frost heave or settlement forces, and (b) identify surface heave or subsidence above the Pipeline. This program, including baseline data, shall be finalized and operational prior to transmission of Natural Gas through the Pipeline.

3.11.3 Construction of Access Roads, ice ramps, ice work pads, protective work mats, or any other method to protect the ground surface shall be approved by the Pipeline Coordinator. Approvals shall be obtained during all phases of the Lease, including Construction, Operation, Maintenance, and Termination of the Pipeline.

3.11.4 The Pipeline Coordinator shall approve Pipeline trench backfill methods prior to the start of detailed Construction planning.

3.12 Pipe/Soil Interaction

3.12.1 The Lessee shall produce a summary report discussing the effects of modifications to the in-situ thermal condition of the soils supporting the Pipeline caused by Construction, Operations, and/or Maintenance. The report shall also include the steps taken to mitigate those effects so as to maintain Pipeline operational integrity and minimize the effects of ground surface expression. The Pipeline shall be designed to maintain Pipeline integrity under potential ground movements resulting from these modifications as required by ASME B31.8S. The report shall be sealed by an engineer registered in the State of Alaska.

3.12.2 The Lessee shall monitor the thermal regime and submit annual reports on the thermal stability of the Pipeline. The reports shall also include records of the gas temperatures maintained in the Pipeline. The reporting frequency of these reports shall continue until the Pipeline Coordinator has determined that the installation has stabilized.

3.13 Rivers, Streams, and Floodplains

3.13.1 The Pipeline shall be designed to withstand or accommodate the effects (including runoff, stream and floodplain erosion, meander cutoffs, lateral migration, ice jams, and icings) of those meteorological and hydrologic (including surface and subsurface) conditions considered characteristic for each hydrologic region.

3.13.2 For stream crossings and portions of the Pipeline within a floodplain, the following design standards shall apply:

(a) The design flood shall be based on the 100-year flood event as defined by the USGS Regional regression equations or flood frequency analysis of gage data if close and representative to the stream under consideration;

(b) The depth of channel scour shall be established by appropriate field investigations and theoretical calculations using those combinations of water velocity and depth that yield the maximum value. At the point of maximum scour, the cover over the top of the pipe shall be at least twenty (20) percent of the computed scour, but not less than four (4) feet;

(c) For overhead crossings, analysis shall be made to ensure that support structures are adequately protected from the effects of scour, channel migration, undercutting, ice forces, degradation of permafrost, and other external and internal loads;

(d) To avoid channelization along the pipe, appropriate design and construction procedures shall be included in the plans required and shall be used wherever there is potential for such channelization;

(e) Methods of constructing stream crossings, including horizontal directional drilling or excavation and backfill of pipe trench near and through stream banks and existing river-training structures shall be approved by the Pipeline Coordinator prior to initiation of Construction; and

(f) Low water crossings (fords across streams or rivers where any mobile ground equipment is moved on the streambed) shall be designed, constructed, maintained, and Restored to standards approved by the Pipeline Coordinator.

3.13.3 The Pipeline shall be designed to minimize the number of stream and Wetland crossings and to include, but not be limited to, consideration of effects to other nearby structures, from aufeis development, erosion and sedimentation, restriction of natural meander, or alteration of the physical or chemical nature of the water body caused by Pipeline Activities.

3.13.4 Temporary access over stream banks prior to and following Construction shall be made through the use of fill ramps rather than by cutting through stream banks, unless otherwise approved by the Pipeline Coordinator. The Lessee shall remove such ramps upon termination of the activity. Ramp materials shall be disposed of in a manner approved by the Pipeline Coordinator.

3.13.5 Culverts, bridges, and other hydrological structures necessary for Maintenance of the Pipeline shall be designed at a minimum to accommodate a fifty (50) year flood in accordance with criteria established by the American Association of State Highway and

Transportation Officials and the Federal Highway Administration, and in accordance with the DOT&PF Alaska Highway Drainage Manual.

3.13.6 ADF&G standards shall be adhered to for installation of culverts in fish streams designated by the Pipeline Coordinator. Such culverts shall be necessary for Construction or Operation of the Pipeline.

3.14 Access Roads

3.14.1 The Lessee shall submit a layout of each proposed Access Road for approval by the Pipeline Coordinator.

3.14.2 Access Roads shall be constructed to standards suitable for safe operations of equipment at the travel speeds proposed by the Lessee.

3.14.3 Design, materials, and construction practices employed for Access Roads shall be in accordance with safe and proven engineering practice. Access Roads intended for permanent use shall be constructed in accordance with federal and State road standards and the principles of construction for roads in the arctic environment.

3.14.4 The maximum allowable grade is twelve (12) percent unless otherwise approved by the Pipeline Coordinator.

3.15 Work Pads

3.15.1 Gravel work pads shall be designed and constructed to protect the ground surface and prevent any thermal degradation of permafrost.

3.15.2 A Maintenance Plan for work pads shall be developed for acceptance by the Pipeline Coordinator.

4. HIGHWAY USE AGREEMENT

4.1 Prior to commencement of Construction, the Lessee shall enter into a comprehensive agreement with DOT&PF for the use of highways and other facilities under the jurisdiction of the DOT&PF.

THIS LINE LIST IS SUBJECT TO A COMPLETED TITLE REPORT

ADL 418997
ALASKA STAND ALONE GAS PIPELINE/ASAP
RIGHT-OF-WAY LEASE

EXHIBIT B
LINE LIST

Umiat Meridian

Township 11 North, Range 14 East
Section(s): 11, 14, 15, 22, 27, 28, 33

Township 10 North, Range 14 East
Section(s): 4, 8, 9, 17, 20, 29, 32

Township 9 North, Range 14 East
Section(s): 4, 5, 9, 15, 16, 22, 27, 34

Township 8 North, Range 14 East
Section(s): 2, 10, 11, 15, 21, 22, 28, 32, 33

Township 7 North, Range 14 East
Section(s): 5, 7, 8, 18, 19, 30

Township 7 North, Range 13 East
Section(s): 25, 36

Township 6 North, Range 13 East
Section(s): 1, 2, 11, 12, 13, 24, 25, 36

Township 5 North, Range 13 East
Section(s): 1

Township 5 North, Range 14 East
Section(s): 6, 7, 17, 18, 20, 29, 32

Township 4 North, Range 14 East
Section(s): 4: SE1/4 & N1/2, SW1/4,
9, 16, 21, 28, 33

Township 3 North, Range 14 East
Section(s): 3, 4, 10, 14, 15, 22, 23, 26, 35

Township 2 North, Range 14 East
Section(s): 1, 2, 11, 12, 13, 24, 25, 36

THIS LINE LIST IS SUBJECT TO A COMPLETED TITLE REPORT

Township 2 North, Range 15 East
Section(s): 31

Township 1 North, Range 14 East
Section(s): 1, 6, 11, 12, 14, 15, 22, 23, 27, 28, 33

Township 1 North, Range 15 East
Section(s): 6

Township 2 North, Range 14 East
Section(s): 1, 2, 11, 12, 13, 24, 25, 36

Township 1 South, Range 14 East
Section(s): 3, 4, 9, 16, 21, 22, 27, 34

Township 2 South, Range 14 East
Section(s): 3, 4, 9, 16, 21, 28, 32, 33

Township 3 South, Range 14 East
Section(s): 5, 7, 8, 18, 19, 30, 31

Township 4 South, Range 14 East
Section(s): 6, 7, 17, 18, 19, 20, 29, 30, 31

Township 5 South, Range 14 East
Section(s): 4, 5, 8, 16, 17, 21, 28, 29, 32

Township 6 South, Range 14 East
Section(s): 5, 6, 7, 18, 19, 29, 30, 31, 32

Township 7 South, Range 14 East
Section(s): 5, 8, 9, 16, 20, 21, 29, 32

Township 8 South, Range 14 East
Section(s): 5, 7, 8, 18

Township 8 South, Range 13 East
Section(s): 13, 23, 24, 26, 27, 33, 34

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Fairbanks Meridian

Township 29 North, Range 12 West
Section(s): 23, 26, 35 (Portion East of the Middle Fork Koyukuk River)

Township 28 North, Range 12 West
Section(s): 3, 10, 15, 16, 20, 21

Township 12 North, Range 11 West
Section(s): 12 (Yukon River and Lot 2)
13

Township 12 North, Range 10 West
Section(s): 18, 19, 20, 27, 28, 29, 34, 35, 36

Township 11 North, Range 10 West
Section(s): 1

Township 11 North, Range 9 West
Section(s): 6, 7, 8, 9, 15, 16, 17, 22, 23, 25, 26, 36

Township 11 North, Range 8 West
Section(s): 31, 32

Township 10 North, Range 8 West
Section(s): 13, 14

Township 10 North, Range 7 West
Section(s): 18, 19, 20, 29, 30, 32, 33

Township 9 North, Range 7 West
Section(s): 3, 4, 10, 11, 13, 14, 24

Township 9 North, Range 6 West
Section(s): 19, 30, 31, 32

Township 8 North, Range 6 West
Section(s): 5, 8, 9, 15, 16, 22, 23, 25, 26, 36

Township 8 North, Range 5 West
Section(s): 30, 31

Township 7 North, Range 5 West
Section(s): 5, 6, 8, 17, 20, 29, 31, 32

Township 6 North, Range 5 West
Section(s): 5, 6, 7, 18, 19, 30, 31

Township 5 North, Range 5 West
Section(s): 6 (W1/2), 7 (W1/2)

Township 5 North, Range 6 West
Section(s): 12, 13, 24, 25, 36

Township 4 North, Range 6 West
Section(s): 1, 2, 11, 14, 22, 23, 27, 34

Township 3 North, Range 6 West
Section(s): 2, 3, 11, 14, 23, 24, 25, 26, 36

Township 2 North, Range 6 West
Section(s): 1, 12, 13,
24 (Tract B, Chatanika River),
25 (USS 4459 and Chatanika River),
36

Township 1 North, Range 6 West
Section(s): 1, 2,
11 (USS 4474),
14 (USS 4474 and USS 4466A),
23, 26 (USS 4445B, USS 4473C, USS 3721),
34 (USS 9979),
35 (USS 9979)

Township 1 South, Range 6 West
Section(s): 3, 4,
9 (USS 4448-C),
16, 20, 21, 29, 31, 32

Township 2 South, Range 6 West
Section(s): 5,
7, 8 (Lots 1 & 3, USS 2123),
18

Township 2 South, Range 7 West
Section(s): 24 (USS 9064),
25 (82-6),
35 (Plat No. 85-5),
36 (Plat No. 85-5)

Township 3 South, Range 7 West
Section(s): 2 (Plat No. 82-10),
3 (Plat No. 82-10; Tract D),
9 (ROW),
10 (ROW and Plat No. 85-6),
16 (ROW, 181, Plat No. 83-4; Excluding ASLS 82-181, Berg),
17 (ROW, Excluding ASLS 82-181, Berg; Plat No. 83-4, Nenana),
19 (Parks Hwy ROW), 20 (NW4NE4SW4 and SE4SE4NW4),
30 (Parks Hwy ROW)

Township 3 South, Range 8 West
Section(s): 25 (Parks Hwy ROW),
36 (W2)

Township 4 South, Range 8 West
Section(s): 2 (Parks Hwy ROW),
11 (ROW, Tr B2A, Tr B2B),
14 (Tanana River),
35 (Lot 1)

Township 5 South, Range 8 West
Section(s): 3 (SE1/4; Lots 8, 9, & 14; TA 19830035),
10 (E1/2; TA 19830035),

Township 6 South, Range 8 West
Section(s): 28 (N1/2)

Township 7 South, Range 8 West
Section(s): 4,
8 (Lots 2 and 3)

Township 7 South, Range 9 West
Section(s): 36

Township 8 South, Range 9 West
Section(s): 11, 13,
14 (ROW, Portion west of the Nenana, Nenana River),
15 (Parks Hwy ROW),
22 (ROW, NW1/4SE1/4),
27, 34, 35

Township 9 South, Range 9 West
Section(s): 3 (ROW),
10 (ROW, Plat 80-9),
11,
14 (ROW, Creek Alaska Subdivision),
23 (ROW, Portion west of the Nenana River, Creek Alaska Subdivision),
24 (Portion west of the Nenana River),
25 (ROW, Portion West of the Parks Hwy ROW),
36 (ROW, Creek Alaska Subdivision, Plat)

Township 10 South, Range 8 West
Section(s): 6 (Portion West of the Nenana River),
7 (ROW, Excluding ASLS 87-361, ASLS 85-237, ASLS 92-70 and ASLS 88-111),
17 (Excluding ASLS 94-20, ROW),
18 (Excluding ASLS 86-108 and ASLS 86-160, ROW),
20,
21 (ROW, W1/2W1/4),
28 (ROW, NW1/4NW1/4 that portion lying west of the Parks Hwy ROW),
28 (Material Site that portion lying west of the Parks Hwy ROW),
33 (Parks Hwy ROW)

Township 11 South, Range 8 West
Section(s): 4 (That portion westerly of the Alaska Railroad ROW, excluding USS 5866; Park Hwy ROW),
9 (E1/2 excluding USS 5866; Parks Hwy ROW),
16 (E1/2 excluding ASLS 85-121; Parks Hwy ROW),
21 (Parks Hwy ROW; E1/2 excluding ASLS 85-120, ASLS 86-56, ASLS 88-164, ASLS 87-367, and ASLS 89-130),
22 (Parks Hwy ROW; excluding the Alaska Railroad ROW, USS 9054),
27 (Excluding ASLS 91-97, ASLS 87-327, AND ASLS 90-135; Parks Hwy ROW),
28 (Parks Hwy ROW),
34 (E1/2 excluding ASLS 83-168; Parks Hwy ROW),
35 (Parks Hwy ROW)

Township 12 South, Range 8 West
Section(s): 1 (SW1/4),
2 (Tracts A, B, & D, ROW),
11 (Tract B),
12 (Excluding First Addition Healy Small Tracts, Plat 68-245),
13 (NE1/4, Parks Hwy ROW, Portion west of Parks Hwy ROW excluding PLAT 68-245)

Township 13 South, Range 7 West
Section(s): 5, 6, 8, 9 (Portions within Parks Hwy ROW),
16 (Parks Hwy ROW),
21, 27,
33 (Parks Hwy ROW),
34 (Parks Hwy ROW; Nenana River)

Township 14 South, Range 7 West
Section(s): 2 (Tract A),
3 (Nenana River lying w/in Section)

Township 14 South, Range 6 West
Section(s): 17, 18,
19 (Excluding USS 2177),
20, 29, 32

Township 15 South, Range 6 West
Section(s): 20 (Tract B)

Township 16 South, Range 7 West
Section(s): 12 (Nenana River)

Township 17 South, Range 7 West
Section(s): 12 (Nenana River),
33 (Parks Hwy ROW)

Township 18 South, Range 7 West
Section(s): 4 (Denali Hwy ROW; Parks Hwy ROW)

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Township 18 South, Range 8 West
Section(s): 21 (ROW within Lot 1, USS 6113),
30 (E1/2SW1/4, SE1/4, S1/2SE1/4NW1/4, E1/2NE1/4, SW1/4NE1/4, S1/2NW1/4NE1/4),
20 (E1/2SW1/4, SW1/4SW1/4, SE1/4),
29 (Portion lying northwest of the northwesterly boundary of the Alaska Railroad ROW)

Township 18 South, Range 9 West
Section(s): 36 (LOT 1, SW1/4SE1/4, NW1/4SE1/4, NE1/4SE1/4, S1/2NE1/4, S1/2NW1/4, SW1/4),

Township 20 South, Range 9 West
Section(s): 5 (TRACT A, USRS),
8

Township 20 South, Range 10 West
Section(s): 24, 25,
26 (PARCEL 15-4, Tract B, Parcel 15-3; Parks Hwy ROW),
34 (Tract E; Parcel 15-1; Parks Hwy ROW),
35

Township 21 South, Range 10 West
Section(s): 3, 4, 8, 9, 16, 17, 19, 20, 3

Township 21 South, Range 11 West
Section(s): 36

Township 22 South, Range 11 West
Section(s): 1, 2, 11, 12, 14, 22, 23, 27, 34

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Seward Meridian

Township 33 North, Range 2 West
Section(s): 16, 20, 21, 29, 30, 31

Township 32 North, Range 3 West
Section(s): 1, 2, 6, 9, 10, 11, 16, 17, 20, 29, 30, 31

Township 32 North, Range 4 West
Section(s): 36

Township 31 North, Range 4 West
Section(s): 1, 2, 3, 9, 10, 16, 17, 19, 20, 30

Township 31 North, Range 5 West
Section(s): 24, 25, 26, 34, 35

Township 30 North, Range 5 West
Section(s): 3, 8,
9 (Lot 1A),
16, 17, 20, 21, 28, 33

Township 29 North, Range 5 West
Section(s): 4, 9, 17, 20, 28,
29 (Lot A2)
32 (Lot A1)

Township 28 North, Range 5 West
Section(s): 5 (ROW),
8 (ROW),
17 (ROW),
19 (ROW),
30 (ROW),
31 (ROW)

Township 27 North, Range 5 West
Section(s): 6 (ROW),
7 (ROW),
18 (ROW),
19 (ROW),
30 (ROW),
31 (ROW)

Township 26 North, Range 5 West
Section(s): 7, 8, 20, 29, 32

Township 25 North, Range 5 West
Section(s): 5 (ASCS 89-8, S05 Tract C),
8 (ASCS 89-8, S08 Tract F; Tract J; ROW; S08 Tract B),
17 (ASCS 89-8, S17 Tract; Tract B),
20 (ASCS 89-8, S20 TRACT B),
33

Township 24 North, Range 5 West
Section(s): 4, 5, 9, 15

Township 24 North, Range 4 West
Section(s): 32 (Lot A7)

Township 23 North, Range 4 West
Section(s): 5 (ROW),
8 (Lot B5 & B8),
29 (ROW),
32 (ROW)

Township 22 North, Range 4 West
Section(s): 7, 8, 17, 20

Township 21 North, Range 4 West
Section(s): 5 (ROW),
18 (Lot A6, ROW),
19 (Lot A2, ROW),
30 (ROW),
31 (Lot C6; Lot 2, ASLS 97-072)

Township 20 North, Range 4 West
Section(s): 6 (ROW),
7 (ROW; Lot B3; Kashwitna Lake),
18 (ROW),
31 (Lot C2)

Township 19 North, Range 4 West
Section(s): 6 (Lots D13, D14; ROW),
7 (Willow Airport, Parcel E)

Township 19 North, Range 5 West
Section(s): 1 (Lot A1),
2 (Lot A1)
10, 15,
17 (ROW),
22, 27, 34

Township 18 North, Range 5 West
Section(s): 3 (Lot A1),
9 (Lot A1),
10 (Lot B1),
16 (Lot A1),
17 (Lot A1),
20 (Lot A1),
29 (Lot A1),
31,
32 (Lot A1)

Township 17 North, Range 5 West
Section(s): 6, 7, 17, 18, 20, 29, 32

Township 16 North, Range 5 West
Section(s): 10 (Lots D2, D1 and C1),
11, 14

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FAIRBANKS LATERAL

Fairbanks Meridian

Township 2 South, Range 6 West
Section(s): 1, 2, 3, 4, 9

Township 2 South, Range 5 West
Section(s): 4, 5, 6

Township 1 South, Range 5 West
Section(s): 25, 34, 35, 36

Township 1 South, Range 4 West
Section(s): 1, 2, 8, 9, 10, 11, 12, 15, 16,
19 (ROW),
20, 21, 22, 23, 30, 31

Township 1 North, Range 4 West
Section(s): 36

Township 1 North, Range 3 West
Section(s): 21, 29, 30, 31

Township 1 North, Range 2 West
Section(s): 15 (ROW),
16,
21 (ROW),
22 (ROW),
27 (ROW),
35

Township 1 South, Range 2 West
Section(s): 1 (ROW)

ADL 418997
ALASKA STAND ALONE GAS PIPELINE/ASAP
RIGHT-OF-WAY LEASE

EXHIBIT C
LESSEE GUARANTY

(EXCEPTION: A GUARANTY WILL NOT BE REQUIRED FROM A STATE ENTITY)

ADL 418997
ALASKA STAND ALONE GAS PIPELINE/ASAP
RIGHT-OF-WAY LEASE

EXHIBIT D
DEFINITIONS

Terms having specific meaning in this Lease and incorporated documents are indicated by capitalization. In the absence of a definition in this Exhibit D, terms shall be defined in accordance with definitions found in any applicable State statute or regulation, and otherwise in accordance with common usage.

Access Roads mean the roads or ice roads on State Lands constructed or used by Lessee within, or for ingress to and egress from, the Pipeline. It does not include the State highways or private roads or those highways and/or roads managed by a municipality, a borough, a city, other local jurisdictions or the Alaska DOT&PF.

As Built means an engineering diagram that depicts the centerline location of the Pipeline and the improvements as constructed.

Commissioner means the Commissioner of the Alaska Department of Natural Resources and includes the Commissioner's delegates, when a delegation of power to administer all or a portion of the provisions of this Lease is made pursuant to AS 38.35.210.

Construction means all Field Activities by the Lessee or its Contractors located on the Leasehold which involve more than *de minimis* physical disturbance of the existing natural land features or conditions of the Leasehold. Construction is not limited to mean only the actual construction of the Pipeline, but also includes other disturbances such as materials movements and stockpiling, development of borrow pit areas, and the establishment of work-camps and communications facilities. Construction excludes, however, the following kinds of Field Activities: engineering surveys, soil tests, biological and other studies, and any Field Activities in connection with the Termination of the Pipeline.

Construction Segment means a portion of the Pipeline that constitutes a complete physical entity or stage, in and of itself, which can be constructed independently of any other portion or stage of the Pipeline, in a designated area or between two given geographical points reasonably proximate to one another. It is not to be construed as referring to the entirety of the Pipeline.

Contractor means any contractor or subcontractor at any tier, and the employees, representatives, and agents of such a contractor.

Design Basis and Criteria mean a document specifying how the design and engineering provides for and meets the performance and operational requirements of the project and meets regulatory requirements, maintains safety, protects the environment and protects public interests. The Design Basis and Criteria covers the Pipeline and Related Facilities.

Field Activity means any Lease-related activity conducted on or in direct support of activities on the Leasehold by the Lessee.

Field Representative means an employee, Contractor, agent, or representative of the Lessee, appointed in writing by the Lessee, with notice to the State, to receive notices and orders from the

Commissioner's authorized representative at any location not part of the Lessee's urban administrative offices during Construction.

Final Design means the stage of the engineering of a Construction Segment when design is essentially complete and includes detailed facility and equipment specifications, process flow diagrams, detailed route maps, Construction drawings, detailed Construction methods, and timing, manpower and equipment requirements.

Fish Rearing Areas mean those areas inhabited by fish during any life stage.

Fish Spawning Beds mean those areas where anadromous and resident fish deposit their eggs.

Hazardous Substance or Hazardous Material means any solid, liquid, or gas that is defined as hazardous under local, State or federal laws or regulations. In particular, any substance defined as hazardous under Alaska Department of Labor, Alaska Department of Environmental Conservation, EPA, OSHA, U.S. DOT/PHMSA and FDA laws and regulations shall be considered hazardous under this Lease.

Initial Construction means all Construction performed by the Lessee or its Contractors that is conducted prior to the first start-up and Operation of the Pipeline.

Lease Anniversary Date means the same day and month as the date this Lease is effective, in each subsequent year that this Lease is in effect.

Leasehold means the State Lands subject to this Lease as those lands are identified in Exhibit B of this Lease and any amendments, modifications and subsequent renewals.

Lessee means the Alaska Gasline Development Corporation, or its successors and/or assigns holding an undivided ownership interest in the right-of-way in accordance with the provisions of this Lease.

Maintenance means activities associated with ensuring that the Pipeline and Related Facilities meet all legal, government and regulatory requirements. This may involve repairs, fixes, and replacement of parts.

Natural Gas has the same meaning as given in AS 38.35.230(5), i.e. all hydrocarbons produced at the wellhead not defined as oil.

Notice to Proceed means a permission to initiate Initial Construction that is issued in accordance with the Stipulations set forth in Exhibit A of this Lease.

Operation(s) means all activities connected with the transportation of Natural Gas through the Pipeline including Maintenance of the Pipeline.

Overwintering Areas mean those areas inhabited by fish between freeze-up and break-up.

Person(s) has the same meaning as given in AS 01.10.060(a)(8).

Pipeline means all the facilities of a total system of pipe, whether owned or operated under a contract, agreement, or lease, used by Lessee for transportation of Natural Gas for delivery, for storage, or for further transportation, and including all pipe, pump or compressor stations, station equipment, tanks, valves, Access Roads, bridges, airfields, terminals and terminal facilities, including docks and tanker loading facilities, operations control centers for both the upstream part of the pipeline and the terminal, tanker ballast treatment facilities, and fire protection systems,

communication systems, and all other facilities used or necessary for an integral line of pipe, taken as a whole, to effectuate transportation, including an extension or enlargement of the line.

Pipeline Activities mean activities involving and related to Construction, Operation, Maintenance, and Termination of the Pipeline or any part of the Pipeline.

Preliminary Design means the stage of the engineering for a Construction Segment when the design has been refined enough to include basic facility and equipment specifications, route maps, and Construction methods.

Quality Assurance Program means the programmatic application of planned, systematic quality activities to ensure that the project will employ all processes needed to satisfy the commitments and requirements to ensure the integrity of the Pipeline, and required standards for health, safety, and environment.

Related Facilities mean those structures, devices, improvements, and sites located in, on, or over State Lands subject to this Lease and other lands in the State, other than the pipe itself, the substantially continuous use of which is necessary for the Operation and Maintenance of the Pipeline. Related Facilities include, but are not limited to: pump or compressor stations, station equipment, tanks, valves, Access Roads, bridges, airfields, terminals and terminal facilities, including docks and tanker loading facilities, control center(s) for all operations, tanker ballast treatment facilities, fire protection systems, and communication systems. Related Facilities generally do not include equipment not owned by the Lessee or facilities or Pipelines upstream of the gas treatment facilities or upstream of the first compressor station, except where such equipment constitutes the portion of the operations control center necessary to operate the Pipeline.

Restoration means the return of a disturbed site on the Leasehold upon completion of use by the Lessee to a physical and biological condition consistent with applicable State and federal law, regulations and policies at the time and to the extent acceptable to the Commissioner but in any event no better than its condition prior to the issuance of this Lease nor to original contours. Restoration includes, where appropriate, erosion and sedimentation control, stabilization, habitat reconstruction, Revegetation, and visual amelioration.

Restore means leaving a disturbed site in a condition consistent with applicable State and federal law, regulations and policies at the time acceptable to the Commissioner but in any event no better than its condition prior to the issuance of this Lease nor to original contours.

Revegetation means the establishment of native plant cover, unless non-native plant cover is required as a temporary means to reduce erosion, on disturbed lands in a manner consistent with applicable State and federal law and regulations. Methods or techniques to accomplish this include, but are not limited to, surface protection and preparation, fertilizing, seeding, planting, mulching and watering, and utilizing local growing conditions to dictate the timing for establishment of vegetative cover.

Revegetate means establishing native plant cover, unless non-native plant cover is required as a temporary means to reduce erosion, and reestablish conditions suitable for native plants. The priority of native plant cover for reestablishment shall be plant cover from 1) the immediate area; 2) the regional area; and 3) the State of Alaska.

Roads mean the State highways or private roads or those highways and/or roads managed by a municipality, a borough, a city, other local jurisdictions or the Alaska DOT&PF.

State Land(s) has the same meaning as given in AS 38.35.230(9).

State Pipeline Coordinator means that officer operating under written delegation of authority from the Commissioner with the authority and responsibility of administering a portion or all of the provisions of this Lease.

Termination means all activities connected with the expiration or completion of use of the right-of-way.

Trans-Alaska Pipeline System (TAPS) means that pipeline, or related facilities, referred to in and authorized by the Trans-Alaska Pipeline Authorization Act, Title II, P.L. 93 153, 87 Stat. 584.

Wetlands mean those areas defined as wetlands in State and federal law.

Written Authorization(s) means any authorization issued in writing by the Commissioner other than a Notice to Proceed.

Appendix N

Pipeline Design Approach

Alaska Stand Alone Gas Pipeline / ASAP

Design Methodology to Address Frost Heave Potential

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Prepared for:

ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

Michael Baker Jr., Inc.
6/9/2011

121283-MBJ-RPT-024

Rev. 0

REVISION HISTORY

Rev	Date	Comments	Approval
0	6/9/2011	Initial Release	

EXECUTIVE SUMMARY

The purpose of this report is to introduce the design methodology for addressing potential threats related to frost heave in areas where the ASAP is routed through frost susceptible soils. Specifically, this report introduces the ASAP approach to the structural mechanics issues of the pipeline, particularly the methodology employed to ensure pipeline mechanical structural integrity when subjected to potential displacements associated with earth movement.

The report also addresses questions raised by the Pipeline and Hazardous Materials Safety Administration (PHMSA) to the Alaska Gasline Development Corporation (AGDC) regarding the approach to structural mechanics of the Alaska Stand Alone Gas Pipeline/ASAP (ASAP) relating to potential ditch displacements, such as frost heave, which could affect the longitudinal stress/strain response of the pipeline.

The ASAP project methodology to ensure pipeline integrity from time-dependent threats such as frost heave depends on the evaluation of a limiting curvature of the pipe. The limiting curvature of the pipe is used for design screening of the route terrain units and developing operational monitoring using pipeline in-line inspection (ILI) tools that detect pipeline movement (e.g., high resolution geometry pigs). The limiting curvature criterion is derived from consideration of limiting tensile and compressive strains capacities of the pipe material. This criterion is used to screen pipe route segments which do not exceed the criteria limits, after evaluation of the interaction of the pipe material, its operating characteristics, and the segment route subsurface behavior. Those segments that are determined to potentially exceed the curvature criteria limits are subject to mitigative actions to reduce the pipe response to within acceptable bounds.

Section 1 through Section 4 introduce the ASAP design terminology as it applies to this effort. In particular, these chapters relate the development of the methodology that employs curvature limits to ensure pipeline integrity, especially for those displacement-controlled loadings that induce transverse bending. The introductory material includes background on the determination of the loading, its associated soil and pipe resisting functions, and how these are integrated in a combined pipe-soil interaction analysis. The analytical process measures the effect of the loading and soil resisting functions on pipe response against quantitative structural integrity criteria for the range of route soils to be encountered and a range of operational conditions. This evaluation process for the range of alignment conditions forms the demand evaluation.

Section 5 focuses on the line pipe material and fabrication, and the corresponding development of appropriate design limits using these materials. These limits are used as the capacity evaluation and are used to judge the acceptance or rejection of the demand developed in the previous chapters. Section 5 then addresses the questions:

- How are the curvature limits to be developed?
- What tests will be conducted to verify the limits?
- What material requirements will be imposed?

Section 6 outlines the application of the design methodology to the alignment. This includes an introduction to the alignment conditions where the loading under consideration in this report, frost heave, would *not* occur. The application methodology is presented as a progressive exclusion sieve, narrowing

down the alignment conditions, and associated alignment geographical segments, where the concern needs more detailed evaluation and potential mitigation. This chapter addresses the questions:

- Where would curvature criteria be used?
- Where would curvature criteria not be used?

Section 7 addresses construction requirements relating to frost heave answering the question:

- What modifications to standard construction techniques will be needed?

Section 8 addresses potential operational mitigation methods if operational monitoring concludes that the established curvature/strain limits may be exceeded and pipeline integrity is at risk. This chapter addresses the questions:

- What monitoring will be required during operations to ensure the limits are not exceeded?
- What mitigation measures will be employed should the limits be approached or exceeded?

As discussed with PHMSA, AGDC has not yet developed the final quantitative criteria, nor has AGDC compiled the ASAP alignment subsurface evaluation, which would allow completion of this design determination and application of the frost heave methodology to final design. Nevertheless, AGDC is confident that the process presented herein addresses the design methodology requirements needed at this front end of preliminary design, and forms a framework for successful evaluation of the route in final design.

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ACRONYMS AND ABBREVIATIONS

ADOT&PF	Alaska Department of Transportation and Public Facilities
AGDC	Alaska Gasline Development Corporation
API	American Petroleum Institute
APSC	Alyeska Pipeline Service Company
ARRC	Alaska Railroad Corporation
ASAP	Alaska Stand Alone Gas Pipeline
ASME	American Society of Mechanical Engineers
ASTM	American Standard Testing Materials
AUT	Automated ultrasonic testing
BLM	Bureau of Land Management
cf	Cubic feet
CFR	Code of Federal Regulations
CO2	Carbon dioxide
CTOD	Crack tip opening displacement
D/t	Diameter to wall thickness ratio
DGGS	State of Alaska Division of Geological and Geophysical Surveys
FEL	Front end loading
GIS	Geographic Information System
HDD	Horizontal directional drill(ing)
HT	Hoop tension
ILI	In-Line Inspection
INS	Inertial Navigation System
ksi	Kips per square inch
LT	Longitudinal tension
MAOP	Maximum allowable operating pressure
MMscfd	Million standard cubic feet per day
PHMSA	Pipeline and Hazardous Materials Safety Administration
psi	Pounds per square inch
psig	Pounds per square inch gage
ROW	Right-of-way
SMYS	Specified minimum yield strength
TAPS	Trans-Alaska Pipeline System
U.S.	United States of America
UAF	University of Alaska Fairbanks
USGS	U.S. Geological Survey

SECTION 1. INTRODUCTION

The purpose of this report is to introduce the design methodology for addressing potential threats related to frost heave in areas where the ASAP is routed through frost susceptible soils. Specifically, this report introduces the ASAP approach to the structural mechanics issues of the pipeline, in particular the methodology employed to ensure pipeline mechanical structural integrity when subjected to potential displacements associated with earth movement.

Presentation of the design methodology will help address questions raised by the Pipeline and Hazardous Materials Safety Administration (PHMSA) in correspondence to the Alaska Stand Alone Gas Pipeline/ASAP project (ASAP or the Project) and in meetings between PHMSA and the ASAP technical team. Correspondence with PHMSA is reproduced in Appendix A of this report. The specific item of interest is the section entitled *"External loads that exceed design allowable – strain based design"* contained in the letter to Dan Fauske from Jeffrey Wiese, received by the Alaska Gasline Development Corporation (AGDC) on May 4, 2011. In the beginning of this section, five code segments of the federal regulations are cited: 49 CFR 192, paragraphs 192.103, 192. 105, 192.111, 192.317, and 192.620. Further discussion of these regulations is presented in Section 2.

Potential threats to the pipeline integrity are generally identified and assessed using ASME B31.8S, Managing System Integrity of Gas Pipelines, which has an overview of a generalized procedure to the approach to earth movement threats contained in Section A-9, "*Weather Related and Outside Force Threat (Earth Movement, Heavy Rains or Floods, Cold Weather, Lightning)*." The potential pipeline displacement loading from earth movement used to illustrate the approach in this report is frost heave. Note that frost heave is a time-dependent threat, which is different from other familiar earth movement threats, such as seismicity, which are time-independent.

1.1 PROJECT OVERVIEW

The purpose of the Alaska Stand Alone Gas Pipeline/ASAP is to provide the in-state infrastructure for the reliable delivery of natural gas, primarily from the existing gas production facilities on the North Slope of Alaska, to markets in South Central Alaska, Fairbanks, and other communities, as practical. The pipeline routing is generally along the state's existing highway corridors from the North Slope to tidewater in Southcentral Alaska. A route map is presented in Figure 1.1.

The design basis for ASAP consists of a 24-inch-diameter chilled natural gas pipeline, approximately 737 miles in length, with a flow rate of up to 500 million standard cubic feet per day (MMscfd). The mainline pipeline system will be designed to transport natural gas consisting of either a highly-conditioned natural gas enriched in non-methane hydrocarbons or of conditioned natural gas containing mostly methane. At the 500 MMscfd throughput a single compressor station is required to be located approximately 286 miles south of Prudhoe Bay. A 12-inch lateral pipeline, approximately 35 miles in length, will tie-in to the mainline at approximately ASAP milepost 458 to supply up to 60 MMscfd of utility grade gas to Fairbanks.

The majority of the pipeline will be installed belowground utilizing conventional trenching techniques. The mainline pipeline will be API 5L X70 pipe with a minimum wall thickness of 0.595 inches, for the maximum allowable operating pressure (MAOP) of 2500 psig, which corresponds to

a design factor of 0.72. There is no intention of utilizing the alternative MAOP provisions of the 49 CFR 192 regulations which allow an increase of the design factor to 0.80. Since much of the pipe lies within the state roadway right-of-way (ROW), the design factor for over half the length of the mainline is 0.60 resulting in a wall thickness increase to 0.714 inches. The decrease in the design factor is required so as to conform to the 49 CFR 192.111(b)(2) when the pipeline is in a parallel encroachment. The Fairbanks Lateral will be API 5L X65 pipe with a minimum wall thickness of 0.250 inches (increased from 0.190 inches for constructability) for the MAOP of 1480 psig.

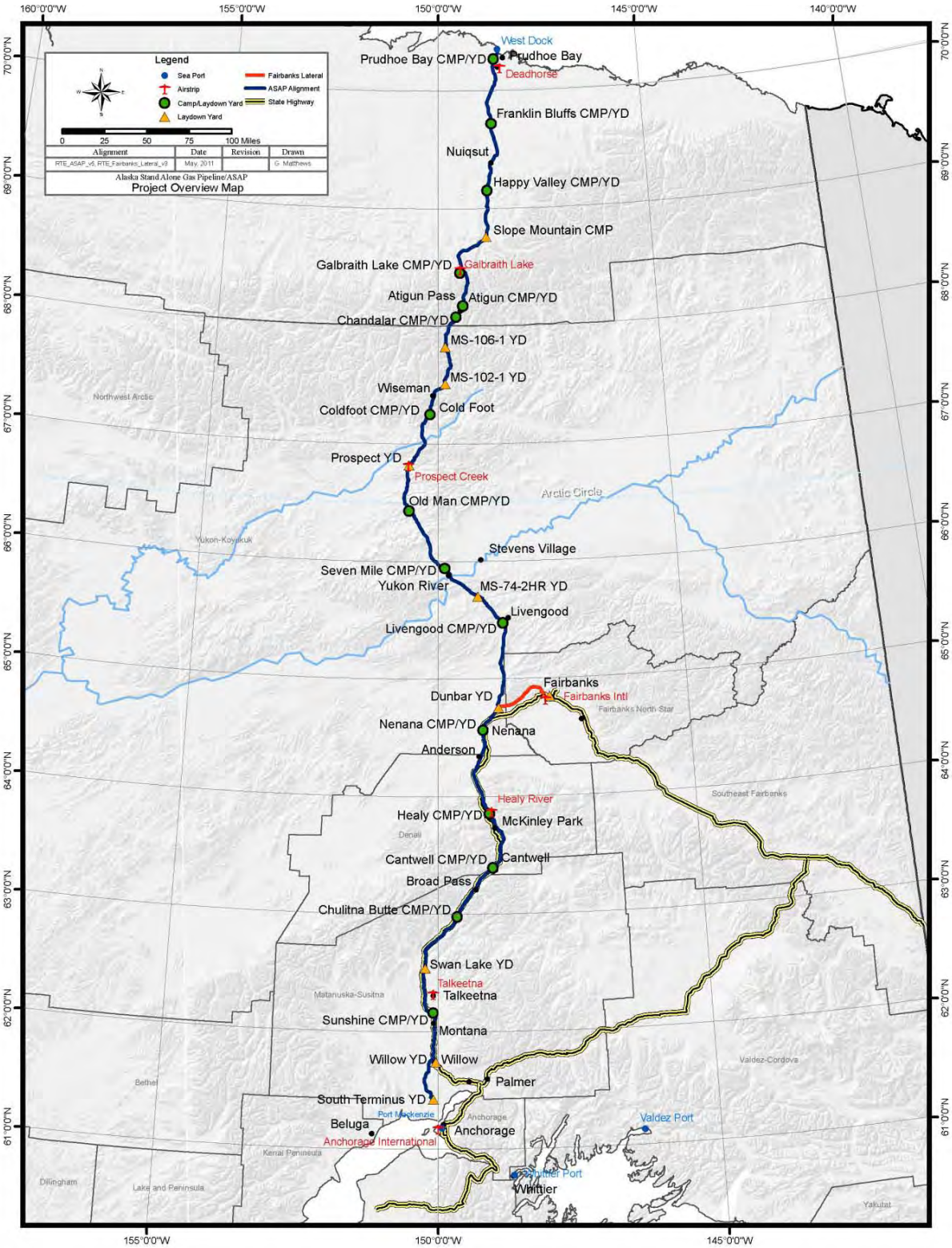

Figure 1.1 Route Map

1.2 PROJECT PHASING AND ASSOCIATED DELIVERABLES

1.2.1 PROJECT PHASING

Research shows that the disciplined application of a stage-gated process is strongly correlated with producing superior project outcomes. The gated approach involves breaking a capital project into discretely defined phases, where a clear set of deliverables or outcomes is outlined for each phase, which must be completed before the project is approved to move into the next phase. AGDC will be employing a stage-gated approach to project execution and delivery.

The first major phase of the gated project delivery process is FEL (front-end loading). Three stages usually comprise the FEL process (Conceptual Engineering, Preliminary Design, and Detailed Design) prior to project sanction (start of Execution). ASAP is currently in Conceptual Engineering, or early definition stages of project development.

The results of the initial phases provide critical input for making the final authorization decision to move forward with the project. The primary objective of FEL is to achieve an understanding of the project that is sufficiently detailed so that significant and costly changes in engineering, construction, and the startup phases of a project will be minimized.

The Conceptual Engineering project objective is development of the Project Plan due July 1, 2011. This will be the end of Conceptual Engineering. After that time, the Alaska Legislature will decide whether the Project will proceed to Preliminary Design, utilizing State funding, or whether the Project will be shelved or in some way modified at the end of the funding period in July 2011.

As the Project progresses into Preliminary Design and beyond, development of a large integrated project team will be needed comprised of people with a wide range of capabilities that can perform key functional roles in the project team organization. Project skill sets that will be required to move the project forward include operations, maintenance, business, process design, project controls, construction management, procurement and contracting, quality assurance, health and safety, and permitting.

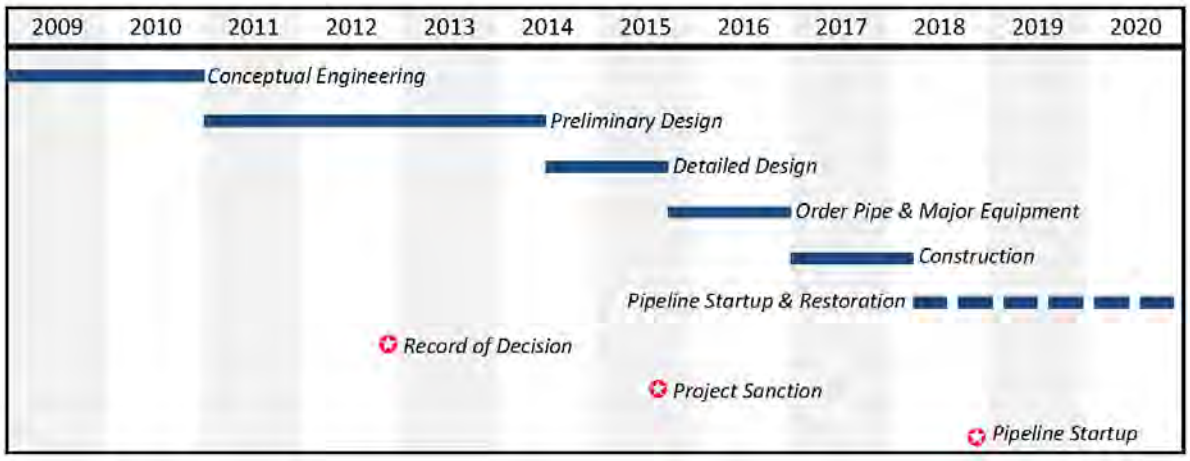

Figure 1.2 Project Schedule

1.2.2 DESIGN DELIVERABLES

The frost heave design approach is depicted in Figure 1.3 and will be explained further throughout this report. As the design progresses from Preliminary Design though Detailed Design and then Construction, information is being collated and verified to allow the design to progress along this design approach flowchart. In general, Preliminary Design follows the methodology development, scopes the data collection required for the demand and capacity to be further verified, and starts the data development for the route. Tasks scheduled to be finalized in Preliminary Design include:

- Identification of the input parameters required for the project approach that will implement this design methodology, including the analysis of the geothermal conditions and the structural analysis.
- Trial analyses completed and documented.
- The terrain units along the identified alignment are identified and captured in the project GIS – appropriate geotechnical parameters identified as required input for the methodology are assigned to the terrain units based on borehole analysis.
- The alignment route geo-database is implemented within the project GIS, concentrating on the subsurface information available along the routes from past exploratory tasks.
- Gaps in the route geo-database will be identified for required exploration.
- Potential manufacturers of the line pipe are contacted, and joints of the line pipe acquired for small-scale testing to be completed before the end of Preliminary Design.

Detailed Design will include finalizing the capacity and demand-capacity application evaluation process for the route including the following tasks:

- Finalization of the frost heave design approach methodology.
- The line pipe strain capacity is determined using the small-scale test results, and verified with full-scale testing.
- The route geo-database will be queried using the design methodology with route segments displaying potential unallowable heave potential subjected to additional scrutiny and/or mitigative measures.
- The final material and pipe order will incorporate any requirements to implement these measures.

The identified potential line segments subject to additional scrutiny identified in final design may require special mitigative measures that could be the basis of a special construction team. Baseline monitoring will be required within a practicable time after startup, followed with operational monitoring throughout the life of the project.

Design reviews by PHMSA and other agencies will occur throughout the various phases of the project.

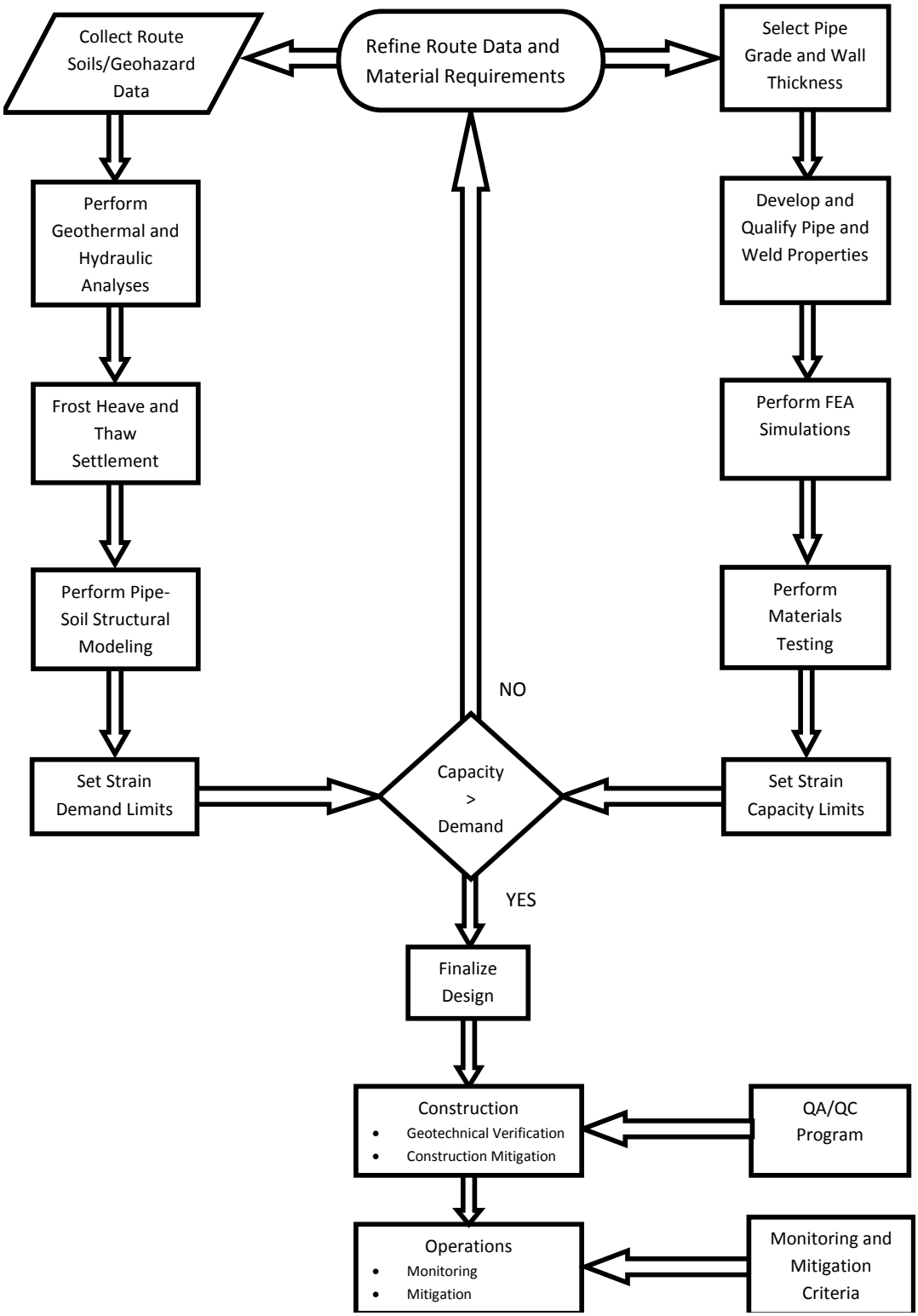

Figure 1.3 Design Approach Flowchart

1.3 ORGANIZATION OF THE REPORT

Section 1 through Section 4 introduce the ASAP design terminology as it applies to this effort. In particular, these chapters relate the development of the methodology that employs curvature limits to ensure pipeline structural integrity especially for those displacement-controlled loadings that induce transverse bending. The introductory material includes background on the determination of the loading, its associated soil and pipe resisting functions, and how these are integrated in a combined pipe-soil interaction analysis. The analytical process measures the effect of the loading and soil resisting functions on pipe response against quantitative structural integrity criteria for the range of route soils to be encountered as well as a range of operational conditions. This evaluation process for the range of alignment conditions forms the demand evaluation.

Section 5 focuses on the line pipe material and fabrication, and the corresponding development of appropriate design limits using these materials. These limits are used as the resistance capacity and are used to judge the acceptance or rejection of the demand developed in the previous chapters. Section 5 then addresses the questions:

- How are the curvature limits to be developed?
- What tests will be conducted to verify the limits?
- What material requirements will be imposed?

Section 6 outlines the application of the design methodology to the alignment. This includes an introduction to the alignment conditions where the loading under consideration in this report, frost heave, would not occur. The application methodology is presented as a progressive exclusion sieve, narrowing down the alignment conditions, and associated alignment geographical segments, where the concern needs more detailed evaluation and potential mitigation. This chapter addresses the questions:

- Where would curvature criteria be used?
- Where would curvature criteria not be used?

Section 7 addresses construction requirements relating to frost heave answering the question:

- What modifications to standard construction techniques will be needed?

Section 8 addresses potential operational mitigative methods if operational monitoring concludes that the established limits may be exceeded and pipeline integrity is at risk. This chapter addresses the questions:

- What monitoring will be required during operations to ensure the limits are not exceeded?
- What mitigation measures will be employed should the limits be approached or exceeded?

SECTION 2. STRUCTURAL MECHANICS OF BURIED PIPELINES

Although some sections of the ASAP are aboveground, notably at waterway crossings and at the beginning of pipeline route on the North Slope, ASAP is primarily a buried pipeline. Buried pipelines are essentially "restrained," that is, displacement of the pipe is restricted by the soil around it.

For the problem of frost heave, advanced analytical tools, and input functions needed to characterize the components of the frost heave methodology, are required to integrate the various parts of the loading and resistance functions so as to correctly address the loading demand on the pipeline. This section reviews some of the familiar parts of the demand problem, such as the internal pressure and change in temperature, and then reviews how these are integrated into the time-dependent loading functions for the longitudinal stress components to derive a unified mechanical approach.

The basis of the structural mechanics for pipeline engineering is summarized in Appendix B. For such a straightforward "structure," a pressurized pipe can actually exhibit fairly complex behavior involving significant stress components in a biaxial stress state.

The resultant mechanical state of the pipeline that arises from the external loads imposed from different sources, causing both hoop and longitudinal pipe stress effects, is referred to as the "demand" on the pipeline. Since the overall resultant is a complex stress state, the demand is best characterized in this combined state – i.e., because the relative magnitudes of the orthogonal components are roughly of the same magnitude, the interaction mechanics must be considered.

Yet, this evaluation of the "demand" is not sufficient for design, since it must be judged where the behavior is acceptable in the design, i.e., whether the "capacity" of the pipe is sufficient to resist the demand. The basis for material regulatory acceptance of the line pipe centers on the yield point for a uniaxial condition. The yield point for pipeline engineering is defined by testing requirements to be the point at which the specified minimum yield strength (SMYS) of the pipe is recorded – 0.5% strain. As noted, this definition of the "yield" does not concisely fit classical "textbook" definitions of yield, which is often defined as the point at which non-recoverable, i.e., "plastic" deformations, initiate. For example, if the ASAP API 5L X70 pipe material was considered to be governed by Hooke's law ($\sigma = E\varepsilon$, where σ is stress, ε is strain, and E is the modulus of elasticity) to the SMYS of 70 ksi, the associated strain would be only:

$$\varepsilon = 70ksi / 29{,}500ksi / in / in = 0.00237in / in = 0.237\%$$

Thus, to reach the strain associated with SMYS, an additional 0.263% strain occurs, which cannot be accounted for by an elastic relationship. Alternative yield point characterizations are defined using an "offset" method where a line with the elastic slope is drawn from a specified strain offset point – again confirming the necessary incorporation of non-recoverable (plastic) deformation just to reach the SMYS of the pipe.

In addition, as noted the SMYS value is defined in a uniaxial condition. Again because the orthogonal stress components are roughly comparable in magnitude, the simple uniaxial relations must be extended to consider actual biaxial conditions. Generally, the extensions involve structural

mechanics relationships that allow the combined stress conditions to be related back to uniaxial tests and uniaxial stress conditions or "effective" stresses that characterize the biaxial conditions, often by reference to a skewed reference frame.

2.1 PRESSURE CONTAINMENT

The governing regulatory document for the ASAP pipeline, 49 CFR 192, addresses the "…design pressure for steel pipe…" in 49 CFR 192.105. The design factor used in this formula for the design pressure is addressed in 49 CFR 192.111.

Although there are provisions for alternative approaches to this design factor, with additional associated requirements for utilizing this alternative formulation, AGDC has elected to everywhere avoid this alternative formulation for the design factor. Thus, requirements relating to this alternative formulation, including those cited in 49 CFR 192.620, are not applicable to ASAP and are not further addressed in this report.

The design pressure formula cited in the federal regulations ($P = (2\ St/D)\times F\times E\times T$) is recognized as the classical Barlow's formula derived from basic equilibrium considerations (see Appendix B). The derivation does not depend on the material type (e.g., steel, aluminum, etc.), the mechanical state of the pipe material (elastic, inelastic, plastic…) nor consideration of pipe behavior in the orthogonal longitudinal direction. The robustness of this formulation makes it ideal for the focus of pressure containment guidance, both in regulations and consensual standards.

On the other hand, and somewhat because there are no associated limiting conditions arising from the derivation for the application of this formula, there are no associated explicit requirements for other types of loadings that can be deduced from this design pressure formula. In particular, there are no requirements associated with the design pressure formula that impose any conditions or limitations upon the longitudinal stress/strain behavior of the pipeline. There are more exact formulations for thick-walled pipes (generally defined as having a diameter to wall thickness ratio (D/t) of less than 20), but typical transmission lines, including ASAP, are thin-walled pipes.

Thus, the design pressure formula cited in the regulations will be met regardless of the design limitations imposed on the longitudinal effects, i.e., if the pipeline diameter, thickness, and operating pressure meet a 72% specified minimum yield strength (SMYS) requirement at startup, the same combination of these input parameters into the design pressure formula cited in the regulations will produce the same limiting stress of 72% SMYS, and thus identically meet these regulatory requirements indefinitely throughout operations, regardless of the longitudinal behavior. This is a conclusion from the stress mechanics of pipelines, and is not peculiar to any aspect of the ASAP nor to any transmission pipeline.

2.2 TREATMENT OF LONGITUDINAL LOADINGS

In contrast to the explicit requirements for the design pressure formula, the federal regulations contain only general guidance for additional types of loadings, and no explicit limitations. General guidance is contained in 49 CFR 192.103 which states:

> *Pipe must be designed with sufficient wall thickness, or must be installed with adequate protection, to withstand anticipated external pressures and loads that will be imposed on the pipe after installation.*

More specifics about potential hazards to be investigated are contained in 192.317:

> *(a) The operator must take all practicable steps to protect each transmission line or main from washouts, floods, unstable soil, landslides, or other hazards that may cause the pipeline to move or to sustain abnormal loads…*

If additional thickness is found to be required for reasons other than pressure containment, the allowable pressure must not be increased through a re-computation of the design pressure formula to take advantage of this additional thickness as per 49 CFR 192.105.

The requirements of 49 CFR 192 quoted above, though general in nature, are an explicit reminder to all operators that prudent oversight of the potential detrimental effects from external loads requires diligent investigation and cannot be waived. To satisfy this requirement, the pipeline industry has addressed the lack of explicit requirements in the regulatory framework through consensual standards so as to satisfy the general regulatory requirements.

The U.S. gas industry accepted standard for requirements in areas where the regulations give only general guidance is ASME B31.8, Gas Transmission and Distribution Piping Systems. To be clear, where there is a disagreement in ASME B31.8 with the regulations, the regulations are followed.

In particular, ASME B31.8 Section 833 addresses longitudinal loads and is the basis for industry analysis of longitudinal stresses – in compliance with the need for such an analysis of external loads as required by the regulations, and in no way contradictory or contraindicating any specific requirements in the regulations as to the details of such an undertaking. These requirements are incorporated in all commercial pipe stress analysis programs such as CAESAR II and AUTOPIPE. Section 833.3 sets the longitudinal stress requirements for restrained pipe with a limitation of 90% of SMYS, while Section 833.4 sets the combined stress requirements for restrained pipe with a limitation of 90% of SMYS for long term loading and 100% of SMYS for short term loading (ASAP has no temperature derating), while Section 833.5 details the requirements for design to utilize a stress greater than yield.

AGDC follows the procedure as described above, which adheres to regulatory requirements, using explicit industry recommended procedures to satisfy those requirements. AGDC has identified no exceptions to this described procedure.

2.3 EFFECTIVE STRESS

To characterize the combined effects of the operational circumferential load, i.e. the hoop stress due to pressure containment, with the longitudinal effects from frost heave, a method of determining the combined effect is required. Further, this combined effect must be able to be compared to the actual material tests that are typically performed and/or required for material requisition, which are uniaxial.

As noted above, the SMYS value is defined in a uniaxial condition. Again because the orthogonal stress demand components are roughly comparable in magnitude, the simple uniaxial relations must be extended to relate to the actual biaxial conditions. Generally, the extensions involve structural mechanics relationships that allow the combined stress conditions to be related back to uniaxial tests and uniaxial stress conditions or "effective" stresses that characterize the biaxial conditions, often by reference to a skewed reference frame. This section presents the background for the "effective stress" combinatorial techniques, which are used within the frost heave design methodology.

The two most commonly used theories for determining effective stresses in pipelines are the maximum shear stress theory, commonly referred to as the Tresca theory, and the maximum distortion energy theory, commonly referred to as the von Mises' theory. The effective stresses that result from these theories are both represented in ASME B31.8.

The first approach is the Tresca yield criterion, and as described in more detail in Appendix B, for the biaxial stress conditions that exist in pipelines the yielding criterion is expressed as follows:

$$\left|\sigma_H\right| \le \sigma_y \qquad \text{and} \qquad \left|\sigma_L\right| \le \sigma_y \qquad \text{and} \qquad \left|\sigma_H - \sigma_L\right| \le \sigma_y$$

where:

σ_H is the hoop stress;

σ_L is the longitudinal stress; and

σ_y is the yield stress of the pipe.

The hexagonal Tresca yield function is illustrated in longitudinal stress vs. hoop stress space in Figure 2.1 for an elastic-plastic material with a yield strength of 70 ksi. Any stress falling within the hexagon indicates that the material behaves elastically while points on the hexagon indicate that the material is yielding. This criterion is implemented under B31.8 Section 833.4 to limit combined stress for restrained pipe as:

$$\left|\sigma_H - \sigma_L\right| \le k \cdot S \cdot T$$

where:

k is an allowable stress multiplier (for loads of long duration, k is 0.90, and for occasional non-periodic loads of short duration it is 1.0);

S is the pipe SMYS; and

T is the temperature derating factor (T=1.0 for temperatures ≤ 250°F, per B31.8 Section 841.116).

The second approach is the von Mises' yield criterion, which defines a different effective stress to compare against the uniaxial "yield point" as:

$$\sqrt{\sigma_1^{\ 2} - \sigma_1 \cdot \sigma_2 + \sigma_2^{\ 2}} = \sigma_y$$

This is the equation of an ellipse as also shown in Figure 2.1 for an elastic-plastic material with a yield strength of 70 ksi. Any stress falling within the ellipse indicates that the material behaves elastically while points on the ellipse indicate that the material is yielding. This criterion is implemented under B31.8 Section 833.4 to limit combined stress for restrained pipe as:

$$[\sigma_L^{\ 2} - \sigma_L \cdot \sigma_H + \sigma_H^{\ 2}] \le k \cdot S \cdot T$$

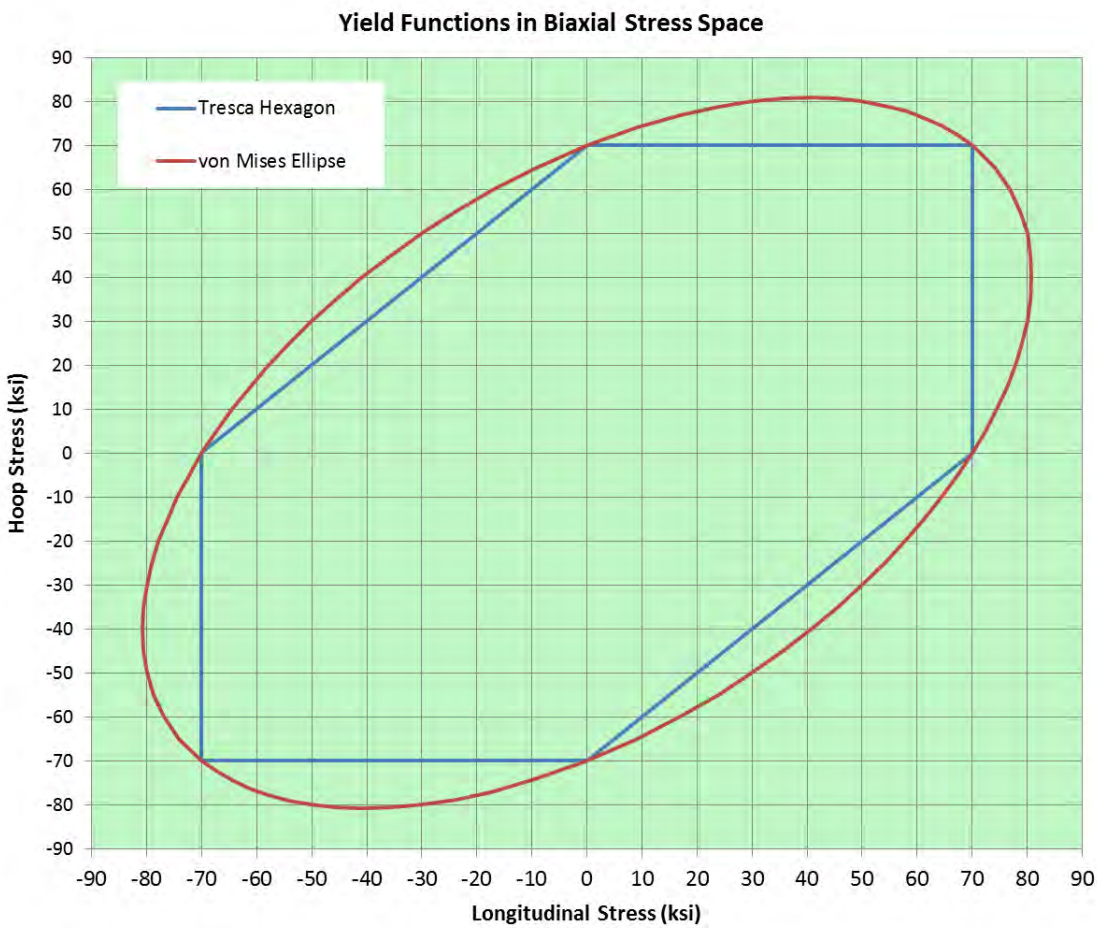

Figure 2.1 Illustration of Tresca and von Mises Yield Functions

Note that the Tresca hexagon meets the von Mises ellipsoid at certain points around the periphery of the ellipsoid and is elsewhere contained within the ellipsoid. Since points located within the

yield function boundaries are said to define elastic states while those on the yield function boundaries define a yielded condition, the Tresca criterion can be seen to be slightly more conservative than the von Mises criterion. The differences, however, are small and both approaches are accepted. In general, the von Mises theory is the more widely used in computer applications and advanced inelastic analysis because of its smooth surface and corresponding continuously differentiable function. The Tresca theory, because of its simplicity, is often used in manual/hand calculations.

2.4 APPLICATION OF THE METHODOLOGY

The methodology described above for the combination of the orthogonal stresses in the pipe that arise from the operational load acting concurrently with the imposed frost heave, are effectively combined within the analytical pipe stress program PIPLIN, which will be described in more detail in Section 4 of this report.

SECTION 3. GEOHAZARDS

A geohazard is defined as a naturally occurring or project-induced geological, geotechnical, or hydrological phenomenon that could load the pipeline, causing a pipeline integrity concern, or that could impact the ROW, causing an environmental concern. The principal geohazards of concern for ASAP design are frost heave and thaw settlement.

3.1 GEOTHERMAL CONSIDERATIONS

Geothermal design considers the coupled effect of soil mechanics and heat transfer principles that drive physical processes that can impact the operational reliability and performance of the pipeline. Examples of these processes are:

- Frost bulb formation;
- Frost heave beneath the pipe;
- Thaw bulb formation; and
- Thaw settlement of the soils supporting the pipe.

The preferred mode for the ASAP is buried and it is anticipated the pipeline will encounter thermal states ranging from continuous permafrost in the north, to discontinuous permafrost in the center, and thawed muskeg, alluvial, lacustrine, glacial moraine, and outwash type soils in the central and southern regions (see Figure 3.1). These conditions require designs that allow for pipeline deformations caused by frost heave and thaw settlement.

In general, the pipeline will be operated chilled (≤32°F) in the continuous and discontinuous permafrost regions, but may operate above freezing at least during parts of the year along the southern portion (south of Nenana). As a result, frost heave is likely in unfrozen frost-susceptible soils where the pipeline operating temperature is below freezing, and there is a potential for thaw settlement to occur in frozen, ice-rich soils where the pipeline operating temperature is above freezing.

To reduce potential impacts along the northern portion, the gas will be chilled to 30°F before leaving the North Slope Gas Conditioning Plant. As the gas travels southward, the operating temperature will fluctuate based on several factors including time of year, surrounding ambient ground temperature, and the Joule-Thompson effect.

With chilling of the gas, it is anticipated that the majority of the pipeline will operate below freezing for most or all of the year. As indicated in Figure 3.1, permafrost is typically continuous or discontinuous until the south flank of Alaska Range. For the remainder of the alignment to the pipeline terminus, the permafrost is mapped as sporadic or isolated and the pipeline will be buried in glacially derived landforms that are typically frost susceptible.

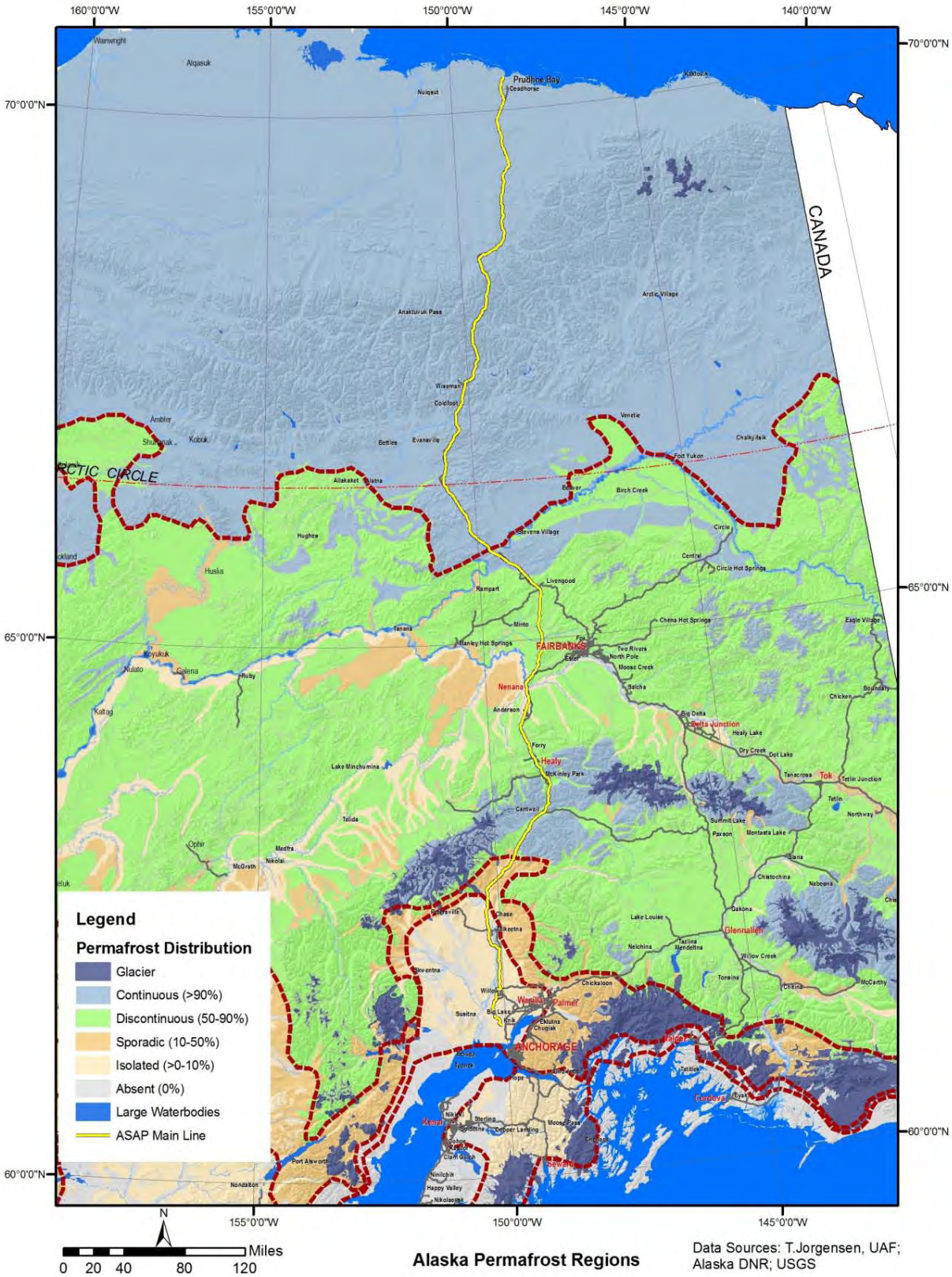

Figure 3.1 ASAP Permafrost Characteristics

Frost heave is anticipated where unfrozen frost-susceptible soils exist in combination with other critical conditions such as available water. Frost heave mitigation may involve removing/replacing frost-susceptible soils within the influence zone of the pipeline or providing insulation or heat to prevent the frost-susceptible soils below the pipe from freezing. A heater may be installed near Willow to raise the pipeline operating temperature above freezing and mitigate potential frost bulb development between Willow and the terminus (i.e., eliminate the frost bulb during the summer). However, basic design details such as the size, location, and expected operating schedule will only be determined after extensive geothermal analysis has been completed.

3.2 DESIGN DEVELOPMENT

3.2.1 GEOTECHNICAL/GEOTHERMAL DATA

Geotechnical/geothermal data will be used for general and specific geotechnical analysis for the gas pipeline. The following data have been gathered and available to the project:

- Soils, thermal state, and groundwater data from historical borehole and from test pit logs drilled by the project (Tanana River at Nenana), ADOT&PF, ARRC, the University of Alaska Fairbanks (UAF) Water and Environmental Research Center, and the UAF Geophysical Institute.
- Laboratory data from index property and engineering property tests done on borehole and field samples acquired by the project and ADOT&PF.
- General and specific geological and geotechnical data from published sources including the State of Alaska Division of Geological and Geophysical Surveys (DGGS) and U.S. Geological Survey (USGS).
- Orthoimagery and other aerial or satellite based imagery acquired for the project or available from DGGS 2011 LiDAR survey.
- Topographic data from project field survey work, aerial photography, and published maps.
- Bedrock data from borehole logs, laboratory testing of samples, field reconnaissance, and available public sources such as ADOT&PF, DGGS, and USGS.
- Terrain unit and landform data developed by the project and from published maps and reports.
- General reconnaissance data from field programs.

3.2.2 SELECTION OF GEOTECHNICAL/GEOTHERMAL PARAMETERS FOR DESIGN

Many design parameters are site specific and will be obtained over time as field studies from the various disciplines are completed. Additional guidelines and the basic approach to geotechnical and geothermal analyses are discussed below.

Geotechnical parameters necessary for frost heave analysis and design will initially be estimated based on terrain unit analyses already completed and calibrated against legacy borehole and lab test data recovered for the project. This approach will be augmented by field and laboratory test results from planned geotechnical investigations. Frost susceptibility is primarily a function of soil grain size where non-plastic fines (typically silt) create pore spaces that facilitate capillarity and

freezing point depression. The U.S. Army Corps of Engineers frost design and classification system is a universal standard for addressing frost heave behavior (see Table 3.1). Critical conditions for pipeline frost heave distress occur where the pipeline traverses abrupt contrasts in soil conditions and the soils freeze and thaw repeatedly (seasonally).

Note that the frost classification system is based primarily on soil particle size distribution. Geotechnical tests to properly classify and analyze frost heave potential include the following tests with corresponding standard test methods.

Table 3.1 U.S. Army Corps of Engineers Frost Design Soil Classification System

Frost Susceptibility[a]	Frost Group	Note	Kind of soil	Amount finer than 0.02mm (wt%)	Typical soil type under USCS[b]
Negligible to low	NFS[c]	a	Gravels	0 to 1.5	GW, GP
		b	Sands	0 to 3	SW, SP
Possible	PFS[d]	a	Gravels	1.5 to 3	GW, GP
		b	Sands	3 to 10	SW, SP
Low to medium	S1		Gravels	3 to 6	GW, GP, GW-GM, GP-GM
Very low to high	S2		Sands	3 to 6	SW, SP, SW-SM, SP-SM
Very low to high	F1		Gravels	6 to 10	GM, GW-GM, GP-GM
Medium to high	F2	a	Gravels	10 to 20	GM, GM-GC, GW-GM, GP-GM
Very low to very high		b	Sands	6 to 15	SM, SW-SM, SP-SM
Medium to high	F3	a	Gravels	>20	GM, GC
Low to high		b	Sands except very fine silty sands	>15	SM, SC
Very low to very high		c	Clays, I_p>12	-	CL,CH
Low to very high	F4	a	All silts	-	ML, MH
Very low to high		b	Very fine silty sands	>15	SM
Low to very high		c	Clays, I_p>12	-	CL, CL-ML
Very low to very high		d	Varved clays and other fine-grained banded sediments	-	CL and ML; CL, ML, and SM; CL, CH, and ML; CL, CH, ML, and SM

[a] Based on laboratory frost-heave tests
[b] G, gravel; S, sand; M, silt; W, well graded; P, poorly graded; H, high plasticity; L, low plasticity
[c] Non-frost susceptible
[d] Requires laboratory frost-heave test to determine frost susceptibility
Source: Johnson et. al. 1986

(Andersland and Ladanyi 2004)

Table 3.2 Geotechnical Tests for Frost Heave Potential

Test	Standard
Moisture content	ASTM D2216
Gradation (sieve analysis)	ASTM C136
Gradation (sieve with hydrometer)	ASTM D422
Atterberg Limits	ASTM D4318

Table 3.3 Additional Geotechnical Tests for Frost Heave Evaluation

Test	Standard
Moisture-Density Relationship	ASTM D1557
Specific Gravity	ASTM C127
Unit Weight of Frozen Soil	Gravimetric test of undisturbed frozen soil

Additional geotechnical parameters needed to forecast frost heave include permeability, pressure on the freezing front; frost penetration rate and frost heaving rate; longitudinal, bearing and uplift resistance; soil load/deflection and creep characteristics; soil temperature gradient, and climatic data. Many of these parameters can be empirically correlated with the results of geotechnical tests listed above. A probabilistic approach to assigning soil properties may be adopted if sufficient sample data is acquired by the project. When data gaps are identified, they will be filled as necessary. Climatic data will be updated to include most recent data from stations along the route. Limits of applicability of climatic data will be based on geographic similarities along the line.

The approach to frost heave analysis will be to combine route soils data with climatic data and pipeline thermal predictions and pipe deformation analysis. Thermal conditions of the pipeline and ground will be predicted using a coupled hydraulics/geothermal model. This model will be comprised of a linear hydraulics model of the pipeline with two-dimensional “slices” of soil defined at intervals along the pipeline. The slices are defined principally by the terrain unit analysis, thus geotechnical information will accompany each slice that allows prediction of frost heave. The hydraulics model will predict temperatures along the pipeline for a given throughput, inlet temperature and pressure, initial soil temperatures, and gas properties. The pressure and temperature of the flowing gas depends upon the heat flux through the pipe wall which, in turn, depends on the pipe interaction with the subsurface thermal state (ground temperatures).

Predictions of the ground temperatures surrounding the pipe will be made by the geothermal model. The model will consider a two-dimensional “slice” of the pipe surrounded by soil regions and bounded on the surface by location dependent varying climatic functions. A finite element

approach will be applied to develop a series of "snapshots" along the pipeline of the changing thermal condition of the subsurface over time, which is in turn used to estimate the heat flux along the alignment to the flowing gas. The result is an estimate of the magnitude and timing of freezing of initially thawed ground including the geometry of the evolving frost bulb. The same process is used to predict thawing of initially frozen ground.

The pipe/soil thermal regime and geotechnical properties that define the soil's frost susceptibility will then be used to predict the amount of heave beneath the pipeline. The frost heave predictions will be calibrated against results of previous frost heave laboratory and field testing performed by the research community and special testing completed by industry for other projects.

3.3 APPLICATION OF THE METHODOLOGY

Similar to the data describing the pipe material properties and the associated functional behavioral description, the geotechnical properties are also integrated in the pipe-soil interaction analysis within the program PIPLIN, described in Section 4 of this report. These geotechnical properties describe two parts of the soil interaction analysis: the displacement imposed on the pipe ditch bottom over time (i.e., the restrained heave), and the resistance to the pipe movement by the soils surrounding the buried pipe. As described in Section 4, the pipe strain demand resulting from the predicted frost heave is determined through a series of pipe-soil interaction analyses that consider heave of the soils beneath the pipe as a function of time and take into account pressure feedback from the pipe at the base of the frost bulb, and the resistance of the soil to differential pipe movement.

Problematic areas identified in performing this route-wide analysis will be subject to site-specific analysis. The site-specific analysis will follow the same general approach, but will utilize more refined soil and thermal inputs. If the site-specific analysis results in unacceptable levels of pipe strain demand (i.e., pipe strain demand that exceeds the pipe strain capacity), then mitigative measures would be employed as described in Section 6.3.

SECTION 4. STRAIN DEMAND DETERMINATION

4.1 PIPE-SOIL INTERACTION ANALYSIS OVERVIEW

The mechanism of pipeline frost heave has been investigated in detail for many previous arctic gas pipeline projects. Frost heave occurs when a chilled pipeline freezes water in frost-susceptible soil in which it is buried. As the soil freezes, it expands and forms a frost bulb around the pipe. Upward heave of the pipe is produced by swelling at the bulb face as the bulb grows. Significant pipe stresses and deformations can occur when the buried pipeline runs between a stable soil and a frost-susceptible soil. Because the pipe heaves in the frost-susceptible soil section but remains stationary in the adjacent stable soil section, a differential vertical heave displacement profile is produced across the transition between the stable and frost-susceptible soil sections.

The strain demand analyses for frost heave of ASAP will be carried out using the PIPLIN computer program (SSD 2011). PIPLIN is a special-purpose finite element program developed to perform stress and deformation analysis of two-dimensional pipeline configurations. The analyses will consider several nonlinear aspects of pipeline behavior, including pipe yield, large-displacement effects, and nonlinear frozen soil support.

A heaving section of a pipeline together with a schematic view of the corresponding PIPLIN model is illustrated in Figure 4.1. To reduce the required size of the model, a symmetric boundary condition (i.e., zero rotation and zero longitudinal translation) is normally imposed at the end of the model corresponding to the center of the heave span. The sufficient model length is such that the boundary condition specified at the remote end of the model has no influence on the key analysis results. The pipe is typically assumed to be initially straight with a uniform depth of soil cover.

The pipe is modeled using beam type elements in which the stresses and strains are monitored at a number of fiber points around the pipe cross section at the element ends. PIPLIN achieves additional economy by considering a plane of symmetry through the pipe centerline (e.g., the vertical plane in frost heave model) so that only one-half of the pipe cross section is analyzed. In these analyses, the pipe cross-section is assumed to remain circular and plane sections are assumed to remain plane. The pipe element accounts for large displacement effects (i.e., changes in the equilibrium due to large displacements) by adding geometric stiffness coefficients to the element stiffness matrix. This allows PIPLIN models to accurately capture important column buckling and cable tension effects.

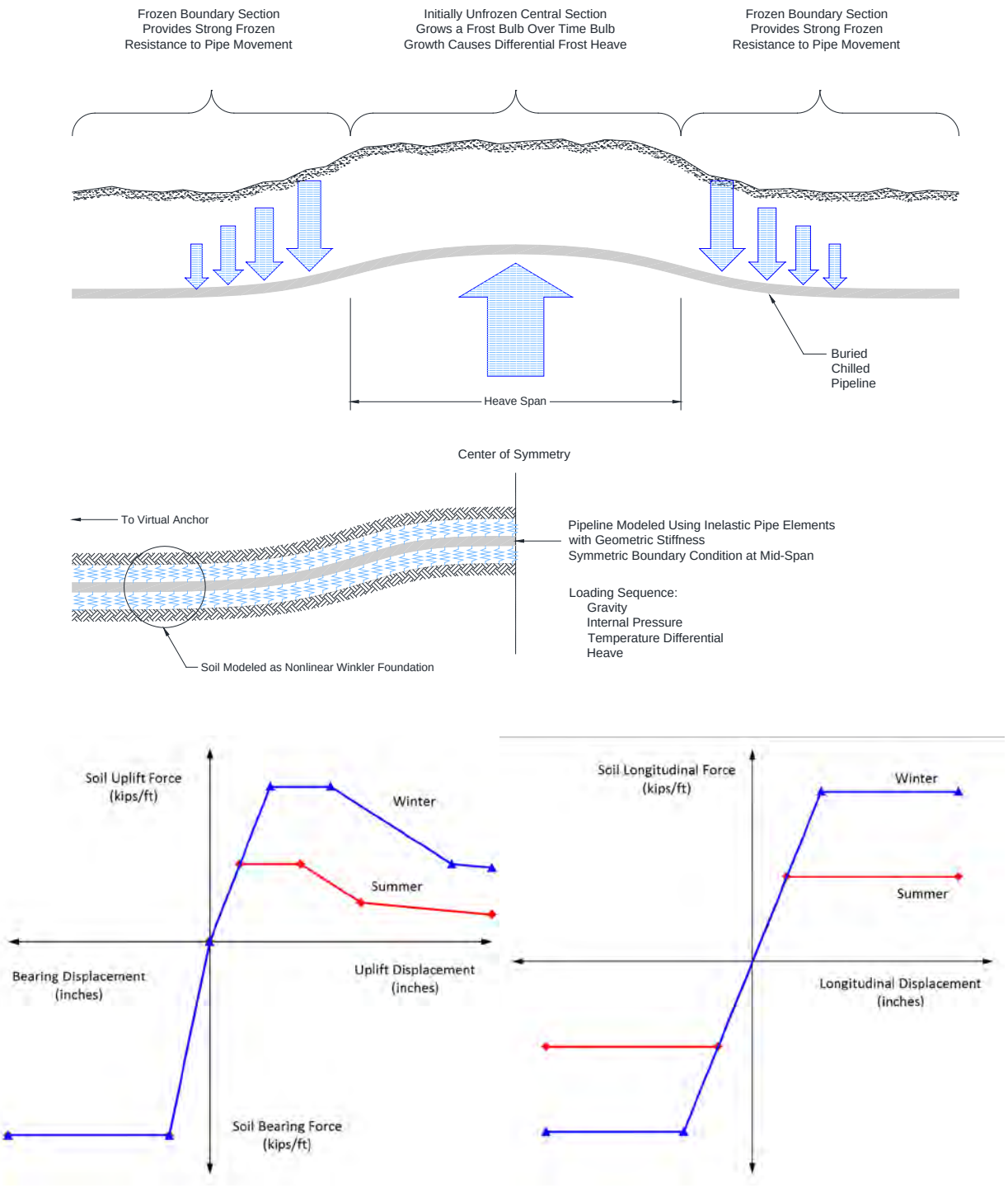

Figure 4.1 Frost Heave Illustration

Pipe yield at the fiber points around the pipe cross section is taken into account assuming the von Mises yield criterion so that interaction between hoop and longitudinal stresses is included. The pipe steel material is modeled using the Mroz (Mroz 1967) multi-linear kinematic hardening plasticity model which is able to accurately capture anisotropic pipe steel stress-strain relationships

(e.g., pipe that has different stress-strain curves in the longitudinal tension/compression vs. hoop tension/compression directions). The pipe material model provides a very reasonable representation of steel behavior under monotonic, unloading and cyclic load conditions.

The soil is modeled as a nonlinear Winkler foundation. This means that the soil support is idealized as a series of discrete, independent, nonlinear springs lumped at the element midpoints. In effect, this assumes that the soil can be regarded as a series of plane "slices". The basic assumption is that the slices deform independently of each other. The pipe-soil springs are assumed to have uniform properties over any pipe segment.

The frost heave analyses are typically initiated with the application of gravity, internal pressure and temperature differential loads. If desired, a hydrostatic test loading/unloading sequence can be considered prior to applying the operating loads. A multi-year (typically 20 to 30 years) frost heave simulation of the pipe-soil interaction model is then undertaken. The frost heave analyses are nonlinear time-history analyses performed using small steps through time. Within the heave span, the frost bulb geometry and frost heave vary with time. Seasonal variations of the uplift, longitudinal, and bearing creep soil temperatures (and corresponding resistance) are also specified with each heave time step. The heave is imposed progressively at the base of the pipe-soil springs within the heave span. The amount of heave at the ditch bottom is calculated separately for each transverse pipe-soil support in turn accounting for the important pressure feedback from the pipe at the base of the frost bulb. A transition length between the finite length section of heaving soil and the adjacent non-heaving soil section can be specified if desired.

The complete pipe-soil deformation state is established at each increment of the analysis. The program output includes pipe displacements, soil support deformations and reactions; pipe axial forces, bending moments and curvatures; axial, hoop and von Mises stresses and axial and hoop strains in the pipe. The maximum pipe tension and compression strain demands are established at each output state to provide time-history plots of these key response quantities.

4.2 PIPE MATERIAL PROPERTIES

As implemented in PIPLIN, the Mroz plasticity model assumes that the pipe material yields according to the von Mises theory under plane-stress conditions. The bi-axial stress-strain behavior is defined by a set of progressively larger, non-overlapping elliptical yield surfaces in longitudinal stress vs. hoop stress space. The Mroz theory specifies that as the steel yields, the individual ellipses translate without changing size or shape, which is the well-known kinematic hardening assumption. The theory also specifies the direction of movement of each ellipse – essentially, any ellipse moves so that when the stress point reaches the next larger ellipse, the yielding ellipses do not overlap.

One of the key features of the PIPLIN steel model is that the elliptical yield functions can be shifted to initial positions in order to mimic the effects of the pipe expansion phase of the UOE manufacturing process. The shifts are selected such that the analytical uniaxial stress-strain results closely match a set of uniaxial longitudinal tension (LT), hoop tension (HT) target stress-strain curves. For pipe steel fabricated with the UOE process, the ellipses tend to be shifted along the HT axis. The pure HT ellipse shifting pattern tends to result in an elevated proportional limit and

relatively sharp (abrupt) yielding point for the HT curve (due to work hardening and bunching of the ellipses) and a low proportional limit with progressive (well rounded) yielding for the hoop compression (HC) curve (due to Bauschinger effect). The steel model is well suited for capturing key aspects of the anisotropy patterns typically observed in UOE pipe.

As described in "A Material Model for Pipeline Steels" (Hart, et. al 1996), an 8-parameter model can be used to develop input material properties for strain levels below 2%. This portion of the steel stress-strain curve can be divided into 3 regions namely; a linear elastic region, a curved transition or "knee" region, and an essentially linear "fully plastic" region. The term "fully plastic" is not strictly correct since the steel still has a finite hardening modulus. The model requires that the HT and LT curves have the same elastic modulus and the same fully-plastic strain hardening modulus. However, the shape of the HT and LT curves in the yield transition region can be different i.e., the curves can have different proportional limits and different degrees of "sharpness" or "roundedness" through the transition from elastic to fully-plastic conditions. The strength levels of the curves in the fully-plastic strain hardening region need not be the same. A 2-root fitting process can be used to determine the ellipse sizes and initial shifts required to closely match a given "target" LT-HT pair of stress-strain curves (as well as a 3-root fitting process when a "target" LT-HT-LC triple of stress-strain curves is available).

4.3 GEOTHERMAL INPUT

Frost heave is associated with growth of a frost bulb around the chilled pipe and it is assumed that heave is produced by swelling at the bulb face as the frost bulb grows wider and deeper (see Figure 4.2). The amount of heave for a given increase in frost bulb depth is influenced by several parameters including the type of soil, the availability of moisture, the speed with which the frost bulb grows, the bearing pressure exerted by the pipe on the ditch bottom and other factors. In addition, the amount of movement at the ditch bottom depends on the depth of the frost bulb, with a given amount of swelling producing less ditch bottom heave as the frost bulb gets progressively deeper. Free heave is the heave that would occur if the pipeline provided no resistance to movement. Restrained heave, which is less than the free heave, is the heave that results accounting for the pipelines resistance to movement which tends to increases the amount of pressure at the base of the frost bulb.

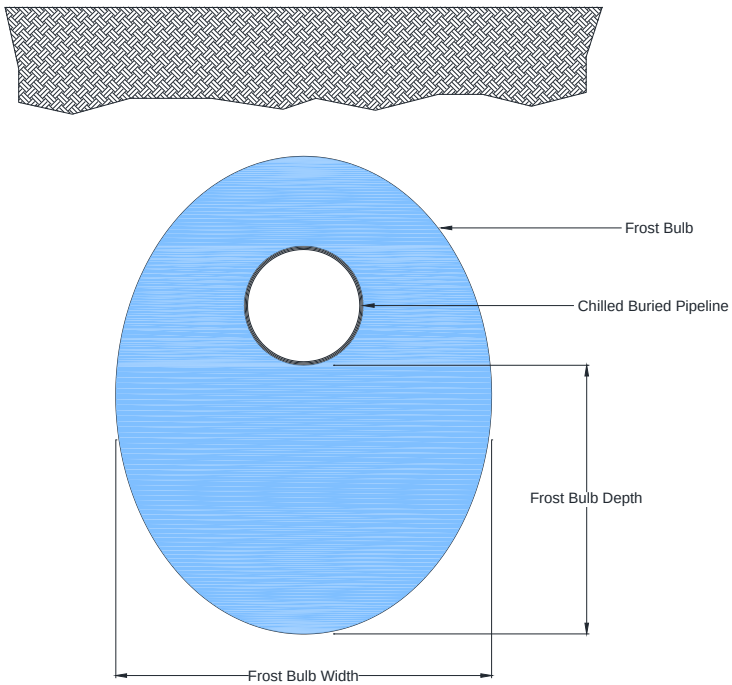

Figure 4.2 Frost Bulb Schematic

PIPLIN analyzes the effects of restrained frost heave by treating heave movements as equivalent support "settlements," applied at the ditch bottom (i.e., at the base of the bearing springs). Because heave originates at the frost bulb face, a theory is needed to convert swelling of the soil into ditch bottom movements. PIPLIN has several different options for specifying pipeline frost heave effects. The "Revised Formula Method" is the option selected for the ASAP project. In the Revised Formula Method, the program calculates ditch bottom movements using the segregation potential theory (Konrad 1981) given certain information describing the frost bulb properties.

The following time-independent parameters are specified:

(1) A reference pressure "P_o" to be used in the segregation potential equation.
(2) The frost bulb density "γ" which is used to calculate the soil pressure at the frost bulb base due to bulb self weight.
(3) The equivalent burial depth "D_o" which is used in the calculation of soil pressure.
(4) The initial overburden force correction term "F_o" which is used in the calculation of soil pressure.

In addition to the time-independent parameters described above, time-histories of the following frost bulb and soil properties are provided as an input table:

(1) Frost bulb depth "D" below pipe.
(2) Shear force per foot of pipe "S". In general, the shear force term can be due to side shear and/or end shear effects. Note that because a time-history of S is input, seasonal variations can be directly included.
(3) Bearing width "B_S" at the base of the frost bulb over which the shear force S is assumed to be distributed. That is, the soil bearing pressure at the frost bulb base due to S is S/B_S.

(4) Bearing width, B_F, at the base of the frost bulb over which the ditch bottom bearing force, F, is assumed to be distributed. The soil bearing pressure at the frost bulb base due to F is F/B_F.
(5) Temperature gradient "G", at the frost front.
(6) The coefficient "a" to be used in the segregation potential equation.
(7) A reference segregation potential "SP_o" at the reference pressure "P_o".

At any given time "t" and at any given point within the heaving section of the pipe, the values of $D(t)$, $S(t)$, $B_S(t)$, $B_F(t)$, $G(t)$, $a(t)$ and $SP_o(t)$ can be obtained from the input time-history table. Note that for most applications, the values of a and SP_o are constant with time. One exception to this is for a layered soil profile where a and SP_o may vary with depth. The variation with depth can be considered indirectly as a variation with the times that the bottom of frost bulb reaches the different soil layers. When a pipe segment has a different heave material at each end (e.g., when considering a heave material transition), the heave material properties at a given transverse support location are obtained by linear interpolation between the properties at end "I" and end "J" of the segment. The values of S, D, B_S, B_F and G are calculated at the middle of the time step, by interpolation in the input time-histories. The pressure to be used in the equation for heave rate is computed as follows:

$$P = \gamma\,(D + D_0) + \frac{S}{B_S} + \frac{(F - F_0)}{B_F}$$

where the parameters γ, D, D_o, S, B_S, F_o and B_F are defined above. The term "F" is the feedback force exerted by the pipe on the ditch bottom per unit length of pipe (i.e., F is equal to the current transverse (T) support reaction). As already noted, the quantities γ, D_o and F_o are constants and the quantities D, S, B_S and B_F vary with time. The bearing force F is obtained from analysis of the interaction between the pipe and soil, and varies with location along the pipe as well as with time. If overburden (soil plus pipe) loads are specified, the initial pipe bearing force will equal the overburden soil weight plus the pipe weight. The initial value of the pressure for heave calculations will thus include the effect of the soil weight at the ditch bottom level (in the γD_o pressure term) plus the effect of the overburden soil weight (in the $(F-F_o)/B_F$ pressure term). If no F_o correction is made, the overburden soil weight will be included in the pressure calculation twice. The parameters D_o and F_o are selected to provide the desired initial pressure for heave calculations. The shear resistance term S can be used to represent the resistance provided by the unfrozen soil on the sides of the soil "block" above the widest point of the frost bulb and/or the resistance provided by the frozen soil "abutments" at each end of the heaving span.

When the frost bulb depth increases during an analysis time step, the heave rate, $\dot{H}(t)$, is calculated using the segregation potential equation:

$$\dot{H}(t) = 1.09 SP_0(t) e^{a(t)(P(t)-P_0)} G(t)$$

and the heave increment is given by:

$$\Delta H = \dot{H}(t)\Delta t$$

If the frost bulb depth decreases ("retreats") during a time step, thaw settlement rather than frost heave occurs. The amount of settlement is set equal to the amount of heave that occurred over that depth interval when the frost bulb depth was increasing. PIPLIN tracks the heave vs. frost bulb depth "path" for each transverse spring within the heaving segments of the model. Once the frost bulb depth starts to increase again after a decreasing interval, the "old" heave vs. frost bulb depth path is overwritten at depth levels larger than the most recent "retreated" depth (i.e., the new heave vs. frost bulb depth path need not follow the original path after retreating). This "settlement upon frost bulb depth retreat" feature can be deactivated if desired.

In any time step, increments of movement at the ditch bottom are assumed to be in the transverse direction only. If the pipe is horizontal, this will be the vertical direction. The effect of the movement is calculated using a step-by-step procedure. The amount of heave is calculated separately for each support in turn. The resulting displacement pattern is treated exactly like a settlement profile, and the response of the pipe is calculated.

During a heave analysis, the program predicts a "trial" heave displacement increment (ΔH_{trial}) at each transverse spring in the heaving section of the model for each time step based on the current bearing pressure, and applies this displacement increment profile to the model. The program then recalculates the bearing pressure and a corresponding "adjusted" heave displacement increment ($\Delta H_{adjusted}$) at each transverse spring in the heaving section of the model based on the average pressure over the time step. If $\Delta H_{adjusted}$ differs from ΔH_{trial} by more than user specified tolerances at any transverse spring in the heaving section of the model, a new prediction is made and the time step is repeated. If convergence cannot be obtained within a specified number of iterations, the time step is automatically halved, and the process is repeated. If the time step is subdivided more than a specified number of times, the program stops executing. If convergence is obtained rapidly, and if the time step has been subdivided, the subdivided step is doubled, but is never allowed to exceed the basic time step.

4.4 SOIL RESISTANCE CHARACTERIZATION

As previously noted, the soil is modeled in PIPLIN as a nonlinear Winkler foundation, i.e., the soil support is idealized as a series of discrete, independent, nonlinear springs lumped at the pipe element midpoints. The longitudinal pipe-soil springs provide resistance to longitudinal motion and the transverse pipe-soil springs provide resistance to transverse motion where longitudinal and transverse are defined relative to the original, un-deformed, geometry of the pipe axis. The pipe-soil springs are assumed to have uniform properties over any pipe segment.

Longitudinal pipe-soil spring supports are distributed along the pipe axis to represent cohesive resistance of the soil to longitudinal displacement of the pipe. For each pipe element, the longitudinal pipe-soil spring state is determined from the average of the longitudinal displacements of the pipe nodes at each end of the element. The supports are assumed to provide resistance to longitudinal movement up to a specified force per unit length of pipe and then to slip at constant load.

Transverse pipe-soil spring supports are distributed along the pipe to represent the transverse (T) resistance of the soil (e.g., upward or downward). For each pipe element, the transverse pipe-soil

spring state is determined from the average of the transverse displacements of the pipe nodes at each end of the element. In any pipe segment, different properties may be specified for downwards/bearing (+T) and upwards/uplift (–T) loading on the soil. The soil bearing (+T) resistance is the resistance of the trench bottom to downward movement of the pipe. For ASAP, frost heave simulations, the bearing resistance of the soil will be accounted for in the model using elasto-plastic springs. The strength of the bearing spring is typically selected to correspond to the minimum annual pipe temperature. For ASAP, the pipe-soil bearing resistance will also consider temperature and bearing pressure dependent secondary creep. The soil uplift (–T) resistance is the resistance of the soil to upward movement of the pipe. The ASAP frost heave analyses will consider the temperature, displacement rate and displacement dependence of the uplift pipe-soil springs using PIPLIN's uplift analysis capability.

In Arctic regions, the soil around a buried pipeline may be completely frozen during the winter but significantly thawed during the summer. Also, the temperature of the pipe contents may be intentionally cycled so as to create a thaw annulus around the pipe as a means of mitigating frost heave. Under these conditions, the resistance of the soil can vary significantly. PIPLIN's uplift, longitudinal pipe-soil spring (L-spring) and creep analysis features allow strength variations of this sort to be taken into account during a frost heave simulation. During the course of a frost heave analysis, a typical year is broken up into several (typically 12) multi-step analysis sequences such that the near sinusoidal pipe and soil temperature variation, and the corresponding soil resistance variations are approximated using a piecewise-linear variation through time. A typical "steady-state" annual cycle is normally assumed to apply for each year of the analysis.

4.4.1 UPLIFT RESISTANCE

PIPLIN's uplift analysis feature allows for the specification of uplift soil spring strengths that depend on the uplift spring displacement, the uplift soil temperature, and the displacement rate of the uplift spring. Uplift force-displacement relationships can be specified based on a piecewise-linear "backbone curve" defined using up to 8 uplift force-displacement coordinates for up to 60 different soil temperatures at up to 10 different uplift deformation rates. The uplift strength will typically, but not necessarily, increase with decreasing soil temperature and increasing uplift deformation rate and will typically, but not necessarily, decrease with increasing uplift displacement after reaching a peak strength value at a relatively small displacement. For uplift soil temperatures, displacements and deformation rates between the specified input values, the strengths are obtained using 2-way linear interpolation between the input backbone relationships for different uplift displacement rates and uplift temperatures. For uplift temperatures and displacement rates outside of the specified input range, the backbone curve corresponding to the nearest specified temperature or displacement rate is used. For displacements greater than the last specified displacement, the last specified strength is assumed. Within a given uplift analysis step, the uplift properties at each spring are modified based on the uplift temperature, the current rate of uplift spring displacement, and the current uplift displacement.

As described above, PIPLIN's uplift analysis option allows for consideration of the displacement and displacement rate dependence of the pipe-soil uplift springs as well as the temperature dependence as influenced by seasonal ground surface and/or pipe temperature variations. The approach proposed for the ASAP frost heave analyses is to use a single uplift soil temperature (32°F)

corresponding to thawed soil conditions together with two or more uplift soil temperatures to cover the range of frozen soil temperature conditions encountered over a typical year of operation during the frost heave analysis. The uplift temperature values and the time between adjacent temperature values are specified for a typical 1 year analysis cycle. The uplift soil temperature will be taken as equal to the pipe temperature or some measure of the average backfill temperature, both of which have a seasonal variation that resembles a sine wave. The ASAP project proposes to compute the thawed and frozen uplift pipe-soil spring properties based on publically available geotechnical procedures (e.g., see COLTKBR 2003 and COLTKBR 2007).

4.4.2 BEARING RESISTANCE

PIPLIN has sophisticated creep support analysis capabilities including pressure and temperature dependent primary and secondary creep. If desired, creep properties can be associated with any transverse segment support, and creep analyses can be carried out. The pressure and temperature dependence is considered by specifying the creep parameters at up to 5 temperatures for up to 20 pressures. For temperatures and pressures within the specified temperature and pressure ranges, the creep parameters are obtained by linear interpolation between input values. For temperatures and pressures that are outside of the specified temperature and pressure ranges, the creep parameters associated with the nearest input temperature or pressure are used.

For the ASAP frost heave analyses, it is proposed to consider secondary creep in the bearing pipe-soil supports. Including secondary creep has the effect of adding a secondary creep dashpot – a viscous support element that provides resistance proportional to the velocity – (with a dashpot coefficient C_s) in series with the elastic-perfectly plastic bearing spring associated with each pipe element. The dashpot coefficient C_s is specified to be dependent on both temperature and the bearing pressure between the pipe and soil, typically decreasing with increasing temperature and pressure. The ASAP project proposes to use publically available geotechnical procedures (COLTKBR 2007) to compute the bearing spring and dashpot properties.

4.4.3 LONGITUDINAL RESISTANCE

In any segment, the strength of the L-spring can be defined to vary with temperature, by specifying up to 20 temperatures and up to 20 corresponding strengths. For temperatures between the specified values, the strengths are obtained by linear interpolation. For temperatures outside of the specified range, the strength corresponding to the nearest specified temperature is assumed. An initial temperature (the same for all segments) is specified, and this determines the L-spring strength at the beginning of the analysis. The effect is to place an upper limit on the strength of the L-spring. If this strength is exceeded at any location, the stiffness is reduced to zero. The effect, initially, is exactly as if a stiffness (K) value of zero had been specified for the support. However, the behavior differs from that with K=0, because the strength can subsequently be changed.

In any load sequence, it can be specified that the longitudinal (L-spring) soil temperature changes progressively, so that the cutoff on the strength also changes. If the strength decreases, the resistance developed by the support is progressively reduced, leading to a redistribution of load along the pipeline. If the strength increases, the support force remains unchanged but the stiffness becomes nonzero (the value on the basic force-displacement relationship for the current support

force). In this case there is no redistribution of load. The strength may be cycled in any desired way, for as many seasonal cycles as desired.

As described above, L-spring analysis allows for consideration of the temperature dependence of the pipe-soil longitudinal springs as influenced by seasonal surface and/or pipe temperature variations. The approach proposed for the ASAP frost heave analysis is to specify a single longitudinal soil temperature corresponding to thawed soil conditions together with several additional longitudinal soil temperatures to cover the range of frozen soil temperature conditions encountered over a typical year of operation during the frost heave analysis. The longitudinal temperature values and the time between adjacent temperature values are specified for a typical one year analysis cycle. The longitudinal soil temperature will be taken as equal to the pipe temperature which has a seasonal variation that resembles a sine wave. For ASAP, the thawed longitudinal pipe-soil spring properties will be computed using conventional procedures (e.g., see ASCE 1984, Hart et. al 2001, and Honegger et. al 2004). For frozen soil conditions, the ASAP project proposes to utilize publically available geotechnical procedures (COLTKBR 2007) for estimating the pipe-soil longitudinal spring relationship.

4.5 MODEL GEOMETRY

The typical model geometry consists of a straight, horizontal section of the pipeline with a uniform depth of frozen soil cover. The chilled pipeline is assumed to cross an initially thawed span – this is the location where a frost bulb will grow around the pipe resulting in differential frost heave. A plane of symmetry is assumed at the center of the heaving span so that only one-half of the heaving pipeline configuration is analyzed. A transition length (or ramp) between the finite length section of heaving soil and the adjacent non-heaving soil section can be specified if desired. A multi-span analysis approach is undertaken considering different simulations for on the order of 10 different span lengths ranging from very short spans (e.g., down to say 10 feet) to very long spans (e.g., up to say 150 feet). The variation in span length is an important consideration because shorter spans, which are often associated with relatively high levels of strain per inch of heave tend to be “shut down” due to pressure feedback effects (i.e., high bearing pressures increase the stresses at the base of the frost bulb which tends to shut down frost heave). For very long spans, the imposed heave profile approaches a step-change (e.g., similar to a fault crossing). The end result of the multi-span evaluation approach is that it leads to a “critical span” corresponding to the span with the highest strain demand at a given point in time. The critical span length depends on several parameters including the pipe stiffness, the soil resistance and the pressure sensitivity of the heaving soil.

4.6 IMPOSED LOADS

As previously mentioned, frost heave analyses are typically initiated with the application of gravity, internal pressure and temperature differential loads. If desired, a hydrostatic test loading and unloading sequence can be included prior to applying the operating loads. A multi-year frost heave evaluation of the pipe-soil interaction model is then undertaken holding the gravity and internal pressure loads constant. The applied temperature differential can be varied in a sinusoidal pattern over each year of the simulation based on the difference between the time-varying pipe temperature and the constant tie-in temperature. The frost heave analyses are nonlinear time-

history analyses performed using small steps through time. Within the heave span, the frost bulb geometry and frost heave vary with time. Seasonal variations of the uplift, longitudinal and creep soil temperatures are specified with each heave time step. The heave is imposed progressively at the base of the pipe-soil springs within the heave span. The amount of heave at the ditch bottom is calculated separately for each transverse pipe-soil support in turn accounting for pressure feedback.

For a selected heave span length, the results from a PIPLIN frost heave analysis include a detailed output of the state of the pipe-soil interaction model at each time step. The output state includes the current time, the pipe axial force, bending moment, hoop stress, top and bottom fiber von Mises stress, longitudinal stress, hoop strain and longitudinal strain and the curvature at each node of the pipeline model. The output state also includes the uplift, creep and longitudinal soil control temperatures, the longitudinal and transverse spring forces and displacements, the uplift spring displacement rate and the creep displacements for each element of the pipeline model. At the pipe-soil spring locations within the heaving section of the model, the frost bulb width, depth and shear are available together with the pressure components at the base of the frost bulb due to the frost bulb weight, the transverse pipe-soil spring, and shear as well as the total pressure. The current unrestrained mid-span free heave is also provided. The results described above can be post-processed in a number of different ways. Spatial plots and time history plots of various response quantities usually provide the most useful methods for understanding and interpreting the results. It is also possible to develop animations of various spatial response plots to gain a better understanding of how the overall results vary over the course of the multi-year analysis duration.

The most important results from a frost heave simulation for a given span length are the time histories of the maximum tension and compression strain demands. Detailed processing of the PIPLIN deflected shape at each point in time is used to develop time history plots of "digitally pigged" bending strains or curvatures which provides a basis for relating geometry monitoring data (e.g., smart pig survey data) to the corresponding nodal tension and compression strain demands. A schematic illustration of the maximum pig curvature is presented in Figure 4.3 for a 25-year frost heave simulation. Note that the "wiggles" in the curvature time history plots are due to the seasonal variations in the pipe-soil spring resistance.

Figure 4.3 can be used to illustrate, on a conceptual basis, the pipeline curvature monitoring approach to be utilized for ASAP for a high heave location. The dashed yellow horizontal line corresponds to the intervention curvature criterion while dashed red horizontal line corresponds to the curvature associated with the governing pipe strain limit. Note how the intervention threshold is reached in the 13th year of the simulation while the governing strain limit threshold is reached in the 16th year of the simulation.

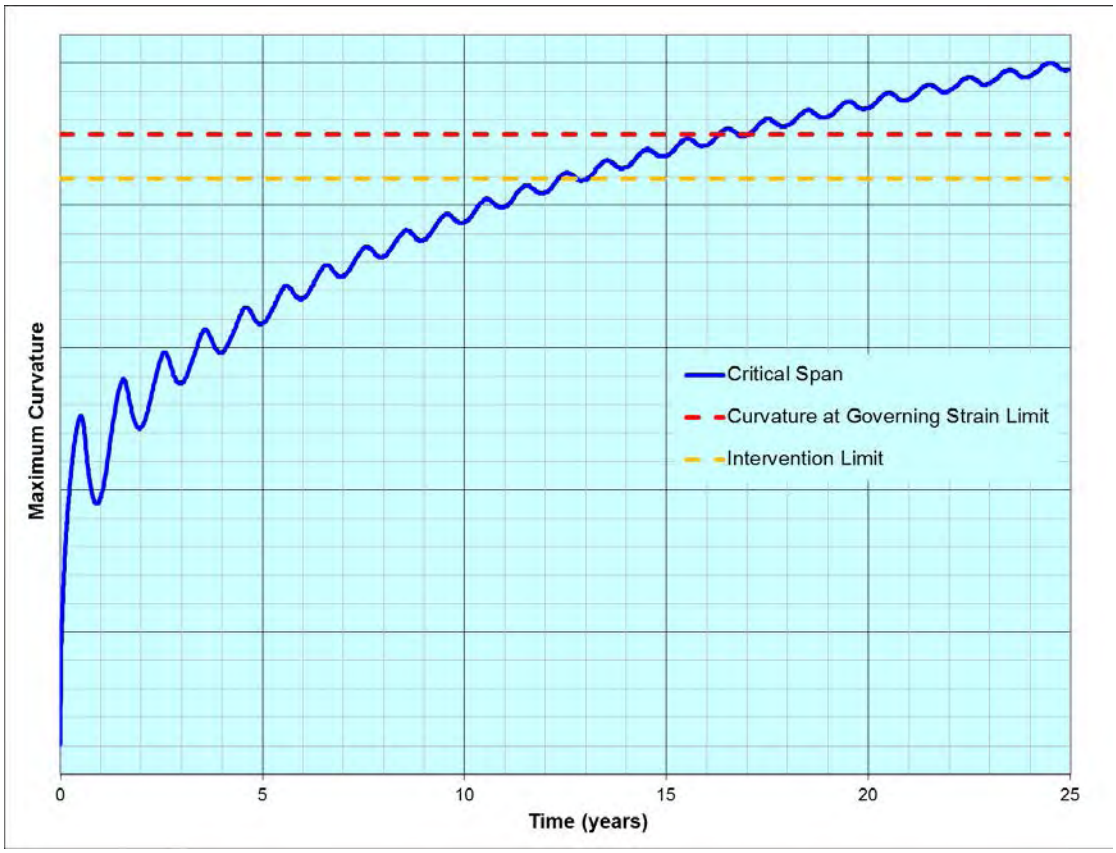

Figure 4.3 Illustration of Maximum Curvature Time History

SECTION 5. STRAIN CAPACITY DETERMINATION

5.1 MATERIAL REQUIREMENTS

The ASAP will be constructed of API 5L X70 line pipe with a wall thickness that varies between 0.595 inches and 0.857 inches as appropriate for the Location Class (i.e., design factor of 0.72, 0.60, and 0.50 for Class Locations 1, 2, and 3, respectively).

5.1.1 LINE PIPE

A generic stress-strain relationship where various properties of the stress vs. strain curve are highlighted is presented in Figure 5.1. For the purposes of strain demand calculations, the maximum strain range of interest typically runs out to about 2% strain. The initial elastic slope of the curve, frequently called "Young's modulus" is denoted in Figure 5.1 as E_{start}. The point at which the tangent slope of the curve first departs from a projection of the elastic slope is called the proportional limit. The tangent slope of the curve at high strains (i.e., the slope to the right of the point labeled "fully plastic") is denoted as E_{end}. Note that the term "fully plastic" is not strictly correct since the steel still has a finite hardening modulus (slope) at this point whereas fully plastic implies a slope of zero. The section of the curve between the proportional limit and the fully plastic point is often referred to as the "knee" region where the steel transitions from elastic to plastic conditions. The dashed line tangent projections from the curve passing through the proportional limit and the fully plastic point (bounding the knee region) make up what is referred to as the backbone curve. For pipe steels, the yield strength is defined as the stress at a strain of 0.5% per API 5L, shown as the stress coordinate denoted as "Y" in Figure 5.1. Note that for nominal pipe size (NPS) 8 and above, the yield strength is defined based on the hoop tension stress-strain curve.

The shape of the pipe steel stress-strain relationship can have a significant effect on the pipe strain demand and as well as the pipe strain capacity (particularly the compressive strain capacity). An illustration of pipe steel stress-strain relationships with different behaviors across the knee region of the curve is presented in Figure 5.2. In general, pipe steel stress-strain curves with a relatively abrupt or "sharp" elastic-to-plastic transition (purple and red curves) tend to lead to larger strain demands and lower strain capacities than stress-strain curves with a relatively rounded elastic-to-plastic transition (blue curve). Similarly, stress-strain curves with relatively low strain hardening modulus (slope) characteristics (e.g., the red curve in the flat "Lüders plateau" region) tend to lead to larger strain demands and lower strain capacities than stress-strain curves with relatively high strain hardening modulus characteristics. Deformation analyses should consider a range of bounding input steel stress-strain relationships that have been developed to be consistent with exemplar stress-strain test results from the project pipe material.

In addition, the shape of stress-strain curves can be significantly different for pipe steel tests performed in the LT, HT, LC and HC directions, especially for higher grade pipe materials and for UOE pipe. In other words, these materials are anisotropic. Based on experience with UOE pipe test results, it is generally observed that over the strain range from approximately 0.2% to 0.8% strain (i.e., in the so-called "knee" region), the four stress-strain curves tend to have the following relative strength ranking: HT > LC ≥ LT > HC and that the HT curve usually tends to be the "sharpest" of

the four curves. Unlike the specifications under API 5L which are focused on the hoop tension yield and ultimate tensile strengths (in order to satisfy the pressure induced hoop stress design requirements), the following sections are focused on the longitudinal tension stress-strain characteristics.

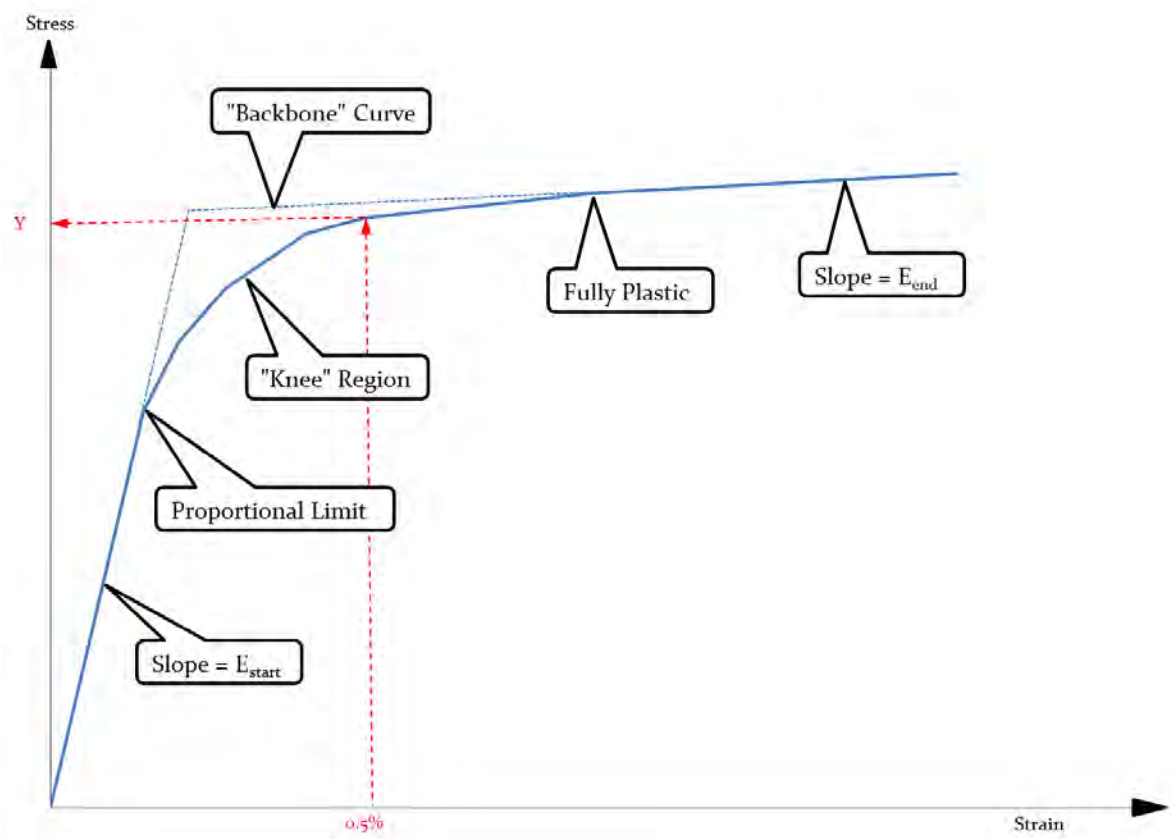

Figure 5.1 Normative Properties of a Steel Stress-Strain Relationship

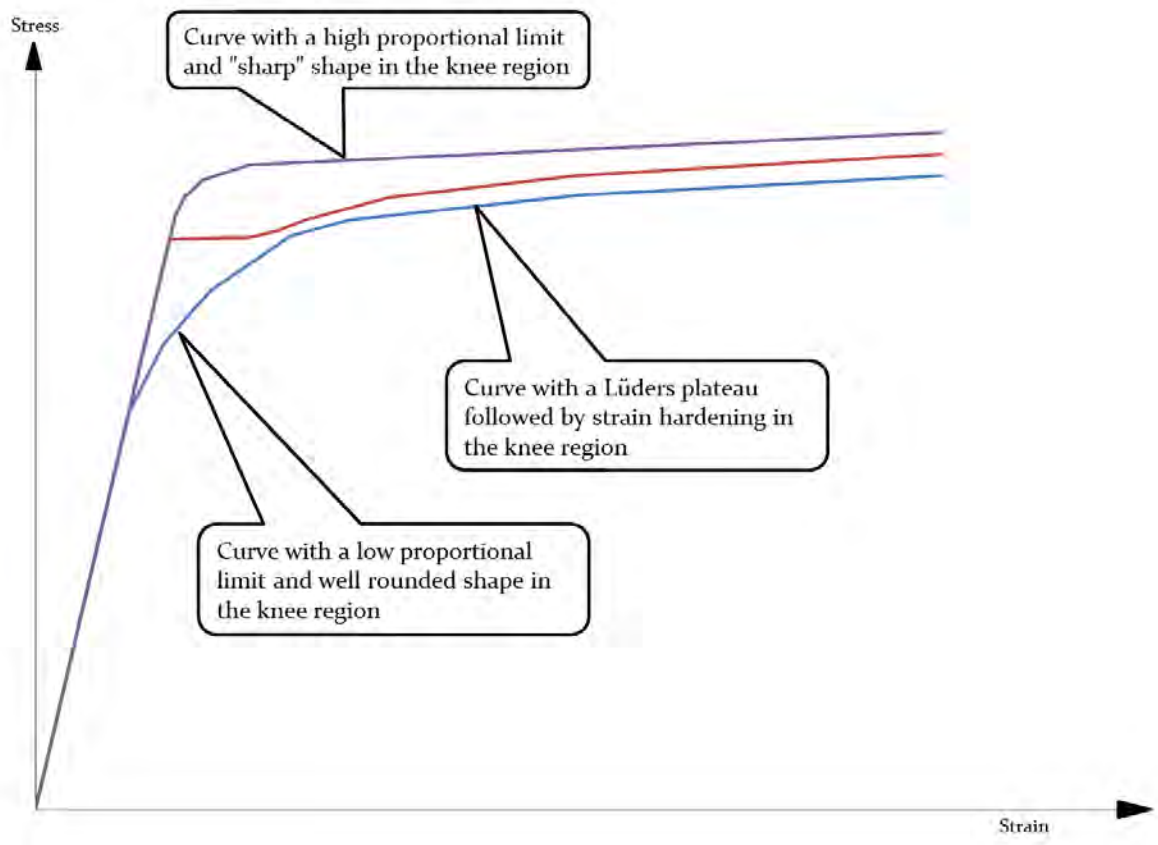

Figure 5.2 Illustration of Differing Stress-Strain Behavior in the Knee Region

(1) MINIMUM LONGITUDINAL YIELD STRENGTH

As noted above, the longitudinal tension (LT) stress-strain curves tend to be slightly weaker than the hoop tension (HT) stress strain curves in the knee region (e.g., in the region where yielding is defined). In many cases, the LT yield stress is actually below the specified minimum yield strength. This is not normally a cause for concern since as previously noted, the pipe SMYS is defined in the hoop tension direction.

(2) LONGITUDINAL TENSILE STRENGTH

Consideration will be given to specifying a minimum longitudinal tensile strength, as well as to specifying a relative low yield to tensile ratio to ensure a sufficient work hardening rate to avoid strain localization.

(3) MINIMUM UNIFORM LONGITUDINAL ELONGATION

Likewise, consideration will be given to specifying a minimum uniform longitudinal elongation to further avoid strain localization.

(4) LONGITUDINAL STRESS-STRAIN CURVE

Basic pipe mill certificates will always provide a direct characterization of the yield and ultimate strengths in order to demonstrate that the material meets the specified minimum strength requirements. For ASAP strain-based design, it is anticipated that representative fully digital stress-strain curves will be obtained from both the LT and HT directions. It may also be desirable to obtain representative LC stress-strain curves.

Given the digital stress-strain data from representative pipe samples, it will be straight-forward to compute various measures of anisotropy such as the ratio of HT/LT yield and ultimate strengths or strengths at several selected strain levels of interest (e.g., at 1.5%, 2%, etc.). It will also be possible to compute various measures of curve shape or sharpness for the different curve directions such as the ratio of strengths at different levels of strain across the knee region and/or the plastic complementary energy at various levels of strain. These parameters can be used to characterize the variability of the project stress-strain relationships.

(5) LUDERS PLATEAU

Localized bands of plastic deformation may occur in certain materials before fracture. These bands are commonly referred to as Lüders bands as they were first reported by Guillaume Piobert and W. Lüders. These localization deformations result in a slight drop in strength below the initial yield strength, which is maintained for a moderate increase in imposed strain. The overall range of formation of the bands may form a flat yield, or Lüders, plateau.

Increasing imposed strain beyond the end of the plateau results in an increase in strength through strain-hardening. Strain-hardening continues to a peak that typically exceeds the yield strength by thirty to sixty percent.

For strain-based design applications, it is advisable to avoid excessive sharpness in the knee region of the stress-strain curves from any direction (e.g., LT or HT) and also to avoid a Lüder's plateau. These characteristics can significantly increase the pipe strain demand (while at the same time decreasing the pipe strain capacity).

5.1.2 COATING EFFECT

Strain aging of pipe (e.g., due to heating during coating application) can tend to increase the sharpness of the knee region particularly for the HT curve with higher temperatures leading to higher levels of sharpness. Strain aging is also known to increase the pipe yield and ultimate strengths. Because strain aging tends to increase the yield strength more than it increases the ultimate tensile strength, it also tends to reduce the strain hardening modulus (i.e., as characterized by the Y/T ratio and/or the slope parameter E_{end}) in the region of interest for strain demand. For these reasons, it may be desirable to develop pipe specifications that include review of both as-received and aged stress-strain curves as well as to limit the heat to which the pipe is exposed during coating application if practicable.

5.1.3 DIMENSIONAL CONTROL

Dimensional imperfections within a single length of line pipe can act as buckle initiation points and need to be minimized. However, the key concern for strain-based design is variation from pipe to pipe that acts as an imperfection and results in strain concentrations at girth welds. Any aspects of pipe geometry, such as ovality, variations in thickness, or tolerances in pipe diameter, that can result in misalignment across the weld can impact strain capacity. This is particularly true for thicker pipes, where internal or external alignment clamps may not be able to fully 'round out' pipe for welding.

5.1.4 GIRTH WELDS

Several welding techniques can be employed on girth welds joining lengths of pipe together. All have some impact on strain capacity. For example, GMAW with low CO_2 content shielding gases produces the best combinations of strength and toughness but can be prone to generation of long defects if the welding procedure is not adequately optimized prior to field deployment. It is commonly used for mainline girth welding of long, large diameter pipelines. The various torch configurations such as single torch, dual torch, tandem wire, etc., also have implication on strain capacity. Single torch welding tends to give better results due to the lower heat input, but can affect construction efficiency and pipeline cost, especially in the arctic regions where the construction period is limited and logistics are challenging. Again, a well-balanced approach is needed to select the appropriate welding processes for the double jointing, mainline, tie-in, and infield repair procedures. The requirements of selecting welding procedures for these different types of welds to achieve both high strength and toughness may be challenging. The selected welding processes will need to be properly qualified and tested to confirm that the required strain capacity is met reliably.

5.1.5 WELD OVERMATCH

The key difference between welding for typical pipelines and those subject to high strain is the need for substantial and reliable strength overmatch of the weld metal relative to the base pipe. Reliable overmatch is critical for ensuring flaw tolerance adequate to allow for cost effective pipeline construction while ensuring safe design. This has been demonstrated in full-scale pressurized testing, where high weld overmatch was able to prevent failure at a large manufactured defect, resulting in fracture in the pipe body instead of the welds at high strain. The level of yield strength overmatch required to ensure a safe design depends on project-specific factors such as pipe grade, pipe geometry, flaw acceptance criteria, and the required strain capacity.

5.1.6 WELDMENT TOUGHNESS

Toughness of the weld metal and heat affected zone are critical to strain-based pipeline performance. Upper shelf behavior is required to resist fracture initiation by cleavage. It is also important to ensure adequate upper shelf toughness, which relates to ductile tearing resistance. The Charpy impact test is an excellent tool for assessing toughness and providing a quality check during weld procedure qualifications but is not sufficient for the detailed engineering of strain-

based design pipelines. For these applications, fracture mechanics tests, such as the crack tip opening displacement (CTOD) test, should also be used to ensure adequate resistance to fracture with weld imperfections. Achieving high toughness in small scale testing is necessary but not sufficient to ensure a safe and cost effective strain-based design. The relationship between small scale toughness and full scale performance at high strain has not been adequately established by industry.

5.2 TESTING REQUIREMENTS

A number of small-scale and full-scale tests will be conducted to assist in determining the actual strain capacity of the line pipe to be used on the Project.

5.2.1 CURVED WIDE PLATE TESTING

Curved Wide Plate Testing (CWPT) has been used by industry as a proof test for qualifying strain-based design for many years. The test specimen consists of a large dog bone shape samples cut from a pipe containing the specific girth weld to be qualified. A flaw is saw-cut or electrical discharge machined (EDM) into the desired zone of the weld, and the specimen is pulled to failure in tension. Unfortunately, CWPT is not capable of quantifying the effect of biaxial loading due to internal pressure. It is also impractical to use CWPT to evaluate the effect of high-low misalignment on strain capacity. Recent full scale data have shown that these effects on strain capacity can be very significant. However, CWPT is still considered a cost effective and useful test for line pipe and weld procedure qualification and to establish initial estimates of the strain capacity.

5.2.2 FULL-SCALE TENSION TESTING

Although research is underway to develop suitable alternatives, pressurized full-scale tension testing remains the only fully validated method to confirm tensile strain capacity. If a limited number of tests are planned, an effective strategy is to use these tests to examine lower bound behavior. The goal is to confirm that the design meets the strain demand requirement when the key parameters are at the extremes of the acceptable construction envelope. Care should be taken to select test samples representative of the worst expected combination of the key fabrication parameters. On the other hand, selecting overly conservative parameters can result in an undesirable outcome. Another consideration is the availability of test frames to conduct these full scale tests. At this time, 30-inch pipe with a 0.630-inch wall thickness is near the limit of testing capability, which should be adequate for ASAP. Full-scale bend tests with internal pressure have been used, but are less efficient due to the limited weld length reaching the maximum strain. Additionally, modeling of the load/response behavior can be very challenging relative to a tension test.

5.2.3 COMPRESSIVE STRAIN VALIDATION

Industry has developed and validated empirical equations and finite element modeling methods for estimating the compressive strain capacity of pipelines. The most widely used measure of pipe compressive strain capacity is that associated with the peak moment from an imposed curvature test on a full-scale pipe specimen or finite element analysis of a pipe stub section. Note that this strain limit is a serviceability limit state with a significant post-wrinkling reserve margin before the pipe pressure integrity is compromised (usually due to the development of high local strains within the wrinkle(s)). Empirical equations of this sort will be used to establish preliminary pipeline compressive strain capacity. Finite element analyses (FEA), and possibly pressurized full-scale bend tests, will be conducted to establish the compressive strain capacity. These studies will account for the effects of pipe anisotropy, material work hardening characteristics, girth weld misalignment or high-low, internal pressure fluctuations, axial loading, and thermal aging. The FEA method will be the primary tool to quantify the effect of variability in all major parameters; full-scale bend or buckling tests will only be used to validate the finite element models and provide useful experimental design data, if deemed necessary. A large number of finite element analyses may be required to cover a full range of parametric studies in support of a design reliability assessment. Because the compressive strain is defined over a certain gauge length (typically one to two pipe diameters), the selection of gauge length will accommodate geometric deformation effect and ensure the practical strain detectability by ILI tools. A common gauge length in finite element compressive strain capacity assessment, strain demand assessment, operation ILI monitoring, and any full-scale bend tests will be used.

SECTION 6. ROUTE APPLICATION

6.1 DESIGN APPROACH

A number of approaches can be used when considering a strain-based design, ranging from a relatively simple and straightforward deterministic design approach, where estimates of the strain demand and strain capacity are compared, to more elaborate methods that consider the probability of failure or the reliability of the pipeline.

For the ASAP, a deterministic design approach will be utilized and materials that have strain capacity well in excess of the maximum expected strain demand will be select. All of the parameters used in determining either strain demand or capacity will be conservatively selected. An appropriate safety margin between the conservatively estimated demand and capacity will be applied. The margin will be determined based on the uncertainty level of the key parameters used in ascertaining the design values.

6.2 SEGMENT-BY-SEGMENT DESIGN

Using route geotechnical data in conjunction with the results of the demand and capacity analyses, a segment-by-segment design will be completed to identify the frost heave potential along the alignment. The segment-by-segment design approach is presented in Figure 6.1. The four possible outcomes from application of the flow chart are briefly described below:

- Areas of continuous permafrost, low water table, or where the pipeline operating temperature is greater than 32°F will not be susceptible to frost heave and therefore no rigorous frost heave analysis will be required.
- Areas where the predicted combined pipe stress due to frost heave for the critical span length remain below the allowable combined stress as per ASME B31.8 are classified as having low heave potential and no special mitigative measures will be implemented.
- Areas where the predicted curvature (from digital pigging analysis) due to frost heave for any span length remain below the allowable curvature are classified as being heave susceptible and will require ongoing monitoring. Should the measured curvature reach the intervention curvature limit over time then mitigative measures will be implemented.
- Areas where the predicted curvature (from digital pigging analysis) due to frost heave for any span length exceed the allowable curvature are classified as having high heave potential and mitigative measures will be implemented during design and construction.

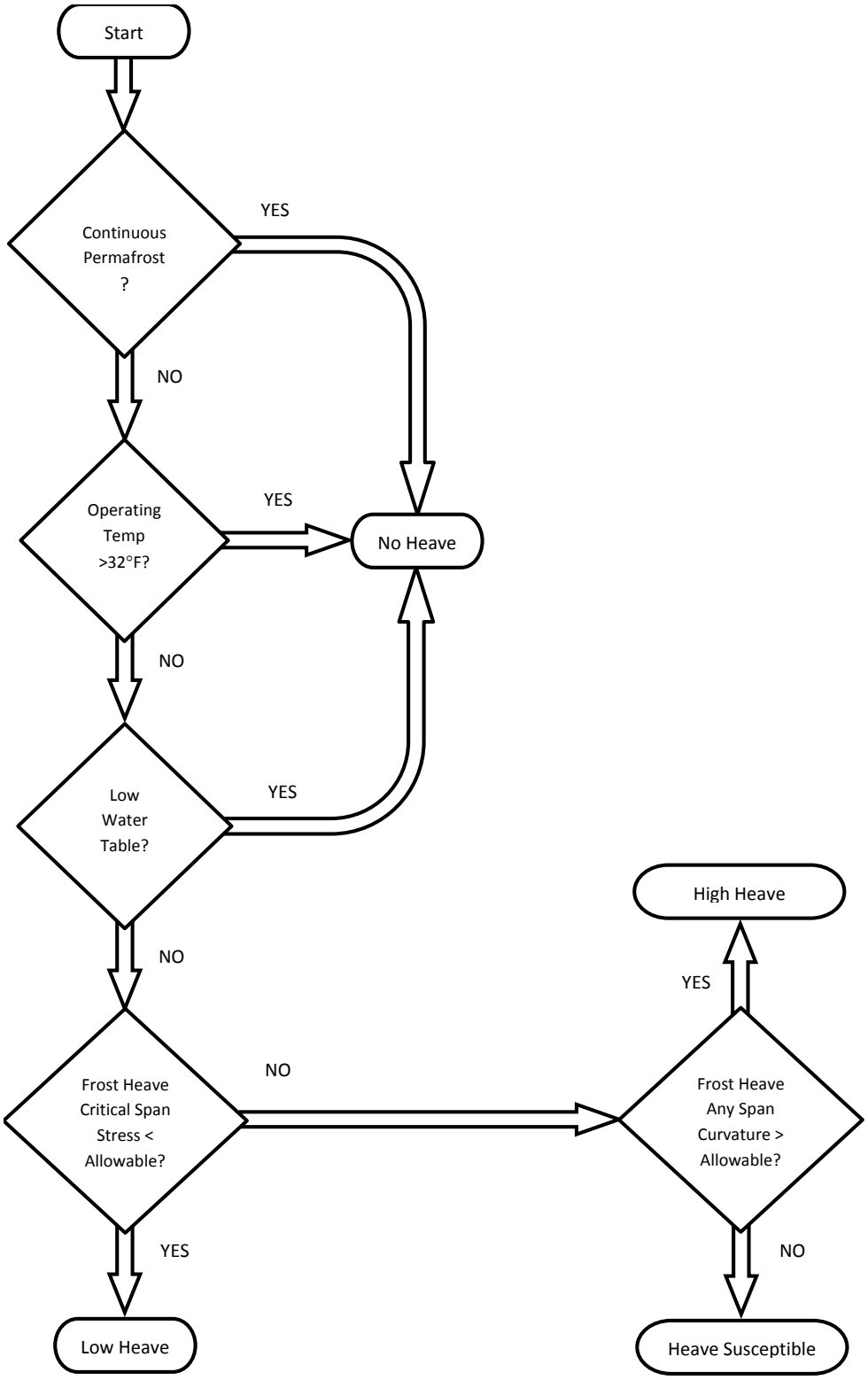

Figure 6.1 Frost Heave Route Assessment Flow Chart

6.3 POTENTIAL DESIGN MITIGATIVE MEASURES

For those pipeline route segments where the estimated heave potential may exceed the ability of the pipe to withstand the imposed displacement, a number of mitigative options, or combinations of options, could be employed to reduce the potential for deleterious movement including:

- Reroute within the alignment corridor to a non-frost-susceptible terrain unit, if available;
- Investigate the subsurface of the suspect terrain segment more closely so as to reduce the conservatism inherent in the station to station approach;
- Change the operating temperature profile of the segment so as to reduce the freeze potential, e.g., by adding heater stations, cycling the temperature, etc.;
- Insulate the pipe ditch to reduce the heat flux through the frost-susceptible soil;
- Increase the pipe wall thickness to increase the resistance of the pipe to ditch displacements, as well as increasing the ability of the pipe to withstand higher displacements;
- Over-excavate the frost-susceptible soil beneath the buried pipeline and replace with non-frost-susceptible soils;
- Excavate soils with high uplift resistance above the pipe springline and replace with soils with low uplift resistance;
- Elevate the pipeline aboveground placing it in an embankment. Elevating the pipe would reduce or eliminate the heat extracted from the ground;
- Elevate the pipeline aboveground placing it on overhead supports. Elevating the pipe would eliminate the heat extracted from the ground and uncouple the pipe from the soil resistance;
- Heat trace the soil underneath the pipe to counteract frost penetration;
- Emplace stand-alone heat pipes to freeze the soil quickly, reducing the ability of the frost-susceptible soil to cause large soil volume changes; and
- Combine compatible concepts presented above.

SECTION 7. CONSTRUCTION RELATED ISSUES

7.1 WELDING PROCEDURES

To ensure high quality welds, a reasonable amount of flexibility is needed in welding parameters to allow welders the ability to manipulate the process and reduce the likelihood of producing unacceptable weld imperfections. The acceptable ranges of parameter variability that are intended to provide the performance that is similar to the completed qualification test welds will be established.

Weld qualification testing will bound the variability of critical parameters. In particular, heat input is critical because heat input modifies the metallurgical features of the HAZ and weld metal. Weld procedures will be qualified to a full suite of small scale tests and may also include large scale performance testing such as curved wide plates or full-scale tension tests with artificial defects. A test program that confirms the adequacy of the welds to provide resistance to fracture with a weld defect at the extreme of the welding process parameters acceptable during construction will be conducted.

7.2 AUTOMATED ULTRASONIC TESTING

Qualification of inspection equipment is critical to the successful implementation of a strain-based design for the pipeline. Materials qualification for strain-based design is intimately tied to the establishment of defect acceptance criteria with height and length restrictions. Radiographic testing does not give qualitative information about defect height and is therefore not suitable for a strain-based design. In order to determine both defect height and length with confidence, automated ultrasonic testing (AUT) will be required. A qualification program will be required to establish not only the detection capability, but also the sizing accuracy of the AUT system to be used during construction. The AUT system will be capable of detecting the critical defect height with high confidence. The sizing error of the system will be established for the range of defect dimensions at the acceptance limit. This error will be subtracted from the critical defect size to establish the acceptance criteria to be used during pipeline welding.

SECTION 8. OPERATIONS AND MAINTENANCE

8.1 MONITORING POTENTIAL FROST HEAVE

During design the frost heave potential along the alignment will be evaluated using the available route alignment data combined with the line pipe capacities and advanced engineering simulation methodology to explore the potential interaction between the soil subsurface and the pipe during its operational life. To address the differential values along the route, soil displacements and resistance values will be estimated using the landform characteristics along the route derived from the project geo-database. Scrutiny will continue throughout the operational life of the pipeline.

A key consideration in any strain-based pipeline design is the "monitor and maintain" component of the design philosophy. Periodic monitoring of the pipeline will identify locations that are of concern with respect to the pipe structural integrity. The monitoring interval is selected such that there will be enough time to plan and undertake intervention prior to the pipe experiencing a loss of structural integrity.

The best way to monitor curvature along ASAP is through periodic ILI surveys. An ILI geometry survey provides the most practicable and reliable way to accurately characterize the geometry of the entire length of the pipeline. Use of a high resolution inertial navigation system (INS) based geometry tool will result in the highest possible level of survey accuracy.

Several ILI vendors offer high resolution INS tools. The instrumentation on these tools includes a strap down, tri-axial fiber optic gyroscope based Inertial Measurement Unit (IMU), a tri-axial accelerometer, an odometer as well as a multi-arm mechanical caliper. The gyroscopes measure the change in orientation of the pig in terms of the pitch, azimuth, and roll angles; the odometer measures the along-the-pipe distance coordinate tie-points; and the calipers measure pipe ovality or dents and also locate the pipeline girth welds. The gyroscope and odometer data can be numerically differentiated to compute the pipeline curvature (which is proportional to the bending strain) or numerically integrated to estimate the pipe position between coordinate tie-points. Typical accuracies of inertial survey tools are as follows:

- Curvature Detection: ±0.02% Strain
- Bend Angle Detection: ±0.1°
- Dent/Ovality: ±2.5 mm
- Weld-to-Weld Distance: ±12.5 mm
- Mapping Accuracy 1:2000 (depends on distance between coordinate tie-points)

Since the early 1990's, the pipeline industry has gained experience with these tools and they have become a key component of pipeline systems which incorporate the "monitor and maintain" component of the strain-based design philosophy. While the pipeline (X-Y-Z) position mapping is useful for GIS applications and pipeline location, the most important result from an inertial survey of a pipeline for structural integrity assessments is the curvature/bending strain not associated with intentional bends. The caliper data can also be extremely useful for establishing out-of-roundness and incipient wrinkling deformations of the pipe wall at high curvature/bending strain locations.

Note that the terms curvature (Ψ) and bending strain ($\varepsilon_{bending}$) are used somewhat interchangeably herein (since $\varepsilon_{bending}=\Psi D/2$).

An important consideration of the ASAP ILI program will be an initial/baseline geometry survey of the pipeline as soon as practicable after construction. This survey will provide a detailed characterization of the as-installed pipeline geometry for comparison with subsequent surveys. Survey-to-survey curvature changes can be used as a basis for estimating the rate of curvature accumulation at any areas of concern. The ASAP curvature monitoring program will establish a curvature limit associated with the governing pipe tension or compression strain limits and an intervention curvature limit will be established as some fraction of the curvature associated with the governing strain limit. The idea is that when high curvature locations are identified, the current curvature and the rate of curvature change can be measured against the intervention curvature limit which will provide a threshold condition at which an intervention can be planned and executed with sufficient time before the curvature reaches that associated with the governing strain limit. This monitoring approach is illustrated conceptually in Figure 4.3.

8.2 POTENTIAL OPERATIONAL MITIGATIVE MEASURES

For those pipeline route segments where the evaluation of ILI or other measurement data shows that the effect on the pipe due to the soil frost heave may exceed the ability of the pipe to withstand the imposed displacement, mitigative options, or combinations of options, could be employed to reduce the criteria exceedance potential during operations. Some of these are seen to be the same as for design, although the practical ability to employ them during operations may be limited. The options include:

- Insulate the pipe ditch to reduce the heat flux through the frost-susceptible soil;
- Excavate soils with high uplift resistance above the pipe springline and replace with soils with low uplift resistance;
- Elevate the pipeline aboveground placing it in an embankment. Elevating the pipe would reduce or eliminate the heat extracted from the ground;
- Emplace stand-alone thermosyphons to freeze the soil quickly, reducing the ability of the frost-susceptible soil to cause large soil volume changes; and
- Combine compatible concepts presented above.

8.2.1 TEMPERATURE CONTROL

Another potential operational philosophy that might be considered is temperature control or temperature cycling. In areas of continuous permafrost, the line is not susceptible to frost heave and operating the line below 32°F will ensure the supporting soils do not thaw and possibly be subjected to another geothermal phenomenon – thaw settlement. Conversely, operating the line above 32°F in areas of thawed ground will guard against frost heave.

In areas of discontinuous or sporadic permafrost, temperature cycling, i.e., fluctuating the operating temperature from below 32°F to above during the course of the year, may limit the overall potential for frost heave or thaw settlement over the life of the line.

8.2.2 LINE LEVELING

Line-leveling is one possible form of intervention/mitigation that can be employed should the measured curvature approach or exceed the curvature limits established for the project. This would entail excavating the line in areas experiencing frost heave and re-leveling the line to reduce the curvature.

SECTION 9. CONCLUSION

The design approach to frost heave explained in this report is summarized in Figure 1.3 which shows the flow of the various steps needed to define and begin the assembly of the components of the project approach in preliminary design; finalize the assembly and verification and apply the approach to the alignment in final design; and continue route monitoring and potential mitigation throughout operations. In the current front end loading phase of the project, the design approach is being developed and scoped of initiation during the next phase - preliminary design.

Although only the approach to frost heave is developed in this report, the approach is illustrative of the design approach to other displacement loadings that may cause longitudinal stress in the pipe such as thaw settlement.

AGDC is committed to the complete development and verification of the design approach for application throughout the design life. As the development progresses, AGDC will share the ongoing verification and application studies with PHMSA throughout this process to ensure concurrence and heighten confidence in the safety and integrity of the pipeline.

SECTION 10. REFERENCES

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APPENDIX A PHMSA CORRESPONDENCE

1. U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration Letter to Mr. Bob Swenson, Alaska Stand Alone Pipeline, dated March 3, 2010
2. State of Alaska, Office of the Governor letter to Mr. Jeffrey Weise, Associate Administrator for Pipeline Safety, US Department of Transportation, dated April 12, 2010
3. U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration Letter to Mr. Daniel Fauske, President Alaska Gasline Development Corporation, received May 4, 2010

U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration

1200 New Jersey Ave, S.E.
Washington, D.C. 20590

March 3, 2010

Mr. Bob Swenson
Alaska Stand Alone Pipeline
Natural Gas Transportation Project
411 W. 4th Avenue, Suite 2C
Anchorage, AK 99501-2343

Re: Alaska Stand Alone Pipeline Natural Gas Transportation Project

Dear Mr. Swenson:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) is writing to request information about the nature of the proposed Alaska Stand Alone Pipeline Natural Gas Transportation Project (ASAP Project) and plans for the submission of special permit applications for the project pursuant to 49 C.F.R. § 190.341. A special permit is an order by which PHMSA waives compliance with one or more of the Federal Pipeline Safety Regulations under the standards set forth in 49 U.S.C. 60118(c) and 49 C.F.R. § 190.341, subject to conditions and limitations set forth in the order. A special permit may be issued to a pipeline operator (or prospective operator) for specified facilities that, absent waiver, would be subject to the regulation.

PHMSA would appreciate a project briefing to review any need that the ASAP Project may have for a special permit. To avoid project delays, PHMSA requests that the ASAP Project submit any special permit applications as soon as possible. PHMSA advises the ASAP Project to submit its applications before making design-related decisions that could require special permits.

Additionally, to facilitate our review of the project for compliance with the gas pipeline safety regulations at 49 C.F.R. Part 192 and any special permit application(s), please provide the safety and environmental information listed in the informal preliminary information requests enclosed with this letter as Enclosures A and B. Depending on your response, PHMSA may request additional information, including, but not limited to: data, reports, studies, documents, and independent third party analyses. PHMSA expects a detailed safety and environmental review to take a minimum of 12 months or more, depending upon the extent and nature of the request, any requirements for additional information or studies, and the quality of submittal documents.

PHMSA is required to conduct an environmental review in accordance with the National Environmental Policy Act. An overview of the preliminary environmental information needed to support your anticipated special permit applications is provided in Enclosure B. Your timely submission of permit applications and detailed safety and environmental information will enable

PHMSA to properly analyze potential risks to public safety and to the environment that could result from our decision to grant or deny a special permit.

Please contact Dennis Hinnah at 907-271-4937, or Alan Mayberry, Director of Engineering and Emergency Support, at 202-366-5124, if you have any questions.

Sincerely,

Jeffrey D. Wiese
Associate Administrator for Pipeline Safety

Cc: With Enclosures

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Enclosure A

Information Request for the Proposed ASAP Project

1.0 Introduction

This document outlines preliminary information PHMSA will need to begin both review of project compliance with 49 Code of Federal Regulations (CFR) Part 192 and consideration of anticipated special permit applications. It is not an exhaustive listing of required information, but identifies initial information needs on the types of issues PHMSA believes might require more extensive review.

Gas pipeline operators must comply with 49 CFR Part 192 (the Regulations), and the industry codes and standards incorporated by reference into the Regulations, when designing, constructing, inspecting, testing and operating natural gas pipelines. Compliance with the Regulations, codes, and standards provides a substantial basis for concluding that pipelines have been designed, fabricated, constructed, inspected, and tested in a manner that will protect public safety.

If an operator (or prospective operator) of a pipeline facility wishes to deviate from one or more Regulations, the operator may apply for a special permit to do so. Pursuant to 49 USC 60118(c) PHMSA has the authority to issue orders (special permits) granting a waiver of compliance with the Regulations with respect to such pipeline facility on terms PHMSA considers appropriate if PHMSA determines that the special permit is not inconsistent with pipeline safety. PHMSA often places conditions on special permits designed to address any safety issues that are identified during the special permit review process. The procedures for processing special permits are set out in 49 CFR § 190.341.

PHMSA anticipates that the ASAP Project will propose alternative design methods, most notably the use of a Reliability Based Design approach addressed in Supplement to ASME B31.8R-2008. The use of Reliability Based Design is not recognized under current Regulations. In addition, PHMSA anticipates ASAP Project may apply for special permits to waive other regulations including, but not limited to, requirements regarding post construction pressure tests, depth of cover, and valve spacing.

Use of design, material, construction, operational and integrity management approaches not recognized under current Regulations will have potential effects on many functional areas, including specified design attributes, fabrication, construction, operation, monitoring, and integrity management. This information request outlines our preliminary information needs in each functional area. Within each functional area, the criteria being assessed are identified together with the underlying technical requirement (code, standard, rule, etc.). The required information associated with the criteria statement is then identified. There is also a general set of

required information that enables definition of the scope of anticipated special permit (waiver) requests. This information request is not comprehensive. As design and operating intent matures, it is expected that additional information will be identified in these functional areas:

- General Requirements (Section 2)
- Design Requirements (Section 3)
- Material and Fabrication Requirements (Section 4)
- Construction Requirements (Section 5)
- Corrosion Control Requirements (Section 6)
- Testing Requirements (Section 7)
- Operation and Maintenance (O&M) Requirements (Section 8)
- Integrity Management Requirements (Section 9)

2.0 General Requirements

2.1 Applications for Special Permits (Waivers)

2.1.1 Criterion: In order to understand the impact of anticipated special permits, PHMSA must be provided with sufficient information early in the design phase of the pipeline.

Basis: Federal Law 49 U.S.C. 60118(c); 49 C.F.R. § 190.341.

(a) Required Information: A summary of codes, consensus industry standards and special assurance practices (design, operational, maintenance, and integrity management) that ASAP Project will apply to the full life cycle of the Project.

(b) Required Information: An overview summary of the extent to which the design will comply with, go beyond, and/or deviate from, existing regulatory requirements.

(c) Required Information: A listing of all regulations (including consensus industry standards and other material incorporated into the regulations by reference [Re: 49 CFR § 192.7]), by specific section, that will be the subject of a special permit request. For any regulation/requirement not listed, it will be assumed that the ASAP Project intends full compliance in accordance with the pipeline safety regulations contained in 49 CFR Part 192. The nature of the deviation from the requirement must be identified. If you do not submit any applications for a special permit when replying to this request, please note when you will submit special permit requests. For each regulation for which a special permit (waiver) will be sought, the applicable pipeline segments to which these special permits apply must be identified. If the deviation applies to the entire pipeline, identify as "all segments."

(d) Required Information: It is anticipated that one condition of any special permit would be full-time oversight by federal PHMSA inspectors, both in the ASAP Project's headquarters design and operations offices and at construction camps. This oversight will require suitable office space and/or accommodations both at headquarters offices and at all construction camps, and unfettered access by federal inspectors to documents, records, and activities subject to federal oversight. The ASAP Project should commit to satisfy these conditions.

(e) Required Information: Identify the pipeline stationing and mile posts for the location or locations of the applicable special permit segment(s)

2.2 Quality Management System

2.2.1 Criterion: The unique challenges associated with the ASAP Project's proposed project, including the anticipated need for special permits from established pipeline safety regulations, places a greater burden on the ASAP Project's quality and management systems to assure pipeline integrity, safety, and environmental protection for the life of the pipeline. A robust quality management system is essential to meet these objectives and to provide PHMSA with the confidence in the pipeline design, operational, maintenance, and integrity management plans to approve anticipated special permits.

Basis: 49 CFR § 192.13

(a) Required Information: Provide the prospective Quality Management System plan/program. Please indicate whether you will conform to, and implement, API Specification Q1. Please describe and justify any exceptions taken to API Specification Q1.

2.3 Construction Quality Assurance and Quality Control

2.2.1 Criterion: The unique challenges associated with the ASAP Project's proposed project, including the anticipated need for special permits from established pipeline safety regulations, places a greater burden on the ASAP Project's quality of construction to assure pipeline integrity, safety, and environmental protection for the life of the pipeline. A robust construction quality assurance and quality control process is essential to meet these objectives.

Basis: 49 CFR § 192.13

(a) Required Information: Provide the ASAP Project's construction quality assurance and quality control plans and procedures. Please identify and indicate your commitment to conform to, and implement, applicable construction quality standards.

3.0 Design Requirements

3.1 Reliability Based Design

3.1.1 Criterion: It is implicit in 49 CFR 192 that operators are to apply stress-based design practices for pipeline design. Since many specific regulations assume this approach and are predicated on a stress-based design, the application of other design practices requires a special permit. Use of a Reliability Based Design and Assessment (RBDA) approach requires review of extensive information in order to reach the conclusion that pipeline safety is not compromised.

Basis: 49 CFR Part 192, Subpart C.

(a) Required Information: Provide pipeline design criteria and identify associated limit states associated with each criterion for applicability to the reliability based model.

(b) Required Information: Identify all target reliability values associated with pipeline and component design and provide the basis for their determination, including specific identification of any assumptions used and the basis for validity of each assumption. Also identify where target values have been increased to improve the margin of safety.

(c) Required Information: Provide the model used to determine the reliability of the pipeline, including the value of the applicable limit states and the associated limit state functions. Include the basis for any non-conservative inputs, such as wall thickness, when compared to similar values that would be derived from a design determined using methods that comply with 49 CFR 192 requirements. Include the basis for any segmentation of the pipeline for purposes of establishing the reliability target.

(d) Required Information: Identify any time-dependent inputs that could affect model results, such as population density determinations. For such time-dependent inputs, provide programs or procedures that will evaluate these inputs and their impact on the model.

(e) Required Information: Provide the basis for the use of empirical or test data when developing the reliability model, including documented evidence that the data used is representative for its intended purpose. Justify applicability of the data

used to new pipeline construction and operation in the service conditions expected.

(f) Required Information: Provide the basis for key assumptions and any simplifications in the model.

(g) Required Information: Provide a listing of the hazards considered by the model, including natural phenomena hazards (e.g., seismic, slope instability, freeze-thaw effects), and the basis for their contribution to the probability of pipeline failure.

(h) Required Information: Provide the basis for uncertainty that exists with the model and identify safety margins applicable to the pipeline.

(i) Required Information: If any risks, such as environmental risks, are not considered by the model, give the basis for elimination of such risks.

3.2 Strain Based Design

3.2.1 Criterion: It is implicit in 49 CFR Part 192 that operators are to apply stress-based design practices for pipeline design. Since many specific regulations assume this approach and are predicated on a stress-based design, the application of other design practices requires a special permit. Use of a Strain Based Design approach requires review of extensive information in order to reach the conclusion that pipeline safety is not compromised.

Basis: 49 CFR Part 192, Subpart C.

(a) Required Information: Identify applicable threats and limit states for which strain based design techniques will be used for each pipeline segment.

(b) Required Information: Because a comprehensive consensus industry standard has not yet been developed for strain based design, it is incumbent upon the ASAP Project to establish, document, and justify the design process/procedure, design criteria, and safety margins. The ASAP Project must submit its formal design process description and design criteria. This material must include the basis for all design criteria, how the criteria were established, data used to determine acceptability of design criteria, justification for design/safety factors incorporated into the design criteria, and means incorporated in the design or operation to verify the consistency of operational conditions with design basis assumptions. This applies to line pipe (including special

pieces/joints such as induction bends) and pipeline components (such as compressor stations, valves, pressure vessels, etc.)

(c) Required Information: Identify the design basis natural phenomena and/or outside force events/hazards applicable to each pipeline segment, the associated magnitude of these events/hazards, and the bases for any assumed values. This includes seismic events (earthquake zones and fault zones), frost heave, freeze/thaw cycles, landslides, soil creep, soil collapse, severe weather events, volcanic loadings and any other credible outside force scenario. The ASAP Project should submit the design criteria, including design margin/safety factors, to address each event/hazard.

3.3 Additional Design Requirements for Alternative MAOP

3.3.1 Criterion: It is our understanding that the ASAP Project's strain based design approach and methodology for post-construction verification of pipeline integrity will likely apply for a special permit from MAOP and/or class location requirements of Subparts J and/or L. Even if a special permit is not requested, the ASAP Project may desire to operate at the alternative MAOP allowed in Part 192. In either case, the additional design requirements of 49 CFR §§ 192.112 and 192.620 apply.

Basis: 49 CFR §§ 192.112 and 192.620

(a) Required Information: Provide information that demonstrates compliance with 49 CFR §§ 192.112 and 192.620 for applicable pipeline segments.

(b) Required Information: Provide a detailed pipe fracture control plan that demonstrates compliance with 49 CFR § 192.112(b).

3.4 Depth of Cover

3.4.1 Criterion: Known deviations from depth of cover requirements must be documented and reviewed for acceptability. In these cases, the ASAP Project must apply for a special permit.

Basis: 49 CFR § 192.137(c)

(a) Required Information: Provide a description of the locations where the pipeline will be exposed and buried. Where buried, identify the depth of cover. Identify any design features which provide additional protection to the pipeline due to deviations from required depth of cover. Identify the segments and

locations by milepost to which these additional protective features will be provided.

3.5 Valve Spacing

3.5.1 Criterion: Regulations require minimum block valve spacing based on the class location in which the segment is located.

Basis: 49 CFR § 192.179

(a) Required Information: The ASAP Project should identify the criteria and technical basis for establishing block valve spacing and location.

3.6 Pipeline Components

3.6.1 Criterion: The unique challenges of the ASAP project could also have significant affect on the design of compressor stations and other components of the pipeline system, besides line pipe.

Basis: 49 CFR Part 192, Subpart D

(a) Required Information: The ASAP Project should identify the criteria, specifications, and technical basis for designing pipeline components other than line pipe, including as a minimum all items listed in Subpart D.

4.0 Material and Fabrication Requirements

4.1 Steel Pipe Manufacturing Specification and Quality

4.1.1 Criterion: The proposed pipeline will operate at pressures well above those typical for US pipeline operation and therefore require very heavy wall pipe. In addition, there have been recent examples of sub-standard steel being installed in new pipelines in the lower 48 states. The steel and pipe must meet all technical and quality standards. In addition, the ASAP Project has indicated its intent to request a special permit from post-construction pressure testing. As a result, additional activities or requirements to assure pipe quality are imperative.

Basis: 49 CFR § 192.55 and Appendix B; and PHMSA Advisory Bulletin in 74 CFR 23930, May 21, 2009, Docket No. PHMSA-2009-0148; and PHMSA "Interim Guidelines for Confirming Pipe Strength in Pipe Susceptible to Low Yield Strength" dated September 10, 2009

(a) Required Information: Provide all specifications that will be used to manufacture the steel and pipe.

(b) Required Information: Identify all consensus industry standards which will be used for manufacturing, and testing the properties of, the steel and pipe.

(c) Required Information: Provide a description of the ASAP Project's quality oversight process with respect to the manufacture of steel and pipe. This should include the process used to qualify the selected steel mill(s) and pipe manufacturing facilities and the process by which the ASAP Project will provide quality oversight of steel and pipe manufacturing process.

(d) Required Information: Provide a description of testing that will be performed to verify the quality and material properties of the pipe. This should include a listing of all material properties to be tested and acceptance criteria for all properties. A special permit will be requested for post-construction pressure testing, PHMSA would expect that 100% of pipe joints be tested to verify material properties. If a sampling approach is used to verify pipe material properties, the ASAP Project must submit an engineering and technical justification for assuring that all pipe joints meet material specifications. Because of recent problems at other construction projects with pipe steel not meeting specified minimum yield strength (SMYS) specifications, the ASAP Project should explicitly address its processes and procedures for

assuring that all pipe joints meet minimum material property specifications.

(e) Required Information: Provide a process description for analyzing and dispositioning material properties and flaws. If applicable, provide the basis for determining the use of Engineering Critical Assessment methodology to address the acceptability of material flaws.

5.0 Construction Requirements

5.1 Qualification of Welding Procedures

5.1.1 Criterion: Existing PHMSA regulations specify minimum requirements for welding of pipe. Welding of pipe in arctic environment presents challenges.

Basis: 49 CFR Part 192, Subpart E

(a) Required Information: Provide any special processes, procedures, or additional requirements used to qualify the weld procedure in accordance with API 1104. In particular, if strain based design is used, the destructive testing used to qualify the weld procedure should be both a hoop stress overstress test and a bending/mechanical deformation overstrain test. Include a description of all special processes (e.g., backwelding).

(b) Required Information: If API 1104, Appendix A will be used for welding and weld non-destructive testing, the ASAP Project must outline guidance documents for the testing of weld and non-destructive testing (NDT) procedures for various pipe steel suppliers and pipe manufacturers. The guidance must document how pipeline welders and NDT technicians will be qualified. The guidance document must outline how Appendix A will be developed into construction procedures that give guidance to Construction Personnel and Quality Assurance Personnel to properly handle pipe lifting and lower-in operations with out invalidating API 1104, Appendix A.

(c) Required Information: Provide a description of how the weld procedures account for very heavy wall pipe, the extreme arctic environment, and any other unique condition not typically encountered in pipeline construction in the lower 48 states. Factors such as pre-weld heat treatment, post-weld heat treatment, maintenance of heat on weld, and maximum time allowed between passes should be explicitly addressed. Demonstrate how the shop qualified weld procedure or procedure qualified in a controlled environment is appropriate for the field environment.

(d) Required Information: Provide a description of how the weld procedures account for the potential difficulties encountered with weld site preparation and pipe fit-up for any field-cut factory bends and pipe wall thickness variances. This information should include, but not be limited to, fit-up tolerance for alignment of pipe ends, joint design, accounting for wall thickness variance,

(e) Required Information: Provide a description of how the weld procedures will be qualified and field implemented for conducting backwelding and repair welding to meet API 1104.

5.2 Qualification of Welders

5.2.1 Criterion: Existing PHMSA regulations specify minimum requirements for welder qualification. Welding of pipe in arctic environment presents challenges.

Basis: 49 CFR Part 192, Subpart E

(a) Required Information: Provide a description of the process for qualifying individuals to weld on the pipeline. Explicitly describe any special features of the welder qualification process that address very heavy wall pipe, the extreme arctic environment, and any other unique condition not typically encountered in typical pipeline construction in the lower 48 states.

5.3 Weld Acceptance Testing and Acceptance Criteria

5.3.1 Criterion: Because the ASAP Project has indicated it intends to request a special permit from post-construction pressure testing, weld acceptance testing and acceptance criteria are critical.

Basis: 49 CFR Part 192, Subpart E

(a) Required Information: Provide the specific written weld test program and weld acceptance criteria. Because the ASAP Project has indicated it intends to request a special permit from post-construction pressure testing, PHMSA would expect that 100% of welds would be nondestructively tested. The ASAP Project should describe and justify its weld acceptance criteria, using API 1104 as the basis; in particular, the ASAP Project should describe and justify if it intends to incorporate alternative acceptance criteria from Appendix A of API 1104 and use of any other proposed standards. the ASAP Project should describe the pipe conditions where backwelding will be used including for fittings, heavy wall pipe and transitions.

5.4 General Construction in Arctic Conditions

5.4.1 Criterion: Each transmission line or main must be constructed in accordance with comprehensive written specifications or standards that are consistent with Part 192. If the ASAP Project intends to request a special permit from post-construction pressure testing, additional measures are needed to

assure that the pipeline does not sustain integrity-threatening damage during construction. In addition, extreme arctic conditions pose unique challenges to pipeline construction.

Basis: 49 CFR Part 192, Subpart G

(a) Required Information: The ASAP Project should submit its plans and processes for quality oversight of construction activities, including QC inspection of all construction activities.

(b) Required Information: The ASAP Project should submit its plan regarding how it will address the unique challenges of the arctic environment during pipeline construction (e.g., discontinuous permafrost, stability of disturbed permafrost, pinch points). The ASAP Project should address if and how it will apply API RP 2N to its pipeline construction activities.

(c) Required Information: The ASAP Project should submit its plan to assure pipe coating durability and integrity during pipe lowering, backfilling, and horizontal directional drills. The plan should describe all pipeline installation activities including procedures for handling pipe, lowering pipe into the ditch, type of backfill material to be used, and backfill procedures.

(d) Required Information: PHMSA expects that all construction personnel would be covered under the ASAP Project's Construction OQ program for the Alternative MAOP Rule, since mistakes during construction could lead to threats to pipeline integrity. The ASAP Project should describe all construction and verification related tasks to be included in its Construction OQ program. Helpful information for compliance with the Alternative MAOP Rule can be found at: http://primis.phmsa.dot.gov/maop/index.htm .

(e) Required Information: The ASAP Project should submit its plan regarding how it will address the unique challenges of the arctic environment during the time period between completion of construction for each segment and operational startup. PHMSA would expect the pipeline to be maintained and monitored sufficiently to prevent damage from outside forces, corrosion, etc. prior to being placed into service. The ASAP Project should address how it will monitor the pipeline for potential damage (including strain conditions) that could occur to the pipeline segments during long periods of disuse prior to placing the pipeline system into service.

5.4.2 Criterion: Regulations require that pipeline and components must have sufficient supports to preclude undue strain, including but not limited to, that caused by temperature-induced contraction/expansion or by high internal pressures.

Basis: 49 CFR § 192.161

(a) Required Information: Provide design and construction requirements for support structures.

5.5 Recent Construction Issues

5.5.1 Criterion: PHMSA has identified problems at recent construction projects in the lower 48 states that could present special challenges during construction in an arctic environment. PHMSA expects the ASAP Project to proactively develop its construction processes and procedures to avoid these problems.

Basis: 49 CFR Part 192, Subpart E

(a) Required Information: Provide a description of plans, processes and procedures to address/prevent the following problems: field cuts of factory or induction bends (sized for segmenting), poor weld fit-up, poor quality welding, poor backfill material, damaged or improperly installed coating, damaged pipe from improper bending in the field, hydrogen assisted cracking, damage or over-strain during lowering in ditch and backfill, and poor quality NDT.

5.6 Additional Construction Requirements for Alternative MAOP

5.6.1 Criterion: It is our understanding that the ASAP Project's strain based design approach and methodology for post-construction verification of pipeline integrity will necessitate the need to apply for a special permit from MAOP and/or class location requirements of Subparts J and/or L. Even if a special permit is not requested, the ASAP Project may desire to operate at the alternative MAOP allowed in Part 192. In either case, additional construction requirements of 49 CFR §§ 192.384 and 192.620 apply.

Basis: 49 CFR §§ 192.384 and 192.620

(a) Required Information: Provide information that demonstrates compliance with 49 CFR §§ 192.384 and 192.620 for applicable pipeline segments.

6.0 Corrosion Control Requirements

6.1 External Corrosion Control

6.1.1 Criterion: An effective corrosion control program is essential to long term pipeline integrity.

Basis: 49 CFR Part 192, Subpart I

(a) Required Information: Submit plans for managing external corrosion, including coating system, cathodic protection (CP), surveillance, monitoring, and periodic assessment (i.e., ILI assessment). The plans should provide comprehensive details of the CP system design, installation, operation, maintenance, and performance (including minimum performance specifications). PHMSA expects plans to include interference surveys to identify and mitigate all sources of interference (e.g., telluric currents, nearby pipelines, high voltage electric transmission lines, third party structures, etc.) and how they impact CP of the pipeline.

(b) Required Information: Submit plans for managing internal corrosion, including moisture control, inhibitors, coupons, monitoring, and periodic assessment (i.e., ILI assessment).

(c) Required Information: Submit plans for managing atmospheric corrosion on non-buried pipe, including monitoring and periodic assessment (i.e., ILI assessment).

6.2 Internal Corrosion Control

6.2.1 Criterion: An effective corrosion control program is essential to long term pipeline integrity.

Basis: 49 CFR Part 192, Subpart I

(a) Required Information: Describe your program to monitor for and mitigate the presence of, deleterious gas stream constituents, including, as applicable:

i. Provisions for use of filter separators or separators and gas quality monitoring equipment,
ii. Use of gas quality monitoring equipment including moisture analysis, chromatograph, and periodic hydrogen sulfide sampling
iii. Use of cleaning pigs and inhibitors, and sample accumulated liquids
iv. Use of corrosion coupons for internal corrosion monitoring

(b) Required Information: Describe your program to address deleterious gas stream constituents including the following as applicable:

i. Provisions to limit carbon dioxide and limits
ii. Provisions to restrict the presence of free water and limits
iii. Provisions to limit hydrogen sulfide and limits

(c) Required Information: Describe your program for review of the effectiveness of your mitigation and monitoring efforts, including anticipated frequency of formal review

7.0 Testing Requirements

7.1 Post Construction Pressure Test

Criterion: Each pipeline must be pressure tested to substantiate material strength, proposed MAOP, and that it is leak-tight. It is our understanding that the ASAP Project intends to request a special permit from this requirement. This is a critical aspect of pipeline regulations that verifies pipeline integrity prior to being placed into service. Other provisions of the pipeline safety regulations are predicated upon a successful demonstration of pipeline strength by pressure test. Any special permit from conducting a pressure test that fully complies with 49 CFR Part 192, Subpart J would require a substantial justification, including mitigation measures to assure an equal or greater level of pipeline safety.

Basis: 49 CFR Part 192, Subpart J

(a) Required Information: The ASAP Project should describe its proposed alternative methods to verify the strength and leak-tightness of the pipeline prior to being placed into service. As part of this information, the ASAP Project should describe additional compensatory measures related to pipeline design, construction, inspection, and testing of materials, operational measures and components to assure pipeline integrity. A comprehensive quality assurance and verification program description will ultimately be required of the ASAP Project.

(b) Required Information: If the ASAP Project chooses to conduct a pressure test in conformance with Subpart J, describe the test plans and procedures to be used. The procedures should address the specific challenges associated with conducting the pressure test in arctic conditions.

8.0 Operation and Maintenance (O&M) Requirements

8.1 MAOP

8.1.1 Criterion: Existing regulations require that MAOP be established based on test pressure and assuring that the hoop stress does not exceed SMYS (with safety margin) for the class location in which the pipeline segment is located. If the ASAP Project applies for a special permit from the regulations pertaining to the MAOP, and/or class location, PHMSA would expect the applicable provisions of 49 CFR § 192.620 to apply. Even if a special permit is not requested, the ASAP Project may desire to operate the pipeline in accordance with the alternative MAOP allowed by Part 192. In either case, the ASAP Project should describe its program for complying with 49 CFR § 192.620.

Basis: 49 CFR Part 192, Subparts J and L; 49 CFR § 192.620

(a) Required Information: Describe and justify your alternative process for establishing the MAOP of the pipeline, if applicable.

(b) Required Information: Describe and justify your program for complying with the O&M requirements contained in 49 CFR § 192.620(d) for operating at alternative MAOP, if applicable.

8.2 Strain Monitoring

8.2.1 Criterion: With a traditional stress based design, assuring that the pipe hoop stress is not exceeded is a relatively simple matter of enforcing the MAOP. With a strain based design, long term assurance that design basis strain loading conditions are not exceeded requires the effective use of strain gauges and an effective monitoring program. PHMSA would expect that the ASAP Project's additional preventive measures would include a formal program for monitoring strain and ROW conditions. PHMSA would expect additional monitoring in earthquake zones and fault zones, hill/mountain side cut areas, discontinuous permafrost and permafrost areas including freeze/thaw areas. Because of the anticipated special permit to use strain based design, and the proximate threat of outside forces, PHMSA expects the ASAP Project to implement a robust strain monitoring program.

Basis: 49 CFR Part 192, Subpart L

(a) Required Information: Describe and justify the systems, tools, and plans for continually monitoring and analyzing localized strain on the pipeline, along with procedures for implementing preventive and mitigative measures to proactively address conditions that could cause design basis strain limits to be exceeded. PHMSA would expect such a program to include periodic ILI assessment with tools capable of identifying pipe deformation and other anomalies indicative of pipe movement, deformation, or other strain conditions.

8.3 Reliability Based Assessment

8.3.1 Criterion: It is implicit in 49 CFR Part 192 that operators are to apply stress-based design practices for pipeline design. Since many specific regulations assume this approach and are predicated on a stress-based design, the application of other design practices requires a special permit. Use of a Reliability Based Design and Assessment (RBDA) approach requires review of extensive information in order to reach the conclusion that pipeline safety is not compromised. A key aspect of RBDA is the periodic assessment of pipeline condition and integrity to assure that limit states are not exceeded during the life of the pipeline.

Basis: 49 CFR Part 192, Subparts C, J, L, and O.

(a) Required Information: Provide a description of the program for monitoring pipeline integrity and the material condition of the pipeline, including assessment methodology, acceptance criteria for anomalies/defects, and frequency of assessment. PHMSA would expect such a program to include an ILI assessment program and a comprehensive strain monitoring program.

(b) Required Information: Provide a description of the operational approach that will be used as the dense gas phase transitions between gaseous, liquid and supercritical fluid. PHMSA would expect the approach to include normal and abnormal operations and associated monitoring and mitigation.

9.0 Integrity Management Requirements

9.1 Failure Impact Zone

9.1.1 Criterion: Covered pipeline segments must comply with the integrity management requirements of 49 CFR Part 192, Subpart O. In addition, ASME B31.8S provides guidance for managing pipeline integrity. An important aspect of managing pipeline integrity is understanding the consequences of an explosion and/or fire that could occur following a failure. It is our understanding that the ASAP Project intends to request a special permit from key requirements such as design and pressure testing. As part of granting such a special permit, PHMSA would expect the ASAP Project to develop rigorous and robust failure impact zone analysis for the entire pipeline.

Basis: 49 CFR Part 192, Subpart O and ASME B31.8S

(a) Required Information: Identify the covered pipeline segments as defined by Subpart O. Identify how the covered segments are identified, including how the potential impact radius (PIR) is determined. This should include justification for derivation of the PIR formula in accordance with ASME B31.8S for the unique operating parameters contemplated, including very large pipe diameter, very high operating pressure, and very rich gas.

(b) Required Information: The ASAP Project should identify and justify how it will use the methodology in ASME B31.8S (or other methodology) to identify the leak or failure impact zone of an explosion and/or fire resulting from a leak or failure of the pipeline. The ASAP Project should also analyze and provide a report on the potential consequences arising from injury to any persons in proximity to the pipeline, population density, proximity of population with limited or impaired mobility, damage to property in proximity to the pipeline, damage to the environment, potential for secondary failures, and the impact on public convenience and necessity. The report should include a justification for the threshold heat flux and shock wave used to evaluate each type of damage receptor and consider fire duration. Note that consequences may vary based on the richness of the gas transported and as a result of how the gas decompresses. The richer the gas, the more important defects and material properties are in modeling the characteristics of the failure. Because of the unique circumstances in Alaska, it is important to assure that the impact of an explosion or fire on nearby critical infrastructure is minimized. This includes, but is not limited to, the Trans Alaska Pipeline System (TAPS), bridges, electric power transmission lines, etc. In additional, the ASAP Project should

analyze the effects of un-ignited gas releases and impacts resulting from interruption of service.

9.2 Periodic Integrity Assessments

9.2.1 Criterion: The integrity management rule requires that pipeline integrity be assessed at least every 7 years. It is our understanding that the ASAP Project intends to request a special permit from key requirements such as design and pressure testing. As part of granting such a special permit, PHMSA would expect the ASAP Project to conduct integrity assessments for the entire pipeline more frequently than the minimum required in Subpart O.

Basis: 49 CFR Part 192, Subpart O and ASME B31.8S

(a) Required Information: Describe the planned integrity assessment methods, frequency, and how they address all threats applicable to the entire pipeline.

9.3 Preventive and Mitigative Measures

9.3.1 Criterion: The integrity management rule requires that pipelines in high consequence areas have additional preventive and mitigative measures, beyond those otherwise required by 49 CFR Part 192. It is our understanding that the ASAP Project intends to request a special permit from key requirements such as design and pressure testing. PHMSA would expect the ASAP Project to develop rigorous and robust preventive and mitigative measures for the entire pipeline to assure long term pipeline integrity.

Basis: 49 CFR Part 192, Subpart O and ASME B31.8S

(a) Required Information: Describe the planned preventive and mitigative measures, and how they address all threats applicable to the pipeline.

(b) Required Information: Correlate preventive and mitigative measures to the proposed application of RBDA and its associated catalog of design limits. The information must demonstrate how the ASAP Project, using RBDA, confirms consistency with the integrity management requirements.

9.4 Risk Analysis

9.4.1 Criterion: The integrity management rule requires operators to conduct a risk analysis for pipeline segments in high consequence areas and use the risk analysis results to schedule and prioritize integrity assessments, identify threats, and determine preventive and mitigative measures to manage

those threats. It is our understanding that the ASAP Project intends to request a special permit from key requirements such as design and pressure testing. As part of granting such a special permit, PHMSA would expect the ASAP Project to develop and implement a rigorous and robust risk analysis methodology for the entire pipeline to assure long term pipeline integrity.

Basis: 49 CFR Part 192, Subpart O and ASME B31.8S

(a) Required Information: Describe the planned risk analysis methodology, and how it will be used to manage all threats applicable to the entire pipeline and assure pipeline integrity.

(b) Required Information: The ASAP Project should describe the methodology for using risk analysis results to identify the risk drivers for each pipeline segment and how those risk drivers will be used to determine the most effective integrity assessment and/or mitigation option. In doing so, the ASAP Project should analyze the unique circumstances associated with each special permit request as well as the failure impact zone to identify how to manage the threats and prevent or mitigate the consequences of a leak or failure, when the special permit conditions are in place, using the most effective engineering, integrity assessment and operational measures for risk mitigation.

(c) Required Information: The ASAP Project should describe how it will validate its risk analysis methodology to assure that the methods used have produced results that are usable and consistent with the operator's and industry's experience. The ASAP Project should describe how it will analyze and monitor operational, maintenance or other activities to identify areas that are inaccurately represented by the risk analysis process, and use that information to modify and continually improve its risk analysis process.

Enclosure B

Guidance for Special Permit Applicants on Providing Environmental Information

The processing of an Alaska gas pipeline special permit (SP) application will involve an environmental analysis in accordance with the National Environmental Policy Act of 1969 (NEPA), the President's Council on Environmental Quality regulations implementing NEPA (40 CFR 1500-1508), and Department of Transportation (DOT) policy. To the extent PHMSA's grant or denial of your special permit request may constitute a Federal action under NEPA, in addition to analyzing any potential risks to public safety, PHMSA also analyzes any potential risks to the environment that could result from such grant or denial. PHMSA will evaluate whether the special permit would significantly impact the likelihood of a pipeline spill or failure as compared to the environmental status quo in the absence of the special permit.

PHMSA requests that the applicant submit its special permit applications and environmental information as soon as possible. If PHMSA does not receive special permit applications and all necessary supporting information well in advance the ASAP Project decision making on design, construction and other issues, the project may be delayed.

To facilitate PHMSA's environmental analysis, the special permit applicant needs to provide certain environmental information. The purpose of this form is to provide guidance to the applicant on what information should be provided. Any information submitted by the applicant is subject to being made public.

I. Purpose and Need

[Describe pipeline and specify county and state where the affected segments located]

[Cite regulation(s) for which special permit (waiver) is sought. Paste relevant portion of regulation(s) here.]

[State the unique circumstances and reasons for your special permit request. Explain how the special permit will benefit you and the public.]

II. Site Description and Affected Environment

Describe the right-of-way and the type of environment in the vicinity of the affected pipeline segments including:

[Provide map if available]

[Describe extent to which landowners, businesses, and residential areas are in the vicinity including parks]

[Describe surface waters in the vicinity including wetlands]

[Describe drinking water aquifers in the vicinity]

[Describe soils and vegetation in the vicinity]

[Describe wildlife habitats including fisheries in the vicinity]

[Describe any geologic hazards]

[Describe any cultural resources that may be affected if a special permit were granted]

[Describe any socioeconomic impacts or special impacts on Native Americans, if any,, if a special permit were granted]

[Describe the existing infrastructure that is within the Potential Impact Radius of the pipeline]

III. Mitigation Measures

[Describe the alternative mitigation measures you are offering to implement in lieu of compliance with the regulations for which you are seeking a special permit.]

IV. Analysis and Investigation of Alternatives

[Explain the basis for the particular set of alternative mitigation measures listed in section III above. Explain whether the measures will ensure that a level of safety and environmental protection equivalent to compliance with existing regulations is maintained.]

[Discuss how the special permit would affect the risk or consequences of rupture or failure (positive, negative, or none)]

[Discuss any effects on pipeline longevity and reliability such as life-cycle and periodic maintenance. Discuss any technical innovations as well]

[Discuss how the special permit would impact human safety]

[Discuss whether the special permit would affect land use planning]

[Discuss any pipeline facility, public infrastructure, and environmental impacts associated with implementing the special permit. In particular, discuss how any environmentally sensitive areas could be impacted]

[Evaluate alternatives to the special permit and any beneficial or adverse consequences of such alternatives.]

NOTE: The ASAP Project should include the pipeline stationing and mile posts (MP) for the location or locations of the applicable ***special permit segment(s)***.

SEAN PARNELL
Governor

P.O. Box 110001
Juneau, Alaska 99811-0001
(907) 465-3500
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STATE OF ALASKA
OFFICE OF THE GOVERNOR

April 12, 2010

Mr. Jeffrey D. Wiese
Associate Administrator for Pipeline Safety
U.S Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

Dear Mr. Wiese,

The Office of the Governor is in receipt of March 3, 2010 requesting information about the nature of the proposed Alaska In-State Gas Pipeline Project and plans for the project to submit waivers for compliance with Federal Pipeline Safety Regulations under the federal standards you identified.

Our Office has reviewed Enclosure A included in your letter that requests information concerning special permits. I am enclosing a table with this letter which responds to each criterion you identified. Please note a number of concerns raised in Enclosure A are related to procedures that have been identified, or are under consideration by other proposed arctic natural gas pipeline proponents. The Alaska In-State Gas Pipeline Project (identified in your letter as the Alaska Stand Alone Pipeline) is attempting to maintain a tight timeline in order to provide for the near term energy needs of residents and commercial interests within the state of Alaska. Our team has made specific efforts throughout our planning and initial engineering design to highlight issues that might cause delay, and has worked hard to avoid the need for any request for submission of special permit applications for the project pursuant to 49 C.F.R. Section 190.341. We believe there are no special permit applications required at this time, but will remain diligent in our review of such need.

For example, we are not requesting waivers for the Alaska In-State Gas Pipeline Project (identified in Enclosure A of your March 3, 2010 letter) for the following key permits:

- application of reliability based design and assessment;
- deviation from depth of cover and valve spacing requirements;
- relief from post-construction hydrotest requirements;
- alternative MAOP requirements; or
- deviation from class location requirements.

Enclosure B to your letter contains "Guidance for Special Permit Applicants on Providing Environmental Information." An Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act (NEPA) is currently underway with the U.S. Army Corps of Engineers (USACE) as the lead federal agency with several other federal agencies acting as cooperating agencies. The EIS will assess potential risks to the public and the environment that could result from approval of the Alaska In-State Gas Pipeline Project. In the event that the Alaska In-State Gas Pipeline Project needs to deviate from one or more regulations, a special permit waiver

would be filed with Pipeline and Hazardous Materials Safety Administration (PHMSA). Alaska In-State Gas Pipeline Project would coordinate with PHMSA, the USACE, and the cooperating agencies to evaluate the potential environmental effects of any special permit waiver and analyze this request in accordance with NEPA.

The Alaska In-State Gas Pipeline Project team will also stay informed on the progress of other pipeline projects in the state, and will stand ready to adopt any new policies for arctic conditions as they are developed and PHMSA deems them appropriate for our project.

We would appreciate it if you would continue to include us in any deliberations as these matters progress.

Sincerely,

Robert Swenson
Project Manager
Alaska In-State Pipeline

Enclosure

cc: The Honorable Gene Therriault, Office of the Governor
Serena Sweet, U.S. Army Corps of Engineers
Ron Denton, Bureau of Land Management
Mike Thompson, Joint Pipeline Office
Harold Heinze, Alaska Natural Gas Development Authority

In-State Gas Pipeline Project [Alaska Stand Alone Pipeline (ASAP)]
PHMSA March 3, 2010 Information Request - Response Outline

Issue	Criterion Summary	Response
2.1.1	Provide PHMSA with sufficient information early in design process	The detailed design phase of the Alaska Stand Alone Pipeline (ASAP) project is scheduled to start in 2011.
2.2.1	Quality Management System	A Quality Management System for the ASAP project would be implemented during detailed design.
2.3.1	Construction Quality Assurance	A construction QA/QC plan would be developed for construction, in conjunction with the selected construction contractors.
3.1.1	Reliability Based Design and Assessment	A Reliability Based Design and Assessment (RBDA) approach is not proposed for use by the project.
3.2.1	Strain Based Design	Strain based design for integrity assurance for arctic geohazard potential loadings would be developed, as required, in accord with American Society of Mechanical Engineers (ASME) B31.8, Para833.5: "Design for Stresses Greater than Yield".
3.3.1	Additional Design Requirements for Alternative Maximum Allowable Operating Pressure (MAOP)	No special permit for the following are being sought: • class location requirements, or • alternative MAOP
3.4.1	Depth of Cover	No special permits are being sought for deviations from depth of cover.
3.5.1	Valve Spacing	No special permits are being sought for deviations from minimum block valve spacing.
3.6.1	Pipeline Components	No special permits are being sought for pipeline components.
4.1.1	Steel Pipe Manufacturing Specification and Quality	The specifications for the proposed X70 line-pipe will be ensured to meet all regulatory requirements and PHMSA guidelines. However, detailed pipe specifications and vendor qualifications pipe are not expected to be addressed until the detailed design phase.
5.1.1	Qualification of Welding Procedures	Welding requirements would be developed during detailed design.
5.2.1	Qualification of Welders	Welder qualification requirements would be specified in the construction bid.
5.3.1	Weld Acceptance Testing and Acceptance Criteria	No special permits are being sought for deviations from post-construction pressure testing.

Issue	Criterion Summary	Response
5.4.1	General Construction in Arctic Conditions	No special permits are being sought for deviations from post-construction pressure testing. Special construction practices required for arctic conditions would be addressed in the Construction plan and Quality Assurance & Quality Control (QA/QC) manual.
5.5.1	Recent Construction Issues	Construction practices required to avoid pipe quality issues, and to remediate all identified defects would be addressed in the Construction plan and QA/QC manual.
5.6.1	Additional Construction Requirements	No special permits for the following are being sought: • class location requirements, or • alternative MAOP
6.1.1	External Corrosion Control	External corrosion control would be addressed during detailed design
6.2.1	Internal Corrosion Control	Internal corrosion control would be addressed during detailed design
7.1	Post Construction Pressure Test	No special permits are being sought for deviations from hydrotest requirements.
8.1.1	MAOP	No special permits for the following are being sought: • class location requirements, or • alternative MAOP
8.2.1	Strain monitoring	Operational monitoring techniques would be developed in accord with any strain based design measures
8.3.1	Reliability Based Assessment	A Reliability Based Design and Assessment (RBDA) approach is not proposed for use by the project.
9.1.1	Failure Impact Zone	No special permits are being sought for deviations from hydrotest requirements.
9.2.1	Periodic Integrity Assessments	No special permits are being sought for deviations from hydrotest requirements.
9.3.1	Preventive and Mitigative Measures	No special permits are being sought for deviations from hydrotest requirements.
9.4.1	Risk Analysis	No special permits are being sought for deviations from hydrotest requirements.

U.S. Department of Transportation
Pipeline and Hazardous Materials
Safety Administration

1200 New Jersey Ave, S.E.
Washington, D.C. 20590

MAY 04 2011

Mr. Daniel Fauske
President
Alaska Gasline Development Corporation
P.O. Box 101020
411 West Fourth Ave., Suite 1E
Anchorage, AK 99501

Re: Supplemental to PHMSA letter dated March 3, 2010;
State of Alaska letter to PHMSA dated April 12, 2010
ASAP Plan of Development dated March 2011

Dear Mr. Fauske:

On March 3, 2010, the Pipeline and Hazardous Materials Safety Administration (PHMSA) wrote to Mr. Robert Swenson of the Alaska Gasline Development Corporation(AGDC) requesting information concerning the proposed Alaska Stand Alone Gas Pipeline Project (ASAP Project). PHMSA informed AGDC that to the extent the ASAP Project proposal called for design, materials, construction, or operating specifications that would not meet the current Federal Pipeline Safety Regulations, AGDC may need to submit one or more special permit applications for the project pursuant to 49 C.F.R. § 190.341. A special permit is an order by which PHMSA waives or modifies compliance with one or more of the Federal Pipeline Safety Regulations under the standards set forth in 49 U.S.C. § 60118(c) and 49 C.F.R. § 190.341, subject to conditions and limitations set forth in the order. A special permit may be issued to a pipeline operator (or prospective operator) for specified facilities that, absent waiver, would be subject to the regulation.

AGDC's April 12, 2010, response to our March 3, 2010 letter stated that "We believe there are no special permit applications required at this time, but will remain diligent in our review of such need." AGDC has briefed PHMSA technical experts several times on certain aspects of the project, but the level of detail has been insufficient for PHMSA to fully understand AGDC's plans and approach to some of the technical and regulatory issues described in the letter.

Based on the information on the ASAP Project provided in connection with the limited project briefings, we believe that current regulations may not allow the approach to the ASAP Project that AGDC may be proposing in certain geo-hazard areas. More specifically, one or more special permit applications may be required if the following approaches are being used:

External loads that exceed design allowable – strain based design

As prescribed in 49 CFR §§ 192.103, 192.105, 192.111, 192.317, and 192.620, natural gas pipelines must be designed to limit stresses below the specified minimum yield strength (SMYS) by a design factor based on class location. AGDC has indicated that it intends to operate under the standard maximum allowable operating pressure (MAOP) provisions of 49 CFR Part 192 and the alternative MAOP provision in section 192.620 allowing 80% SMYS under certain circumstances will not be used. Most of the pipeline is anticipated to be located in a Class 1 location. Accordingly, for those segments located in a Class 1 location, the stress must be limited to 72% SMYS. Lower allowable stresses would apply to Class 2 and 3 locations. The regulations in 49 CFR §§ 192.103 and 192.105 also require additional wall thickness sufficient to handle concurrent external loads, and require that the pipeline be protected from foreseeable hazards and conditions that may cause the pipeline to sustain abnormal loads.

AGDC has indicated that "Strain based design (SBD) for integrity assurance for arctic geo-hazard potential loadings would be developed, as required, in accordance with American Society of Mechanical Engineers (ASME) B31.8, para833.5: "Design for Stresses Greater than Yield"" (see Enclosure A, State of Alaska letter to PHMSA dated April 12, 2010). PHMSA believes this approach may result in the pipeline being subjected to indefinitely sustained loads in excess of 72% SMYS in areas of frost heave, thaw settlement, slope instability, and other areas of expected significant soil movement. To date, PHMSA is not aware that design and operational methods to predict and monitor strain to assure that external loads that exceed the pipe SMYS and approach ultimate tensile strength are detected and mitigated have been proposed for the ASAP Project.

The current Part 192 code is based on hoop strength and internal pressure. Part 192 has no provisions for the material, design, operations and maintenance, or integrity management aspects of SBD; nor do any sections of API 5L, ASME/ANSI B31.8 or B31.8S that have been incorporated by reference into Part 192. Therefore, a special permit application with detailed technical and engineering analysis of materials, design, and operating parameters and a full description of proposed mitigative measures would be required to allow PHMSA to make a determination as to whether the proposed use of SBD to allow the ASAP pipeline to indefinitely sustain external loads in excess of current design strength requirements is consistent with pipeline safety.

Fracture Control Plan

Under 49 CFR § 192.112(b), the ASAP Project is not required to have a fracture control plan if the pipeline will be operated at 72% SMYS operating pressures or less. Should the ASAP Project decide to design, construct, and operate the pipeline in accordance with the alternative MAOP Rule as prescribed in 49 CFR § 192.112, however, the pipeline must be designed for fracture initiation and fracture arrest which will require additional pipe toughness or crack arrestors to limit fracture propagation in failure situations.

Pipeline external coating

As prescribed in 49 CFR §192.455(a), a pipeline must have an external protective coating that meets the requirements of §192.461 and it must have a cathodic protection system designed to protect the pipeline in accordance with Subpart I. It is important to note, however, that use of an external coating with a shielding layer would likely prevent full cathodic protection from reaching the pipe. Therefore, all pipeline external coatings would be required to be compatible with cathodic protection as required in §192.461. If the pipeline is operated at an alternative MAOP, external coatings would also be required to meet § 192.112(f).

To avoid project delays, PHMSA suggests that ASAP submit any special permit applications for the above items or other project items that would not meet Part 192 as soon as possible. PHMSA advises ASAP to submit any special permit applications before making design-related decisions that could be adversely impacted by possible special permit conditions and measures that PHMSA may require in lieu of compliance with existing code provisions.

Additionally, to facilitate our review of your special permit application(s), please provide the information listed in Enclosures A and B of PHMSA's March 3, 2010 letter with any special permit application. Depending on your response, PHMSA may request additional information, including, but not limited to: data, reports, studies, and independent third party analyses. PHMSA expects a detailed safety and environmental review of a special permit application to take a minimum of 12 months or more, depending upon the extent and nature of the request, any requirements for additional information or studies, and the quality of submittal documents.

While the Army Corps of Engineers (COE) is currently designated as the lead agency for environmental reviews of the overall project, PHMSA is required to conduct an environmental review of any environmental impacts of its decision to grant or deny a particular special permit. An overview of the preliminary environmental information needed to support your special permit applications and facilitate PHMSA's environmental review is provided in Enclosure B. Enclosure C details information requested for a special permit for allowable external loads over 72% of Specified Minimum Yield Strength (SMYS) of the pipe – Strain Based Design.

Your timely submission of special permit applications and detailed safety and environmental information will enable PHMSA to properly analyze potential risks to public safety and to the environment that could result from our decision to grant or deny a special permit.

Please contact Dennis Hinnah, Deputy Director of Western Region at (907) 271-4937, or Jeffery Gilliam, Director of Engineering and Research Division, at (202) 366-0568, if you have any questions.

Sincerely,

Jeffrey D. Wiese
Associate Administrator for Pipeline Safety

cc: With Enclosures B and C

Ms. Serena Sweet
Project Manager
U.S. Army Corps of Engineers
CEPOA-RD-S
P.O. Box 6898
Elmendorf AFB, AK 99506-0898

Mr. Bud Rice
Environmental Protection Specialist
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240 West 5th Avenue, Suite 114
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Mr. Mark Jen
Environmental Protection Agency
222 West 7th Ave. #19
Anchorage, AK 99513-7588

Mr. Earle Williams
Acting Project Manager
Bureau of Land Management
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Mr. Mike Thompson
State Pipeline Coordinator
Joint Pipeline Office
Department of Natural Resources
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Project Manager
Federal Energy Regulatory Commission
888 First Street, NE, Room lA
Washington, DC 20426

Mr. Frank Richards
Deputy Federal Coordinator
Office of the Federal Coordinator
188 West Northern Lights Boulevard, Suite 600
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Mr. William P. Doyle
Director of Permits, Scheduling & Compliance
Office of the Federal Coordinator
Alaska Natural Gas Transportation Projects
1717 H St., NW, Suite 801
Washington, DC 20006

Enclosure B
Guidance for Special Permit Applicants on Providing Environmental Information

The processing of an Alaska gas pipeline special permit (SP) application will involve an environmental analysis in accordance with the National Environmental Policy Act of 1969 (NEPA), the President's Council on Environmental Quality regulations implementing NEPA (40 CFR 1500-1508), and Department of Transportation (DOT) policy. To the extent PHMSA's grant or denial of your special permit request may constitute a Federal action under NEPA, in addition to analyzing any potential risks to public safety, PHMSA also analyzes any potential risks to the environment that could result from such grant or denial. PHMSA will evaluate whether the special permit would significantly impact the likelihood of a pipeline spill or failure as compared to the environmental status quo in the absence of the special permit.

PHMSA requests that the applicant submit its special permit applications and environmental information as soon as possible. If PHMSA does not receive special permit applications and all necessary supporting information well in advance the ASAP Project decision making on design, construction and other issues, the project may be delayed.
To facilitate PHMSA's environmental analysis, the special permit applicant needs to provide certain environmental information. The purpose of this form is to provide guidance to the applicant on what information should be provided. Any information submitted by the applicant is subject to being made public.

I. Purpose and Need

[Describe pipeline and specify county and state where the affected segments located]
[Cite regulation(s) for which special permit (waiver) is sought. Paste relevant portion of regulation(s) here.]
[State the unique circumstances and reasons for your special permit request. Explain how the special permit will benefit you and the public.]

II. Site Description and Affected Environment

Describe the right-of-way and the type of environment in the vicinity of the affected pipeline segments including:
[Provide map if available]
[Describe extent to which landowners, businesses, and residential areas are in the vicinity including parks]
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[Describe drinking water aquifers in the vicinity]
[Describe soils and vegetation in the vicinity]
[Describe wildlife habitats including fisheries in the vicinity]
[Describe any geologic hazards]
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[Describe any socioeconomic impacts or special impacts on Native Americans, if any, if a special permit were granted]
[Describe the existing infrastructure that is within the Potential Impact Radius of the pipeline]

III. Mitigation Measures

[Describe the alternative mitigation measures you are offering to implement in lieu of compliance with the regulations for which you are seeking a special permit.]

IV. Analysis and Investigation of Alternatives

[Explain the basis for the particular set of alternative mitigation measures listed in section III above. Explain whether the measures will ensure that a level of safety and environmental protection equivalent to compliance with existing regulations is maintained.]

[Discuss how the special permit would affect the risk or consequences of rupture or failure (positive, negative, or none)]

[Discuss any effects on pipeline longevity and reliability such as life-cycle and periodic maintenance. Discuss any technical innovations as well]

[Discuss how the special permit would impact human safety]

[Discuss whether the special permit would affect land use planning]

[Discuss any pipeline facility, public infrastructure, and environmental impacts associated with implementing the special permit. In particular, discuss how any environmentally sensitive areas could be impacted]

[Evaluate alternatives to the special permit and any beneficial or adverse consequences of such alternatives.]

NOTE: The ASAP Project should include the pipeline stationing and mile posts (MP) for the location or locations of the applicable ***special permit segment(s)***.

Enclosure C
Information Requested for the Anticipated Special Permit for Allowable External Loads over 72% Specified Minimum Yield Strength (SMYS) – Strain Based Design

Information that would be needed in a special permit application includes:

- Arctic Engineering
  - Route data, geothermal, hydraulics, and geo-technical
  - Frost heave & settlement prediction models
  - Pipe to soil structural modeling
    - Frost heave lab tests
    - Frozen soil uplift tests
    - Heave field test comparisons
    - Full scale bend tests
  - Environmental loads – soil properties, hill sides, slide areas, settlement areas outside frost heave locations
  - Strain demand basis
- Materials
  - Pipe grade and wall thickness
  - Internal pressure effects – strain capacity and combined hoop stress on pipe
  - Pipe mechanical and chemistry properties, and steel and pipe rolling practices
  - Pipe weld end and body diameter and ovality requirements to meet on a consistent basis maximum girth weld misalignment assumptions for strain capacity
  - Pipe and steel inspection procedures
  - Pipe girth weld properties and procedures
  - Non-destructive pipe girth weld inspection practices
  - Coating application temperature effects – strength increase/decrease, work hardening (Y/T), and elongation effects
  - Allowable anomalies in pipe, weld and during operations and location of them – welds and pipe such as cracked welds, weld anomalies, pipe dents, and wall loss
    - Maximum girth weld misalignment and affect on strain capacity
    - Maximum girth weld flaws and there affect on strain capacity
      - Crack driving force for which a ductile crack becomes unstable as measured by a crack tip opening displacement (CTOD) test
    - Low strength steel and there affects on strain capacity
    - Wall loss anomalies in both circumferential and longitudinal direction and there affects on strain capacity
    - Pipe dents and there affect on strain capacity
- Pipeline Engineering and Construction
  - Strain demand and strain capacity basis
    - Design –
      - Design safety factors – review of arctic data, material data, and construction specifications
      - Reliability assessment - does it meet safety design factors

        - Strain capacity design basis – how are the below properties considered and destructive test results
            - Weld strength overmatch
            - Steel and weld toughness and heat affected zone softening
            - Curved wide plate tests
            - Full scale plate tests
            - Full scale bend tests
            - Finite element simulations
        - Design safety factors – any needed adjustments
            - Allowable strain limit versus ultimate strain limit
- Construction
    - Construction specifications
        - Weld procedures – procedure testing, welder testing, and on-going verification tests during construction
        - Geotechnical verification parameters
        - Installation specifications – including verification parameters and any specification deviation parameters
        - Quality Assurance/Quality Control (QA/QC) practices to ensure engineering parameters are meet or exceeded
            - Training procedures
            - Inspection procedures
        - Documentation of construction, QA/QC and in-place installation findings
- Operations and Maintenance (O&M)
    - Pipeline segments
        - Type monitoring required and monitoring interval – normal and strain design locations
        - O&M integrity actions to mitigative findings – when and intervals
        - Training of O&M personnel – type
        - Integrity Management (IM) – how strain capacity design is integrated into IM
            - Strain monitoring – type and intervals
            - Strain intervention criteria
            - Reviews of program to meet special permit, code, specifications, procedures, and keep public, employees, environment, and facilities safe

APPENDIX B STRUCTURAL MECHANICS OF BURIED PIPELINES

Although some sections of the ASAP are aboveground, notably at waterway crossings and at the beginning of pipeline route on the North Slope, ASAP is primarily a buried pipeline. Buried pipelines are essentially "restrained," that is, displacement of the pipe is restricted by the soil around it.

Engineering calculations typically address the pipe in a bi-axial stress state called plane stress. The active stresses considered in pipe engineering calculations are shown in Figure B. 1 – a hoop stress and strain which act around the circumference of the pipe, and a longitudinal stress and strain which are directed along the long axis of the pipe. In general, there is a third stress, a shear stress, which could be acting on the edges of the above unit section, but this is not normally significant and usually neglected in engineering calculations of transmission pipelines. Pipelines with diameter to wall thickness ratios (D/t) greater than 20, typical of transmission pipelines, are considered "thin-walled" as the distribution of normal stress perpendicular to the surface is essentially uniform throughout the wall thickness.

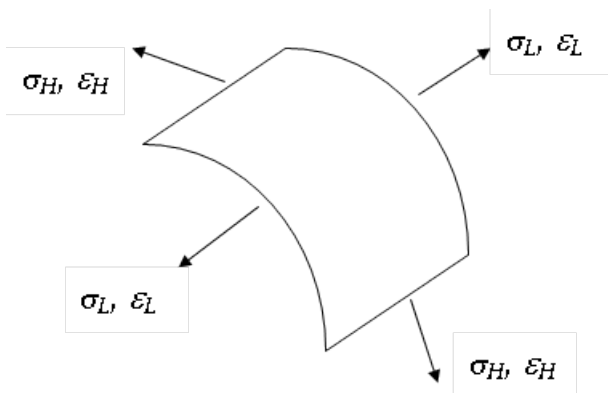

Figure B. 1 Pipe Stresses and Strains

The relation between stress (σ) and strain (ε) for pipeline steel when loaded in one direction (i.e., a unixial stress-strain curve) can be generally represented as shown in Figure B.2. Below the proportional limit, the stress is linearly related to the strain, a relation called Hooke's law, given by:

$$\sigma = E\varepsilon \qquad \text{Equation B.1}$$

with the constant "*E*" known as the Young's modulus. The yield point for pipeline engineering is defined by testing requirements to be the point at which the specified minimum yield strength (SMYS) of the pipe is recorded – 0.5% strain. Note that this definition of the "yield" does not concisely fit classical "textbook" definitions of yield, which is often defined as the point at which non-recoverable, i.e. "plastic" deformations, initiate. For example, if the pipe material was considered to be governed by Hooke's law to SMYS of 70 ksi, the associated strain would be only:

$$\varepsilon = 70ksi / 29{,}500ksi / in / in = 0.00237in / in = 0.237\%$$

Thus, to reach the strain associated with SMYS an additional 0.263% strain occurs, which cannot be accounted for by an elastic relationship. Note that alternative yield point definitions are defined using an "offset" method where a line with the elastic slope is drawn from a specified strain offset point – again confirming the necessary incorporation of non-recoverable (plastic) deformation just to reach SMYS.

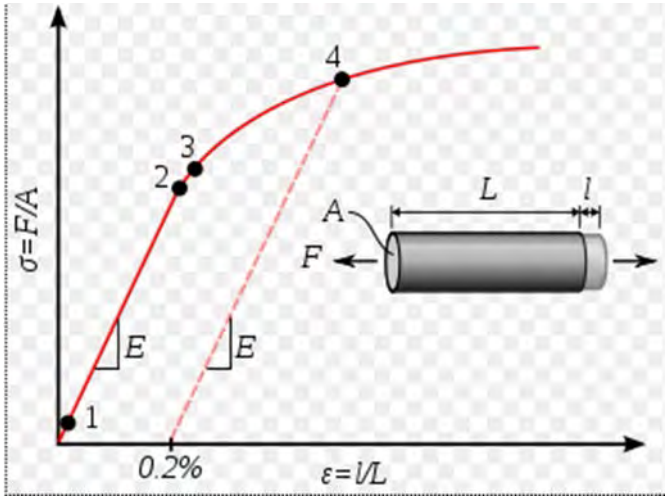

Figure B.2 Typical Pipe Stress-Strain Uniaxial Curve

where:

1. True Elastic limit (first dislocation)
2. Proportionality Limit
3. Elastic Limit
4. Yield point

Below the proportional limit of the pipe stress-strain curve, where the stresses and strains are linearly related the relationship between stress and strain under plane stress conditions can be expressed as:

$$\begin{pmatrix} \varepsilon_H \\ \varepsilon_L \end{pmatrix} = \frac{1}{E}\begin{bmatrix} 1 & -\nu \\ -\nu & 1 \end{bmatrix}\begin{pmatrix} \sigma_H \\ \sigma_L \end{pmatrix} \qquad \text{Equation B.2}$$

where:

E is the Modulus of Elasticity, sometimes called Young's modulus. For steel in the temperature range of operations, the value is approximately 29,500 ksi/in/in;

ε_H is the strain in the hoop direction;

ε_L is the strain in the longitudinal direction;

σ_H is the stress in the hoop direction;

σ_L is the stress in the longitudinal direction; and

ν is Poisson's ratio which is defined as the negative of the ratio of strain perpendicular to the load to the strain parallel to the load, and is a constant for stresses below the proportional limit. The value of Poisson's ratio for steel is 0.3.

B.1. HOOP STRESS

Hoop stress (σ_H), also known as "circumferential stress" is the normal stress on a longitudinal plane through the pipe centerline (see Figure B.3) resulting from internal forces (Q) resisting the fluid pressure force (P).

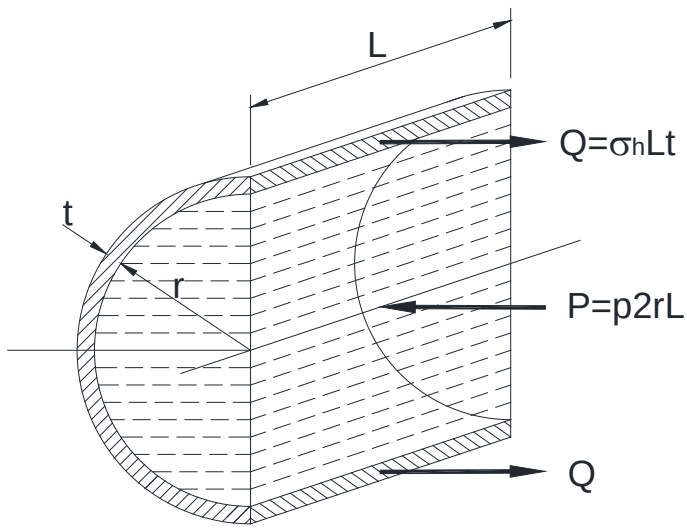

Figure B.3 Hoop Stress Free Body Diagram

To satisfy the equilibrium equation:

$$\sum F_y = 0 = P - 2Q$$

With $P - p2rL$ and $Q = \sigma_H Lt$; then

$p2rL - 2\sigma_H Lt$; or

$p2rL = 2\sigma_H Lt$; or

$\frac{p2r}{2t} = \sigma_H$; setting $2r$ to d gives:

$$\sigma_H = \frac{pd}{2t} \qquad \text{Equation B.3}$$

This formula is commonly known as **Barlow's Formula** and is the base equation used in 49 CFR 192 to determine the design pressure for steel pipe after applying a design factor, a longitudinal joint factor, and a temperature derating factor.

B.2. LONGITUDINAL STRESS

The typical causes of longitudinal stress in buried pipelines are:

- Changes in steel temperature that, under unrestrained conditions, would cause lengthening or shortening of the pipe;
- Changes in internal pressure that, under unrestrained conditions, would cause lengthening or shortening of the pipe; and
- Transverse bending (flexure) of the pipe as it conforms to outside forces/displacements, such as frost heave or thaw settlement.

In straight pipe, the longitudinal strains due to internal pressure and temperature differential act uniformly across the section of the pipe. Transverse bending causes a linear variation in longitudinal strain across the section of the pipe. These relationships are illustrated in Figure B.4.

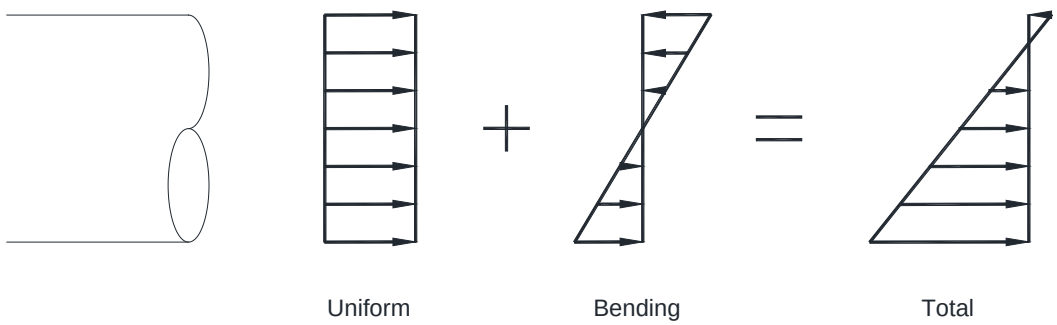

Figure B.4 Uniform, Bending and Total Longitudinal Pipe Strains

PRESSURE EFFECT ON LONGITUDINAL STRESS/STRAIN

As noted in Equation B.2, there is a relation between stress and strain for the two stress components of interest, and this relation can be used to derive additional information about the stress state. For example, although the hoop stress is directly related to the containment pressure, there is also an effect of the containment pressure on the longitudinal stress components.

In the elastic range, the associated longitudinal stress due to the pressure effect in the buried line can be found by substituting the known hoop stress for the pressure containment and noting that the longitudinal strain for a fully restrained pipe is zero, and then using this information in Equation B.2:

$$\begin{pmatrix} \varepsilon_{H-pressure} \\ 0 \end{pmatrix} = \frac{1}{E}\begin{bmatrix} 1 & -\nu \\ -\nu & 1 \end{bmatrix}\begin{pmatrix} pd/2t \\ \sigma_{L-pressure} \end{pmatrix}$$

By the second equation:

$$0 = \frac{-\nu pd}{E2t} + \frac{\sigma_{L-pressure}}{E}; \quad \text{or:}$$

$$\sigma_{L-pressure} = \frac{\nu pd}{2t} = 0.3\sigma_H \qquad \text{Equation B.4}$$

For aboveground, i.e., unrestrained sections of the pipe, the longitudinal strain is not zero

TEMPERATURE

For a pipeline that is free to expand, the strain caused as a result of temperature differential (change in temperature of the pipe steel from its installation temperature) is defined by:

$$\varepsilon_{L-temp} = \alpha(T - T_i)$$

where:

- $\varepsilon_{L\text{-}temp}$ is the longitudinal strain due to temperature (in/in) in an unrestrained pipeline;
- α is the coefficient of thermal expansion (in/in/°F);
- T is the temperature for the state of interest (°F); and
- T_i is the installation temperature (°F)

In aboveground segments of the pipeline, the thermal expansion and contraction is partially restrained and so produces longitudinal force and induces secondary longitudinal bending stress especially where the pipe configuration affords this partial restraint to thermal movement, such as near supports and at and near bends, and offsets. The design temperature differential is typically input into a pipe/structural analysis program in combination with other applicable loads to find the effects of these load components on aboveground segments.

A fully restrained pipeline has a net longitudinal strain of zero – i.e., it resists that tendency to expand with an equal and opposite mechanical strain of: $\varepsilon_{L-temp} = -\alpha(T - T_i)$, thus producing a total net strain of zero.

In the elastic range, the associated stress due to thermal restraint in the buried line can be found by noting that the associated hoop stress for this load is zero, and then using this information in Equation B.2:

$$\begin{pmatrix} \varepsilon_{H-temp} \\ \varepsilon_{L-tempT} \end{pmatrix} = \frac{1}{E}\begin{bmatrix} 1 & -\nu \\ -\nu & 1 \end{bmatrix}\begin{pmatrix} 0 \\ \sigma_{L-temp} \end{pmatrix}$$

By the second equation:

$$\varepsilon_{L-temp} = \frac{\sigma_{L-temp}}{E}; \qquad \text{or:}$$

$$\sigma_{L-temp} = E\varepsilon_{L-temp} = -E\alpha(T - T_i) = E\alpha(T_i - T) \qquad \text{Equation B.5}$$

As can be seen from the equation, operating temperatures that are less than the installation temperature would cause a longitudinal tensile component (stress component is positive), while operating temperatures that are greater than the installation temperature would cause a longitudinal compressive component (stress component is negative).

BENDING

When an initially straight pipe is bent into a circular arc, longitudinal strains, and stresses, develop through the pipe cross-section in the plane of the bend. Below the proportional limit the longitudinal strain and stress in the extreme fibers of the pipe cross section are defined by:

$$\varepsilon_{L-bending} = \pm r/R \qquad \text{and} \qquad \sigma_{L-bending} = \pm Er/R$$

where:

$\varepsilon_{L\text{-}bending}$	is maximum longitudinal strain due to bending (in/in);
$\sigma_{L\text{-}bending}$	is maximum longitudinal stress due to bending (psi);
r	is the outside radius of the pipe section (in); and
R	is the longitudinal radius of the arc of bend of the pipe centerline (in).

When subjected to external forces/displacements a pipe resist via beam action. This beam action induces bending moments within the pipe section, which can be converted to stress by:

$$\sigma_{L-bending} = \pm Mr/I$$

where:

I	is moment of inertia of the pipe (in^4); and
M	is bending moment (in-lbf)

B.3. COMBINED STRESS

The general state of stress in a buried pipeline under a combination of loads can be determined by considering the principal stresses within the pipe. For biaxial stress conditions that exist in pipelines, the principal stresses are the hoop stress (σ_H) and the longitudinal stress (σ_L). The longitudinal stress is the summation of longitudinal stresses from temperature, pressure, and bending ($\sigma_{L\text{-}temp} + \sigma_{L\text{-}pressure} + \sigma_{L\text{-}bending}$). Longitudinal stresses from other axial forces, if present, are also included.

YIELD CRITERION

The two most commonly used yield criteria for determining effective stresses in pipelines are the maximum shear stress theory, commonly referred to as the Tresca theory, and the maximum distortion energy theory, commonly referred to as the von Mises' theory.

(1) MAXIMUM SHEARING STRESSS THEORY

As discussed in "Mechanics of Materials" by Popov [Popov 1976], the maximum shearing stress theory is based on the observation that in a ductile material, slipping occurs during yielding along critically oriented planes. This suggests that the maximum shearing stress plays a key role in the yielding behavior. It is assumed that the material yielding depends on the maximum shearing stress so that whenever a critical value $\tau_{critical}$ is reached, yielding commences. The value of $\tau_{critical}$ is set equal to the shearing stress at yielding under uniaxial tension ($+\sigma_y$) or compression ($-\sigma_y$) loading:

$$\tau_{\max} \equiv \tau_{critical} = \left| \frac{\pm \sigma_y}{2} \right|$$

Hence, the maximum shearing stress is equal to ½ of the uniaxial yield stress. For biaxial stress conditions that exist in pipelines the corresponding yielding criterion is expressed as follows:

$$\left|\sigma_H\right| \le \sigma_y \qquad \text{and} \qquad \left|\sigma_L\right| \le \sigma_y \qquad \text{and} \qquad \left|\sigma_H - \sigma_L\right| \le \sigma_y$$

This is referred to as the Tresca yield criterion. The hexagonal Tresca yield function is illustrated in longitudinal stress vs. hoop stress space in Figure B.5 for an elastic-plastic material with a yield strength of 70 ksi. Any stress falling within the hexagon indicates that the material behaves elastically while points on the hexagon indicate that the material is yielding. This criterion is implemented under B31.8 Section 833.4 to limited combined stress for restrained pipe as:

$$\left|\sigma_H - \sigma_L\right| \le k \cdot S \cdot T$$

where:

k is an allowable stress multiplier (for loads of long duration, k is 0.90, and for occasional non-periodic loads of short duration it is 1.0);

S is the pipe SMYS; and

T is the temperature derating factor (T=1.0 for temperatures ≤ 250°F, per B31.8 Section 841.116).

(2) MAXIMUM DISTORTION ENERGY THEORY

As discussed by Popov [Popov 1976], a widely accepted criterion for yielding of ductile materials is based on energy concepts wherein the total elastic energy of the material is divided into two parts: one associated with volumetric changes of the material, and the other causing shearing distortions. By equating the shearing distortion energy at yield under uniaxial tension to that under combined stress, the yield criterion for combined stress is established. For plane stress conditions, with principal stresses σ1 and σ2, the yield condition for an ideal plastic material becomes:

$$\left(\frac{\sigma_1}{\sigma_y}\right)^2 - \left(\frac{\sigma_1 \cdot \sigma_1}{\sigma_y \cdot \sigma_y}\right) + \left(\frac{\sigma_2}{\sigma_y}\right)^2 = 1 \qquad \text{or} \qquad \sqrt{\sigma_1^{\,2} - \sigma_1 \cdot \sigma_2 + \sigma_2^{\,2}} = \sigma_y$$

This is the equation of an ellipse as shown in Figure B.5 for an elastic-plastic material with a yield strength of 70 ksi. Any stress falling within the ellipse indicates that the material behaves elastically while points on the ellipse indicate that the material is yielding. This is referred to as the von Mises yield criterion. This criterion is implemented under B31.8 Section 833.4 to limited combined stress for restrained pipe as:

$$[\sigma_L^{\,2} - \sigma_L \cdot \sigma_H + \sigma_H^{\,2}] \le k \cdot S \cdot T$$

Figure B.5 Illustration of Tresca and von Mises Yield Functions

Appendix O

Air Quality Summary of Potential-To-Emit (PTE) Calculations

Table 1. Stationary Source PTE[1]

No. of Units	Description	Fuel Type	Total Rating [4]	Maximum Heating Rate	NOx EF	NOx Emissions (TPY)	CO EF	CO Emissions (TPY)	PM EF	PM-10 Emissions (TPY)	PM-2.5 Emissions (TPY)	VOC EF	VOC[8] Emissions (TPY)	SO_2 EF	SO_2 Emissions (TPY)	HAPs Emissions (TPY)	CO2-e Emissions[5] (TPY)
Gas Conditioning Facility[2, 3]																	
10	Compressors	NG	57645 Hp	576.45 MMBtu/hr	0.32 lb/MMBtu	**807.95**	0.082 lb/MMBtu	**207.04**	0.0066 lb/MMBtu	**16.66**	**16.66**	0.0021 lb/MMBtu	**5.30**	0.675 lb/MMscf	**1.6709**	**2.59**	**295416.64**
7	Regenerators	NG	270.87 MMBtu/hr	2326.30 MMscf/yr	100 lb/MMscf	**116.31**	84 lb/MMscf	**97.70**	7.6 lb/MMscf	**8.84**	**8.84**	5.5 lb/MMscf	**6.40**	0.675 lb/MMscf	**0.7851**	**4.63**	**138814.30**
2	Electric Generators	NG	37562 KW	193.33 MMBtu/hr	4.08 lb/MMBtu	**3454.95**	0.082 lb/MMBtu	**268.44**	7.71E-05 lb/MMBtu	**0.07**	**0.07**	0.1180 lb/MMBtu	**99.92**	0.675 lb/MMscf	**0.5604**	**60.59**	**99078.89**
1	Emergency Flare[9] Pilot/Purge/ Sweep/Assist	NG	2.0 MMscf/ day	744600 MMBtu/yr	0.068 lb/MMBtu	**25.32**	0.37 lb/MMBtu	**137.57**	26.47 lb/MMscf	**9.66**	**9.66**	0.063 lb/MMBtu	**23.45**	0.675 lb/MMscf	**0.2464**	**0.0005**	**TBD**
	Emergency Flare[9] Full-plant blowdowns	NG	535 MMscf/ day	1,091,400 MMBtu/yr	0.068 lb/MMBtu	**37.11**	0.37 lb/MMBtu	**201.91**	26.47 lb/MMscf	**14.16**	**14.16**	0.063 lb/MMBtu	**34.38**	0.675 lb/MMscf	**0.3611**	**0.0005**	**TBD**
					Total NOx	**4441.64 TPY**	**Total CO**	**912.84 TPY**	**Total PM**	**49.39 TPY**	**49.39 TPY**	**Total VOC**	**169.46 TPY**	**Total SO_2**	**3.624 TPY**	**Total HAPs =67.81 TPY**	**Total CO2-e = 519694.6 TPY**
Compressor Station[2, 3]																	
2	Compressors	NG	15691 Hp	156.91 MMBtu/hr	0.32 lb/MMBtu	**219.93**	0.082 lb/MMBtu	**56.35**	0.0066 lb/MMBtu	**4.54**	**4.54**	0.0021lb/MMBtu	**1.44**	0.675 lb/MMscf	**0.4548**	**0.71**	**80412.57**
1	Primary Electric Generator	NG	663 KW	3.41 MMBtu/hr	4.08 lb/MMBtu	**60.98**	0.317 lb/MMBtu	**4.74**	7.71E-05 lb/MMBtu	**0.00**	**0.00**	0.118 lb/MMBtu	**1.76**	0.675 lb/MMscf	**0.0099**	**1.07**	**1748.82**
1	Emergency Flare[9] Pilot/Purge/ Sweep/Assist	NG	0.275 MMscf/ day	102382.5 MMBtu/yr	0.068 lb/MMBtu	**3.48**	0.37 lb/MMBtu	**18.94**	26.47 lb/MMscf	**1.33**	**1.33**	0.063 lb/MMBtu	**3.23**	0.675 lb/MMscf	**0.0339**	**0.0001**	**TBD**
	Emergency Flare Full-plant	NG	500 MMscf/ day	1020000 MMBtu/yr	0.068 lb/MMBtu	**34.68**	0.37 lb/MMBt	**188.70**	26.47 lb/MMscf	**13.24**	**13.24**	0.063 lb/MMBtu	**32.13**	0.675 lb/MMscf	**0.3375**	**0.0005**	**TBD**

Table 1. Stationary Source PTE[1]

No. of Units	Description	Fuel Type	Total Rating [4]	Maximum Heating Rate	NOx EF	NOx Emissions (TPY)	CO EF	CO Emissions (TPY)	PM EF	PM-10 Emissions (TPY)	PM-2.5 Emissions (TPY)	VOC EF	VOC[8] Emissions (TPY)	SO_2 EF	SO_2 Emissions (TPY)	HAPs Emissions (TPY)	CO2-e Emissions[5] (TPY)
	blowdowns						u										
						Total NOx	**319.07 TPY**	**Total CO**	**268.73 TPY**	**Total PM**	**19.11 TPY**	**19.11 TPY**	**Total VOC**	**38.56 TPY**	**Total SO_2**	**0.836 TPY**	**Total HAPs =1.78 TPY**	**Total CO2-e = 82161.39 TPY**
Straddle and Off-Take Facility[2, 3]																	
3	Compressors	NG	14840 Hp	148.40 MMBtu/hr	0.32 lb/MMBtu	**208.00**	0.082 lb/MMBtu	**53.30**	0.0066 lb/MMBtu	**1.82 TPY**	**1.82**	0.0021lb/MMBtu	**1.36**	0.675 lb/MMscf	**0.4301**	**0.28**	**76051.42**
3	Primary Electric Generator	NG	1517 KW	7.81 MMBtu/hr	4.08 lb/MMBtu	**139.53**	0.317 lb/MMBtu	**10.84**	7.71E-05 lb/MMBtu	**0.00 TPY**	**0.00**	0.118 lb/MMBtu	**4.04**	0.675 lb/MMscf	**0.0226**	**2.45**	**4001.55**
2	Reboiler & Regenerator	NG	10.9 MMBtu/hr	93.61 MMscf/yr	100 lb/MMscf	**4.68**	84 lb/MMscf	**3.93**	7.6 lb/MMscf	**0.36 TPY**	**0.36**	5.5 lb/MMscf	**0.26**	0.675 lb/MMscf	**0.0316**	**0.19**	**5585.99**
1	Emergency Flare[9] Pilot/Purge/ Sweep/Assist	NG	0.75 MMscf/ day	279225 MMBtu/yr	0.068 lb/MMBtu	**9.49**	0.37 lb/MMBtu	**51.66**	26.47 lb/MMscf	**3.62**	**3.62**	0.063 lb/MMBtu	**8.80**	0.675 lb/MMscf	**0.0924**	**0.0001**	**TBD**
	Emergency Flare[9] Full-plant blowdowns	NG	71.8 MMscf/ day	146,472 MMBtu/yr	0.068 lb/MMBtu	**4.98**	0.37 lb/MMBtu	**27.10**	26.47 lb/MMscf	**1.90**	**1.90**	0.063 lb/MMBtu	**4.61**	0.675 lb/MMscf	**0.0485**	**0.0001**	**TBD**
						Total NOx	**366.68 TPY**	**Total CO**	**146.83 TPY**	**Total PM**	**10.17 TPY**	**10.17 TPY**	**Total VOC**	**19.07 TPY**	**Total SO_2**	**0.625 TPY**	**Total HAPs =3.30 TPY**	**Total CO2-e = 85638.84 TPY**
Cook Inlet NGL Extraction Plant Facility[2, 3]																	
3	Compressors	NG	37268 Hp	372.68 MMBtu/hr	0.32 lb/MMBtu	**522.35**	0.082 lb/MMBtu	**133.85**	0.0066 lb/MMBtu	**10.77**	**10.77 TPY**	0.0021lb/MMBtu	**3.43**	0.675 lb/MMscf	**1.0802**	**1.68**	**190989.46**
1	Main Facility Generator	NG	1223 KW	6.29 MMBtu/hr	4.08 lb/MMBtu	**112.49**	0.317 lb/MMBtu	**8.74**	7.71E-05 lb/MMBtu	**0.00**	**0.00**	0.118 lb/MMBtu	**3.25**	0.675 lb/MMscf	**0.0182**	**1.97**	**3225.96**
3	Reboiler and Regenerator	NG	103.71 MMBtu /hr	890.69 MMscf/yr	100 lb/MMscf	**44.53**	84 lb/MMscf	**37.41**	7.6 lb/MMscf	**3.38**	**3.38**	5.5 lb/MMscf	**2.45**	0.675 lb/MMscf	**0.3006**	**1.77**	**53148.86**

Table 1. Stationary Source PTE[1]

No. of Units	Description	Fuel Type	Total Rating [4]	Maximum Heating Rate	NOx EF	NOx Emissions (TPY)	CO EF	CO Emissions (TPY)	PM EF	PM-10 Emissions (TPY)	PM-2.5 Emissions (TPY)	VOC EF	VOC[8] Emissions (TPY)	SO_2 EF	SO_2 Emissions (TPY)	HAPs Emissions (TPY)	CO2-e Emissions[5] (TPY)
1	Emergency Flare[9] Pilot/Purge/ Sweep/Assist	NG	2 MMscf/ day	744600 MMBtu/yr	0.068 lb/MM Btu	**25.32**	0.37 lb/M MBt u	**137.75**	26.47 lb/MM scf	**9.66**	**9.66**	0.063 lb/M MBtu	**23.45**	0.675 lb/M Mscf	**0.2464**	**0.0005**	**TBD**
	Emergency Flare[9] Full-plant blowdowns	NG	113.1 MMscf/ day	1020000 MMBtu/yr	0.068 lb/MM Btu	**7.84**	0.37 lb/M MBt u	**42.68**	26.47 lb/MM scf	**2.99**	**2.99**	0.063 lb/M MBtu	**7.27**	0.675 lb/M Mscf	**0.0763**	**0.0005**	**TBD**
					Total NOx	**712.53 TPY**	**Tota l CO**	**360.43TPY**	**Total PM**	**26.80 TPY**	**26.80 TPY**	**Total VOC**	**39.85 TPY**	**Total SO_2**	**1.722 TPY**	**Total HAPs = 5.42 TPY**	**Total CO2-e = 247364.28 TPY**
Stationary Camps[1, 6, 7]																	
14	500-man Construction Camp Stations	Diesel	1850 KW/uni t	1,110,164 gal/yr	9.2 g/KW-hr	**2301**	11.4 g/K W-hr	**2851**	0.2 g/KW-hr	**50**	**50**	1.3 g/KW -hr	**325**	0.000 2 lb/gal	**1.66**	**4.56**	**174216**
					Total NOx	**2301 TPY**	**Tota l CO**	**2851 TPY**	**Total PM**	**50 TPY**	**50 TPY**	**Total VOC**	**325 TPY**	**Total SO2**	**1.66 TPY**	**Total HAPs = 4.56 TPY**	**Total CO2-e = 174216 TPY**

Notes:

1. All emissions calculations used conservative assumptions of 8,760 hours per year of operation; 7,000 Btu per Hp-hr maximum fuel rating for generator engines; and 10,000 Btu per Hp-hr maximum fuel ratings for gas compressors.
2. EPA's AP-42 Tables 3.1-1, 3.1-2a, 3.1-3, & 3.2-2, and Tables 1.4-1 & 1.4-2 emission factors were used for calculations of NOx, CO, VOC, PM, PM-10, PM-2.5, and HAPs for natural gas-fired combustion units.
3. For all natural gas-fired combustion units:
   SO_2 emission factor was determined by Mass Balance assuming 4 ppm H_2S in Natural Gas (NG)
   Gas Fuel: (4 ppmv H2S)/(1,000,000)] * (1 lbmole/379.4 scf) * (64 lb SO2/lbmole) * (1,000,000 scf/MMscf) = 0.675 lb/MMscf
   Calculations used conversions of 1020 Btu/scf.
   The most conservative AP-42 emission factor was used for internal combustion engines (i.e., uncontrolled 4 stroke lean burn engines) in AP-42 Table 3.2-2.
4. Conversion Factors: KW to BTU/hr; hp to Btu/hr
   Assumed generator maximum rated fuel usage = 7,000 Btu/hp-hr
   Assumed compressor maximum rated fuel usage = 10,000 Btu/hp-hr
   1 hp = 0.735294118 KW
   1 KW = 1.341 hp
5. GHG emissions (CO2-e) are based on emission factors in 40 CFR 98 Tables A-1, C-1, and C-2:
   For diesel-fired units: CO2-e EF = CO2 + 21(CH4) + 310(N2O) = 74.209 kg/MMBtu; CO2 = 73.96; CH4 = 0.003; N2O = 0.0006
   For natural gas-fired units: CO2-e EF = CO2 + 21(CH4) + 310(N2O) = 53.072 kg/MMBtu; CO2 = 53.02; CH4 = 0.001; N2O = 0.0001
   Used conversion factor of 1.10231 short (US) ton to 1 long ton.
6. All emissions calculations used conservative assumptions of 8,760 hours per year of operation during the construction phase.
   Construction camps would no longer be used during the operations phase of the proposed Project.
   The camp engines would be considered nonroad engines if they are at a location for less than 12 consecutive months.

7. Diesel fuel is assumed to have a sulfur content of 15 ppmw (0.0015 weight percent, ULSD); heat rate of 7,000 Btu/hp-hr; and density of 7.1 lb/gal.
   SO_2 emissions for diesel fuel-fired units (camp generators) were calculated based on mass balance.
   EPA's NSPS Subpart IIII Tier 2 emission factors (EF) were used for calculations of NOx, CO, VOC, PM, PM-10, and PM-2.5 for diesel fuel-fired units (camp generators).
   EPA's AP-42 Table 3.4-3 and Table 3.4-4 emission factors (EF) were used for calculations of HAPs for diesel fuel-fired units (camp generators).
8. VOC fugitive emissions for the 37 mainline valves is estimated at 3.37 TPY, based on average emission factor of 0.00945 kg/hr per unit at 8,760 hours/year operation. (Reference: Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, November, 1995, Table B-3-1. Emission Factors Calculated From Revised Synthetic Organic Chemical Manufacturing Industry (SOCMI) Correlation Equations).
9. For the emergency flares, the following conservative assumptions were used:
   For total pilot/purge/sweep/assist operation: 2.0 MMscf/day for Gas Conditioning Facility and Cook Inlet NGL Extraction Plant, 0.275 MMscf/day for Compressor Station and 0.75 MMscf/day for Straddle and Off-take Facility
   48 hours per year worst case total time with major flaring for full-plant blowdowns
   Used a lightly smoking emission factor for the PM-10 of 40 ug/L, converted as follows using an assumption that input gas to exhaust gas is 1:10.6: (40 µg/L)(lb/ 453.6 * 10^6 µg)(28.32 L exhaust/scf exhaust)(10.6 scf exhaust/scf gas)(10^6 scf/MMscf) = 26.47 lb/MMscf
   VOC is 45% of exhaust (AP-42 Table 13.5-1 THC factor = 0.14 lb/MMBtu): 0.45*0.14 = 0.063 lb/MMBtu
   TBD means “to be determined”

Table 2. Construction Mobile Vehicle PTE[1, 2]

No. of Units	Description	Ave. daily hours/ day/ unit	Total Days of operation (days/yr)	Total miles run (hrs/yr)	NOx EF[1] (lb/mile)	NOx PTE (TPY)	CO EF[1] (lb/mile)	CO PTE (TPY)	PM-10 EF (lb/mile)	PM-10 PTE (TPY)	PM-2.5 EF (lb/mile)	PM-2.5 PTE (TPY)	SO_2 EF (lb/mile)	SO_2 PTE (TPY)	VOC EF (lb/mile)	VOC PTE (TPY)	CO2-e EF (lb/mile)	CO2-e PTE (TPY)
1	4 Wheel Vehicle	10	300	90000	0.0008	**0.0349**	0.0077	**0.3445**	0.000090	**0.0040**	0.000057	**0.0026**	0.000011	**0.0005**	0.000796	**0.0358**	1.1120	**50.04**
22	Bus, 26 Passenger	8	300	1584000	0.0008	**0.6145**	0.0077	**6.0626**	0.000090	**0.0711**	0.000057	**0.0455**	0.000011	**0.0085**	0.000796	**0.6307**	1.1120	**880.70**
8	Bus, 45 Passenger	8	300	576000	0.0008	**0.2234**	0.0077	**2.2046**	0.000090	**0.0259**	0.000057	**0.0166**	0.000011	**0.0031**	0.000796	**0.2293**	1.1120	**320.26**
8	Carryall, 4x4	10	300	720000	0.0008	**0.2793**	0.0077	**2.7557**	0.000090	**0.0323**	0.000057	**0.0207**	0.000011	**0.0039**	0.000796	**0.2867**	1.1120	**400.32**
90	Pick-Up/ Crewcab, 4x4	10	300	8100000	0.0008	**3.1421**	0.0077	**31.0017**	0.000090	**0.3637**	0.000057	**0.2329**	0.000011	**0.0434**	0.000796	**3.2249**	1.1120	**4503.60**
3	Snow Machine	6	180	97200	0.0008	**0.0377**	0.0077	**0.3720**	0.000090	**0.0044**	0.000057	**0.0028**	0.000011	**0.0005**	0.000796	**0.0387**	1.1120	**54.04**
1	Foam Truck	10	300	90000	0.0173	**0.7796**	0.0155	**0.6956**	0.000650	**0.0292**	0.000550	**0.0247**	0.000027	**0.0012**	0.002238	**0.1007**	2.8200	**126.90**
2	Fuel Truck, 4,000 Gal	10	300	180000	0.0173	**1.5592**	0.0077	**1.3912**	0.000650	**0.0585**	0.000550	**0.0495**	0.000027	**0.0024**	0.002238	**0.2014**	2.8200	**253.80**
3	Lube Truck	10	300	270000	0.0173	**2.3388**	0.0077	**2.0868**	0.000650	**0.0877**	0.000550	**0.0742**	0.000027	**0.0036**	0.002238	**0.3021**	2.8200	**380.70**
13	Mechanic Truck	10	300	1170000	0.0173	**10.1347**	0.0077	**9.0426**	0.000650	**0.3801**	0.000550	**0.3215**	0.000027	**0.0156**	0.002238	**1.3091**	2.8200	**1649.70**
2	Pre-Heat Truck	10	300	180000	0.0173	**1.5592**	0.0077	**1.3912**	0.000650	**0.0585**	0.000550	**0.0495**	0.000027	**0.0024**	0.002238	**0.2014**	2.8200	**253.80**
3	Skid Truck	10	300	270000	0.0173	**2.3388**	0.0077	**2.0868**	0.000650	**0.0877**	0.000550	**0.0742**	0.000027	**0.0036**	0.002238	**0.3021**	2.8200	**380.70**
2	Tire Truck	10	300	180000	0.0173	**1.5592**	0.0077	**1.3912**	0.000650	**0.0585**	0.000550	**0.0495**	0.000027	**0.0024**	0.002238	**0.2014**	2.8200	**253.80**
4	Powder Truck	10	300	360000	0.0173	**3.1184**	0.0155	**2.7823**	0.000090	**0.1170**	0.000550	**0.0989**	0.000027	**0.0048**	0.002238	**0.4028**	**2.820**	**507.60**
2	Flatbed, 2 Ton	10	300	180000	0.0173	**1.5592**	0.0155	**1.3912**	0.000650	**0.0585**	0.000550	**0.0495**	0.000027	**0.0024**	0.002238	**0.2014**	1.1120	**100.08**
2	Flatbed, 4 Ton	10	300	180000	0.0173	**1.5592**	0.0155	**1.3912**	0.000650	**0.0585**	0.000550	**0.0495**	0.000027	**0.0024**	0.002238	**0.2014**	1.1120	**100.08**
1	Water Truck, 4,000 Gal	6	300	54000	0.0309	**0.8349**	0.0102	**0.2758**	0.001355	**0.0366**	0.001248	**0.0337**	0.000040	**0.0011**	0.002528	**0.0682**	1.1120	**30.02**
8	Water Truck, 6,000 Gal	6	300	432000	0.0309	**6.6795**	0.0102	**2.2065**	0.001355	**0.2928**	0.001248	**0.2696**	0.000040	**0.0087**	0.002528	**0.5460**	1.1120	**240.19**
14	Welding Truck w/ 1 Mach	6	300	756000	0.0173	**6.5486**	0.0155	**5.8429**	0.000650	**0.2456**	0.000550	**0.2077**	0.000027	**0.0101**	0.002238	**0.8459**	1.1120	**420.34**
1	Tanker - Fuel 10,000 Gal	4	300	36000	0.0309	**0.5566**	0.0102	**0.1839**	0.001355	**0.0244**	0.001248	**0.0225**	0.000040	**0.0007**	0.002528	**0.0455**	1.1120	**20.02**

Table 2. Construction Mobile Vehicle PTE[1, 2]

No. of Units	Description	Ave. daily hours/ day/ unit	Total Days of operation (days/yr)	Total miles run (hrs/yr)	NOx EF[1] (lb/mile)	NOx PTE (TPY)	CO EF[1] (lb/mile)	CO PTE (TPY)	PM-10 EF (lb/mile)	PM-10 PTE (TPY)	PM-2.5 EF (lb/mile)	PM-2.5 PTE (TPY)	SO_2 EF (lb/mile)	SO_2 PTE (TPY)	VOC EF (lb/mile)	VOC PTE (TPY)	CO2-e EF (lb/mile)	CO2-e PTE (TPY)
6	Tanker - Water 12,000 Gal	4	300	216000	0.0309	**3.3398**	0.0102	**1.1032**	0.001355	**0.1464**	0.001248	**0.1348**	0.000040	**0.0044**	0.002528	**0.2730**	**2.8200**	**304.56**
					Total NOx	**48.7974 TPY**	**Total CO**	**76.0032 TPY**	**Total PM-10**	**2.2412 TPY**	**Total PM-2.5**	**1.8302 TPY**	**Total SO2**	**0.1257 TPY**	**Total VOC[3]**	**9.6484 TPY**	**Total CO2-e**	**13,158.62 TPY**

Notes:

1. Emission factors from EMFAC 2007 (ver 2.3), based on highest (most conservative) emission factors for on-road passenger vehicles & delivery trucks for Year 2012 scenario.
2. Assumed average of 30 mph speed per vehicle, construction duration of 1,440 hours (4 months, 30 days/month, 12 hours/day) during summer and 4,320 hours (6 months, 30 days/month, 24 hours/day) during winter.
3. VOC emissions are less than 10 TPY; HAPs are assumed insignificant.

Table 3. Construction Mobile Heavy Equipment PTE[1, 2]

No. of Units	Description	Max. Rating (Hp/unit)	Total Power output (hp-hr/yr)	NOx EF[2] (g/hp-hr)	NOx PTE (TPY)	CO EF[2] (g/hp-hr)	CO PTE (TPY)	PM-10 EF[2] (g/hp-hr)	PM-10 PTE (TPY)	PM-2.5[2] EF (g/hp-hr)	PM-2.5 PTE (TPY)	SO_2 EF[2,4] (g/hp-hr)	SO_2 PTE (TPY)	VOC EF[2,3] (g/hp-hr)	VOC PTE (TPY)	CO2-e EF[5] (Kg/MMBtu)	CO2-e PTE (TPY)
1	Backhoe/ Loader	300	1,728,000	11.00	**20.95**	2.71	**5.16**	0.7776	**1.48**	0.7776	**1.48**	0.0258	**0.05**	1.17	**2.23**	74.2090	**989.47**
3	Nodwell Tracked Vehicle	240	4,147,200	11.00	**50.29**	2.71	**12.39**	0.7776	**3.55**	0.7776	**3.55**	0.0258	**0.12**	1.17	**5.35**	74.2090	**2374.73**
2	Towed Drum Compactor	60	691,200	11.00	**8.38**	4.60	**3.50**	0.8640	**0.66**	0.8640	**0.66**	0.0279	**0.02**	1.21	**0.92**	74.2090	**395.79**
2	Gravel Conveyor, 24" x	300	3,456,000	11.00	**41.90**	2.28	**8.69**	0.4800	**1.83**	0.4800	**1.83**	0.0258	**0.10**	0.59	**2.25**	74.2090	**1978.94**
1	Crushing Plant, 300 HP	300	1,728,000	14.00	**26.67**	3.03	**5.77**	0.9600	**1.83**	0.9600	**1.83**	0.0279	**0.05**	1.33	**2.53**	74.2090	**989.47**
1	Gravel Screening	300	1,728,000	14.00	**26.67**	3.03	**5.77**	0.9600	**1.83**	0.9600	**1.83**	0.0279	**0.05**	1.33	**2.53**	74.2090	**989.47**
2	Hydraulic Crane, 50 Ton	600	6,912,000	11.00	**83.81**	4.60	**35.05**	0.8640	**6.58**	0.8640	**6.58**	0.0279	**0.21**	1.21	**9.22**	74.2090	**3957.88**
2	Dozer Tractor, D4	48	552,960	11.00	**6.70**	2.15	**1.31**	0.6624	**0.40**	0.6624	**0.40**	0.0255	**0.02**	0.92	**0.56**	74.2090	**316.63**
6	Dozer Tractor, D6 LGP	185	6,393,600	11.00	**77.52**	2.15	**15.15**	0.6624	**4.67**	0.6624	**4.67**	0.0255	**0.18**	0.92	**6.48**	74.2090	**3661.03**
11	Dozer Tractor, D7 w/ Winch	200	12,672,000	11.00	**153.65**	2.15	**30.03**	0.6624	**9.25**	0.6624	**9.25**	0.0255	**0.36**	0.92	**12.85**	74.2090	**7256.10**
8	Dozer Tractor, D8	177	8,156,160	11.00	**98.90**	2.15	**19.33**	0.6624	**5.96**	0.6624	**5.96**	0.0255	**0.23**	0.92	**8.27**	74.2090	**4670.29**
7	Dozer Tractor, D8 w/ Ripper	177	7,136,640	11.00	**86.53**	2.15	**16.91**	0.6624	**5.21**	0.6624	**5.21**	0.0255	**0.20**	0.92	**7.24**	74.2090	**4086.51**
7	Dozer Tractor, D8 w/ Winch	177	7,136,640	11.00	**86.53**	2.15	**16.91**	0.6624	**5.21**	0.6624	**5.21**	0.0255	**0.20**	0.92	**7.24**	74.2090	**4086.51**
5	Dozer Tractor, D9 w/ Ripper	474	13,651,200	11.00	**165.52**	2.15	**32.35**	0.6624	**9.97**	0.6624	**9.97**	0.0255	**0.38**	0.92	**13.84**	74.2090	**7816.80**
6	Excavator, 320 (1.5 CY)	140	4,838,400	11.00	**58.67**	4.60	**24.53**	0.8640	**4.61**	0.8640	**4.61**	0.0279	**0.15**	1.21	**6.45**	74.2090	**2770.51**
10	Excavator, 325 (1.5 CY)	188	10,828,800	11.00	**131.30**	4.60	**54.91**	0.8640	**10.31**	0.8640	**10.31**	0.0279	**0.33**	1.21	**14.44**	74.2090	**6200.67**
14	Excavator, 330 (2.0 CY)	247	19,918,080	11.00	**241.51**	4.60	**101.00**	0.8640	**18.97**	0.8640	**18.97**	0.0279	**0.61**	1.21	**26.57**	74.2090	**11405.28**
2	Snow Blower - Self Propelled	250	720,000	11.00	**8.73**	4.60	**3.65**	0.8640	**0.69**	0.8640	**0.69**	0.0279	**0.02**	1.21	**0.96**	74.2090	**412.28**
7	Motor Grader, 16G	250	10,080,000	11.00	**122.22**	1.54	**17.11**	0.6048	**6.72**	0.6048	**6.72**	0.0258	**0.29**	0.48	**5.33**	74.2090	**5771.90**
3	Excavator, 325 w/ Hammer	188	3,248,640	11.00	**39.39**	4.60	**16.47**	0.8640	**3.09**	0.8640	**3.09**	0.0279	**0.10**	1.21	**4.33**	74.2090	**1860.20**

Table 3. Construction Mobile Heavy Equipment PTE[1, 2]

No. of Units	Description	Max. Rating (Hp/unit)	Total Power output (hp-hr/yr)	NOx EF[2] (g/hp-hr)	NOx PTE (TPY)	CO EF[2] (g/hp-hr)	CO PTE (TPY)	PM-10 EF[2] (g/hp-hr)	PM-10 PTE (TPY)	PM-2.5[2] EF (g/hp-hr)	PM-2.5 PTE (TPY)	SO_2 EF[2,4] (g/hp-hr)	SO_2 PTE (TPY)	VOC EF[2,3] (g/hp-hr)	VOC PTE (TPY)	CO2-e EF[5] (Kg/MMBtu)	CO2-e PTE (TPY)
14	Wheel Loader, 966	235	18,950,400	11.00	**229.78**	2.71	**56.61**	0.7776	**16.24**	0.7776	**16.24**	0.0258	**0.54**	1.17	**24.44**	74.2090	**10851.17**
1	Wheel Loader, 980	393	2,263,680	11.00	**27.45**	2.71	**6.76**	0.7776	**1.94**	0.7776	**1.94**	0.0258	**0.06**	1.17	**2.92**	74.2090	**1296.20**
2	Wheel Loader, 988	430	4,953,600	11.00	**60.06**	2.71	**14.80**	0.7776	**4.25**	0.7776	**4.25**	0.0258	**0.14**	1.17	**6.39**	74.2090	**2836.48**
2	Farm Tractor w/ Spreader	600	6,912,000	11.00	**83.81**	7.34	**55.92**	1.2192	**9.29**	1.2192	**9.29**	0.0255	**0.19**	2.04	**15.54**	74.2090	**3957.88**
2	Tack Rig w/ Air & Power	600	6,912,000	11.00	**83.81**	4.60	**35.05**	0.8640	**6.58**	0.8640	**6.58**	0.0279	**0.21**	1.21	**9.22**	74.2090	**3957.88**
10	5th Wheel Tractor-Lowboy	600	34,560,000	11.00	**419.05**	7.34	**279.62**	1.2192	**46.45**	1.2192	**46.45**	0.0255	**0.97**	2.04	**77.71**	74.2090	**19789.38**
4	5th Wheel Tractor - String	600	13,824,000	11.00	**167.62**	7.34	**111.85**	1.2192	**18.58**	1.2192	**18.58**	0.0255	**0.39**	2.04	**31.09**	74.2090	**7915.75**
1	LGP Tractor Unit	600	3,456,000	11.00	**41.90**	7.34	**27.96**	1.2192	**4.64**	1.2192	**4.64**	0.0255	**0.10**	2.04	**7.77**	74.2090	**1978.94**
1	Boom Truck, 8 Ton	250	1,440,000	11.00	**17.46**	2.28	**3.62**	0.4800	**0.76**	0.4800	**0.76**	0.0261	**0.04**	0.59	**0.94**	74.2090	**824.56**
4	End Dump, 25 Ton	300	6,912,000	11.00	**83.81**	2.28	**17.37**	0.4800	**3.66**	0.4800	**3.66**	0.0261	**0.20**	0.59	**4.50**	74.2090	**3957.88**
15	End Dump, 35 Ton	330	28,512,000	11.00	**345.71**	2.28	**71.66**	0.4800	**15.09**	0.4800	**15.09**	0.0261	**0.82**	0.59	**18.54**	74.2090	**16326.24**
3	End Dump, 50 Ton	400	6,912,000	11.00	**83.81**	2.28	**17.37**	0.4800	**3.66**	0.4800	**3.66**	0.0261	**0.20**	0.59	**4.50**	74.2090	**3957.88**
2	Farm Tractor w/ Harrow	600	6,912,000	11.00	**83.81**	7.34	**55.92**	1.2192	**9.29**	1.2192	**9.29**	0.0255	**0.19**	2.04	**15.54**	74.2090	**3957.88**
3	Lowboy Trailer, 60	600	10,368,000	11.00	**125.71**	2.28	**26.06**	0.4800	**5.49**	0.4800	**5.49**	0.0261	**0.30**	0.59	**6.74**	74.2090	**5936.81**
1	Lowboy Trailer, 100	600	3,456,000	11.00	**41.90**	2.28	**8.69**	0.4800	**1.83**	0.4800	**1.83**	0.0261	**0.10**	0.59	**2.25**	74.2090	**1978.94**
4	High Deck Trailer, 40'	600	13,824,000	11.00	**167.62**	2.28	**34.74**	0.4800	**7.31**	0.4800	**7.31**	0.0261	**0.40**	0.59	**8.99**	74.2090	**7915.75**
1	Tracked Trailer - LGP	600	3,456,000	11.00	**41.90**	2.26	**8.61**	0.6336	**2.41**	0.6336	**2.41**	0.0255	**0.10**	1.21	**4.61**	74.2090	**1978.94**
1	Dragline w/ Clam Bucket, 4	100	576,000	11.00	**6.98**	4.60	**2.92**	0.8640	**0.55**	0.8640	**0.55**	0.0279	**0.02**	1.21	**0.77**	74.2090	**329.82**
9	Drill - John Henry	400	20,736,000	11.00	**251.43**	4.60	**105.14**	0.8640	**19.75**	0.8640	**19.75**	0.0279	**0.64**	1.21	**27.66**	74.2090	**11873.63**
8	Sideboom, 572	200	9,216,000	11.00	**111.75**	4.60	**46.73**	0.8640	**8.78**	0.8640	**8.78**	0.0279	**0.28**	1.21	**12.29**	74.2090	**5277.17**

Table 3. Construction Mobile Heavy Equipment PTE[1, 2]

No. of Units	Description	Max. Rating (Hp/unit)	Total Power output (hp-hr/yr)	NOx EF[2] (g/hp-hr)	NOx PTE (TPY)	CO EF[2] (g/hp-hr)	CO PTE (TPY)	PM-10 EF[2] (g/hp-hr)	PM-10 PTE (TPY)	PM-2.5[2] EF (g/hp-hr)	PM-2.5 PTE (TPY)	SO_2 EF[2,4] (g/hp-hr)	SO_2 PTE (TPY)	VOC EF[2,3] (g/hp-hr)	VOC PTE (TPY)	CO2-e EF[5] (Kg/MMBtu)	CO2-e PTE (TPY)
20	Sideboom, 583	300	34,560,000	11.00	**419.05**	4.60	**175.24**	0.8640	**32.91**	0.8640	**32.91**	0.0279	**1.06**	1.21	**46.10**	74.2090	**19789.38**
2	Sideboom, 594	410	4,723,200	11.00	**57.27**	4.60	**23.95**	0.8640	**4.50**	0.8640	**4.50**	0.0279	**0.15**	1.21	**6.30**	74.2090	**2704.55**
8	Sideboom, 572 w/ Auto	200	9,216,000	11.00	**111.75**	4.60	**46.73**	0.8640	**8.78**	0.8640	**8.78**	0.0279	**0.28**	1.21	**12.29**	74.2090	**5277.17**
1	Heavy Duty Wrecker	400	2,304,000	11.00	**27.94**	4.60	**11.68**	0.8640	**2.19**	0.8640	**2.19**	0.0279	**0.07**	1.21	**3.07**	74.2090	**1319.29**
3	Chain Trencher -	1000	17,280,000	11.00	**209.52**	4.60	**87.62**	0.8640	**16.46**	0.8640	**16.46**	0.0279	**0.53**	1.21	**23.05**	74.2090	**9894.69**
1	Ditch Witch 3500	40	230,400	11.00	**2.79**	4.60	**1.17**	0.8640	**0.22**	0.8640	**0.22**	0.0279	**0.01**	1.21	**0.31**	74.2090	**131.93**
1	Winch, 60 Ton	430	2,476,800	11.00	**30.03**	4.60	**12.56**	0.8640	**2.36**	0.8640	**2.36**	0.0279	**0.08**	1.21	**3.30**	74.2090	**1418.24**
1	Ice Trimmer	250	360,000	11.00	**4.37**	4.60	**1.83**	0.8640	**0.34**	0.8640	**0.34**	0.0279	**0.01**	1.21	**0.48**	74.2090	**206.14**
				Total NOx	**4875.28 TPY**	**Total CO**	**1774.53 TPY**	**Total PM-10**	**357.25 TPY**	**Total PM-2.5**	**357.25 TPY**	**Total SO_2**	**11.76 TPY**	**Total VOC**	**516.94 TPY**	**Total CO2-e**	**229,693.64 TPY**

Notes:

1. Assumed construction duration of 1,440 hours (4 months, 30 days/month, 12 hours/day) during summer and 4,320 hours (6 months, 30 days/month, 24 hours/day) during winter.
2. Emission rates from Santa Barbara County Air Pollution Control District (SBCAPCD) Table 1 - Construction Emission Factors.
3. ROC (same as VOC) equals uncontrolled exhaust THC plus aldehydes.
4. SO_2 emission factors for diesel combustion were modified to reflect use of fuel having 0.0015 pct. sulfur.
5. Emission factors from Tables C-1a, C-2, & Table A-1 40 CFR 98: CO2-e emission factor = CO2 + 21(CH4) + 310(N2O) = 74.209 kg/MMBtu; CO2 = 73.96; CH4 = 0.003; N2O = 0.0006. Used conversion factor of 1.10231 short (US) ton to 1 long ton.
6. HAPs emissions to be determined.

Table 4. Construction Miscellaneous Mobile Equipment (Compressors, Engines, Support Utilities) PTE[1, 2]

No. of Units	Description	Max. Rating (Hp/unit)	Total Annual hours per year (hrs/yr)	NOx EF (lb/hr)	NOx PTE (TPY)	CO EF (lb/hr)	CO PTE (TPY)	PM-10 EF (lb/hr)	PM-10 PTE (TPY)	PM-2.5 EF (lb/hr)	PM-2.5 PTE (TPY)	SO2 EF (lb/gal)	SO2 PTE (TPY)	VOC EF2,3 (lb/hr)	VOC PTE (TPY)	HAPs EF (lb/MMBtu)	HAPs PTE (TPY)	CO2-e EF (Kg/MMBtu)	CO2-e PTE (TPY)
50	Light Plant, 4 Lights[3]	21 Hp	288,000 hrs/yr	0.27 lb/hr	**38.88 TPY**	0.35	**50.40 TPY**	0.05	**7.2 TPY**	0.05	**7.2 TPY**	0.00021	**0.0324 TPY**	0.08	**11.52**	-	**TBD**	74.2090	**3463.14 TPY**
No. of Units	**Description**	**Total Annual Fuel Usage (gal/yr)**	**Total Annual Heating Rate (MMBTu/yr)**	**NOx EF (lb/MMBtu)**	**NOx PTE (TPY)**	**CO EF (lb/MMBtu)**	**CO PTE (TPY)**	**PM-10 EF (lb/MMBtu)**	**PM-10 PTE (TPY)**	**PM-2.5 EF (lb/MMBtu)**	**PM-2.5 PTE (TPY)**	**SO2 EF (lb/gal)**	**SO2 PTE (TPY)**	**VOC EF (lb/MMBtu)**	**VOC PTE (TPY)**	**HAPs EF (lb/MMBtu)**	**HAPs PTE (TPY)**	**CO2-e EF (Kg/MMBtu)**	**CO2-e PTE (TPY)**
4	Air Compressor, 1600 CFM	460,000	64,051	4.41	**141.23**	0.95	**30.42**	0.31	**9.93**	0.31	**9.93**	0.00021	**0.0491**	0.35	**11.21**	0.00428	**0.1371**	74.2090	**5239.47**
2	Air Compressor, 185 CFM	34,560	4,804	4.41	**10.59**	0.95	**2.28**	0.31	**0.74**	0.31	**0.74**	0.00021	**0.0037**	0.35	**0.84**	0.00428	**0.0103**	74.2090	**392.96**
8	Air Compressor, 375 CFM	329,551	45,808	4.41	**101.01**	0.95	**21.76**	0.31	**7.10**	0.31	**7.10**	0.00021	**0.0351**	0.35	**8.02**	0.00428	**0.0981**	74.2090	**3747.12**
4	Generator, 15 KW	34,560	4,804	4.41	**10.59**	0.95 lu	**2.28**	0.31	**0.74**	0.31	**0.74**	0.00021	**0.0037**	0.35	**0.84**	0.00428	**0.0103**	74.2090	**392.96**
4	Generator, 40 KW	69,120	9,608	4.41	**21.18**	0.95	**4.56**	0.31	**1.49**	0.31	**1.49**	0.00021	**0.0074**	0.35	**1.68**	0.00428	**0.0206**	74.2090	**785.92**
4	Dewatering Pump, 4"	11,770	1,636	4.41	**3.61**	0.95	**0.78**	0.31	**0.25**	0.31	**0.25**	0.00021	**0.0013**	0.35	**0.29**	0.00428	**0.0035**	74.2090	**133.83**
18	Dewatering Pump, 6"	228,096	31,705	4.41	**69.91**	0.95	**15.06**	0.31	**4.91**	0.31	**4.91**	0.00021	**0.0243**	0.35	**5.55**	0.00428	**0.0679**	74.2090	**2593.54**
6	Hydrotest Fill Pump, 6"	69,120	9,608	4.41	**21.18**	0.95	**4.56**	0.31	**1.49**	0.31	**1.49**	0.00021	**0.0074**	0.35	**1.68**	0.00428	**0.0206**	74.2090	**785.92**
8	Envirovac unit 8' x 30'	17,280	2,402	4.41	**5.30**	0.95	**1.14**	0.31	**0.37**	0.31	**0.37**	0.00021	**0.0018**	0.35	**0.42**	0.00428	**0.0051**	74.2090	**196.48**
12	Painting Shelter	46,080	6,405	4.41	**14.12**	0.95	**3.04**	0.31	**0.99**	0.31	**0.99**	0.00021	**0.0049**	0.35	**1.12**	0.00428	**0.0137**	74.2090	**523.95**
4	Pump Shelter	69,120	9,608	4.41	**21.18**	0.95	**4.56**	0.31	**1.49**	0.31	**1.49**	0.0002	**0.0074**	0.35	**1.68**	0.00428	**0.0206**	74.2090	**785.92**
1	Soft Sided Bldg, 55' x 60'	5,760	801	4.41	**1.77**	0.95	**0.380**	0.31	**0.12**	0.31	**0.12**	0.00021	**0.0006**	0.35	**0.14**	0.00428	**0.0017**	74.2090	**65.49**
1	Portable Building, 40' x	5,760	801	4.41	**1.77**	0.95	**0.380**	0.31	**0.12**	0.31	**0.12**	0.00021	**0.0006**	0.35	**0.14**	0.00428	**0.0017**	74.2090	**65.49**
1	Office Trailer, 10' x 50'	5,760	801	4.41	**1.77**	0.95	**0.380**	0.31	**0.12**	0.31	**0.12**	0.00021	**0.0006**	0.35	**0.14**	0.00428	**0.0017**	74.2090	**65.49**
4	Pipe Trailer, 40' to 60'	23,040	3,203	4.41	**7.06**	0.95	**1.52**	0.31	**0.50**	0.31	**0.50**	0.00021	**0.0025**	0.35	**0.56**	0.00428	**0.0069**	74.2090	**261.97**
2	Hydrotest Instrument	11,520	1,601	4.41	**3.53**	0.95	**0.76**	0.31	**0.25**	0.31	**0.25**	0.00021	**0.0012**	0.35	**0.28**	0.00428	**0.0034**	74.2090	**130.99**
2	Hydrotest Pump Trailer	11,520	1,601	4.41	**3.53**	0.95	**0.76**	0.31	**0.25**	0.31	**0.25**	0.00021l	**0.0012**	0.35	**0.28**	0.00428	**0.0034**	74.2090	**130.99**

Table 4. Construction Miscellaneous Mobile Equipment (Compressors, Engines, Support Utilities) PTE[1, 2]

No. of Units	Description	Total Annual Fuel Usage (gal/yr)	Total Annual Heating Rate (MMBTu/yr)	NOx EF (lb/MMBtu)	NOx PTE (TPY)	CO EF (lb/MMBtu)	CO PTE (TPY)	PM-10 EF (lb/MMBtu)	PM-10 PTE (TPY)	PM-2.5 EF (lb/MMBtu)	PM-2.5 PTE (TPY)	SO2 EF (lb/gal)	SO2 PTE (TPY)	VOC EF (lb/MMBtu)	VOC PTE (TPY)	HAPs EF (lb/MMBtu)	HAPs PTE (TPY)	CO2-e EF (Kg/MMBtu)	CO2-e PTE (TPY)
13	Welding Shelter	74,880	10,408	4.41	**22.95**	0.95	**4.94**	0.31	**1.61**	0.31	**1.61**	0.00021	**0.0080**	0.35	**1.82**	0.00428	**0.0223**	74.2090	**851.41**
2	Van Trailer - Auto Welding	11,520	1,601	4.41	**3.53**	0.95	**0.76**	0.31	**0.25**	0.31	**0.25**	0.00021	**0.0012**	0.35	**0.28**	0.00428	**0.0034**	74.2090	**130.99**
				Total NOx	**504.7 TPY**	**Total CO**	**150.75 TPY**	**Total PM-10**	**39.94 TPY**	**Total PM-2.5**	**39.94 TPY**	**Total SO_2**	**0.1943 TPY**	**Total VOC**	**48.49**	**Total HAPs**	**0.45 TPY**	**Total CO2-e**	**20744.04 TPY**

Notes:

1. Assumed construction duration of 1,440 hours (4 months, 30 days/month, 12 hours/day) during summer and 4,320 hours (6 months, 30 days/month, 24 hours/day) during winter.
2. Emission factors are from AP-42 Tables 3.3-1 for NOx, CO, PM, VOC, and HAPs, and mass balance for SO_2 (except for the Light Plants, see Note 3). Diesel fuel is assumed to have a heat content of 139,000 Btu/gal, heat rate of 7,000 Btu/hp-hr, density of 7.1 lbs/gal, and 0.0015% sulfur content (ULSD).
3. Emission rates from Worley Parsons Air Emissions Summary June 2010.
4. Emission factors from Tables C-1a, C-2, & Table A-1 40 CFR 98: CO2-e emission factor = CO2 + 21(CH4) + 310(N2O) = 74.209 kg/MMBtu; CO2 = 73.96; CH4 = 0.003; N2O = 0.0006. Used conversion factor of 1.10231 short (US) ton to 1 long ton.

Table 5. Construction Non-Mobile Source PTE[1, 2]

No. of Units	Description	Total Annual Fuel Usage (gal/yr)	NOx EF	NOx PTE (TPY)	CO EF	CO PTE (TPY)	PM-10 EF	PM-10 PTE (TPY)	PM-2.5 EF	PM-2.5 PTE (TPY)	SO_2 EF (lb/gal)	SO_2 PTE (TPY)	VOC EF (g/hp-hr)	VOC PTE (TPY)	HAPs EF[3] (lb/MMBtu)	HAPs PTE (TPY)	CO2-e EF[4] (Kg/MMBtu)	CO2-e PTE (TPY)
3	Indirect Heater,	17,280	18 lb/10^3 gal	**0.16**	5 lb/10^3	**0.04**	1.08 lb/10^3 gal	**0.01**	0.83 lb/10^3 gal	**0.01**	0.00021	**0.0018**	2.493 lb/10^3	**0.02**	No Data	**Assumed insignifica**	74.2090	**196.48**
12	Indirect Heater, 500K	69,120	18 lb/10^3 gal	**0.62**	5 lb/10^3	**0.17**	1.08 lb/10^3 gal	**0.04**	0.83 lb/10^3 gal	**0.03**	0.00021	**0.0074**	2.493 lb/10^3	**0.09**	No Data	**Assumed insignifica**	74.2090	**785.92**
1	Base Radio Unit	5,760	4.41 lb/MMBtu	**1.77**	0.95 lb/MMB	**0.38**	0.31 lb/MMBtu	**0.12**	0.31 lb/MMBtu	**0.12**	0.00021	**0.0006**	0.35 lb/MMB	**0.14**	0.00428	**0.0017**	74.2090	**65.49**
2	Warehouse Facility	11,520	4.41 lb/MMBtu	**3.53**	0.95 lb/MMB	**0.76**	0.31 lb/MMBtu	**0.25**	0.31 lb/MMBtu	**0.25**	0.00021	**0.0012**	0.35 lb/MMB	**0.28**	0.00428	**0.0034**	74.2090	**130.99**
			Total NOx	**6.07 TPY**	**Total CO**	**1.36 TPY**	**Total PM-10**	**0.42 TPY**	**Total PM-2.5**	**0.41 TPY**	**Total SO_2**	**0.0110 TPY**	**Total VOC**	**0.53 TPY**	**Total HAPs**	**0.0051 TPY**	**Total CO2-e**	**1178.88 TPY**

Notes:

1. Assumed construction duration of 1,440 hours (4 months, 30 days/month, 12 hours/day) during summer and 4,320 hours (6 months, 30 days/month, 24 hours/day) during winter.
2. Emission factors are from AP-42 Tables 3.3-1, 1.3-1, 1.3-3 and 1.3-6 for NOx, CO, PM, and VOC and mass balance for SO_2. Diesel fuel is assumed to have a heat content of 139,000 Btu/gal, heat rate of 7,000 Btu/hp-hr; density of 7.1 lbs/gal and 0.0015% sulfur content (ULSD).
3. HAPs emission factors from AP-42 Table 3.4-3 & 4.
4. Emission Factors from Tables C-1a, C-2, & Table A-1 40 CFR 98: CO2-e emission factor = CO2 + 21(CH4) + 310(N2O) = 74.209 kg/MMBtu; CO2 = 73.96; CH4 = 0.003; N2O = 0.0006. Used conversion factor of 1.10231 short (US) ton to 1 long ton.

Table 6. Construction Fugitive Emissions

Project Component	Mainline Construction (Acres)[1]	Total Hours per Year (hrs/year)[2]	PM-10 Fugitive EF[3, 4] (lb/acre-hr)	PM-10 Fugitive PTE During Construction (TPY)	PM-2.5 Fugitive PTE During Construction[6] (TPY)	Fairbanks Lateral (Acres)[1]	Total Hours per Year (hrs/year)[5]	PM-10 Fugitive EF[3, 4] (lb/acre-hr)	PM-10 Fugitive PTE During Construction (TPY)	PM-2.5 Fugitive PTE During Construction[6] (TPY)	Denali National Park Route Variation (Acre)	Total Hours per Year (hrs/year)[5]	PM-10 Fugitive EF[3,4] (lb/acre-hr)	PM-10 Fugitive PTE During Construction (TPY)	PM-2.5 Fugitive PTE During Construction[6] (TPY)
Pipeline ROW	9,508	2,200	3.49	36,501.21	3,650.12	417.2	880	3.49	640.65	64.07	185.5	880	3.49	284.85	28.48
Temporary Extra Work Spaces	982	2,200	3.49	3,769.90	376.99	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor Stations	1.4	2,200	3.49	5.37	0.54	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gas Conditioning	68.7	2,200	3.49	263.74	26.37	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cook Inlet NGLEP Facility	5.2	2,200	3.49	19.96	2.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Straddle and Off-Take	3.3	2,200	3.49	12.67	1.27	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mainline valves (MLVs)	0.8	2,200	3.49	3.07	0.31	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pipe storage, rail, and contractor	182.7	2,200	3.49	701.39	70.14	N/A	N/A	N/A	N/A	N/A	NA	NA	NA	NA	N/A
Construction Camps	126.5	2,200	3.49	485.63	48.56	TBD	TBD	TBD	TBD	TBD	NA	NA	NA	NA	N/A
Access roads	514.3	2,200	3.49	1,974.40	197.44	120.7	880	3.49	185.35	18.53	0	NA	NA	0.00	0.00
Total	**11,393 acres**			**43,737 TPY**	**4,374 TPY**	**538 acres**			**826 TPY**	**82.60 TPY**	**185.5 acres**			**285 TPY**	**28 TPY**

Notes:

1. See Table 2.1-3 notes for detailed information on construction footprint acreage.
2. Total construction hours per year assumed to be 220 hours per month for 10 months for Mainline.
3. Emission rates from Santa Barbara County Air Pollution Control District (SBCAPCD) Table 1 - Construction Emission Factors.
4. Fugitive dusts are PM-10. Assumed controlled emission factor equals uncontrolled PM (10.91 lb/acre-hr, ref. EPA AP-42, Vol. 1, 1993, Section 13.2.3.3) times 0.5 (50% credit for watering) times 0.64 (Ref. California ARB, 1988; Profile 391 - Road and Building Construction Dust).
5. Total construction hours per year assumed to be 220 hours per month for 4 months for Fairbanks Lateral.
6. Total PM fugitive dust is assumed equal to PM-10 fugitive dust. PM-2.5 fugitive dust is estimated at 10 percent of PM-10, based on the study conducted by Midwest Research Institute in 2006 (*Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors*) for the Western Governors Association to better characterize the PM-2.5/PM-10 ratio in fugitive dust. This report has been accepted by the EPA as an approved adjustment to the emission factors in EPA AP-42, Section 13.2.

Table 7. Open Burning Emissions

Project Component	NOx (tons)	CO (tons)	VOC (tons)	SO_2 (tons)	PM (tons)	PM-10 (tons)	PM-2.5 (tons)	HAPs (tons)	CO_2 (tons)
Mainline Construction	251	8,942	476	84-	1,471	1,471--	1,086	560	131,120[h]
Fairbanks Lateral	19	660	35	6	109	109--	80	41	9,678
Denali National Park Route Variation	7	238	13	2	39	39--	29	15	3,497

Notes:

1. Worst-case emissions from open burning were provided by AGDC (see response to Request for Information [RFI] 186), using emission factors from Andrae, M.O. and P. Merlet, Emission of Trace Gases and Aerosols from Biomass Burning (2001). Open burning activities would occur during the first year only.

Appendix P

Existing Material Sites
AGDC Plan of Development Attachment 6

Attachment 6 - Existing Material Sites

The following spreadsheet contains a list of 546 existing material sites along the entire ASAP alignment (AGDC obtained the data from an Alaska Department of Transportation and Public Facilities study compiled by R&M Consultants, Inc. in 2009). AGDC conservatively estimated the material required for ASAP construction at approximately 13.1 million cubic yards and then analyzed the list in order to allocate ASAP material needs, limiting the allocation to the 144 open active sites. These sites account for approximately 36.7 million cubic yards of material available within the work limits of the existing mining plans. Furthermore, approximately 57 million cubic yards of material are available from the 402 other existing sites identified in the spreadsheet. Thus, ASAP requirements would account for approximately 14 percent of the total 93.7 million cubic yards available within the work limits of the existing mining plans at all 546 sites. The status of the non-open sites ranges from low potential to closed, and further investigation would be required to identify their usefulness for ASAP.

ASAP Milepost (Rev. 5)	Material Site ID	Material Available Within Mining Plan Work Limits(CY)	Material Needed for ASAP	Material Remaining After ASAP (CY)	Material Site Owner	Permit Number	Permit Status	Classification	Material Site Status
13.7	65-9-102-2	1,000,000	50,000	950,000	SOA	ADL 416891	4/22/2015	ACTIVE	OPEN
17.9	65-9-042-2	0		0	SOA	ADL 403088	CLOSED 1982	INACTIVE	CLOSED
19.3	65-9-101-2	1,000,000		1,000,000	SOA	ADL 416890	Appl Pend.	ACTIVE	UNKNOWN
23.4	65-9-100-2	1,000,000		1,000,000	SOA	ADL 416889	Appl Pend.	ACTIVE	UNKNOWN
25.1	65-9-026-2	1,000,000		1,000,000	SOA	ADL 418554	APPLN.	ACTIVE	UNKNOWN
30.6	65-9-025-2	0		0	SOA	ADL 403088	CLOSED 1982	INACTIVE	CLOSED
32.9	65-9-041-2	0		0	SOA	ADL 403089	CLOSED 1982	INACTIVE	CLOSED
38.8	Sag GL1	50,000		50,000				INACTIVE	POTENTIAL
41.7	65-9-024-2	1,000,000		1,000,000	SOA	ADL 403090	1/31/2009	ACTIVE	UNKNOWN
48.3	65-9-040-2	0		0	SOA	ADL 403091	CLOSED 1982	INACTIVE	CLOSED
51.7	65-9-023-2	0		0	SOA	ADL 403092	CLOSED 1982	INACTIVE	CLOSED
52.7	65-9-039-2	0		0	SOA	ADL 403084	CLOSED 1982	INACTIVE	CLOSED
56.0	65-9-038-2	1,000,000		1,000,000	SOA	ADL 403083	12/31/2002	ACTIVE	UNKNOWN
57.9	65-9-096-2	1,000,000	500,000	500,000	SOA	ADL 416500	10/31/2010	ACTIVE	OPEN
61.6	Sag GL2	50,000		50,000				INACTIVE	POTENTIAL
66.9	65-9-074-2	100,000	50,000	50,000	SOA	ADL 413790	10/31/2010	ACTIVE	OPEN
70.6	65-9-073-2	0		0	SOA	ADL 413791	CLOSED 2004	INACTIVE	CLOSED
78.2	65-9-072-2	1,000,000	100,000	900,000	SOA	ADL 414762	7/2/2005	ACTIVE	OPEN
80.1	65-9-071-2	1,000,000	10,000	990,000	SOA	ADL 414760	7/2/2005	ACTIVE	OPEN
81.4	65-9-070-2	0		0	SOA	ADL 415231	NE	INACTIVE	CLOSED
81.6	MP 340.9 Site	500,000		500,000				ACTIVE	LOW POTENTIAL
82.8	65-9-069-2	0		0	SOA	ADL 414763	NE	INACTIVE	CLOSED
87.9	65-9-005-2	250,000	100,000	150,000	SOA	ADL 417985	7/13/2013	ACTIVE	OPEN
89.6	65-9-068-2	0		0	SOA	ADL 415230	NE	INACTIVE	CLOSED
91.1	MP 331 Site	500,000		500,000				ACTIVE	POTENTIAL
99.8	65-9-067-2	0		0	SOA	ADL 415229	NE	INACTIVE	CLOSED
106.4	MP 317 Site	50,000		50,000				ACTIVE	LOW POTENTIAL

Attachment 6 - Existing Material Sites

ASAP Milepost (Rev. 5)	Material Site ID	Material Available Within Mining Plan Work Limits(CY)	Material Needed for ASAP	Material Remaining After ASAP (CY)	Material Site Owner	Permit Number	Permit Status	Classification	Material Site Status
106.7	65-9-066-2	0		0	SOA	ADL 415237	NE	INACTIVE	CLOSED
108.5	65-9-065-2	0		0	SOA	ADL 415233	NE	INACTIVE	CLOSED
111.6	65-9-062-2	0		0	SOA	ADL 415234	NE	INACTIVE	CLOSED
111.6	65-9-063-2	0		0	SOA	ADL 415232	NE	INACTIVE	CLOSED
117.1	65-9-061-2	1,000,000	500,000	500,000	SOA	ADL 415236	4/30/2019	ACTIVE	OPEN
121.6	MP 301 Site	150,000		150,000	SOA			ACTIVE	POTENTIAL
125.6	65-9-060-2	200,000	100,000	100,000	BLM	FF-093032	12/31/2010	ACTIVE	OPEN
131.8	65-9-059-2	150,000	75,000	75,000	BLM	FF-093031	12/31/2010	ACTIVE	OPEN
138.1	Toolik Lake	50,000		50,000	BLM			INACTIVE	POTENTIAL
140.2	65-9-058-2	0		0	BLM	F-73467	CLOSED 2001	INACTIVE	CLOSED
146.0	65-9-104-2	1,000,000		1,000,000	BLM	Pending	Appl Pend.	ACTIVE	POTENTIAL
146.4	65-9-076-2	500,000	400,000	100,000	BLM	FF-093029	12/31/2010	ACTIVE	OPEN
153.8	65-9-056-2	500,000	250,000	250,000	BLM	FF-093028	12/31/2010	ACTIVE	OPEN
155.7	Atigun GL1	50,000		50,000				INACTIVE	POTENTIAL
160.1	65-9-021-2	250,000	125,000	125,000	BLM	FF-093027	12/31/2010	ACTIVE	OPEN
160.9	65-9-022-2	250,000	250,000	0	BLM	FF-093026	12/31/2010	ACTIVE	OPEN
161.7	MP 258.7 Site	250,000		250,000				ACTIVE	POTENTIAL
164.1	Atigun GL2	50,000		50,000				INACTIVE	POTENTIAL
167.4	65-9-008-2	500,000	500,000	0	BLM	FF-093025	12/31/2010	ACTIVE	OPEN
171.0	MP 249.5 Site	100,000		100,000				ACTIVE	POTENTIAL
178.8	65-9-004-2	100,000	100,000	0	BLM	FF-093024	12/31/2010	ACTIVE	OPEN
179.8	MP 239.4 Site	200,000		200,000				ACTIVE	POTENTIAL
185.2	MP 234.4 Site	250,000		250,000				ACTIVE	POTENTIAL
188.7	Dietrich GL1	50,000		50,000				INACTIVE	POTENTIAL
193.5	Dietrich GL2	50,000		50,000				INACTIVE	POTENTIAL
195.2	Dietrich GL3	50,000		50,000				INACTIVE	POTENTIAL
196.0	65-9-079-2	50,000	50,000	0	BLM	FF-093023	12/31/2010	ACTIVE	OPEN
197.3	65-9-055-2	1,000,000	1,000,000	0	BLM	FF-093022	12/31/2010	ACTIVE	OPEN
198.1	65-9-089-2	0		0	BLM	FF-093021	12/31/2010	ACTIVE	OPEN
199.0	65-9-105-2	500,000		500,000	BLM	Pending	Appl Pend.	ACTIVE	POTENTIAL
203.4	Dietrich GL4	50,000		50,000				INACTIVE	POTENTIAL
204.2	Dietrich GL5	50,000		50,000				INACTIVE	POTENTIAL
205.6	Dietrich GL6	50,000		50,000	BLM			INACTIVE	POTENTIAL
206.7	65-9-054-2	250,000		250,000			NE	INACTIVE	CLOSED
207.0	MP 213.4 Site	250,000		250,000				ACTIVE	POTENTIAL
209.6	Dietrich GL7	50,000		50,000				INACTIVE	POTENTIAL
211.9	Dietrich GL8	50,000		50,000				INACTIVE	POTENTIAL

Attachment 6 - Existing Material Sites

ASAP Milepost (Rev. 5)	Material Site ID	Material Available Within Mining Plan Work Limits(CY)	Material Needed for ASAP	Material Remaining After ASAP (CY)	Material Site Owner	Permit Number	Permit Status	Classification	Material Site Status
219.3	Middle Fork GL1	50,000		50,000				INACTIVE	POTENTIAL
223.9	65-9-052-2	0		0	BLM	FF-093020	7/2/2005	ACTIVE	OPEN
225.8	65-9-097-2	0		0	BLM	FF-093442	12/31/2010	ACTIVE	UNDEVELOPED
234.5	65-9-051-2	50,000	50,000	0	BLM	FF-093018	12/31/2010	ACTIVE	OPEN
235.6	65-9-090-2	0		0	BLM	FF-093019	12/31/2010	ACTIVE	OPEN
235.7	Middle Fork GL2	50,000		50,000				INACTIVE	POTENTIAL
239.0	Middle Fork GL3	50,000		50,000				INACTIVE	POTENTIAL
241.3	65-9-098-2			0	SOA		NE	INACTIVE	CLOSED
243.6	65-9-036-2	0		0	SOA	ADL 417989	8/28/2017	ACTIVE	OPEN
246.1	65-9-087-2			0	BLM	F-84768	Closed 1986	INACTIVE	CLOSED
246.1	65-9-092-2	0		0	SOA		NE	INACTIVE	CLOSED
247.3	65-9-093-2	0		0	SOA		NE	INACTIVE	CLOSED
248.9	65-9-091-2	0		0	BLM	FF-093016	12/31/2010	ACTIVE	OPEN
251.5	Middle Fork GL4	50,000		50,000				INACTIVE	POTENTIAL
254.5	65-9-050-2			0	BLM	FF-093015	12/31/2010	ACTIVE	OPEN
254.7	MP 166.5 Site	200,000		200,000				ACTIVE	LOW POTENTIAL
256.4	65-9-103-2	150,000	150,000	0	BLM	FF-95000	12/31/2017	ACTIVE	OPEN
260.6	65-9-035-2	100,000	100,000	0	BLM	FF-093013	12/31/2010	ACTIVE	OPEN
262.4	65-9-081-2	50,000	50,000	0	BLM	FF-093012	12/31/2010	ACTIVE	OPEN
264.1	65-9-084-2	0		0	BLM	F-093011	12/31/2010	ACTIVE	OPEN
265.2	65-9-083-2			0			NE	INACTIVE	CLOSED
265.9	MP 156.1 Site	1,000,000		1,000,000				ACTIVE	POTENTIAL
267.7	65-9-048-2	0		0	BLM	FF-093010	12/31/2010	ACTIVE	OPEN
269.2	65-9-034-2	0		0	BLM	FF-093009	12/31/2010	ACTIVE	OPEN
274.1	65-9-046-2			0	BLM	FF-093008	12/31/2010	ACTIVE	OPEN
275.7	65-9-045-2			0					
276.1	65-9-045-2A	0		0	BLM	FF-093007	12/31/2010	ACTIVE	OPEN
282.3	Jim River GL1	50,000		50,000				INACTIVE	POTENTIAL
286.1	65-9-003-2	0		0	BLM	FF-093005	12/31/2010	ACTIVE	OPEN
288.9	65-9-082-2	250,000		250,000	BLM	FF-093004	12/31/2010	INACTIVE	CLOSED
291.1	65-9-028-2	50,000	50,000	0	BLM	FF-93003	12/31/2010	ACTIVE	OPEN
292.7	65-9-032-2	200,000	200,000	0	BLM	FF-093002	12/31/2010	ACTIVE	OPEN
295.2	65-9-037-2	500,000	500,000	0	BLM	FF-93001	12/31/2010	ACTIVE	OPEN
295.1	MP 125 Site	200,000		200,000				ACTIVE	POTENTIAL
295.2	MP 124.4 Site	1,000,000		1,000,000				ACTIVE	POTENTIAL
301.2	65-9-007-2	0		0	BLM	FF-093000	12/31/2010	ACTIVE	OPEN
306.2	MP 112.3 Site	150,000		150,000				ACTIVE	POTENTIAL

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ASAP Milepost (Rev. 5)	Material Site ID	Material Available Within Mining Plan Work Limits(CY)	Material Needed for ASAP	Material Remaining After ASAP (CY)	Material Site Owner	Permit Number	Permit Status	Classification	Material Site Status
306.2	MP 114 Site	500,000		500,000				INACTIVE	POTENTIAL
307.4	MP 109 Site	150,000		150,000				INACTIVE	POTENTIAL
310.2	65-9-075-2	250,000		250,000	BLM	FF-92999	12/31/2010	INACTIVE	CLOSED
312.5	65-9-031-2	0		0	BLM	FF-72897	CLOSED 2004	INACTIVE	CLOSED
313.6	Caribou Mtn	500,000		500,000	BLM			INACTIVE	POTENTIAL
317.2	MP 100.5 Site	50,000		50,000				ACTIVE	POTENTIAL
320.4	MP 97 Site	250,000		250,000				INACTIVE	CLOSED
323.5	MP 94 Site	250,000		250,000				INACTIVE	
329.7	65-9-043-2	0		0	BLM	FF-092997	12/31/2010	ACTIVE	OPEN
331.7	65-9-030-2	0		0	BLM	FF-092996	12/31/2010	ACTIVE	OPEN
335.6	MP 82.5 Site	200,000		200,000				INACTIVE	LOW POTENTIAL
337.3	No Name Creek GL1	50,000		50,000				INACTIVE	POTENTIAL
339.3	MP 78.3 Site	500,000		500,000				ACTIVE	LOW POTENTIAL
340.0	65-9-006-2	0		0	BLM	FF-092994	12/31/2010	INACTIVE	CLOSED
341.9	65-9-078-2	200,000	200,000	0	BLM	FF-092995	12/31/2010	ACTIVE	OPEN
343.7	No Name Creek GL2	50,000		50,000				INACTIVE	POTENTIAL
345.5	65-9-085-2	0		0	BLM	F-81594	Closed 1983	INACTIVE	CLOSED
348.0	MP 70 Site	150,000		150,000				ACTIVE	LOW POTENTIAL
349.8	MP 67.8 Site	500,000		500,000				ACTIVE	POTENTIAL
353.6	65-9-029-2	500,000	500,000	0	BLM	FF-092993	12/31/2010	ACTIVE	OPEN
355.6	65-9-002-2	0		0	BLM	F-40580	CLOSED 1979	INACTIVE	CLOSED
356.8	MP 61 Site	500,000		500,000				ACTIVE	LOW POTENTIAL
358.1	65-9-001-2	500,000		500,000	BLM	FF-092992	12/31/2010	ACTIVE	UNKNOWN
360.3	65-9-009-2	0		0	SOA	ADL 51002	CLOSED 2003	INACTIVE	CLOSED
362.4	65-3-011-2	0		0	SOA	ADL 49434	CLOSED 2003	INACTIVE	CLOSED
368.0	OMS 76-2.1	200,000		200,000				INACTIVE	POTENTIAL
368.8	65-3-019-2	1,000,000		1,000,000	SOA		12/31/2011	ACTIVE	OPEN
375.3	65-3-018-2	0		0	SOA	ADL 413805	8/30/2014	ACTIVE	OPEN
377.0	65-3-016-2	500,000	500,000	0	SOA	ADL 413803	8/30/2014	ACTIVE	OPEN
381.1	65-3-094-2	0		0	SOA				
383.2	65-3-015-2	500,000	500,000	0	SOA	ADL 413802	8/30/2014	ACTIVE	OPEN
384.2	65-3-014-2	150,000		150,000	SOA	ADL 413801	APP.PEND.	ACTIVE	POTENTIAL
389.5	65-3-013-2	200,000	200,000	0	SOA	ADL 413800	8/31/2014	ACTIVE	OPEN
389.1	OMS 73-1R	200,000		200,000				INACTIVE	POTENTIAL
399.2	65-3-012-2	50,000	50,000	0	SOA	ADL 413799	8/31/2014	ACTIVE	OPEN
399.9	65-3-020-2	150,000		150,000	SOA	Appln Pend?		ACTIVE	POTENTIAL
402.7	MP 4 Site	250,000		250,000				INACTIVE	POTENTIAL

Attachment 6 - Existing Material Sites

ASAP Milepost (Rev. 5)	Material Site ID	Material Available Within Mining Plan Work Limits(CY)	Material Needed for ASAP	Material Remaining After ASAP (CY)	Material Site Owner	Permit Number	Permit Status	Classification	Material Site Status
405.1	680-027-2	0		0	SOA		Relinq. 1985	INACTIVE	CLOSED
405.8	680-029-2	1,000,000	1,000,000	0	SOA	ADL 416466	4/30/2010	ACTIVE	OPEN
405.8	680-031-2	1,000,000	1,000,000	0	SOA	ADL 414242	12/31/2015	ACTIVE	OPEN
405.8	680-105-2	1,000,000	500,000	500,000	SOA	ADL 416019	12/31/2009	ACTIVE	OPEN
405.1	680-106-2	1,000,000		1,000,000	Mental H.	ADL 413466	Expired 97	ACTIVE	POTENTIAL
405.1	680-112-2	1,000,000		1,000,000	SOA	ADL 416039	12/31/2009	ACTIVE	OPEN
405.2	TOLOVANA	1,000,000		1,000,000				ACTIVE	POTENTIAL
466.2	37-1-037-2	100,000	100,000	0	Doyon		N/A	ACTIVE	OPEN
466.2	37-1-038-2	0		0	Doyon		N/A	ACTIVE	OPEN
466.2	37-1-039-2	0		0	SOA	ADL 408769	12/31/2010	ACTIVE	OPEN
466.2	37-1-040-2	100,000		100,000	SOA	ADL 407982	TA'd	ACTIVE	UNKNOWN
466.2	37-1-043-2	200,000		200,000	SOA		Closed	INACTIVE	CLOSED
468.5	37-1-041-2	100,000	100,000	0	SOA	ADL 408768	12/31/2010	ACTIVE	OPEN
469.6	37-1-042-2	100,000	100,000	0	SOA	ADL 408766	12/31/2010	ACTIVE	OPEN
470.9	37-1-046-2	100,000		100,000	Doyon		N/A	INACTIVE	CLOSED
471.9	37-1-044-2	200,000		200,000	SOA	ADL 30743	Indef	ACTIVE	OPEN
473.5	37-2-011-2	500,000	290,000	210,000	SOA	ADL 19524	Indef	ACTIVE	OPEN
473.0	37-1-045-2	200,000		200,000	SOA	ADL 409028	12/31/2010	ACTIVE	CLOSED
473.0	37-1-130-2	200,000		200,000	SOA	ADL 33769	Indef	INACTIVE	CLOSED
473.0	37-1-134-2			0					
473.0	37-1-045-2	200,000		200,000	SOA	ADL 409028	12/31/2010	ACTIVE	CLOSED
475.1	37-1-094-2	200,000		200,000			NE	INACTIVE	CLOSED
475.7	37-2-013-2	0		0			NE	INACTIVE	CLOSED
477.0	37-2-012-2A	0		0			NE	INACTIVE	CLOSED
477.5	37-2-012-2	500,000		500,000			NE	INACTIVE	CLOSED
478.3	37-2-153-2	0		0			NE	INACTIVE	CLOSED
481.7	37-2-040-2			0					
481.7	37-2-049-2	0		0	PVT		N/A	INACTIVE	CLOSED
482.5	37-2-047-2	100,000	100,000	0	Doyon		N/A	ACTIVE	OPEN
481.9	37-2-046-2	100,000		100,000			NE	INACTIVE	CLOSED
481.9	37-2-048-2	0		0	Doyon		N/A	INACTIVE	CLOSED
482.0	37-2-043-2			0					
482.0	37-2-050-2	0		0		NE		INACTIVE	CLOSED
482.0	37-2-051-2	50,000		50,000		NE		INACTIVE	CLOSED
482.7	37-2-052-2	50,000		50,000	Doyon		N/A	ACTIVE	OPEN
482.0	37-2-053-2	0		0			NE	INACTIVE	CLOSED
482.0	37-2-154-2	50,000		50,000			NE	ACTIVE	OPEN

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ASAP Milepost (Rev. 5)	Material Site ID	Material Available Within Mining Plan Work Limits(CY)	Material Needed for ASAP	Material Remaining After ASAP (CY)	Material Site Owner	Permit Number	Permit Status	Classification	Material Site Status
483.8	37-2-054-2	0		0			NE	INACTIVE	CLOSED
483.8	37-2-055-2	0		0	Doyon		N/A	ACTIVE	OPEN
484.7	37-2-056-2	0		0	Doyon		N/A	ACTIVE	OPEN
485.5	37-2-057-2	0		0			NE	INACTIVE	CLOSED
485.8	37-2-058-2	0		0			NE	INACTIVE	CLOSED
486.6	37-2-059-2	0		0	SOA		N/A	ACTIVE	OPEN
486.7	37-2-060-2EXT			0					
486.8	37-2-060-2	0		0	SOA		N/A	INACTIVE	CLOSED
486.9	37-2-062-2	0		0	SOA		N/A	INACTIVE	CLOSED
487.0	37-2-060-2 ext	0		0	SOA		N/A	INACTIVE	CLOSED
488.0	37-2-063-2	0		0	SOA		N/A	INACTIVE	CLOSED
489.6	37-2-061-2	50,000		50,000			NE	INACTIVE	CLOSED
489.6	37-2-064-2			0					
491.1	37-2-065-2	50,000		50,000	SOA		N/A	INACTIVE	CLOSED
491.2	37-2-066-2	50,000		50,000	SOA		N/A	INACTIVE	CLOSED
492.0	37-2-139-2	0		0			NE	INACTIVE	CLOSED
492.0	37-2-144-2	250,000		250,000	SOA			INACTIVE	CLOSED
492.0	639-001-2	0		0			NE	INACTIVE	CLOSED
492.0	639-002-2	0		0			NE	INACTIVE	CLOSED
492.0	639-004-2	50,000		50,000			NE	INACTIVE	CLOSED
492.0	639-005-2	500,000		500,000			NE	INACTIVE	CLOSED
492.0	639-006-2	250,000		250,000	SOA		Closed	INACTIVE	CLOSED
492.0	639-007-2	500,000		500,000			NE	INACTIVE	CLOSED
492.0	639-008-2	500,000		500,000			NE	INACTIVE	CLOSED
492.0	639-009-2	1,000,000		1,000,000	SOA	ADL 416618	5/20/2011	INACTIVE	CLOSED
492.0	639-010-2	1,000,000		1,000,000	SOA	ADL 416618	TA'd	INACTIVE	CLOSED
492.0	639-011-2	1,000,000		1,000,000	SOA	ADL 414378	12/31/2000	INACTIVE	CLOSED
492.1	639-003-2	50,000		50,000			NE	INACTIVE	CLOSED
499.7	37-2-067-2	400,000		400,000	ARR		N/A	ACTIVE	OPEN
499.7	37-2-068-2	200,000		200,000			NE	INACTIVE	CLOSED
501.5	37-2-069-2	1,000,000	360,000	640,000	SOA	ADL 408748	5/4/2016	ACTIVE	OPEN
501.5	37-2-095-2	100,000		100,000			NE	INACTIVE	CLOSED
502.4	37-2-096-2	150,000		150,000	SOA	ADL 408745	12/31/2009	ACTIVE	OPEN
501.8	37-2-070-2			0					
502.0	37-2-071-2	50,000		50,000			NE	INACTIVE	CLOSED
502.1	37-2-097-2	50,000		50,000			NE	INACTIVE	CLOSED
502.4	37-2-078-2			0					

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502.7	37-2-072-2	50,000		50,000			NE	INACTIVE	CLOSED
503.2	37-2-098-2	0		0			NE	INACTIVE	CLOSED
503.3	37-2-073-2	200,000		200,000			NE	INACTIVE	CLOSED
504.2	37-2-074-2	50,000		50,000	SOA	ADL 408884	12/31/2009	ACTIVE	OPEN
503.5	37-2-099-2			0					
504.1	37-2-075-2	50,000		50,000			NE	INACTIVE	CLOSED
504.7	37-2-100-2	200,000		200,000			NE	INACTIVE	CLOSED
505.8	37-2-101-2	200,000		200,000	SOA	ADL 24642	Indef.	ACTIVE	OPEN
505.7	37-2-076-2	0		0			NE	INACTIVE	CLOSED
505.7	37-2-076-2EXT	50,000		50,000			NE	INACTIVE	CLOSED
506.5	37-2-102-2	100,000		100,000	SOA	ADL 24644	Indef.	ACTIVE	OPEN
506.0	37-2-077-2	100,000		100,000			NE	INACTIVE	CLOSED
506.4	37-2-079-2EXT	100,000		100,000			NE	INACTIVE	CLOSED
507.1	37-2-103-2	50,000		50,000	SOA	ADL 24645	Indef.	ACTIVE	OPEN
506.5	37-2-079-2	50,000		50,000			NE	INACTIVE	CLOSED
507.9	37-2-104-2	50,000		50,000	SOA	ADL 24646	Indef.	ACTIVE	OPEN
507.3	37-2-080-2	50,000		50,000			NE	INACTIVE	CLOSED
507.9	37-2-093-2			0					
507.9	37-2-105-2	100,000		100,000	SOA	ADL 24656	Closed	INACTIVE	CLOSED
508.2	37-2-106-2	0		0			NE	ACTIVE	OPEN
508.4	37-2-081-2	50,000		50,000			NE	INACTIVE	CLOSED
508.7	37-2-107-2	0		0			NE	INACTIVE	CLOSED
508.9	37-2-108-2	50,000		50,000			NE	INACTIVE	CLOSED
508.9	37-2-180-2			0					
509.3	37-2-109-2	50,000		50,000	SOA	ADL 24649	Indef.	INACTIVE	CLOSED
510.5	37-2-110-2	50,000		50,000			NE	INACTIVE	CLOSED
511.1	37-2-082-2	0		0			NE	INACTIVE	CLOSED
511.2	37-2-111-2	250,000		250,000			NE	INACTIVE	CLOSED
512.6	37-2-083-2			0					
512.6	37-2-083-2/ext	50,000		50,000			NE	INACTIVE	CLOSED
512.6	37-2-083-2EXT			0					
513.4	37-2-112-2	250,000	130,000	120,000	SOA	ADL 415776	12/31/2009	ACTIVE	OPEN
513.0	37-2-141-2	0		0	SOA	ADL 50303	Combined w/112	INACTIVE	CLOSED
513.7	37-2-084-2			0					
513.7	37-2-084-2/ext	50,000		50,000			NE	INACTIVE	CLOSED
513.7	37-2-084-2EXT			0					

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514.0	37-2-085-2	50,000		50,000			NE	INACTIVE	CLOSED
514.0	37-2-085-2EXT			0					
514.1	37-2-129-2	50,000		50,000			NE	INACTIVE	CLOSED
516.1	37-2-086-2	50,000		50,000			NE	INACTIVE	CLOSED
517.0	37-2-113-2	100,000		100,000	SOA	ADL 24653	Indef.	ACTIVE	OPEN
517.9	37-2-114-2	50,000		50,000	SOA	ADL 24654	Indef.	ACTIVE	OPEN
518.0	37-2-115-2	50,000		50,000			NE	INACTIVE	CLOSED
518.0	37-2-142-1			0					
518.0	37-2-142-2	100,000		100,000			NE	INACTIVE	CLOSED
519.3	37-2-116-2	50,000		50,000			NE	INACTIVE	CLOSED
519.6	37-2-087-2	50,000		50,000			NE	INACTIVE	CLOSED
519.6	37-2-088-2	0		0			NE	INACTIVE	CLOSED
519.6	37-2-117-2	200,000		200,000			NE	INACTIVE	CLOSED
519.9	37-2-118-2	100,000		100,000			NE	INACTIVE	CLOSED
521.4	37-2-089-2	50,000		50,000			NE	INACTIVE	CLOSED
522.3	37-2-119-2	100,000		100,000			NE	INACTIVE	CLOSED
523.2	37-2-120-2	200,000		200,000	SOA	ADL 408741	12/31/2009	ACTIVE	OPEN
522.6	37-2-121-2	100,000		100,000			NE	INACTIVE	CLOSED
523.5	37-2-122-2	100,000		100,000	SOA	ADL 408740	12/31/2010	ACTIVE	OPEN
523.2	37-2-123-2	50,000		50,000			NE	INACTIVE	CLOSED
523.3	37-2-124-2	50,000		50,000			NE	INACTIVE	CLOSED
524.4	37-2-091-2	50,000		50,000	SOA	ADL 408739	12/31/2009	ACTIVE	OPEN
524.4	37-2-125-2	100,000		100,000			NE	ACTIVE	OPEN
523.9	37-2-090-2			0					
524.4	37-2-126-2	250,000		250,000			NE	INACTIVE	CLOSED
524.7	37-2-092-2	50,000		50,000			NE	INACTIVE	CLOSED
524.8	37-2-127-2	50,000		50,000			NE	INACTIVE	CLOSED
525.6	37-2-143-2	350,000	350,000	0	SOA	ADL 415777	5/22/2006	ACTIVE	OPEN
526.6	37-2-128-2	200,000		200,000	SOA	ADL 408885	12/31/2010	ACTIVE	OPEN
#N/A	638-009-2	0		0			NE	ACTIVE	OPEN
526.9	638-010-2	0		0			NE	ACTIVE	OPEN
526.3	37-2-133-2	50,000		50,000			NE	INACTIVE	CLOSED
526.4	37-2-005-2	100,000		100,000			NE	INACTIVE	CLOSED
528.3	37-2-006-2	200,000		200,000	SOA	ADL 408737	12/31/2009	ACTIVE	OPEN
528.4	37-2-140-2	0		0			NE	INACTIVE	CLOSED
528.5	37-2-006-2A	0		0			NE	INACTIVE	CLOSED
528.5	638-002-2	1,000,000		1,000,000			NE	INACTIVE	CLOSED

Attachment 6 - Existing Material Sites

ASAP Milepost (Rev. 5)	Material Site ID	Material Available Within Mining Plan Work Limits(CY)	Material Needed for ASAP	Material Remaining After ASAP (CY)	Material Site Owner	Permit Number	Permit Status	Classification	Material Site Status
528.5	638-003-2	200,000		200,000			NE	INACTIVE	CLOSED
528.5	638-004-2	250,000		250,000			NE	INACTIVE	CLOSED
528.5	638-005-2	0		0			NE	INACTIVE	CLOSED
528.5	638-007-2	50,000		50,000			NE	INACTIVE	CLOSED
529.9	37-2-007-2	50,000		50,000	ARR		12/30/1999	ACTIVE	OPEN
530.6	37-2-145-2	150,000	102,000	48,000	ARR	ARR-8018	12/31/2006	ACTIVE	OPEN
530.7	37-2-008-2	250,000		250,000	ARR		N/A	ACTIVE	OPEN
531.0	37-2-137-2	100,000		100,000			NE	INACTIVE	CLOSED
531.8	37-2-009-2	250,000		250,000	ARR		N/A	ACTIVE	OPEN
532.9	37-2-010-2	250,000		250,000	SOA	ADL 408717	12/31/2009	ACTIVE	OPEN
532.4	37-2-132-2	200,000		200,000			NE	INACTIVE	CLOSED
533.3	37-2-010-2EXT			0					
533.3	37-2-136-2	150,000		150,000			NE	INACTIVE	CLOSED
538.9	37-2-138-2	0		0			NE	INACTIVE	CLOSED
539.2	37-2-135-2	0		0			NE	INACTIVE	CLOSED
539.4	52-2-081-2	0		0			NE	INACTIVE	CLOSED
548.2	52-2-051-2	0		0	SOA	ADL 408733	12/31/2009	ACTIVE	OPEN
547.5	52-2-087-2	0		0			NE	INACTIVE	CLOSED
547.6	52-2-067-2	200,000		200,000			NE	INACTIVE	CLOSED
550.3	52-2-050-2	100,000		100,000			NE	INACTIVE	CLOSED
550.3	52-2-066-2			0					
552.3	52-2-049-2	50,000		50,000	Ahtna		Indef.	ACTIVE	OPEN
551.7	52-2-065-2	150,000		150,000			NE	INACTIVE	CLOSED
554.2	52-2-064-2	500,000	50,000	450,000	Ahtna		N/A	ACTIVE	OPEN
554.9	52-2-048-2	50,000		50,000	Ahtna		Indef.	ACTIVE	OPEN
555.0	52-2-063-2	50,000		50,000	Ahtna		N/A	ACTIVE	OPEN
555.6	52-2-080-2	100,000		100,000			NE	INACTIVE	CLOSED
557.8	52-2-047-2/ext	0		0	Ahtna		Indef.	ACTIVE	OPEN
558.0	52-2-047-2	0		0				INACTIVE	CLOSED
558.0	52-2-062-2			0					
558.1	52-2-061-2	50,000		50,000			NE	INACTIVE	CLOSED
558.2	52-2-060-2	0		0			NE	INACTIVE	CLOSED
558.4	52-2-001-2	150,000		150,000			NE	INACTIVE	CLOSED
560.6	52-2-059-2	500,000		500,000	Ahtna		N/A	ACTIVE	OPEN
560.7	52-2-058-2	150,000		150,000			NE	INACTIVE	CLOSED
561.5	52-2-068-2	200,000		200,000	Ahtna		N/A	ACTIVE	OPEN
561.7	52-2-046-2	100,000		100,000	Ahtna		Indef.	ACTIVE	OPEN

Attachment 6 - Existing Material Sites

ASAP Milepost (Rev. 5)	Material Site ID	Material Available Within Mining Plan Work Limits(CY)	Material Needed for ASAP	Material Remaining After ASAP (CY)	Material Site Owner	Permit Number	Permit Status	Classification	Material Site Status
561.4	52-2-057-2	50,000		50,000			NE	INACTIVE	CLOSED
562.2	52-2-045-2	150,000		150,000			NE	INACTIVE	CLOSED
562.4	52-2-056-2	150,000		150,000			NE	INACTIVE	CLOSED
563.6	52-2-055-2	50,000		50,000			N/A	ACTIVE	OPEN
563.2	52-2-044-2	0		0	Ahtna		Indef.	INACTIVE	CLOSED
563.2	52-2-069-2			0					
565.1	52-2-052-2	500,000		500,000	Ahtna		Indef.	ACTIVE	OPEN
564.9	52-2-043-2	100,000		100,000			NE	INACTIVE	CLOSED
567.2	52-2-042-2	0		0	Ahtna		Indef.	ACTIVE	OPEN
567.8	52-2-041-2	0		0	Ahtna		Indef.	ACTIVE	OPEN
567.4	52-2-053-2	50,000		50,000			NE	INACTIVE	CLOSED
567.7	52-2-036-2			0					
567.7	52-2-040-2			0					
567.7	52-2-084-2			0					
568.6	35-4-012-2	150,000		150,000			NE	ACTIVE	OPEN
568.0	35-4-008-2	0		0			NE	INACTIVE	CLOSED
568.3	35-4-007-2	200,000		200,000			NE	INACTIVE	CLOSED
568.4	35-4-006-2	50,000		50,000			NE	INACTIVE	CLOSED
568.4	35-4-015-2	0		0			NE	INACTIVE	CLOSED
569.0	35-4-014-2	50,000		50,000			NE	INACTIVE	CLOSED
569.1	35-4-005-2	50,000		50,000			NE	INACTIVE	CLOSED
569.1	35-4-013-2	150,000		150,000			NE	INACTIVE	CLOSED
569.6	35-4-010-2	100,000		100,000			NE	INACTIVE	CLOSED
569.6	35-4-011-2	50,000		50,000			NE	INACTIVE	CLOSED
569.7	35-4-004-2	50,000		50,000			NE	INACTIVE	CLOSED
570.7	35-4-003-2	150,000	60,000	90,000			NE	ACTIVE	OPEN
570.8	35-4-002-2	100,000		100,000			NE	INACTIVE	CLOSED
574.7	35-4-001-2	0		0	SOA	ADL 45636	Closed	INACTIVE	CLOSED
577.5	35-4-100-2	0		0	SOA		Issued	ACTIVE	OPEN
577.6	35-4-028-2			0					
580.4	35-4-024-2			0					
580.4	35-4-105-2	0		0	SOA		Issued	ACTIVE	OPEN
583.2	35-4-033-2	0		0			NE	INACTIVE	CLOSED
583.2	35-4-106-2	100,000		100,000		ADL	6/9/1965	INACTIVE	CLOSED
583.3	35-4-107-2	100,000		100,000	SOA		Relinq.	INACTIVE	CLOSED
583.4	35-4-032-2			0					
584.1	35-4-104-2	0		0	SOA		Issued	ACTIVE	OPEN

Attachment 6 - Existing Material Sites

ASAP Milepost (Rev. 5)	Material Site ID	Material Available Within Mining Plan Work Limits(CY)	Material Needed for ASAP	Material Remaining After ASAP (CY)	Material Site Owner	Permit Number	Permit Status	Classification	Material Site Status
583.5	35-4-034-2	0		0			NE	INACTIVE	CLOSED
585.1	35-4-035-2	200,000		200,000			NE	INACTIVE	CLOSED
585.3	35-4-036-2	200,000		200,000			NE	INACTIVE	CLOSED
586.0	35-4-037-2	300,000		300,000			NE	INACTIVE	CLOSED
587.2	35-4-030-2			0					
587.2	35-4-031-2			0					
587.2	35-4-102-2	50,000		50,000			NE	INACTIVE	CLOSED
587.9	35-4-103-2	100,000		100,000			NE	ACTIVE	OPEN
591.9	35-4-038-2	500,000	200,000	300,000			NE	ACTIVE	OPEN
591.5	638-001-2	500,000		500,000			NE	INACTIVE	CLOSED
591.5	638-006-2	200,000		200,000			NE	INACTIVE	CLOSED
592.2	35-4-029-2			0					
592.2	35-4-039-2	50,000		50,000			NE	INACTIVE	CLOSED
592.2	35-4-039-2ext	0		0			NE	INACTIVE	CLOSED
592.2	35-4-101-2	0		0			NE	INACTIVE	CLOSED
592.4	35-4-023-2			0					
592.4	35-4-101-2ext	0		0			NE	ACTIVE	OPEN
592.4	35-4-139-2			0					
593.6	35-4-022-2	0		0			NE	INACTIVE	CLOSED
593.8	35-4-040-2	500,000		500,000			NE	INACTIVE	CLOSED
594.6	35-4-041-2	1,000,000		1,000,000			NE	ACTIVE	OPEN
595.4	35-4-021-2	100,000		100,000			NE	ACTIVE	OPEN
595.7	35-4-042-2	500,000		500,000			NE	ACTIVE	OPEN
596.2	35-4-043-2	500,000		500,000			NE	ACTIVE	OPEN
596.4	35-4-044-2	500,000		500,000			NE	ACTIVE	OPEN
595.8	35-4-020-2	0		0				INACTIVE	CLOSED
596.9	35-4-045-2	1,000,000		1,000,000			NE	ACTIVE	OPEN
599.6	35-4-018-2	0		0			NE	INACTIVE	CLOSED
599.6	35-4-019-2	100,000		100,000			NE	INACTIVE	CLOSED
600.6	35-4-046-2	1,000,000		1,000,000			NE	ACTIVE	OPEN
601.5	35-4-047-2	300,000	170,000	130,000			NE	ACTIVE	OPEN
601.0	35-4-017-2	0		0			NE	INACTIVE	CLOSED
603.2	35-4-048-2	1,000,000		1,000,000			NE	ACTIVE	UNDEVELOPED
603.9	35-4-016-2	0		0	SOA		RELINQ.	INACTIVE	CLOSED
605.7	35-4-027-2	0		0			NE	INACTIVE	CLOSED
606.2	35-4-026-2	0		0			NE	INACTIVE	CLOSED
606.7	35-4-001-2A	0		0	SOA	ADL 45636	CLOSED 1989	INACTIVE	CLOSED

Attachment 6 - Existing Material Sites

ASAP Milepost (Rev. 5)	Material Site ID	Material Available Within Mining Plan Work Limits(CY)	Material Needed for ASAP	Material Remaining After ASAP (CY)	Material Site Owner	Permit Number	Permit Status	Classification	Material Site Status
606.7	35-4-001-2B	0		0	SOA	ADL 45636	CLOSED 1989	INACTIVE	CLOSED
606.8	35-4-025-2	0		0			NE	INACTIVE	CLOSED
609.9	35-3-037-1	0		0	SOA		RELINQ.	INACTIVE	CLOSED
610.1	35-3-036-1	0		0	SOA		RELINQ.	INACTIVE	CLOSED
611.9	35-3-035-1	500,000		500,000	SOA		ISSUED	ACTIVE	UNKNOWN
614.6	35-3-034-1	500,000		500,000	SOA		ISSUED	ACTIVE	OPEN
615.0	35-3-033-1	0		0	SOA		ISSUED	ACTIVE	UNKNOWN
615.8	35-3-032-1	0		0	SOA		ISSUED	ACTIVE	UNKNOWN
616.0	35-3-031-1	200,000		200,000	SOA		ISSUED	ACTIVE	UNKNOWN
616.2	35-3-030-1	1,000,000		1,000,000	SOA		RELINQ.	INACTIVE	CLOSED
617.3	35-3-029-1	1,000,000		1,000,000			INDEF.	ACTIVE	UNKNOWN
617.9	35-3-028-1	0		0			ISSUED	ACTIVE	UNKNOWN
618.1	35-3-027-1	500,000		500,000			INDEF.	ACTIVE	UNKNOWN
619.0	35-3-024-1	0		0			INDEF.	ACTIVE	UNKNOWN
620.4	35-3-048-1	0		0			NEVER ISSUED	INACTIVE	CLOSED
622.2	35-3-023-1	150,000		150,000			INDEF.	ACTIVE	UNKNOWN
623.4	35-3-022-1	0		0	SOA		TO STATE	ACTIVE	UNKNOWN
623.6	35-3-049-1A	0		0			NE	INACTIVE	REMOVED
623.7	35-3-049-1	100,000		100,000	SOA	ADL 37496	EXPIRED	INACTIVE	CLOSED
623.7	35-3-058-1	0		0	DOT&PF	ADL 40129	ILMT	ACTIVE	OPEN
624.2	35-3-021-1	0		0			RELINQ. 1980	INACTIVE	CLOSED
625.0	35-3-020A-1	0		0	SOA	ADL 43682	ISSUED	INACTIVE	REMOVED
625.4	35-3-019-1	0		0	SOA	ADL 223767		ACTIVE	UNKNOWN
625.8	35-3-020-1	0		0	SOA	ADL 223766		ACTIVE	UNKNOWN
626.3	35-3-018-1	150,000		150,000			RELINQ.	ACTIVE	UNKNOWN
628.3	35-3-017-1	0		0		ADL 223765		ACTIVE	UNKNOWN
629.9	35-3-016-1	0		0			INDEF.	ACTIVE	UNKNOWN
630.6	35-3-015-1	200,000		200,000			INDEF.	ACTIVE	UNKNOWN
633.2	35-3-014-1	500,000		500,000			INDEF.	ACTIVE	UNKNOWN
633.7	35-3-013-1	500,000		500,000			INDEF.	ACTIVE	UNKNOWN
635.7	35-3-053-1	300,000		300,000	SOA	ADL 39392	CLOSED	INACTIVE	CLOSED
636.0	35-3-012-1	500,000		500,000	SOA	ADL 228326		ACTIVE	UNKNOWN
636.5	35-3-011-1	250,000		250,000	SOA	ADL 226666		ACTIVE	UNKNOWN
637.8	35-3-010-1	0		0	SOA	ADL 228732	12/31/2016	ACTIVE	OPEN
639.1	35-3-051-1	1,000,000		1,000,000	SOA	ADL 38864	CLOSED	INACTIVE	CLOSED
640.4	35-3-009-1	0		0			INDEF.	ACTIVE	OPEN

Attachment 6 - Existing Material Sites

ASAP Milepost (Rev. 5)	Material Site ID	Material Available Within Mining Plan Work Limits(CY)	Material Needed for ASAP	Material Remaining After ASAP (CY)	Material Site Owner	Permit Number	Permit Status	Classification	Material Site Status
641.6	35-3-008-1	0		0			INDEF.	ACTIVE	OPEN
641.4	35-3-006-1	0		0	SOA	ADL 39399	INDEF.	ACTIVE	OPEN
641.4	35-3-007-1	1,000,000		1,000,000			ISSUED	ACTIVE	UNKNOWN
642.3	35-3-052-1	500,000		500,000		Private	CLOSED	INACTIVE	CLOSED
642.4	35-3-057-1	0		0	SOA	ADL 38865	CLOSED	INACTIVE	CLOSED
642.8	35-3-050-1	0		0	SOA	ADL 38866	CLOSED	INACTIVE	CLOSED
643.3	35-3-005-1	0		0	Carey			INACTIVE	CLOSED
644.5	35-3-004-1	0		0			INDEF.	ACTIVE	UNKNOWN
644.6	35-3-003-1	0		0			INDEF.	ACTIVE	UNKNOWN
645.0	35-3-002-1	0		0			INDEF.	ACTIVE	UNKNOWN
646.5	35-3-047-1	500,000		500,000	MSB	ADL 26122	CLOSED	INACTIVE	CLOSED
647.6	35-3-046-1	0		0	SOA	ADL 27078		INACTIVE	CLOSED
648.9	35-3-5016-1	0		0	DOT&PF	ADL 45708	ILMA	ACTIVE	OPEN
649.5	35-3-5015-1	1,000,000	450,000	550,000	DOT&PF	ADL 45707	ILMA	ACTIVE	OPEN
649.4	35-3-045-1	500,000		500,000	SOA	ADL 201962	CLOSED	INACTIVE	CLOSED
651.6	35-3-044-1	500,000		500,000	SOA	ADL 25902	CLOSED	INACTIVE	CLOSED
653.3	35-3-5014-1	1,000,000	60,000	940,000	DOT&PF	ADL 45706	ILMA	ACTIVE	OPEN
653.7	35-3-043-1	500,000		500,000	SOA	ADL 25927	CLOSED	INACTIVE	CLOSED
655.0	35-3-5013-1	0		0	DOT&PF	ADL 45705	ILMT	ACTIVE	OPEN
657.2	35-3-5012-1	0		0	DOT&PF	ADL 39400	ILMT	ACTIVE	OPEN
658.8	35-3-042-1	500,000		500,000	SOA	ADL 25901	CLOSED	INACTIVE	CLOSED
660.5	35-3-5011-1	0		0	DOT&PF	ADL 45704	ILMT	ACTIVE	OPEN
660.0	35-3-041-1	200,000		200,000	SOA	ADL 26967	CLOSED	INACTIVE	CLOSED
660.8	35-3-5010-1	500,000		500,000	DOT&PF	ADL 45703	ILMA	ACTIVE	OPEN
660.7	35-3-040-1	150,000		150,000	SOA	ADL 25900	CLOSED	INACTIVE	CLOSED
661.1	583-013-1	0		0			NO ACTION	INACTIVE	CLOSED
662.6	35-3-5002-1	200,000		200,000	DOT&PF	ADL 45701	ILMA	ACTIVE	OPEN
662.4	35-3-5009-1	200,000		200,000	Sik	ADL 45702	CLOSED 1989	INACTIVE	CLOSED
662.7	583-003-1	0		0	SOA	ADL 68216	EXPIRED 1975	INACTIVE	CLOSED
662.8	35-3-039-1	0		0	SOA	ADL 26868	CLOSED	INACTIVE	CLOSED
663.6	584-001-1	1,000,000	240,000	760,000	SOA	ADL 57589	INDEF. FUP	ACTIVE	OPEN
662.9	584-002-1	500,000		500,000	Jurasek	Private	EXPIRED 1977	INACTIVE	CLOSED
662.9	584-003-1	200,000		200,000	Watkins	Private	EXPIRED	INACTIVE	CLOSED
663.3	35-2-5008-1	0		0	DOT&PF	ADL 45658	ILMA	ACTIVE	OPEN
663.3	583-002-1	0		0	SOA	ADL 46707	RELINQ. 1971	INACTIVE	CLOSED
663.6	583-001-1	0		0	DOT&PF	ADL 47384	ILMT	ACTIVE	OPEN
663.9	35-2-012-1	0		0	SOA	ADL 26832	CLOSED	INACTIVE	CLOSED

Attachment 6 - Existing Material Sites

ASAP Milepost (Rev. 5)	Material Site ID	Material Available Within Mining Plan Work Limits(CY)	Material Needed for ASAP	Material Remaining After ASAP (CY)	Material Site Owner	Permit Number	Permit Status	Classification	Material Site Status
664.1	35-2-013-1	0		0			NE	INACTIVE	CLOSED
664.4	35-2-5007-1	500,000		500,000	DOT&PF	ADL 45659	ILMA	ACTIVE	OPEN
665.9	35-2-5006-1	500,000		500,000	DOT&PF	ADL 45660	ILMA	ACTIVE	UNDEVELOPED
666.3	35-2-5005-1	0		0	DOT&PF	ADL 45661	ILMA	ACTIVE	OPEN
667.6	35-2-5004-1	1,000,000		1,000,000	DOT&PF	ADL 45662	ILMA	ACTIVE	UNDEVELOPED
571.5	35-2-5003-1	500,000	450,000	50,000	DOT&PF	ADL 45663	ILMA	ACTIVE	OPEN
671.0	35-2-011-1	0		0	SOA	ADL 26810	ISSUED	ACTIVE	UNKNOWN
671.5	35-2-5001-1	1,000,000		1,000,000	DOT&PF	ADL 45664	ILMA	ACTIVE	OPEN
671.7	35-2-010-1	0		0	SOA	ADL 26786	CLOSED	INACTIVE	CLOSED
672.3	35-2-009-1	0		0	SOA	ADL 26471	CLOSED	INACTIVE	CLOSED
672.6	35-2-008-1	500,000		500,000	SOA	ADL 26472	CLOSED	INACTIVE	CLOSED
673.0	35-2-714-1	250,000		250,000	SOA	ADL 26787	CLOSED	INACTIVE	CLOSED
674.0	35-2-5000-1	0		0		ADL 45665	RELINQ. 1989	INACTIVE	CLOSED
674.9	35-2-1808-1	0		0	SOA	ADL 19672		INACTIVE	REMOVED
675.0	35-2-1806-1	0		0	SOA	ADL 19672		INACTIVE	CLOSED
675.2	35-2-1805-1	100,000		100,000	SOA	ADL 19672		INACTIVE	CLOSED
675.3	35-2-1807-1	200,000		200,000	SOA	ADL 19672		INACTIVE	REMOVED
675.3	35-2-713-1	150,000		150,000	BLM	A-58401	ISSUED	INACTIVE	CLOSED
675.5	35-2-712-1	150,000		150,000	SOA	ADL 32834	CLOSED	INACTIVE	CLOSED
675.6	35-2-002-1	150,000		150,000			NE	INACTIVE	CLOSED
676.1	35-2-453-1	150,000		150,000	SOA	ADL 32835	CLOSED	INACTIVE	CLOSED
677.0	35-2-452-1	0		0	BLM	A-058401	INDEF.	ACTIVE	UNKNOWN
677.1	35-2-711-1	200,000		200,000	SOA	ADL 32833	ISSUED	INACTIVE	CLOSED
677.4	35-2-015-1	0		0	DOT&PF	ADL 45666	ILMA	ACTIVE	UNDEVELOPED
677.9	35-2-410-1	200,000		200,000	MSB			INACTIVE	CLOSED
678.9	35-2-454-1	0		0	LaRue	PRIVATE	CLOSED	INACTIVE	CLOSED
679.3	583-433-1	200,000		200,000			NE	INACTIVE	CLOSED
679.3	583-439-1	0		0			NE	INACTIVE	CLOSED
679.7	35-2-716-1	150,000		150,000	U of A	ADL 21350	CLOSED 1982	INACTIVE	CLOSED
680.0	35-2-434-1	0		0	MSB	ADL 24492	ISSUED	INACTIVE	CLOSED
680.9	35-2-430-1	150,000		150,000			EXPIRED	INACTIVE	CLOSED
682.1	35-2-005-1	250,000		250,000	BLM	A-061923	NO ACTION	INACTIVE	CLOSED
682.1	35-2-431-1	0		0	BLM	A-047326	CLOSED	INACTIVE	CLOSED
684.4	35-2-432-1	250,000		250,000	BLM	A-047327	EXPIRED	INACTIVE	CLOSED
684.5	35-2-718-1	100,000		100,000	SOA	ADL 19495	CLOSED	INACTIVE	CLOSED
685.0	35-2-451-1	100,000		100,000	Gaasland	PRIVATE	ISSUED	INACTIVE	CLOSED
687.6	35-2-004-1	50,000		50,000		PRIVATE	EXPIRED	INACTIVE	CLOSED

Attachment 6 - Existing Material Sites

ASAP Milepost (Rev. 5)	Material Site ID	Material Available Within Mining Plan Work Limits(CY)	Material Needed for ASAP	Material Remaining After ASAP (CY)	Material Site Owner	Permit Number	Permit Status	Classification	Material Site Status
687.6	35-2-425-1	0		0	BLM	A-047320	EXPIRED	INACTIVE	CLOSED
688.1	35-2-409-1	200,000		200,000	BLM	A-047715	EXPIRED	INACTIVE	CLOSED
689.7	35-2-426-1	100,000		100,000	BLM	A-047321	RELINQ.	INACTIVE	CLOSED
690.6	35-2-014-1	0	-	0	DOT&PF	ADL 43689	ILMT	ACTIVE	OPEN
691.9	35-2-427-1	150,000		150,000	BLM	A-047322	EXPIRED	INACTIVE	CLOSED
691.9	35-2-428-1	0		0	BLM	A-047323	EXPIRED	INACTIVE	CLOSED
692.9	35-2-429-1	100,000		100,000	Guse		EXPIRED	INACTIVE	CLOSED
694.9	35-2-422-1	100,000		100,000	BLM	A-047317	EXPIRED	INACTIVE	CLOSED
696.9	35-2-423-1	200,000		200,000	CIRI		ISSUED	INACTIVE	CLOSED
698.2	35-2-424-1	200,000		200,000	Brock		RELINQ.	INACTIVE	CLOSED
699.5	35-2-001-1	0		0	SOA	ADL 22508	EXPIRED	INACTIVE	CLOSED
699.5	35-2-418-1	250,000		250,000	BLM	A-047313	EXPIRED	INACTIVE	CLOSED
699.6	35-2-001A-1	0		0	Joehnck	A-061249	EXPIRED	INACTIVE	CLOSED
700.8	35-2-419-1	250,000		250,000	BLM	A- 047314	EXPIRED	INACTIVE	CLOSED
701.8	35-2-408-1	0		0	SOA	ADL 19037	EXPIRED 1964	INACTIVE	CLOSED
702.5	35-2-420-1	0		0	BLM	A- 047315	EXPIRED	INACTIVE	CLOSED
702.6	35-2-448-1	100,000		100,000	Armstrong	PRIVATE	CLOSED	INACTIVE	CLOSED
703.6	35-2-446-1	200,000		200,000	BLM	A-052165	ISSUED	INACTIVE	CLOSED
704.1	35-2-421-1	0		0	SOA			INACTIVE	CLOSED
705.4	35-2-007-1	50,000		50,000	BLM	A-047713	EXPIRED	INACTIVE	CLOSED
705.5	35-2-407-1	50,000		50,000	SOA	ADL 19036	EXPIRED	INACTIVE	CLOSED
706.2	35-2-447-1	50,000		50,000	Walter & Stinson	PRIVATE	EXPIRED	INACTIVE	CLOSED
706.3	35-2-003-1	0		0	SOA		RELINQ.	INACTIVE	CLOSED
706.5	35-1-450-1	0		0	SOA	ADL 00017	EXPIRED	INACTIVE	CLOSED
706.6	580-018-1	0		0	Kirsch	Private	EXPIRED 1969	INACTIVE	CLOSED
706.6	580-019-1	0		0		NE	NE	INACTIVE	UNKOWN
706.8	35-1-855-1	0		0	DOT&PF	ADL 40293	ILMT	INACTIVE	OPEN
706.9	580-445-1	0		0		ADL 24946	INDEFINITE	ACTIVE	UNKOWN
707.0	35-1-449-1	0		0			NE	INACTIVE	CLOSED
711.6	35-1-412-1	0		0	Dahl	A-029369	CLOSED	INACTIVE	CLOSED
711.9	35-1-413-1	0		0	Dahl	A-029370	CLOSED	INACTIVE	CLOSED
712.2	35-1-009-1	0		0	SOA	ADL 00403		INACTIVE	CLOSED
713.3	35-1-007-1	0		0	Cronin	PRIVATE	NO ACTION	INACTIVE	CLOSED
713.3	35-1-414-1	0		0	BLM		CLOSED	INACTIVE	CLOSED
713.5	35-1-415-1	0		0			NE	INACTIVE	CLOSED
714.0	35-1-417-1	0		0			NE	INACTIVE	CLOSED

Attachment 6 - Existing Material Sites

ASAP Milepost (Rev. 5)	Material Site ID	Material Available Within Mining Plan Work Limits(CY)	Material Needed for ASAP	Material Remaining After ASAP (CY)	Material Site Owner	Permit Number	Permit Status	Classification	Material Site Status
714.3	35-1-441-1	0		0	BLM	A-051648	CLOSED	INACTIVE	CLOSED
737.1	ALSOP SOUTH	50,000	50,000	0	MSB			ACTIVE	OPEN
737.1	MSB 4880	0		0	MSB			ACTIVE	OPEN
737.1	MSB 4881	0		0	MSB			ACTIVE	OPEN

Appendix Q

List of Preparers

List of Preparers

Cardno ENTRIX

Antrobus, Terry – Wildlife; Fisheries; Threatened & Endangered Species; Navigation Resources
M.S., Biology, University of Southwestern Louisiana, 1993
B.S., Environmental Resource Management, Pennsylvania State University, 1991

Ayala, Chelsea – Air Quality; Noise
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M.S., Biological Oceanography, Florida Institute of Technology, 1985
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M.S., Environmental Engineering, Washington State University, 1997
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B.S., Geology, Michigan State University, 1971

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M.S., Environmental and Natural Resource Economics, Oregon State University, 2004
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Ph.D., Operations Research, New York University, School of Engineering and Science, 1973
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B.Ch.E., Chemical Engineering, Manhattan College, 1961

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B.S., Geology, Washington And Lee University, 1996

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M.D., Tufts University School of Medicine, 1972
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MWH Global

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M.S., Civil Engineering, Colorado State University, 2001
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B.S., Civil Engineering, University of Minnesota, 1980

Natural Resource Group

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M.A., Anthropology, University of Alaska Fairbanks, 2001
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B.Sc., Biology, University of Saskatchewan, 1997

United States Army Corps of Engineers

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B.S., Environmental Science, Alaska Pacific University, expected graduation 2013

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B.A., Interior Design, The American College for Applied Art (American InterContinental University), 1984

Soiseth, Benjamin – Project Manager (April – October 2011)
B.S., Wildlife Biology, University of Alaska Fairbanks, 2005

Sweet, Serena – Project Manager (September 2009 – March 2011)
B.S., Biological Sciences, University of Alaska Anchorage, 2004

Cooperating Agencies

Alaska Department of Natural Resources – State Pipeline Coordinator's Office

United States Coast Guard

United States Department of the Interior

United States Department of the Interior – Bureau of Land Management

United States Department of the Interior – National Park Service

United States Department of Transportation – Pipeline and Hazardous Materials Safety Administration

United States Environmental Protection Agency

Appendix R

Distribution List

Distribution List

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United States Department of the Interior
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Washington, DC 20240

United States Department of the Interior – Bureau of Land Management
222 West 7th Avenue, #13
Anchorage, AK 99513-7599

United States Department of the Interior – National Park Service
240 West 5th Avenue, Suite 114
Anchorage, AK 99501

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1200 New Jersey Ave., SE
Washington, DC 20590

Commander (oan)
Seventeenth Coast Guard District
Mr. James Helfinstine
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Juneau, AK 99802

Alaska Department of Natural Resources – State Pipeline Coordinator's Office
411 West 4th Avenue, 2nd Floor
Anchorage, AK 99501

Libraries & Reading Rooms

ANAKTUVUK PASS:

Anaktuvuk Pass Community Center
P.O. Box 21030
3031 Main Street
Anaktuvuk Pass, AK 99721-0030
907-661-3612

ANCHORAGE:

Alaska Resources Library and Information Service (ARLIS)
3211 Providence Drive, Suite 111
Anchorage, AK 99508
907-272-7547

Anchorage Municipal Libraries
Z.J. Loussac Library
3600 Denali Street
Anchorage, AK 99503-6093
907-343-2975

Bureau of Land Management
Public Room
222 West 7th Avenue, #13
Anchorage, AK 99513-7599
907-271-5960

Alaska Dept of Natural Resources
Public Information Center
550 W. 7th Ave., Suite 1260
Anchorage, AK 99501-3557
907-269-8400

UAA/APU Consortium Library
3211 Providence Drive
Anchorage, AK 99508
907-786-1871

BARROW:

Tuzzy Consortium Library
P.O. Box 2130
5421 North Star Street
Barrow, AK 99723
907-852-4050

CANTWELL:

Cantwell Community/School Library
P.O. Box 29
1 School Road
Cantwell, AK 99729
907-768-2372

DENALI PARK:

Denali National Park Library
P.O. Box 9
Mile 237 Parks Hwy
Denali National Park, AK 99755
907-683-2294

FAIRBANKS:

Fairbanks North Star Borough Public Library
1215 Cowles Street
Fairbanks, AK 99701-4313
907-459-1020

Bureau of Land Management
Public Room
1150 University Avenue
Fairbanks, AK 99709
907-474-2200

Alaska Dept of Natural Resources
Public Information Center
3700 Airport Way
Fairbanks, AK 99709-4699
907-451-2705

HEALY:

Tri-Valley School/Community Library
P.O. Box 518
400 Suntrana Street
Healy, AK 99743
907-683-2507

KENAI:

Kenai Community Library
163 Main Street Loop
Kenai, AK 99611
907-283-4378

MINTO:

Minto School Library
P.O. Box 81
Laker One Street
Minto, AK 99758
907-798-7212

NENANA:

Nenana Public Library
P.O. Box 40
201 East Second Street
Nenana, AK 99760
907-832-5812

NIKISKI:

Nikiski Middle/High School Library
P.O. Box 7112
52275 Education Drive
Nikiski, AK 99635
907-776-3456

TALKEETNA:

Talkeenta Public Library
P.O. Box 768
23151 South Talkeetna Spur Road
Talkeetna, AK 99676
907-733-2359

TRAPPER CREEK:

Trapper Creek Public Library
P.O. Box 13388
8901 East Devonshire Drive
Trapper Creek, AK 99683
907-733-1546

WASILLA:

Wasilla Public Library
391 North Main Street
Wasilla, AK 99654
907-376-5913

WILLOW:

Willow Public Library
P.O. Box 129
23557 West Willow Comm Ctr Cir
Willow, AK 99688
907-495-7323

WISEMAN:

Wiseman Community Center
114 Newhouse Street
Wiseman, AK 99790
907-678-2007

Appendix S

Commenter Index
&
Public Comment Matrix

Appendix S Table 1 Commenter Index

Commenter	Comment Letter or Transcript Number (L or T)	Comment Number(s)
Akemann, Bob	T1 T12	5, 8 20-21
Alaska Department of Environmental Conservation (ADEC), Air Quality Division	L29	94-96, 103, 105-106, 108-127
Alaska Department of Environmental Conservation (ADEC), Spill Prevention and Response Division	L29	97, 99, 102
Alaska Department of Environmental Conservation (ADEC), Commissioner's Office	L29	98, 100, 101, 104, 107
Alaska Department of Fish and Game (ADF&G)	L29	128-168
Alaska Department of Health and Social Services (ADHSS)	L29	1-93
Alaska Department of Natural Resources (ADNR); Department of Geological and Geophysical Surveys, Engineering Geology Section	L29	189-236
Alaska Department of Natural Resources (ADNR); Division of Agriculture	L29	237-254
Alaska Department of Natural Resources (ADNR); Mining Land and Water	L29	271-275
Alaska Department of Natural Resources (ADNR); Realty Service Section	L29	256-270
Alaska Department of Natural Resources (ADNR); SPCO	L29	181-188
Alaska Department of Natural Resources (ADNR); Water Resource Section	L29	255
Alaska Department of Public Safety (ADPS), Division of Fire and Life Safety	L29	169-180
Alaska Department of the Interior (ADOI), Office of Environmental Policy and Compliance	L13	1-16
Alaska Gasline Development Corporation (AGDC)	L28	1-70
Alyeska Pipeline Service Company	L2	1-4
Austin, Amanda	L18	1-4
Boeve, Gordon	L7	1-2
Boreal Lodging	L12	1-6
Bredeman, Larry	T11	4, 14
Brosius, Steve	L11	1
Bureau of Land Management, Alaska State Office (BLM - AKSO)	L45 L46 L47 L48 L49	1-29 1 1-91 1 1
Carlson, Bud J.	L34	1
Center for Biological Diversity	L33	1-28
Charles (Anaktuvuk Pass public meeting)	T9	4-7
Charles, Steve	L19	1-6
Cincotta, Christy	L4	1
Crocket, Russell	L21	1-2
David, Wilma	T11	18-20

Commenter	Comment Letter or Transcript Number (L or T)	Comment Number(s)
Delia, Tony - Tanana Chiefs Conference	T7	1-5
Denali Citizens Council	L24	1-53
Doyon Limited	L25	1
Eagleson, Nan	L20 T6	1-2 1-4
Environmental Protection Agency (EPA)	L30 L46 L50 L51	1-280 1-6 1-6 1-2
Fairbanks North Star Borough	L5	1-11
Gardner, Dale Lynn	T9	1
Gerlach, Robert	T5	1
Gordon, Bass	T9	8
Haddadi, Al	T9	10-14
Halladay, Duffy	T8	36-37
Hopkins, Luke - Mayor of Fairbanks	T8	4-10
Hopson, Charles	T2	2-3
Jimmie, Rondell	L43 T11	 1
Madsen, Bill	L6	1-3
Mat-Su State Parks Citizen's Advisory Board	L3	1-10
Mayo, Randy	L22	1-3
McCain, Ed	T4	7-9
Merrow, Robert	T6	5-11
Miller, Pamela	T8	21-34
Nageak, Anna	T9	2-3
National Oceanic and Atmospheric Administration (NOAA)	L31	1-7
National Parks Conservation Association (NPCA)	L15	1-3
National Parks Service (NPS)	L16	1-37
Northern Alaska Environmental Center	T8	20
Owen, Tina	T4	10-14
Paneak, Raymond	T9	9, 15-16
Patkotak, James	T2	1
Peger, Lisa	T8	1-3, 35
Peirce, Merrick	L38 L40 L41 L42	1-2 1-2 1-11 1
Ragland, Hannah	L27	1-49

Commenter	Comment Letter or Transcript Number (L or T)	Comment Number(s)
Reakoff, Jack	L23 L35 L36 T1 T12	1-3 1-8 1-3 1-3, 6-7 1-9
Reakoff, June	T1 T12	4 10
Reakoff, Kristin	L37 T12	1-7 19
Riley, Rocky	T11	5-11, 22
Russell, Daniel N.	L9 L10	1-3 1
Sackett, Jim	L8	1
Salitan, Erik	T12	17
Sattler, Bob - Tanana Chiefs Conference	T8	17-19
Schauwecker, Linda	L1	1
Schoppenhorst, Heidi	T12	11-16
Sherry, Irene	T11	2-3
Silas, Berkman	T11	16-17
Silas, Sarah	T11	21
Stanculescu, Victor	T4	15-19
Storhok, Chris	T8	11-16
Titus, Luke	T11	12-13, 23
US Army Corp of Engineers (USACE)	L14 L32	1-2 1-18
US Department of Transportation, Pipeline and Hazardous Materials Safety Administration (DOT PHMSA)	L17	1-21
Van Dongen, Marc	T4	1-6, 20-21
Wiser, Vera	T11	15

Appendix S Table 2: Comment Matrix

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
L1	1	Linda Schauwecker				We receive your newsletter & we need a change of address.	Comment acknowledged.
L2	1	Alyeska Pipeline Service Company				The precise, safe and secure, location of ASAP facilities relative to TAPS, including the number of crossings, compressor station locations and the Yukon River crossing, will involve additional, more significant design, engineering and review efforts.	Section 5.19.3.2 provides a description of the design approach for the ASAP. This information will be gathered during the USACE 404 permitting process.
L2	2	Alyeska Pipeline Service Company				At the Yukon River crossing, we note that the existing bridge's design accommodates two pipelines on two support racks both of which belong to the TAPS owners. The existing, operating pipeline occupies the "upriver" rack and a future TAPS contingency pipeline would occupy the other.	The AGDC has proposed three options for crossing the Yukon River: construct a new aerial suspension bridge across the Yukon River (the Applicant's Preferred Option); cross the Yukon River by attaching the pipeline to the existing E.L. Patton Bridge (Option 2); or utilize HDD to cross underneath the Yukon River at the location of the proposed new suspension bridge (Option 3). The Yukon River Crossing Options are described in Section 2.2.3.2 of the FEIS. If the pipeline was attached to the existing E.L. Patton Bridge (Option 2), no surface water disturbance would occur as the proposed pipeline would be installed on a hanger pipe assembly that would be placed underneath the existing bridge deck (Figure 2.2-6).
L2	3	Alyeska Pipeline Service Company				Alyeska requests that the ASAP Right-of-Way Grant issued by USBLM include a provision recognizing that Alyeska will review each segment of ASAP or any related facility proposed to be built in the vicinity of TAPS ("Infringing Facility') and determine the conditions under which the Infringing Facility would be compatible with the rights held by the TAPS Owners.	Section 5.23.2.9 - Land Use does not discuss recommended mitigation. AGDC has not proposed any mitigation measures for land use. This provision has not been included in the mitigation chapter. BLM would likely ask that the mitigation measure be included in any permit that might be issued by USACE.
L2	4	Alyeska Pipeline Service Company	General			BLM has developed TAPS compatibility and coordination language for the rights-of-way of two other, former Alaska gas transmission pipeline projects known as ANGTS and TAGS.	Comment acknowledged.

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
L3	1	Mat-Su State Parks Citizen's Advisory Board				The Board concludes that the DEIS has not adequately researched public documents and community plans that address recreation on State managed lands.	The DEIS addresses all management plans for public recreation areas transected by the proposed pipeline and ancillary facilities. Section 5.10 Recreation of the DEIS presents a comprehensive description of recreation areas in proximity to Project facilities and list associated management plans at the federal, state, and local levels. In addition, Section 5.9 Land Use presents a summary of applicable land use plans and discusses consistency of the Project in the context of utility siting. The proposed pipeline would transect two State Park units managed by ADNR - Denali SPP and Willow Creek SRA. The Denali SPP management was developed in 2006. As described in Section 5.9, this plan allows pipelines by permit only when no viable alternative exists (see Table 5.9-13). The Willow Creek SRA Master Plan was developed in 1990. The Plan addresses recreation management and facility development, in addition to a range of other management considerations. However, it does not specifically allow or prohibit utility siting within the SRA.
L3	2	Mat-Su State Parks Citizen's Advisory Board	5.9			We feel that review of these documents will conclude that the routing of the pipeline through the Willow Creek SRA and surrounding area will have long term effects on recreation, contrary to the "minor long-term adverse effects on tourism or recreation..." as stated in the DEIS (5.10-19).	The pipeline ROW would be co-located with Willow Creek Parkway at the south boundary of Willow Creek SRA. As described in Section 5.9, the Willow Creek SRA Master plan allows pipelines by permit only when no viable alternative exists (see Table 5.9-13). The Willow Creek SRA Master Plan was developed in 1990. The Plan addresses recreation management and facility development, in addition to a range of other management considerations. However, it does not specifically allow or prohibit utility siting within the SRA. This information will be gathered during the USACE 404 permitting process.
L3	3	Mat-Su State Parks Citizen's Advisory Board				There are viable route variables for the pipeline that would co-locate with other infrastructure, avoiding the Willow Creek SRA and Little Susitna Recreational River, thus reducing its negative impacts to recreation.	The pipeline ROW would be co-located with Willow Creek Parkway at the south boundary of Willow Creek SRA. An alternative crossing of the Little Susitna River was considered in FEIS Section 4.4.2.4 - Port MacKenzie Rail Route Variation.

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
L3	4	Mat-Su State Parks Citizen's Advisory Board	5.10			According to the ASAP Master Plan, the proposed pipeline route would enter the Willow Creek SRA near pipeline mile 707 and involve the clearing of a 100' construction Right-of-Way for two miles alongside the SRA access road and adjacent to a community park. The route would proceed through Mat Su Borough and State lands and the West Gateway Trail System for another 12 miles, crossing State managed recreational trails ten times. Existing and proposed recreational use through these lands are described in the following documents: Willow Creek SRA Master Plan, Port Mckenzie Rail Project Final EIS, Willow Summer Trails Master Plan, Willow Winter Trails Plan, Matanuska-Susitna Trails Plan, Resolution of the WIllow Area Community Organization.	The referenced trail systems, management plans, and documents have been reviewed. Based upon this information, additional information has been added to Section 5.10.1.4 to describe trail systems, uses, and related planning efforts in the Project area.
L3	5	Mat-Su State Parks Citizen's Advisory Board	5.10			Although the DEIS stated that the pipeline will be located underground and all public access points will be continued, we feel that these heavily used recreational lands and trails are valued by the public for their natural condition. A 100' ROW, that will never grow back to its natural state, will create more unattended trails and unnatural environment. This will negate extensive public trail planning, compromise detailed trail designs and trail user experiences.	Additional information about impacts to recreational trails has been added to Section 5.10.2.2.
L3	6	Mat-Su State Parks Citizen's Advisory Board				The clear cutting will enable inappropriate motorized access to wetlands, anadromous streams and other sensitive areas.	Public access to the ROW for recreation or hunting will be limited by blocking entry areas with large boulders, berms, or fencing. This AGDC proposed mitigation measure is listed as #10 in Section 5.23.6.1 under wildlife, and includes the analysis and effectiveness of the mitigation proposed.

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L3	7	Mat-Su State Parks Citizen's Advisory Board				There are two other route variations that avoid State managed recreational lands, the Port MacKenzie Rail Corridor via the Parks Highway, which is mentioned in the DEIS, and the Alaska Energy Authority State Intertie from the Douglas Station in Willow, south to the Beluga Pipeline. Both alternate routes minimize impacts the State managed recreation, the rail corridor avoiding all State managed recreational areas.	The Parks Highway/Port MacKenzie Rail Corridor was considered as a potential route variation to the proposed ASAP project. The route variation descriptions and analysis are presented in Section 4.4.2.4 of the FEIS. Co-location with the Alaska Intertie from the Douglas Substation in Willow south would result in approximately 12 miles of additional pipeline and was therefore not considered as a reasonable alternative.
L3	8	Mat-Su State Parks Citizen's Advisory Board				The DEIS states the desirability of co-locating the pipeline route to minimize environmental impacts. This is also true of recreational impacts, especially on public, State managed lands.	The proposed pipeline is located mainly in existing road ROW (Dalton Highway) and is co-located within the Trans Alaska Pipeline System (TAPS) corridor. To that end, the Project design minimizes impacts on recreational resources.
L3	9	Mat-Su State Parks Citizen's Advisory Board	5.10			The Mat-Su State Parks Citizen's Advisory Board recommends that the consultant review the negative recreational impacts in greater detail for the proposed route through the Willow Creek SRA, the Little Sustina Recreational River and other State managed recreational areas.	Additional information on impacts to recreational trails has been added to Section 5.10.2.2. This expanded analysis applies to all affected trail systems in the Project area, including the Willow Creek SRA, Little Susitna Recreational River, and other State-managed recreational areas.
L3	10	Mat-Su State Parks Citizen's Advisory Board				We also recommend further consideration of the Parks Highway/Port MacKenzie Rail Corridor and the AEA Alaska Intertie corridor for the ASAP Project.	The Parks Highway/Port MacKenzie Rail Corridor was considered as a potential route variation to the proposed ASAP project. The route variation descriptions and analysis are presented in Section 4.4.2.4 of the FEIS. Co-location with the Alaska Intertie from the Douglas Substation in Willow south would result in approximately 12 miles of additional pipeline and was therefore was not considered a reasonable alternative.
L4	1	Christy Cincotta				In the Subsistence document, figure 5.14-2 appears to show the Native Village of Tyonek as a non-subsistence area. If so, this is incorrect.	The nonsubsistence use area on Figure 5.14-2 includes state waters in upper Cook Inlet, which are located adjacent to the community of Tyonek. The commenter is correct that the community of Tyonek is not located in a state nonsubsistence area. The scale of the map makes such distinction difficult to portray.

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L5	1	The Fairbanks North Star Borough				Our foremost concern is with how the document does not even attempt to study as alternative, a route through Fairbanks. Throughout the PEIS, alternatives for pipeline routes, utility gas verses gas with Natural Gas liquids, the economic and social impact of a gas supply to possible users among various routes, and over social impact of the line was not examined. It is very clear that the document does not function as an acceptable environmental impact statement with alternatives that should have been studied, but instead is justifying a predetermined project route and what the line will carry to the Cook Inlet. The PEIS does not appear to meet the most basic of what the National Environmental Policy Act calls for in its process, an analysis of alternatives.	Alternatives to the proposed action are described and analyzed in Section 4 of the FEIS. A route through Fairbanks is described and analyzed in Section 4.4.2.1. Reasonable alternatives to the proposed action are those that met the purpose and need as described in Section 1.2 and are practical or feasible from the technical standpoint and using common sense. Table 4.6-1 provides a summary of alternatives considered, and their status.
L5	2	The Fairbanks North Star Borough				40 CFR1502 directs agencies that prepare an EIS to study alternatives as part of the NEPA process, this document fails at the most basic level of what a PEIS should include and hence the FNSB is very concerned that litigation from any opponents will be successful.	Alternatives to the proposed action are described and analyzed in Section 4 of the FEIS. Reasonable alternatives to the proposed action are those that met the purpose and need as described in Section 1.2 and are practical or feasible from the technical standpoint and using common sense. Table 4.6-1 provides a summary of alternatives considered, and their status.
L5	3	The Fairbanks North Star Borough				A gas line to the FNSB is absolutely critical to the state's implementation plan for solving the PM2.5 issues within the FNSB. Natural gas is expected to be the only way to reduce PM2.5 to levels below the EPA's air quality standard…	Comment acknowledged. Section 5.15 Human Health, provides information related to PM 2.5 reductions that could be realized from converting to natural gas as a fuel source in the Fairbanks area.
L5	4	The Fairbanks North Star Borough				The Natural gas that would be available as a result of this project is the only fuel source that is affordable to residents and businesses within the FNSB.	As discussed in Section 1.2.2 Purpose and Need, Fairbanks does not have a long-term source of fuel other than oil. Fairbanks Natural Gas, LLC provides Cook Inlet natural gas to approximately 1,100 residential and commercial customers. The socioeconomic benefits of the proposed project are discussed in Section 5.12 of the FEIS.

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L5	5	The Fairbanks North Star Borough				The ASAP project, as laid out in section 2.0 does provide gas service to Fairbanks, via the proposed Fairbanks Lateral tie-in, to a location near the campus of the University of Alaska Fairbanks. This lateral tie-in is sized correctly to meet most of the anticipated demand of the FNSB market including some conversion of coal fired power plants to natural gas.	The project as proposed does not include a Fairbanks distribution system which would be a separate project. The project proposed in this FEIS includes delivery of utility grade natural gas to a gas take-off facility in Fairbanks that would be connected to a gas distribution system to be constructed and/or developed by others.
L5	6	The Fairbanks North Star Borough				Section 4.4.1.1 discusses the Richard Highway Route Alternative and its rejection from further consideration. The FNSB objects to the dismissal of complete analysis of this route within the PEIS under the guise that the route does not present environmental advantages over the proposed route. The PEIS studied in detail only one route, with minor modifications, through Denali National Park. The Richardson Highway Route, along the existing TAPS corridor, has been extensively studied and should be considered in detail as an alternate route of the ASAP. Rejection of the Richardson Highway Route as a viable alternative to the preferred route places the project at considerable risk of failure due to possible litigation by those who feel the Danli route would jeopardize the crown jewel of the national park system.	The FSNB's objection is noted. As described in Section 4.4.1.1, the Richardson Highway Route Alternative is longer than the proposed route and would result in greater impacts to elements of the environment as summarized in table 4.4-3. The proposed route is located east of Denali National Park. The Denali National Park Route Variation alternative is located in the Parks Highway corridor that extends through a portion of Denali National Park.

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L5	7	The Fairbanks North Star Borough				Section 4.4.2.1 discusses the Fairbanks Route Variation that would avoid Minto Flats. Minto Flats is an important traditional native Alaska hunting area that for uncounted generations has produced the moose and fur bearing animals needed for subsistence living and cultural identity of native Alaskans. The Fairbanks Route Variation follows an already developed corridor, which does not disturb an undeveloped region. On page 4-15 of the PEIS, a dubious at best argument that following an already developed corridor verses developing a new route in an undisturbed never developed route "would increase cost and environmental effects" is a prime example of the incomplete nature of this PEIS. The Minto Flats Route has considerable unknown risks that could greatly delay or stop the ASAP project inflicting considerable harm on the FNSB community; hence as Mayor I request the PEIS be modified to completely examine the Fairbanks Route Variation as an alternative to the Minto Flats Route.	As described in Section 4.4 of the FEIS, approximately 82 percent of the proposed Project route would be co-located with or would closely parallel existing pipeline or highway ROW. Colocation is desirable as a means of concentrating development within established corridors and minimizing environmental impacts. The Fairbanks Route Variation was examined as an alternative that would be colocated with existing road corridors. The analyses of the Fairbanks Route Variation as described in Section 4.4.2.1 concluded that the Fairbanks Route Variation presented issues and challenges related to slope and topography and would not present net environmental advantages over the proposed Project route for this segment as the advantages to some key resources are outweighed by increased potential impacts to other key resources. The relationship of the proposed ASAP route to Interior subsistence use areas is depicted in figure 5.14-10. Potential Impacts to subsistence activities for the proposed action are discussed in Section 5.14.3.
L5	8	The Fairbanks North Star Borough				The other argument presented on page 4-15 of the PEIS that the need for an off-take facility in the Fairbanks area would be present more complex permitting and compliance issues, is just as flawed. The facility would be part of the state's attainment plan for Fairbanks. Natural gas service within the FNSB PM2.5 non-attainment area could reduce PM2.5 emissions by as much as 93%, reduce SO2 by 97%, reduce VOC by 95%, reduce CO by 93% and reduce NOx by 43 percent.	A number of reasons are provided for why the Fairbanks Route Variation would not present environmental advantages over the proposed Project route for this segment. These reasons include wetlands, terrain, and populated areas. An issue of concern associated with this alternative is more complex permitting and compliance issues due to aboveground facilities located in Fairbanks. While natural gas service in the area may lead to reduced emissions based on additional activities beyond the scope of the FEIS, permitting and compliance issues would remain.
L5	9	The Fairbanks North Star Borough				The facility would increase the number of good jobs, create economic opportunity and more important, result in greater natural gas transmission service that would be available to the FNSB.	Comment acknowledged

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L5	10	The Fairbanks North Star Borough				The PEIS makes note of the possible necessity of a general conformity determination from the EPA, the facility as part of the State Implementation Plan, would be part of the solution and hence could be determined to be in conformity.	Comment acknowledged.
L5	11	The Fairbanks North Star Borough				The PEIS also makes some interesting assumptions that the Fairbanks region has no use for NGL's that are planned for shipment in the pipeline, this might not be the case as the NGL's have value and use within the FNSB, the PEIS should be modified to study this possibility.	There is currently no evidence of commercial interest in NGL's in Fairbanks. However, as described in Section 3.0 of the FEIS, NGLs that would be processed at a facility in Nikiski could be distributed for instate use by tanker truck or ship.
L6	1	Bill Madsen				I am fully against the current pipeline route	Comment acknowledged.
L6	2	Bill Madsen				The pipeline should follow the oil pipeline…then you don't have to go through or affect the view of Denali National Park. The disturbance has already been made if you take the other route. This route will undoubtedly include delays and special efforts and probably lawsuits which will drive the cost far above the other route.	The Richardson Highway Route Variation is examined in Section 4.4.1.1 of the FEIS.
L6	3	Bill Madsen				I say no, you will not be crossing my land as you indicated you plan to.	Comment acknowledged.
L7	1	Gordon Boeve				I would like to suggest the pipeline follow the Parks highway to Houston and then follow the rail extension that is currently being built to Port Mackenzie.	FEIS Section 4.4.2.4 addresses the Port MacKenzie Rail Route Variation.
L7	2	Gordon Boeve				I would also encourage the use of better pipe near populated areas, even if the current population doesn't warrant it.	AGDC would comply with all Federal and state pipeline safety regulations in the design, construction and operation of the pipeline, and in particular, those specified in 49 CFR 190 to 199. If necessary, AGDC would apply for a special permit from PHMSA, as governed by 49 CFR 190.341.
L8	1	Jim Sackett				I'm very excited about the ASAP project and I hope you can get through the volumes of required paperwork in record time and move toward construction of this much needed project.	Comment acknowledged.

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L9	1	Daniel N. Russell				Because 3.5 trillion cubic feet of natural gas has been already discovered in Cook Inlet, an Alaska Stand Alone Gas Pipeline should start at Cook Inlet and end at Fairbanks. Such a route would bring more than enough natural gas to supply demand in Fairbanks and the Rail Belt with plenty to spare for export. This route would be much lower in total cost than building a pipeline from the North Slope.	Section 4.2.1 of the FEIS discusses Kenai Peninsula and Cook Inlet natural gas supplies. New Kenai Peninsula and Cook Inlet natural gas reserves that could provide a long-term, stable supply of natural gas to markets in the Fairbanks and Cook Inlet areas remain unproven at this time.
L9	2	Daniel N. Russell				The demand for natural gas will continue to decline.	Comment acknowledged. Section 1.2.2 includes projects for future in-state natural gas demand.
L9	3	Daniel N. Russell				It is reasonable that even more natural gas reserves will be discovered and confirmed this summer in Cook Inlet, and surrounding areas. So, it is prudent to wait until all this natural gas is confirmed, before any route is finalized.	Section 4.2.1 of the FEIS discusses Kenai Peninsula and Cook Inlet natural gas supplies. New Kenai Peninsula and Cook Inlet natural gas reserves that could provide a long-term, stable supply of natural gas to markets in the Fairbanks and Cook Inlet areas remain unproven at this time.
L10	1	Daniel N. Russell				My proposed pipeline route (starting at Cook Inlet and ending in Fairbanks) would be much lower in total cost than building a pipeline from the North Slope. The price of natural gas is too low and is going down much too quickly to justify moving natural gas from the North Slope of Alaska at this level of World demand. My proposed pipeline may be extended to the North Slope later in the future, when and only when the price of natural gas makes this profitable and sensible.	As described in Section 1.2.2 of the FEIS: "The primary purpose of the Project is to provide a long-term, stable supply of up to 500 MMscfd of natural gas and NGLs from existing reserves within North Slope gas fields to markets in the Fairbanks and Cook Inlet areas by 2019.". Section 4.2.1 of the FEIS discusses Kenai Peninsula and Cook Inlet natural gas supplies. New Kenai Peninsula and Cook Inlet natural gas reserves that could provide a long-term, stable supply of natural gas to markets in the Fairbanks and Cook Inlet areas remain unproven at this time.
L11	1	Steve Brosius				Follow the current Trans Alaska pipeline. We really don't need another pipeline running down this side of Alaska as well.	The Richardson Highway Route Variation is examined in Section 4.4.1.1 of the FEIS.

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L12	1	Boreal Lodging				I was concerned with the location of the proposed compressor station near Wiseman Village. For a proposed gas route that travels the entire length of the Dalton Highway, it seems odd to me that you would choose a site for one of the more prominent impacts to be within the close proximity of the only village located within the corridor.	Section 2.1.2 Aboveground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6.Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final engineering, but for the purposes of this document, the analysis includes the locations of the compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed."
L12	2	Boreal Lodging				I was also concerned with the proposed degradation of subsistence resources due to impacts related to construction in the close proximity of Wiseman; resources being disrupted with multiple roadways / trails that can and will not be regulated for unauthorized use. In other words it seems your plan is to create serious impacts near our village, that will disrupt the lifestyle of the community and according to your summery, there will be no way for you to control the impacts proposed.	The DEIS identified that impacts to user access in the Interior region would be greatest among seven Interior communities, including Wiseman. The DEIS noted that impacts on user access to communities would be not be expected in areas where the pipeline followed existing or officially designated transportation and utility corridors. The lead federal agency will decide what mitigation should be implemented to address user access impacts. Public access to the ROW for recreation or hunting will be limited by blocking entry areas with large boulders, berms, or fencing. This AGDC proposed mitigation measure is listed as #10, Section 5.23.6.1 under wildlife, and includes the analysis and effectiveness of the mitigation proposed.
L12	3	Boreal Lodging	General			Your summery states that jobs relating to the gas line will off-set the impacts to our community. I do not believe this is true. We have met with your group & discussed job potential for the area; there really was not any potential for local residents, only encouragement to go back to school & get a degree for the possibility of securing a good job related to gas line development in the area.	AGDC proposes to identify and promote work opportunities for local residents by coordinating with local village corporations, tribal governments, city governments and other groups to identify qualified individuals that are interested in working on the project. AGDC also proposes to coordinate with Alaska training centers and universities on workforce development and training opportunities, which may include, but are not limited to future job fairs in the region.

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L12	4	Boreal Lodging				There is no discussion of routing natural gas into our village to reduce the costs associated with offsetting high fuel prices in the area, and if our subsistence resources are also jeopardized, I do not see the gas line as a benefit to residents of this village at all.	As provided in Section 1.2.1 Purpose and Need, the primary purpose of the proposed Project is to provide a long-term stable supply of 500 MMscfd to markets in the Fairbanks and Cook Inlet areas by 2019. However, as highlighted in Section 3.2 Connected Actions, a reasonable foreseeable action includes the delivery of propane to villages.
L12	5	Boreal Lodging				I would hope for you to consider locating your compressor station further down the valley, near Coldfoot or on similar state land, and avoid impacting the residents of Wiseman and the resources in the close proximity of our village any more than the line already will.	Section 2.1.2 Aboveground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6.Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final engineering, but for the purposes of this document, the analysis includes the locations of the compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed." This information will be gathered during the USACE 404 permitting process.
L12	6	Boreal Lodging	General			There's a lot of uninhabited country to the south along the Dalton Corridor that will not suffer from development impacts as much as what is presently proposed.	Co-location with the Dalton Highway corridor is proposed from Prudhoe Bay to near its terminus near Livengood. Approximately 82 percent of the proposed Project route would be co-located with or would closely parallel existing pipeline or highway ROW. Collocation is desirable as a means of concentrating development within established corridors and minimizing environmental impacts. Section 2.1.2 - Aboveground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6. Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final engineering, but for the purposes of this document, the analysis includes the locations of the

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							compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed."
L13	1	Department of the Interior Office of Environmental Policy and Compliance	5.5			To help avoid potential adverse effects, FWS recommends consideration be given to migratory birds when planning for land clearing activities.	Section 5.5.1.1 - Waterbirds and Upland Game Birds states: All migratory birds are protected by the Migratory Bird Treaty Act (MBTA) (16 USC 703–712; 40 Stat. 755 as amended) which prohibits the take of any migratory bird without authorization from USFWS. Section 5.5.2.2 - Proposed Action, Pipeline Facilities, Mainline Construction states: Sensitive habitat including nesting and breeding for birds and other wildlife would be avoided at the extent most possible during the construction under permitting requirements. This is reiterated in Section 5.5.2.2 - Sensitive Wildlife Habitats, Birds.
L13	2	Department of the Interior Office of Environmental Policy and Compliance	5.5			Certain impacts to breeding birds may be avoided by scheduling pipeline construction during winter.	Section 5.5.2.2 Proposed Action, Sensitive Wildlife Habitats, Birds states: Impacts to birds during construction would be minimized due to timing the construction to occur during the winter months.
L13	3	Department of the Interior Office of Environmental Policy and Compliance	5.5			Several areas of particular importance to breeding birds have been identified along the project right-of-way, including Kahiltna Flats, Susitna Flats, and Minto Flats, in addition to other areas where summer construction is likely.	Section 5.5.1.1 - Waterbirds and Upland Gamebirds has been revised to address breeding birds in the Kahiltna Flats, Susitna Flats and Minto Flats Important Bird Areas (IBAs).
L13	4	Department of the Interior Office of Environmental Policy and Compliance	5.23			While the Draft EIS acknowledges that consideration will be given to the timing of work to avoid disturbance to nesting birds, no specific timing windows for avoidance are identified. We believe the Final EIS needs to identify such timing windows. The Migratory Bird Treaty Act prohibits the willful killing or harassment of migratory birds. Migratory bird nests, eggs, or nestlings could be destroyed if work is conducted in nesting habitats during the spring and summer breeding season, which varies by region. Generally recommended periods for	Text has been revised in the updated mitigation chapter to include the AGDC proposed mitigation measures only. A comprehensive migratory bird conservation plan is not included, however, AGDC would develop a Wildlife Interaction and Habitat Protection Plan (discussed in section 5.23.2.5). This plan would be developed in consultation with ADF&G and USFWS, and would include considerations for all terrestrial wildlife, including nesting birds.

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						avoiding disturbance to nesting birds due to land clearing activities may be found at the website: http://alaska.fws.gov/fisheries/fieldoffice/ anchorage//pdf/vegetation_clearing.pdf.	
L13	5	Department of the Interior Office of Environmental Policy and Compliance	5.23			It will be important for the Applicant to contact FWS personnel for advice as a comprehensive migratory bird conservation plan is developed for this project. We recommend including development of such a plan, in collaboration with FWS, as part of the project design process, and described as such in the Final EIS.	Text has been revised in the updated mitigation chapter to include the AGDC proposed mitigation measures only. A comprehensive migratory bird conservation plan is not included, however, AGDC would develop a Wildlife Interaction and Habitat Protection Plan (discussed in section 5.23.2.5). This plan would be developed in consultation with ADF&G and USFWS, and would include considerations for all terrestrial wildlife, including nesting birds.
L13	6	Department of the Interior Office of Environmental Policy and Compliance	5.5			The Bald and Golden Eagle Protection Act protects eagles, as well as their nests, from take, including disturbance. Several components of this project may pose a threat to nesting eagles (e.g., land clearing that removes an eagle nest, construction disturbance, and blasting). In preparing the Final EIS, we recommend the Applicant and USACE (1) review FWS' new Eagle Permit website at http://alaska.fws.gov/eaglepermit/index.htm, and (2) contact the FWS Regional Office (permitsR7MB@fws.gov or 907-786-3685) to discuss the potential for this project to impact golden and bald eagles to ensure that appropriate information is included in the Final EIS regarding actions to be taken to protect nesting eagles.	The suggested documents were reviewed and information was added to the text for clarification. Text was added to Section 5.5 - Wildlife to include suggested content from the FWS website FWS' new Eagle Permit website at http://alaska.fws.gov/eaglepermit/index.htm. This information is presented in Table 5.5-2. Attempts to contact USFWS region office were unsuccessful. Several messages were left at the number indicated but the calls were not returned. Maureen at 907-271-2777 provided information to include regarding the protection of raptor nests. Text revised in section 5.5. 1 - Affected Environment, Migratory Birds state: The AGDC would conduct an aerial raptor nest survey at the appropriate time (prior to leaf out) to document occupied nests within a specified buffer of the proposed Project ROW. Collaboration with USFWS would take place if an unavoidable take would be likely to occur from construction activities, which would require an Eagle Take Permit.

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L13	7	Department of the Interior Office of Environmental Policy and Compliance	5.6			The Final EIS needs to include additional information regarding fish and their life stages likely to be present in waterbodies that will be impacted by water crossings, restoration efforts, or potential changes in stream hydrology. While referencing the Alaska Department of Fish and Game Anadromous Waters Catalog and Fish Distribution Database provides some information, it does not provide a comprehensive description of fish species, distribution, or life stages throughout all the waterbodies that may be impacted.	Section 5.6.1.1 states that the AFFI information is not sufficient and detailed studies would be required for specific sites. The AFFI represents the best available data for the proposed Project area south of Livengood and is cited as such. In addition, as described in Section 5.23.6, AGDC will develop a Mitigation Plan to protect fish resources, based on documented EFH, non-salmonid and resident species presence and habitat use information. Additional seasonal life history and habitat use information will be required to determine the construction schedule for all proposed stream crossings in order to protect fish and their habitat. This information will be gathered during the USACE 404 permitting process.
L13	8	Department of the Interior Office of Environmental Policy and Compliance	5.8			The proposed project is within the range of spectacled eiders, Steller's eiders, and polar bears, all of which have been listed as "threatened" under the Endangered Species Act (ESA). In addition, the northern portion of the project is within polar bear ESA-designated "critical habitat." Furthermore, the possible northern shipping routes for pipeline construction materials would pass through areas with Pacific walruses, which are an ESA candidate species.	Section 5.8 describes threatened and endangered species habitat use. Pacific walrus are identified in Table 5.8-1 and the potential project impacts on this species are described in Section 5.8.4.8. Table 5.8-1 cites the BA for reference of species potentially found within the Project area in Appendix I.
L13	9	Department of the Interior Office of Environmental Policy and Compliance	5.23			The Draft EIS estimates that approximately 5,387 acres of wetlands would be impacted by the project as currently described, with additional land requirements likely to be added as the project design progresses and locations of many permanent temporary facilities are determined. We believe the Final EIS needs to include additional analysis of compensatory mitigation opportunities for lost wetlands.	Compensatory wetland mitigation has been added to Section 5.23. Text is included in the mitigation chapter to describe the concept of compensatory mitigation, and list the options. The mitigation chapter 5.23.2.4 does not include specific compensatory mitigation proposed by AGDC.

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L13	10	Department of the Interior Office of Environmental Policy and Compliance	5.23			We also believe the Final EIS needs to identify other mitigation options, such as establishment of a North Slope mitigation bank. While compensatory mitigation for unavoidable impacts associated with the project is applicable; this project poses unique challenges due to its large scale and the number of habitat types that would be affected. While suitable "in-place" mitigation options may exist where the proposed project crosses portions of interior and southcentral Alaska, suitable mitigation options on the North Slope may be more challenging. We believe the Final EIS need to consider, for example, whether restoration of abandoned pads and airstrips within the vicinity of the proposed project area may be appropriate as partial compensation for project impacts on the North Slope.	Information has been added to Section 5.23 regarding the North Slope mitigation bank. Specifically, Section 5.23.2.4 - Wetland Resources, Best Management Practices identifies the North Slope mitigation bank as a potential mitigation measure.
L13	11	Department of the Interior Office of Environmental Policy and Compliance	General			The proposed portion of the route through Minto Flats is of particular concern to the Department due to the potential adverse impacts to our trust resources. The Draft EIS estimates this route may require construction of approximately 51 miles of new permanent gravel roads in an area (i.e., the Minto Flats) that is otherwise nearly roadless.	Comment acknowledged.
L13	12	Department of the Interior Office of Environmental Policy and Compliance	5.5			As the Draft EIS recognizes, Minto Flats is one of the highest quality waterfowl habitats in Alaska, and it sustains one of the largest trumpeter swan breeding populations in North America. Although the route may avoid many wetlands in Minto Flats, we believe this route would result in habitat fragmentation and the potential for increased access to this important migratory bird breeding area.	Habitat fragmentation is addressed in Section 5.5.2 - Environmental Consequences, which states: Since the proposed Project would be collocated with existing ROWs, and the pipeline would be buried, additional habitat fragmentation would be minimal. Areas proposed that are not collocated with existing ROWs (south of Willow and Minto Flats) would receive some fragmentation.

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L13	13	Department of the Interior Office of Environmental Policy and Compliance	4.0			We recommend that the proposed pipeline be co-located with existing oil pipeline and highway rights-of way in the Fairbanks vicinity, and that the Fairbanks Route Variation be developed as an Alternative in the Final EIS.	The Fairbanks Route Variation was examined as an alternative that would be collocated with existing road corridors. The analyses of the Fairbanks Route Variation as described in Section 4.4.2.1 concluded that the Fairbanks Route Variation presented issues and challenges related to slope and topography, and would not present environmental advantages over the proposed Project route for this segment.
L13	14	Department of the Interior Office of Environmental Policy and Compliance	5.5			Page 5.5-33, Table 5.5-6, Sensitive Wildlife Habitats: We recommend adding nesting raptors to the table for the Atigun Pass area of the Brooks Range. The Draft EIS states that summer construction is proposed for several locations known to have nesting raptors, including the Atigun Pass area of the Brooks Range.	Info on construction spread has been added to Table 5.5-6.
L13	15	Department of the Interior Office of Environmental Policy and Compliance	5.5			Page 5.5-39, Table 5.5-8, Estimated Nesting Habitat Loss Impacts…: With the exception of endangered species and eagles, due to the general lack of information about nesting density of most species, it is difficult to accurately quantify the number of individual birds that may be displaced due to habitat loss or alternation. We recommend revising the table to include estimates of the area (either acres or linear stream miles) of habitat altered or lost.	This table has been deleted.
L13	16	Department of the Interior Office of Environmental Policy and Compliance	5.5			Page 5.8-13, Paragraph 2: The Draft EIS deals with maternal polar bear den sites in the project area; however, the reference given is over 30 years old. We recommend that the Final EIS include more up to date information. One possible source is: Durner, George M.; Fischbach, Anthony S.; Amstrup, Steven C.; Douglas, David C. 2010. Catalogue of Polar Bear (Ursus maritimus) Maternal Den Locations in the Beaufort Sea and Neighboring Regions, Alaska, 1910-2010 http://pubs.usgs.gov/ds/568/ accessed Feb 13, 2012.	More recent data (Durner et al. 2010) has been added to the polar bear figure map in Section 5.5 and cited as such.

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L14	1	USACE	5.23			Rather than just listing mitigation, the EIS must analyze mitigation in detail and explain the effectiveness of the measures in terms of the resulting impacts.	A mitigation chapter has been added to the FEIS as Section 5.23. The analysis and effectiveness of AGDC proposed mitigation measures have been completed in the mitigation chapter for each resource.
L14	2	USACE	General			The body of the EIS should be a succinct statement of all the information on environmental impacts and alternatives that the decision maker and the public need, in order to make the decision and to ascertain that every significant factor has been examined. The EIS must explain or summarize methodologies of research and modeling, and the results of research that may have been conducted to analyze impacts and alternatives." Accordingly please analyze the DEIS to determine areas that repeat information, consolidate information that is the same for different aspects of the analyses and leave out highly technical discussions (these should be in appendices) - reduce to clear understandable language for the general public and those not familiar with scientific terminology.	Revisions to document have been made to improve succinctness. Specific examples include the addition of a mitigation chapter where readers can assess measures proposed by AGDC that are compiled in one part of the document. Also, impact ranking tables have been added to Chapter 6 - Conclusions to allow the reader to easily see potential impacts with highest probability and magnitude.
L15	1	National Parks Conservation Association				NPCA strongly supports the route variation that follows the Parks Highway through Denali National Park for seven miles. The EIS confirms what we expected - that the route through the park has far less environmental impacts than the proposed route around the eastern boundary. The park route is shorter, crosses less streams, disturbs less forest, and impacts far less wetlands. Going around the park into the roadless Yanert Valley will be far more disruptive.	As noted in Section 4.4.2.3, federal laws currently would not allow construction of this route variation within Denali National Park (see further discussion of applicable National Park Service regulations in Section 1.2.6.3). Federal legislation that would allow the route variation has been introduced by the Alaska delegation, and is currently being considered by the U.S. Congress.
L15	2	National Parks Conservation Association				The proposed route has steeper slopes and will likely cause a scar visible from within the park.	Potential impacts visible from within Denali National Park are described in Section 5.11 and Appendix K of the DEIS. The analysis includes visual simulations from key observation points within Denali National Park.

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L15	3	National Parks Conservation Association				As you know, federal law does not currently allow construction of a pipeline through Denali but legislation has been introduced and it is currently progressing through Congress. NPCA supports this legislation, and the more environmentally friendly Denali National Park Route Variation.	Section 4.4.2.3 of the DEIS states: "Currently, federal laws would not allow construction of this route variation within Denali National Park (see further discussion of applicable National Park Service regulations in Section 1.2.6.3). Federal legislation that would allow the route variation has been introduced by the Alaska delegation, and is currently being considered by the U.S. Congress. If such legislation is passed into law, the NPS would have authority to issue a ROW permit for a pipeline route which would result in the fewest or least severe adverse impacts upon the Park."
L16	1	National Parks Service	4.0			EIS Page ES-6: This section states the APP is in the planning process and the first gas would be estimated for mid-2020, well behind the proposed ASAP timeline. Since the ASAP has now been pushed back to 2019, this statement no longer seems reasonable.	This comment is regarding the executive summary. Section 4.4.3 of the FEIS describes the current plan and schedule for the APP project. The current estimate estimates for APP first gas was mid-2020 prior to extension of the FERC permit application filing deadline by 2 years. (http://thealaskapipelineproject.com/project_timing 10/19/2011). Furthermore, the APP project is uncertain at present. Text in the executive summary and Section 4.4.3 of the FEIS has been revised for accuracy and clarity.
L16	2	National Parks Service	4.0			EIS Page ES-7: This section fails to explain why the Fairbanks Route Variation and the Curry rail Route Variation are dismissed from further analysis. This leaves the reader wondering when they are shown on the accompanying map.	In the Executive Summary under Pipeline Route Alternatives, Route Variations, the text has been revised to state: "Several route variations including the Fairbanks, Denali National Park and Preserve, Curry Rail, Alaska Intertie, and Port MacKenzie Rail Extension route variations are considered and analyzed in Section 4.4.2 of the FEIS. Only the Denali National Park and Preserve (NPP) Route Variation is considered a reasonable alternative that would present environmental advantages over the proposed Project route."

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L16	3	National Parks Service	ES			EIS Page ES-14: This discussion should include the yellow-billed loon, which nests on the North Slope of Alaska and the Kittlitz's murrelet, which nests in South-central Alaska and migrates around to the Arctic Ocean, according to recent studies reported at the Alaska marine Science Symposium 2012.	Information on the yellow billed loon was added to the FEIS executive summary. Kittlitz's murrelet is very rare and would not likely nest in the ROW areas of the proposed Project. Text was edited in Section 5.5.1.1 - Waterbirds and Upland Game Birds to state: Rare birds such as the Kittlitz's murrelet may be found in small numbers in the Cook Inlet, but would not likely be affected by proposed vessel traffic because they inhabit near shore areas away from shipping lanes and ports. The Port of Anchorage is not proposed for use to receive cargo for the construction of the proposed Project.
L16	4	National Parks Service	1.0			EIS Page ES-16/21: One of these sections should note the Land and Water Conservation Fund Act (LWCF), which protects lands funded in whole or in part with LWCF grants. Use of such lands is called a "conversion" and they must be replaced.	The text in the FEIS Executive Summary under Environmental Analysis, Land Use, has been revised to state: "Effects on lands acquired by use of grants provided through the Land and Water Conservation Act are described in Sections 5.9 and 5.10 of the FEIS." LWCF lands are discussed in Sections 5.9.1.1, 5.9.2.2, 5.10.1.1, 5.10.1.3, and 5.10.2.2.
L16	5	National Parks Service	General			EIS Page vi, vii, & xvii: The Denali Route Variation is missing in the following sections: water resources, terrestrial vegetation, and wetlands. It is also missing under Noise (pg xvii) but is included under navigation resources (pg xviii).	The Denali National Park Route Variation analysis is included in each of these sections of the FEIS under the heading - Denali National Park Route Variation. As a result of section and heading reorganization, the headings appear in the FEIS Table of Contents.
L16	6	National Parks Service	Appendix B			EIS Page 1-16: The document states that public comments can be seen in their entirety in Appendix E of the Scoping Report (Appendix B of the DEIS), but no public comments are included. We would like to see them for McKinley Village	Appendix B of the FEIS has been updated to include agency and public comments. Agency comments are in Appendix D of the Scoping Report. Public comments are in Appendix E of the Scoping Report. Reference to public comments in section 1.4.1.2 has been revised to state that the transcripts are included in Appendix F of the Scoping Report (Appendix B of the Final EIS).
L16	7	National Parks Service	1.0			EIS Page 1-23 Table 1.5-1: The Organic Act for the NPS states, "… for the purpose of conserving the scenery, natural and historic objects, and wild life …." Not *wildlife*.	This comment refers to Table 1.6-1. The requested revision has been made.

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L16	8	National Parks Service	4.0			EIS Page 4-8 Dry Gas Pipeline: The DEIS indicates AGDC stated the value of NGLs would be important to the economic performance of the proposed Project and that a dry gas pipeline would not provide the NGLs to the pipeline terminus. AGDC does not show the economic reasoning behind this statement. Could a dry gas pipeline be built and the capacity for NGLs added later when bids are received to purchase the NGLs, or has outside interest already been established?	A business case for the proposed project is not presented and evaluated in the FEIS.
L16	9	National Parks Service	4.0			EIS Page 4-15 FBX Route Variation: Figure 4.4-1 is too small to compare and contrast route roughness between the Fairbanks route and the Minto Flats route. A cross-section would be illustrative with elevation changes. The TAPS and proposed APP routes traverse the Fairbanks route which would indicate the feasibility of the Fairbanks route.	An additional figure depicting cross sections of the Fairbanks Route Variation and the Livengood to Dunbar segment of the ASAP mainline has been added as Figure 4.4-2 of the FEIS.
L16	10	National Parks Service	1.0			EIS Page 4-17 Denali NP Route Variation: The text refers to NPS regulations in section 1.2.6.3, but the correct section should be 1.2.4.2.	The requested revision has been made to section 4.4.2.3. Section 1.2.4.2 has been updated to section 1.2.5.2 in FEIS.
L16	11	National Parks Service	5.1			EIS Page 5.1.21 DRV: This paragraph about steep slopes and ravines is not applicable to this section, and was probably copied from language meant for the description of the Preferred as it is trenched up the hill below the Grand Denali Hotel.	Updated information on the Denali National Park Route Variation is located in section 5.1.2.2 under the sub-heading Denali National Park Route Variation. The comment was based on a paragraph that was deleted from the Denali National Park Route Variation section. The paragraph referring to steep slopes and ravines was deleted as suggested.
L16	12	National Parks Service	5.1			EIS Page 5.1-22 Denali Route Variation, 1st and 2nd paras: The discussion of asphalt removal is muddled and probably relates to work in the Canyon, which is not part of the Denali Route Variation. Remove this sentence from paragraph 1, "*However, in a few areas where the canyon walls encroach on the road, the pipeline would be installed beneath or near the road, possibly*	The text has been edited as suggested. The sentence regarding canyon walls encroaching on the road has been deleted.

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
						under the road shoulder." This is incorrect because there are no steep canyon walls along the route inside Denali NP as there are to the north of the Nenana River Bridge.	
L16	13	National Parks Service	5.2			EIS Page 5.1-22 Denali Route Variation Paragraph 3, Last sentence: Other sections of the EIS indicate the pipeline would traverse the Nenana River near McKinley Village with a directional underground boring; not hung from the bridge there. Which option is being put forward?? Hanging the pipeline from a new pedestrian bridge in the area would be beneficial for recreational use and access.	Section 5.2.2.2, sub-heading Denali National Park Route Variation, provides information on the two Nenana River crossings in the Denali National Park Route Variation. The crossing at the northern end near the Canyon commercial area will be accomplished by aerially stringing the pipeline on the pedestrian bridge. The southern crossing near McKinley Village will be via HDD. Section 5.1.2.2, sub-heading Denali National Park Route Variation, has been updated to reflect the information in section 5.2.2.2 regarding the two Nenana River crossings.
L16	14	National Parks Service	5.1			EIS Page 5.1.21-22 DRV-all: Very little of the 4 paragraphs evaluating the soils and geology for the Denali Route Variation have anything to do with the Denali Route Variation. The text is inaccurate,	Revisions to the information on the Denali National Park Route Variation are located in section 5.1.2.2 under the Denali National Park Route Variation sub-section. Discussion of soils is limited, as it is not known whether the soils in this area are discontinuous permafrost, or non-permafrost. Geotechnical studies will be required to characterize local soils.
L16	15	National Parks Service	5.2			EIS 5.2-68 Denali National Park Route Variation: The park route variation starts at MP 539, not 534, and is about 10 miles south of Healy, not 5 miles. This explains the description of placing the pipeline under the road shoulder near canyon constrictions inside the park, which is wrong and needs to be corrected.	Section 5.2.2.2 - Project Segments , Denali National Park Route Variation states: The Denali National Park Route Variation would be located to the west of the mainline pipeline route starting at MP 539 (Figure 4.4-2), approximately 10 miles south of Healy, passing through Denali National Park and Preserve.
L16	16	National Parks Service	5.2			EIS Page 5.2-68 Denali Park Route Variation – Construction: Compare with section 5.1.2.2, which describes hanging the pipeline from two bridges, but here the HDD crossing is proposed for the southern (McKinley Village) crossing of Nenana River. Also, the northern crossing of the Nenana River is the "lower", not upper, part of the river as described in the text, because the	The text has been revised for accuracy. Section 5.2.2.2 - Project Segments, Denali National Park Route Variation, Construction states: It would utilize the existing pedestrian bridge at the lower crossing and HDD to bury the pipeline at the south end (upper crossing).

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						Nenana River flows south to north through the Alaska Range.	
L16	17	National Parks Service	5.2			EIS Page 5.2-68 Construction: The Yanert is a river, not a stream. It is a major tributary of the Nenana River and is mischaracterized as a stream like Montana, Carlo, and others.	The text has been revised for accuracy. Section 5.2.2.2 - Project Segments , Denali National Park Route Variation, Construction states: The Mainline Route from MP 540 to MP 555 proposes to cross six drainages (Montana, Yanert, Carlo and three other unnamed drainages) via open-cut methods (AGDC 2011d) (Table 5.2-24). Construction in these streams would result in potentially short term and long-term impacts as noted above under open-cut methods.
L16	18	National Parks Service	5.3			EIS Page 5.3-7 Denali National Park Route Variation: Maps 4 and 5 show the park route variation, but an inset is needed at a closer scale as the details are lost in the broad scale maps provided, and the Denali National Park Route Variation is not depicted, as it should be.	In the FEIS, Figure 5.3-1, Maps no. 4 and 5 now depict a larger-scale inset of the Denali National Park Variation. Providing even larger scale maps of the entire route is not practical in the document. An even larger scale map of the Denali National Park Route Variation can be found on Figure 4.4-3, albeit not overlain on a vegetation base. More detailed mapping can be found on AGDC's website with the following link: http://www.agdc.us/overview/map/.
L16	19	National Parks Service	5.3			EIS Page 5.3-14 Non-Native and Invasive Plants: The NPS had documented and monitored invasive plants in the entrance area of the park for years and is aggressively treating these infestations. See NPS Alaska Region Invasive Plant Management Plan – Environmental Assessment, August 2009.	The text has been revised to add text from the cited document. Section 5.3.1.3, Non-Native and Invasive Plants states: The Denali National Park has been surveying and treating infestations of invasive plants in the park entrance area since the 1990's (NPS 2009).
L16	20	National Parks Service	5.3			EIS Page 5.3-20 Table 5.3-3: The total for acres affected from construction in the Denali National Park Route variation are off by a factor of 10 or more.	Table 5.3-3 total acres has been revised for accuracy in the row "Total".
L16	21	National Parks Service	5.3			EIS Page 5.3-22 Non-native invasive plants: The elements of a non-native invasive plant (NIP) should be articulated or referred to in an appendix.	Definitions of non-native and invasive plants have been added to section 5.3.1.3 - Non-native and Invasive plants.

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L16	22	National Parks Service	5.4			EIS Page 5.4-25 Denali National Park Route Variation: The 4th and 5th paragraphs in this section appear to be misplaced and should not be a part of the Denali Park route variation. They appear to belong in the following section on gas conditioning facilities.	The text has been revised for accuracy.
L16	23	National Parks Service	5.4			EIS Page 5.5-43 Denali National Park Route Variation – Operations: The first two sentences in the last paragraph on this page indicate non-native plants are more likely encountered and spread along this section of construction than along the corresponding section outside the Parks Highway corridor. We think the opposite is possible because invasive plants occur all along the Parks Highway and introduction of new infestations from equipment operations are more likely into new pristine areas outside of the highway corridor.	The text has been revised for accuracy.
L16	24	National Parks Service	5.5			EIS Page 5.5-45 Mitigation, last bullet: Dr. Carol McIntyre-Hander of NPS has raptor nesting data for Denali National Park (907-455-0671).	A conversation occurred between Melissa Cunningham (Wild North Resources, LLC) and Carol McIntyre-Hander (Denali NPS) on May 31, 2012 whereby Carol stated that the Denali National Park has nesting raptor data and would share this data with AGDC if needed in the future. This information will be gathered during the USACE 404 permitting process.
L16	25	National Parks Service	Appendix M	Appendix M		EIS Page 5.9-5 Section 6(f) of LWCF: How would the ASAP mitigate impacts to Denali State park?	The applicant would meet all conditions of the State lease, which has already been issued. The lease is presented as Appendix M of the FEIS. AGDC would address mitigation impacts to the Denali National Park Route Variation as necessary in the permitting process.
L16	26	National Parks Service	5.9			EIS Page 5.9-21 Denali National Park Route Variation: AGDC has not proposed a route through the park, but it would be more appropriate to state AGDC would not need access roads in the park because access would be provided from the Parks Highway.	The text has been revised for accuracy.

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L16	27	National Parks Service	5.10			EIS Page 5.10-6 Recreational Facilities and Activities: Dog Mushing and snowmachining should be added to the recreational activities along this pipeline route. Both are popular.	The text has been revised to include discussion of dog mushing and snowmachining in Section 5.10.
L16	28	National Parks Service	5.10			EIS Page 5.10 Recreation: This section omits any evaluation of impacts to Recreation in or near Denali National park from construction and maintenance of the Denali Route Variation and how those impacts could be mitigated with timing of construction or other options. This is a high use recreational area, especially in the summer.	Section 5.10.2.3 has been added to the FEIS to address impacts to recreation that would be related to the Denali National Park Route Variation. As indicated in Section 5.10.2.3 and Section 4.4.2.3, construction would occur during the winter months. The following statement has been added to Section 5.10.2.3: "Furthermore, the Denali National Park route variation would be constructed in an area of the Denali NPP in which a low level of recreational use currently occurs (NPS 2012)."
L16	29	National Parks Service	5.11			EIS Page 5.11-9 Denali National Park Route Variation: Figure 5.11-2 does not show the ARR crossings as indicated in the text, but these crossing sites would be useful to show.	Section 5.11.1.1, Denali National Park Route Variation, has been revised to accurately indicate the content of Figure 5.11.2.
L16	30	National Parks Service	5.11			EIS Page 5.11-19 and 20 Figures 5.11-9 and 5.11-10: These figures appear identical. Is this an error? There doesn't appear to be a reference to Figure 5.11-9 in the text.	Figures 5.11-6 through 5.11-10 have been properly labeled and cited in Section 5.11 of the FEIS, and duplicative figures have been corrected.
L16	31	National Parks Service	5.11			EIS Page 5.11-31 Denali National Park Route Variation: There should be a view simulation from the Healy Overlook of this route variation.	While visual simulations are provided for all KOPs in Appendix K, Section 5.11 only provides visual simulations for those KOPs where the visual contrast rating would be moderate-to-weak or stronger. Visual simulations of the Denali National Park Route Variation from the Mt. Healy Overlook Trail are shown on pages 22 through 24 of the FEIS updated May 30, 2012 Visual Impact Analysis in Appendix K.

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L16	32	National Parks Service	5.11			EIS Page 5.11-32 & 34 Figures 5.11-14 & 15: Would the pipeline construction zones depicted in these two simulated views be within the ADOT ROW?	FEIS Figures 5.11-15 and 5.11-16 have been corrected to show the Denali National Park Route Variation immediately adjacent to the Parks Highway; the corresponding figures in the updated May 30, 2012 Visual Impact Analysis in Appendix K (Figures 35 and 36) have also been corrected. Pipeline construction zones depicted in these two simulated views are within the ADOT ROW as depicted.
L16	33	National Parks Service	Appendix B			EIS Page E-7 3.3 Public Comments: The text refers the reader to the complete public comments in their entirely in Appendix E, but Appendix E is a table of stream crossings. The public scoping comments are not available, but we would like to see all of the comments relative to Denali National Park form the McKinley Village scoping meeting.	The Scoping Report (Appendix B of the EIS) now includes the agency and public comments. Agency comments are in Appendix D of the Scoping Report. Public Comments are in Appendix E of the Scoping Report.
L16	34	National Parks Service	ES			EIS PAGE E-7 3.3 Public Comments, Bullet 3: The comments regarding the East Curry Ridge route alternative should also note this route would fit the legislative direction to locate on highway or RR rights of way and it would avoid LWCF 6(f) lands in Denali State Park.	FEIS Section 4.4.2.4, Curry Rail Route Variation, has been revised to state: "The Curry Rail Route Variation would comply with the directive of AS 38.34 to use state land and existing state highway and railroad ROW to the maximum extent feasible, and would also avoid lands acquired by use of grants provided through the Land and Water Conservation Act {LWCF 6(f) lands} in Denali Sate Park."
L16	35	National Parks Service	Appendix K			The September 30, 2011 report is incomplete. Use in the final EIS the more complete December 6, 2011, report.	Appendix K of the FEIS has been replaced with a revised May 30, 2012 version of the report. Section 5.11 of the FEIS has been updated to be consistent with the May 30, 2012 report.
L16	36	National Parks Service	5.11			EIS Page K-30 Figure 37: This figure erroneously shows the Denali NPP Route Variation as separate and parallel to the Parks Highway for its length in the park, but the text describes most of it as being installed immediately adjacent to the Parks Highway with a much reduced impact width compared to the proposed route outside of the park. This figure needs to be corrected in the final.	FEIS Figures 5.11-14 through 5.11-16 have been corrected to show the Denali National Park Route Variation immediately adjacent to the Parks Highway and indicate the view is at the Parks Highway MP234 KOP (ASAP MP 544); the corresponding figures in the updated May 30, 2012 Visual Impact Analysis in Appendix K (Figures 35 and 36) have also been corrected to depict impacts immediately adjacent to the highway.

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L16	37	National Parks Service	5.11			EIS Page K-32 Top Line: The text indicates primary visual impacts would be between MP 223 and 238, but these are the mileposts for the Parks Highway, not the proposed project or its Denali route variation. To be consistent with other parts of the EIS, the location should be as described elsewhere for the MP distances from the North Slope. The highway MP locations could be provided in parentheses.	The Parks Highway Mileposts 223 and 238 correspond with the pipeline Mileposts 555 and 540, respectively. The ADOT mileposts run south to north increasing in number while the pipeline mileposts run north to south. While Appendix K is a report produced by Design Alaska at the direction of AGDC and this report cannot be altered by the EIS team, Section 5.11.2.3 of the FEIS does refer to the pipeline milepost numbers: "The Denali National Park Route Variation represents an alternate route alignment between MP 540.0 and MP 555.0." In addition, the Parks highway MPs have been added to the text.
L17	1	US DOT PHMSA	5.19			DEIS Section 5.19 The gas stream will be a high BTU stream which contains highly volatile liquids at high operating pressure, 2500 psi. At lower pressures the highly volatile liquids would not be entrained in the gas stream, but would become a liquid. The EIS should describe how AGDC plans to address hazardous liquid safety and environmental issues due to the impact radius of a failure of the pipeline system, taking into account the proposed composition of the products being transported along with their toxicity, physical properties, etc.	Measures to address the potential impact radius from a release will be determined during detailed design, in accordance with 49 CFR 192, Subpart O, Gas Transmission Pipeline Integrity Management. Appropriate mitigation measures will be developed in compliance with those DOT regulations and with Stipulation 3.4, Proximity to TAPS and Other Existing Infrastructure, of the State Right-of-Way Lease for the Alaska Stand Alone Gas Pipeline/ASAP, ADL 418997, contained in Appendix M of the DEIS. Generally, any entrained liquids will vaporize at atmospheric pressure. AGDC will work with PHMSA during the design to alleviate any concerns. To assure protection of public safety and the environment in the event of a release from the pipeline, AGDC will develop a contingency plan to address such issues in accordance with Stipulation 2.11, Contingency Plans, of the State Right-of-Way Lease, as well as with all other applicable state and federal regulations. Section 5.19.4 of the FEIS, “NGL Spill Scenario,” addresses issues related to a potential spill scenario associated with the unlikely rupture of the gas pipeline. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
							environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.

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L17	2	US DOT PHMSA	5.19			DEIS Section 5.19 If built, this would be the first major large-diameter natural gas pipeline in the USA with a maximum allowable operating pressure of 2500 psi. The EIS should disclose this and describe the environmental and social consequences of the various modes of failure.	Language regarding 2500 psi MAOP has been inserted in section 5.19. Significant incidents of pipeline leaks or failures, as reported by PHMSA, are discussed in Section 5.19.2 of the DEIS.
L17	3	US DOT PHMSA	5.9			DEIS Section 5.19 Discuss the impact and consequences of a pipeline rupture on existing adjacent infrastructure that is within the potential impact radius (PIR). What effect will the construction and operations, including a rupture, have on TAPS, military bases, and other infrastructure? What are proposed mitigation measures?	Impacts to infrastructure during construction and operations are described in Chapter 5.9. Mitigation measures associated with construction and operations are provided in Section 5.23 and discussed in Section 5.9. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including

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							specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.
L17	4	US DOT PHMSA	Appendix N			DEIS Section 5.19 PHMSA is concerned that the strains on the pipeline will exceed 0.5% once geotechnical, seismic, permafrost, and thaw settlement impacts over the life cycle of the pipeline are taken into account. What procedures and mitigation measures will be used in addition to strain based design to address frost heave, thaw settlement, and other geotechnical issues associated with the arctic or sub-arctic?	Appendix N of the DEIS contains a report prepared for AGDC entitled Design Methodology to Address Frost Heave Potential, this document identifies the design methodology utilized to ensure pipeline mechanical structural integrity in areas where the ASAP is routed through frost susceptible soils. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may

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							act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.
L17	5	US DOT PHMSA	Appendix N			DEIS Section 5.19 What will be the effect of permafrost and seismic zones/faults on the use of strain based design allowing strains over 0.5%? Provide design, safety factors and mitigation measures and timing of these measures, including material, design, construction, and operational procedures and specifications.	Appendix N of the DEIS contains a report prepared for AGDC entitled Design Methodology to Address Frost Heave Potential, this document identifies the design methodology utilized to ensure pipeline mechanical structural integrity in areas where the ASAP is routed through frost susceptible soils. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be

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							at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.
L17	6	US DOT PHMSA	5.19			DEIS Section 5.19 What are the differential (delta) impacts on public safety and the environment from pipe strains exceeding 0.5%?	The differential is not known at this time. AGDC will conduct small- and full-scale testing of pipe material to determine what, if any, differential impacts there are if the pipe strain exceeds 0.5%. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and

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							environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.

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L17	7	US DOT PHMSA	2.0			DEIS Section 2.2 Provide in the EIS minimum pipe design factors and pipe material for various class locations, rivers, compressor stations, road and railroad crossings, TAPS crossings, elevated or bridged sections of pipeline, major geologic fault locations, and bridge crossings. For these locations, provide the pipe wall thickness and grade, design factor, coating type, girth weld non-destructive testing, and pressure test factor. Will locations where strain based design is planned have any different hoop stress design factors? If so, how will they be determined?	As discussed in Section 2.2 of the DEIS, the pipe design for all locations will be in accordance with 49 CFR 192, Subpart C, Pipe Design, which addresses the locations cited in the question. Pipe Wall Thickness and Grade: AGDC plans to use API X70 for the mainline pipe and X65 for the Fairbanks Lateral. Table 4.1-1 of the POD (incorporated into Section 5.19 of the DEIS) shows pipe wall thicknesses by DOT location class. Design Factor: The pipe design for all locations will in accordance with stress design factors in 49 CFR 192.111, Design Factor (F) for Steel Pipe. Type: The entire pipeline will be externally coated with fusion bonded epoxy and internally coated with a two-part epoxy coating. The pipeline will be coated with an additional abrasion-resistant coating for HDD crossings and where the pipeline will be placed in rocky ground or stream crossings where concrete coating is not used for buoyancy control. Non-Destructive Testing of Girth Welds: A combination of non-destructive testing inspection methods will be used to determine weld quality for all pipe girth welds. Pressure Test Factor: The pipeline will be hydrostatically tested to ensure the pipeline has the strength necessary to meet design conditions and verify that the pipeline is leak-free. The pressure test factor will be based on the requirements in 49 CFR 192 Subpart J, Test Requirements, §192.505, Strength Test Requirements for Steel Pipeline to Operate at a Hoop Stress of 30 Percent or More of SMYS and at or Above 100 p.s.i. (689 kPa) Gage. Strain-Based Design: The same hoop stress design factors will used for the entire pipeline. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried

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							and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.

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L17	8	US DOT PHMSA	2.0			DEIS Section 2.3 How will the mainline valves and blow-offs be designed to ensure that entrained liquids do not escape during venting operations, which could create an environmental and safety impact?	Generally, any entrained liquids will vaporize at atmospheric pressure. Blow-down vents will be located adjacent to valves and in compressor stations and AGDC will develop procedures for controlled releases so that they do not increase operational risk or impacts to the environment, including addressing the potential of liquid spills. AGDC will work with PHMSA during the design to alleviate any concerns. Vent design and procedures for controlled releases will be in accordance with 49 CFR 192.167, Compressor Stations: Emergency Shutdown, and with 49 CFR 192.179, Transmission Line Valves. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of

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							materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.
L17	9	US DOT PHMSA	2.0			DEIS Section 2.3 Will blow-offs be located away from roads, highways, and power lines? Explain how the blow-off distances from these structures will be calculated to ensure that venting operations do not cause a public hazard.	Text clarified. Locations will be in accordance with 49 CFR 192.179, Transmission Line Valves, subparagraph (3): "Each section of a transmission line, other than offshore segments, between main line valves must have a blowdown valve with enough capacity to allow the transmission line to be blown down as rapidly as practicable. Each blowdown discharge must be located so the gas can be blown to the atmosphere without hazard and, if the transmission line is adjacent to an overhead electric line, so that the gas is directed away from the electrical conductors." The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous

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							permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.
L17	10	US DOT PHMSA	2.0			DEIS Section2.2 How will cathodic protection systems be used during construction to ensure pipelines do not go over 1 year with no cathodic protection during the construction phase?	AGDC is aware of the need for cathodic protection of the pipeline during construction to ensure that no section of pipe is without cathodic protection for more than 1 year. Cathodic protection will be addressed in detailed design and will be in compliance with 49 CFR 192 Subpart I, Requirements of Corrosion Control, and with Stipulation 3.6, Corrosion, of the State Right-of-Way Lease for the Alaska Stand Alone Gas Pipeline/ASAP, ADL 418997, contained in Appendix M of the DEIS.

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							The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and

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							environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.
L17	11	US DOT PHMSA	2.0			DEIS Section 2.2 How will girth welds and the pipeline be coated to ensure that they are protected against corrosion and do not shield cathodic protection?	Coating will meet the requirements of 49 CFR 192, Subpart I, Requirements for Corrosion Control, §192.461, External Corrosion Control: Protective Coating. This subsection specifies that the pipe coating must be compatible with any cathodic protection. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for

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							safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.
L17	12	US DOT PHMSA	2.0			DEIS Section 2.2 How will the pipe be manufactured, tested, and inspected to ensure that pipe joints are not low strength?	At a minimum, all pipe will be manufactured, tested, and inspected in accordance with 49 CFR 192.7, and with API Specification 5L, Specification for Line Pipe. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle)

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							conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.
L17	13	US DOT PHMSA	2.0			DEIS Section 2.2 How will the blasting plan limit blast charges and impact on surrounding infrastructure?	Text was clarified in Section 2.2 to describe the issues the Blasting Plan will address, including effects on existing infrastructure The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop

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							pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.
L17	14	US DOT PHMSA	5.19			DEIS Section 5.19 Will the pipeline be operated above 32 degrees Fahrenheit in permafrost and discontinuous permafrost? If so, how will the pipeline negative buoyancy be maintained to ensure the pipe will not move to the surface and cause additional stresses on the pipeline?	For a preliminary discussion of qualification of mills and pipe joints, see Appendix N of the DEIS which contains the report: Alaska Stand Alone Gas Pipeline/ASAP Design Methodology to Address Frost Heave Potential (prepared for AGDC by Michael Baker Jr., Inc., 6/9/2011). The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe

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L17	15	US DOT PHMSA	5.19			DEIS Section 5.19 What will be the cleaning pig run frequency to ensure that internal corrosion is minimized and that the requirements of 49 CFR §§ 192.475, 192.476, and 192.477 are satisfied?	AGDC will meet all applicable DOT integrity management (49 CFR 192 Subpart O) and corrosion control requirements (49 CFR 192 Subpart I). Cleaning and maintenance schedules will be developed as part of the pipeline operating plan prior to commissioning and start-up. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the

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							U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.
L17	16	US DOT PHMSA	5.19			DEIS Section 2.0 or 5.19 Provide information on Quality Management Systems or Quality Assurance programs for all phases of manufacturing, quality assurance testing, transportation, construction, and start-up phases of the pipelines.	AGDC will address Quality Management Systems or Quality Assurance in detailed design in accordance with Stipulation 1.4.4, Quality Assurance Plan, of the State Right-of-Way Lease for the Alaska Stand Alone Gas Pipeline/ASAP, ADL 418997, contained in Appendix M of the DEIS. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle)

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							conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.
L17	17	US DOT PHMSA	5.19			DEIS Section 2.0 or 5.19 The EIS should include a map or table with the locations of high consequence areas (HCAs).	While AGDC has preliminarily identified the locations of HCA's, location data suitable for use in creating a GIS database and location map(s) has not been developed. Detailed location data for HCA's will be gathered during final design and construction planning and will be incorporated into AGDC's final permit applications. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be

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							detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.
L17	18	US DOT PHMSA	2.0			DEIS Section 2.0 or 5.1 Please provide specifics of the design of the gas treatment plant as well as the jurisdiction and government agencies that will regulate the construction, operation, and maintenance of the plant.	Specific information regarding the GCF design is not available at this time. Regulatory agencies with jurisdiction over the proposed action, including the construction, operation and maintenance of the GCF are listed in detail in Table 1.5-1 of the DEIS. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to

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							operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.

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L17	19	US DOT PHMSA	Appendix N			DEIS Section 5.19 Please provide more detail regarding the process and procedures that ASAP will use to determine the design and operational parameters for crossing geological hazards.	Appendix N of the DEIS contains a report prepared for AGDC entitled Design Methodology to Address Frost Heave Potential. This document identifies the design methodology utilized to ensure pipeline mechanical structural integrity in areas where the ASAP is routed through frost susceptible soils. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation

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							of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.
L17	20	US DOT PHMSA	2.0			DEIS Section 5.19 PHMSA is concerned about any pipe coatings that may shield the pipe from cathodic protection during its life cycle. If ASAP plans to use a multi-layer coating that may shield cathodic protection during the pipeline's life cycle, what test procedures will be used to determine that the coating will not shield cathodic protection currents, including when disbonded? For the environmental analysis in each resource report, what would be the impact on public safety and the environment of using the multi-layer coating?	As discussed in Section 2.2 of the DEIS, the entire pipeline will be externally coated with fusion bonded epoxy. The pipeline will also be coated with an additional abrasion-resistant coating for HDD crossings and where the pipeline will be placed in rocky ground or stream crossings where concrete coating is not used for buoyancy control. Coating will meet the requirements of 49 CFR 192, Subpart I, Requirements for Corrosion Control, §192.461, External Corrosion Control: Protective Coating. This subsection specifies that the pipe coating must be compatible with any cathodic protection. AGDC does not anticipate any increased impact on public safety. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable, and environmentally sound operations of our nation's pipeline transportation system. The Alaska Stand Alone Pipeline (ASAP) will be buried and is expected to operate with a maximum pressure of 2500 psi. These are operating and terrain situations that are more severe than those of other gas transmission pipelines in the USA. The operating temperature of the pipeline will be at or below the ground temperature. The pipeline will be buried through areas of permafrost, discontinuous permafrost, under waterways, and through other terrain areas subject to ground movement that can be detrimental to safe pipeline operations. These operating and terrain situations pose a unique hazard to the safe operation of the pipeline due to the high operating hoop

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							pressure in the pipeline from the natural gas, lateral forces, and other outside environmental forces that may act to either pull the pipe apart or compress (buckle) the pipe. PHMSA has requested that ASAP provide design, material, construction and operating (life-cycle) conditions, so that this information can be provided to the public and technically reviewed by PHMSA and other governmental agencies prior to the start of materials manufacturing and construction of the pipeline. ASAP must have conditions (including specifications and procedures) in place to provide for safe operation in those terrain areas that will experience lateral forces and combined hoop pressures and forces on the pipeline. ASAP must provide conditions to the U.S. Army Corps of Engineers (ACOE) and PHMSA that provide for the safe operation of ASAP for the life-cycle of the pipeline that meet PHMSA's "strain based design technical conditions" and the ACOE stipulations in the "record of decision" for ensuring the safe, reliable, and environmentally sound pipeline operations prior to the start of project materials manufacturing and construction.
L17	21	US DOT PHMSA	2.0			DEIS Section 2.0 or 5.19 How will above ground and below ground facilities be abandoned when the ASAP pipeline reaches the end of its life-cycle? What regulations will apply to abandonment?	Section 2.4 addresses decommissioning and abandonment of the pipeline. USDOT PHMSA regulations and the terms of the State of Alaska ROW will control the final decommissioning and abandonment plans.
L18	1	Amanda Austin				While I'm not opposed to natural gas as an energy source in general, I do question the necessity of this project at this time.	As provided in Section 1.2.1 Purpose and Need, the primary purpose of the proposed Project is to provide a long-term stable supply of 500 MMscfd to markets in the Fairbanks and Cook Inlet areas by 2019. However, as highlighted in Section 3.2 Connected Actions, a reasonable foreseeable action includes the exportation of NGLs to international markets and to provide propane to Alaska villages.

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L18	2	Amanda Austin				Why isn't a route along the Trans Alaska Pipeline Corridor being considered?	The proposed ASAP route is parallel to the Trans Alaska Pipeline Corridor from Mile 0 at Prudhoe Bay to Mile 405 near Livengood. The Richardson Highway Route would contain an additional segment co-located with the Trans Alaska Pipeline Corridor from near Livengood to Delta Junction. The Richardson Highway Route is discussed in Section 4.4.1.1.
L18	3	Amanda Austin				Tourism in the Denali area generates significant revenue for the Denali Borough and any pipeline along the Parks Highway in the vicinity of Denali NPP could negatively affect this revenue.	Construction of the Proposed action within the vicinity of Denali NPP would have moderate visual contrast at the Government Hill KOP and moderate to strong visual contrast at the Parks Highway south of Entrance KOP. Moderate to high visual impacts are also anticipated in this section during the operations phase for the Proposed action. As discussed in Section 5.11.2.3, moderate to high visual impacts are expected during construction of the Denali Route Variation and these short-term impacts are not expected to change the visual character of the park. The operation of the Denali Route Variation is anticipated to have low visual impacts, which are not expected to change the visual character of the park. Both routes are anticipated to be constructed during the winter months, when tourism in the Denali NPP is relatively low, to minimize construction phase impacts. The Denali Route Variation is anticipated to have low visual impacts and would not alter the visual character of the park during the operations phase, while construction is anticipated to occur during the winter month. Therefore, it is anticipated that the Denali Route Variation would have low to no economic implications upon Denali Park visitation. It is unclear as to how Denali NPP visitation would be affected by moderate to high visual impacts, as anticipated under the Proposed action, however it can be assumed that visitation impacts would be greater than under the Denali Route Variation.
L18	4	Amanda Austin				I was sorely disappointed to see that the public meeting for my area was held midday on a	Comment acknowledged.

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						Thursday in Cantwell. Many people were not able to attend the meeting, and I wonder if that was the intent. A true effort to involve everyone in the public process would have been to hold an evening meeting in Healy as well.	
L19	1	Steve Charles				I strongly oppose the preferred route through the Willow Creek State Recreation Area and the West Gateway Trail System.	Comment acknowledged.
L19	2	Steve Charles				It seems to me that your research was missing the important information on the recreational value of the area to the west of Willow. This area is vital to the recreational, economic and health of our community.	FEIS Section 5.10 addresses developed recreation facilities, dispersed recreation uses, and recreation management on lands in proximity to the pipeline; this discussion includes facilities in the Willow area. Additional information on dispersed recreation and trail use in the Matanuska−Susitna Borough is presented in Section 5.10.3.2 (Construction).
L19	3	Steve Charles				A 100' construction swath (through the Willow Creek State Recreation Area and West Gateway Trail System) will add trails not planned or designed … and will drastically affect trail user experiences.	These types of impacts related to trails are addressed in FEIS Section 5.10.2.2.
L19	4	Steve Charles				A 100' construction swath (through the Willow Creek State Recreation Area and West Gateway Trail System) will allow for inappropriate motorized use in sensitive wetlands and waterbodies.	As stated in FEIS Section 5.10, AGDC will prevent recreational access from ROW construction into sensitive areas as much as possible.
L19	5	Steve Charles				These winter trails are managed by the local communities and funded through Alaska State Parks. They are considered 4(f) resources (U.S. Transportation Act of 1966) in the Port MacKenzie Rail EIS. Please take a look at that document.	The proposed pipeline is not subject to USDOT Section 4(f) regulations as it is not a transportation project under the jurisdiction of USDOT.

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L19	6	Steve Charles				The DEIS talked about co-locating the pipeline corridor with other infrastructure. It happens that there are two locations that would be excellent locations for the pipeline corridor, a Parks Hwy/Port MacKenzie Rail Corridor and the Alaska Intertie from the Douglas Substation in Willow south. The Parks/Port MacKenzie variation was considered but dismissed wrongly in my opinion. Although a bit longer, this route will have less impact on the economic health of Willow and will protect the biggest reason people live in Willow, recreation (Willow Health Organization survey, 2009).	Comment acknowledged. Impacts to recreation are discussed in Section 5.10. Co-location with the Alaska Intertie from the Douglas Substation in Willow south would result in approximately 12 miles of additional pipeline and was therefore not considered a reasonable alternative.
L20	1	Nan Eagleson				I would like to support routing the proposed pipeline along the route of the oil pipeline and to avoid Minto Flats and areas in the Denali Borough, particularly staying away from the east side of the Nenana River and the Yanert River.	The Fairbanks Route Variation was examined as an alternative that would be collocated with existing road corridors. The analyses of the Fairbanks Route Variation is described in Section 4.4.2.1 of the FEIS.
L20	2	Nan Eagleson				If this project were to develop as proposed, I highly encourage the best effort used to avoid disturbing new, presently wild, areas and use corridors, roads or utility corridors already developed, for this project.	Approximately 82 percent of the proposed Project route would be co-located with or would closely parallel existing pipeline or highway ROW. Collocation is desirable as a means of concentrating development within established corridors and minimizing environmental impacts.
L21	1	Russell Crocket				Commenter states that rail transport is a more reasonable route for getting gas from Fairbanks to Anchorage or Whittier for export as rail lines are already in place.	Section 4.3.4 of the FEIS describes and analyzes a potential alternative consisting of a Pipeline from North Slope to Fairbanks, Transport by Rail Car to Southcentral Alaska. This alternative would not be a cost efficient or logistically practicable means of moving large volumes of LNG from Fairbanks to Southcentral Alaska for 30 or more years. Therefore, the pipeline from North Slope to Fairbanks, transport by rail car to Southcentral Alaska alternative would not be a reasonable alternative.
L21	2	Russell Crocket				Commenter is concerned that the port on the McKenzie side of the Cook Inlet is very shallow and "iffy" for boats.	AGDC and its contractors and vendors will complete a thorough review of any potential ports prior to work commencing.

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L22	1	Randy Mayo				The commenter would like to see long term positions available to residents of Stevens Village and is asking for possibility of AGDC to train residents for these positions.	AGDC proposes to identify and promote work opportunities for local residents by coordinating with local village corporations, tribal governments, city governments and other groups to identify qualified individuals that are interested in working on the project. AGDC also proposes to coordinate with Alaska training centers and universities on workforce development and training opportunities, which may include, but are not limited to future job fairs in the region.
L22	2	Randy Mayo				The commenter is concerned about public safety.	AGDC will design, construct and operate the pipeline in a manner to ensure the public safety. Further, AGDC would comply with all Federal and state pipeline safety regulations in the design, construction and operation of the pipeline, and in particular, those specified in 49 CFR 190 to 199.
L22	3	Randy Mayo				Stevens Village is just up the Yukon River from the project and the commenter is concerned about trespass on tribal lands.	As per Section 5.23.5, public access to the ROW for recreation or hunting will be limited by blocking entry areas with large boulders, berms, or fencing. The analysis and effectiveness of blocking public access to areas for hunting and recreation is referenced in 5.23.2.5, mitigation measure #10.
L23	1	Jack Reakoff				I have waited to make my comments in regard to the Alaska Stand Alone Pipeline Project until the community of Wiseman was afforded a briefing on the project, and provided answers to specific questions. There was a need for the agency staff to be better prepared to answer specific questions...I was surprised that the engineers and agency people were unprepared to talk about specifics regarding the location of compressor infrastructure and other facilities in the Wiseman area. This was a meeting for an affected community. At the end of the presentation the people were told they could go on line and look at the details. There are elders here that do not have Internet, or a way of accessing the whole DEIS.	A hard copy of the DEIS was provided in response to this comment.

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L23	2	Jack Reakoff				*Commenter had difficulty accessing the Maps document online.*	Comment acknowledged.
L23	3	Jack Reakoff				When Wiseman was included in a scoping call February 3, 2010 people here were clear about avoiding compressor insulations outside of the Coldfoot development node. The State of Alaska was conveyed 7,000 acres around Coldfoot in 1991. Development nodes were planned by the BLM to reduce strip development in the Utility Corridor in 1986.	According to AGDC, the compressor station locations are based on hydraulic flow analysis using the current design parameters for the project. Locations other than the three discussed in the Plan of Development (available on the project website: www.asapeis.com) and the EIS have not been considered at this time, but the hydraulic analysis will be refined as engineering progresses to pinpoint the location of the compressor station.
L23	4	Jack Reakoff				The scenic Byway plan of 2010 also encouraged developments to occur in development notes to reduce needless view shed impacts.	As suggested in this comment, development that occurs near other development tends to create less visual contrast, and less impact to viewsheds (all other factors being equal) than development in areas with existing no development. This is recognized throughout the visual analysis section as the route is generally assessed to have less visual impact, all other factors equal, when it is located in areas with existing development. The design of the route alternatives, with the majority of the route length located within existing ROW corridors, tends to reduce the level of impact due to this same consideration, as the existing ROW typically includes other linear features such as roadways and utility infrastructure.
L23	5	Jack Reakoff				On the DEIS call 3-2-2012, the engineers and BLM stated that the Compressor sites were not fully designed as to location. But in review of the documents it is very apparent that the concerns, and previous planning efforts were ignored regarding locating the compressor sites in the Coldfoot Development Node. The Node is located about 12 miles south of the Nugget Creek location, and extends to Coldfoot 19.5 miles down the valley.	According to AGDC, the compressor station locations are based on hydraulic flow analysis using the current design parameters for the project. Locations other than the three discussed in the Plan of Development (available on the project website: www.asapeis.com) and the EIS have not been considered at this time, but the hydraulic analysis will be refined as engineering progresses to pinpoint the location of the compressor station.

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L23	6	Jack Reakoff	5.10			The Nugget Creek location (for the compressor) would be in the travel route of local moose and also caribou. The way the river and the active Dalton Highway are configured the animals avoid human activities. The site with 8-12 personnel, and a load station would be disruptive to the game and hunters who watch those areas.	FEIS Section 5.10.2.2 has been edited to include potential hunting impacts in proximity to compressor stations. However, at this point, the level of staffing at the proposed compressor stations is unknown and these facilities may be unmanned.
L23	7	Jack Reakoff	5.10			The Nugget Creek compressor would be very disruptive to subsistence users to compete with the sound and the compressor crews' activities that would displace game movements at a natural funnel point.	The text in FEIS Section 5.10.2.2 - Proposed Action has been revised to read as follows: "Potential compressor station sites, particularly the one located near the Gates of the Arctic, could introduce additional noise, emissions, and activity in an area of the Project and disrupt subsistence users and resources."
L23	8	Jack Reakoff	General			ANILCA Title VIII section .810 requires an analysis of impacts to subsistence uses and the resources. If alternative lands are available to deflect impacts, those are to be seriously considered by the Federal agencies. The high human activity in the wide valley at Coldfoot would have a much lower impact on subsistence resources and the users. The impact to the adjacent native allotment would also be detrimental to the land and its value to the allottee.	Jack Reakoff was contacted on 9/4/2012 to clarify comment. He noted that this comment was part of a larger comment which addressed the siting of a compressor station north of Wiseman where the valley is narrow and there is very little human activity that occurs beyond hunting and recreation (see response to Letter 23, Comment 7). He stated that his main concerns are related to impacts to wildlife and usage of the nearby native allotment if the compressor station is sited there. His suggestion is to locate the compressor station in the vicinity of Coldfoot, where the valley is wide and there is already much human activity that occurs in that area. As noted in the response to Letter 23, Comment 7, text in section 5.10.3.2 has been revised to read as follows: "Potential compressor station sites, particularly the one located near the Gates of the Arctic, could introduce additional noise, emissions, and activity in an area of the Project and disrupt subsistence users and resources."
L23	9	Jack Reakoff				This is a State of Alaska project so facilities should be located to the highest degree on the State Lands.	Comment acknowledged.

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L23	10	Jack Reakoff				The Hydraulic flow of the compressed gas would continue to drop approximately 250 feet in elevation from Nugget Creek's location to Coldfoot itself. There would be little if any real drop in pressure in that short distance with the gravitational flow advantage. From Coldfoot the terrain raises to the south, it is a good location to begin a compression stage to boost the pressure over the hills. The TAPS has a Drag Reducing Agent site in Coldfoot for exactly that same reason.	AGDC will take the comment into consideration as project design progresses.
L23	11	Jack Reakoff				Commenter states that the Nugget Creek compressor should be located at Coldfoot because Coldfoot is centrally located with a 4500-foot airfield, truckstop and café, lodging with 68 rooms, DOT maintenance camp, electrical power to be purchased and a post office. The Compressor crews could easily be rotated out by air...The small Coldfoot community would be beneficial to the Compressor crews in the long dark winters. Those crews would be running down to Coldfoot if the site was at Nugget Creek to check mail and get out of their camp.	Comment acknowledged.
L23	12	Jack Reakoff				A compressor at Coldfoot would result in a noise reduction of the compressor station without the need to produce electricity...The ROW maps I have seen for the other gas line projects put it about .5 miles east of Coldfoot Camp, but behind a small ridge that would act as a sound shield. The Compressor would be out of hearing shot.	According to Table 5.17-2, the closest human noise receptor from the compressor station in Wiseman is about 7.5 miles. At this distance, noise and vibration levels from operations and maintenance of the compressor station facility would be insignificant. This conclusion is based on the following: Using a conservative assumption of approximately 85 to 95 dBA at 50 feet for noise levels from the industrial equipment at the aboveground facilities (that includes compressor stations), the estimated noise levels from operations at the nearest sensitive receptor would be approximately 55 dBA (LEQ) using a nominal existing ambient level of 55 dBA. This noise level is about the same as the noise emitted from a household microwave oven.

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							With respect to subsistence, as in any other industrial development, noise above ambient levels can displace or divert subsistence resources from traditional areas. As discussed in the Subsistence section, displacement of subsistence during construction and operations would have the greatest effect in the undeveloped Minto Flats vicinity and for subsistence users in communities that lie directly along the Project. Displacement of subsistence resources during operations along other parts of the Project (i.e., TAPS and Parks Highway) would be negligible because of already existing disruption. A maximum of a two compressor stations will be required for the proposed Project. Two of the potential compressor station locations are located along the existing TAPS corridor and potential subsistence impacts from these would be negligible. A third potential compressor station site would be located near the Minto Flats Game Refuge and could introduce additional noise, emissions, and activity in an area of the Project with little to no existing development. Noise impacts and mitigation measures would be assessed should this third compressor be deemed necessary.
L24	1	Denali Citizens Council				We have reviewed materials associated with construction of a small diameter pipeline along the Parks Highway along the entire distance between Fairbanks and Anchorage, we've concluded that the impacts and fiscal uncertainties of this project in our region are simply too great, and we would favor Alternative 4.3.3, which stipulates a larger diameter line along the TAPS corridor either to North America, or more likely to an LNG facility in southcentral Alaska, with spur lines to centers of need, such as Fairbanks and Anchorage. This larger diameter line is likely to be more fiscally sustainable and eliminates the complications associated with setting aside an entirely new Right of Way for much of the line, as would be	Comment acknowledged.

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						needed with the ASAP.	
L24	2	Denali Citizens Council				A larger TAPS line meets the needs described for the project, without the negatives associated with the proposed smaller diameter line, which include limited benefits and multiple negative impacts to local and regional landowners.	Section 4.4.3 describes the Spur Pipeline from a North Slope-to-Lower 48 or Valdez Pipeline alternative. A North Slope-to-Lower 48 or Valdez Pipeline is in the planning process and is not currently scheduled to be completed and transporting natural gas by 2019. Furthermore, implementation of the APP is uncertain. Therefore, the Spur Pipeline from a North Slope-to-Lower 48 or Valdez Pipeline would not meet the purpose and need of the proposed Project and would not be a reasonable alternative.
L24	3	Denali Citizens Council				We're doubtful that this pipeline can be constructed and maintained with sufficiently strong safety provisions to avoid damaging events. Given the exceptional nature of such a high pressure line, especially one that is traveling through residential and developed areas, additional discussion of safety concerns is needed.	AGDC will design, construct and operate the pipeline in a manner to ensure the public safety. Further, AGDC would comply with all Federal and state pipeline safety regulations in the design, construction and operation of the pipeline, and in particular, those specified in 49 CFR 190 to 199.
L24	4	Denali Citizens Council				Commenter is concerned of the safety given the planned high pressure of the pipeline.	AGDC will design, construct and operate the pipeline in a manner to ensure the public safety. Further, AGDC would comply with all Federal and state pipeline safety regulations in the design, construction and operation of the pipeline, and in particular, those specified in 49 CFR 190 to 199.
L24	5	Denali Citizens Council				Construction plans and mitigations related to seismicity, mass wasting and the unique conditions associated with permafrost (including thaw due to disturbance, frost heaves, etc.) are vaguely discussed and not clearly identified. Delaying development of these mitigations until a further date leaves it unclear at this time how these concerns would be addressed, and what this would look like on the ground.	In Section 5.23.2.1 - Soils and Geologic Resources, AGDC Proposed Mitigation Measures, #1 includes a list of design considerations and their effectiveness. Detailed design will address specific methods to be used to address the environmental factors that may affect the pipeline.
L24	6	Denali Citizens Council				There is little discussion of how different construction options will be selected in areas of high seismicity. Fault lines are prevalent in the	Active seismic areas will be crossed in a variety of locations of the project, detailed design will address the optimal construction methods for each of these areas.

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						Denali Borough along the proposed route and the DNPP route variation.	Seismic areas having a magnitude of greater than 5 have been identified through the project. This information will be gathered during the USACE 404 permitting process.
L24	7	Denali Citizens Council				A mainline valve (MLV) is identified at mile 538.3 of the mainline. This is adjacent to the developed entrance area outside DNPP, at a point where the Nenana River valley narrows into a rocky canyon, with a considerable amount of erosion and mass wasting. It is unclear where exactly this MLV would be located, as its location is listed as a mile point (in Table 5.11-2, oddly included with Visual Resources, but not in sections related to land use or other facilities), and is not identified in any maps we have found in the EIS. This MLV should be relocated because of safety concerns, both due to the narrowness of the Nenana Canyon in this area, traffic congestion as the road funnels into the canyon, and, of course, falling rocks. It should also be noted that this particular MLV is 27 miles away from the next MLV to the north, while the EIS states that MLVs are required by law to be placed (no more than) every 20 miles. Mitigation measures do not, and could not, address this concern.	FEIS Section 2.1.2 Aboveground Facilities, states: "MLVs would be located at intervals not greater than 20 miles. Approximately 37 MLVs will be necessary to accommodate this spacing requirement. However, the specific locations of MLVs will be determined during the pipeline design process." Table 5.11 of the FEIS has been revised to delete specific MLV locations and to be consistent with Section 2.1.2. This information will be gathered during the USACE 404 permitting process.
L24	8	Denali Citizens Council	General			Any aboveground facility, including MLVs, should not be allowed in residential areas, or in other areas of concentrated public use, or used only when absolutely necessary. In the case of an event that requires increased activity at these sites (such as a system blowdown), the impact to residential areas and other developed areas in the Denali Borough, would be considerable.	AGDC will design, construct and operate the pipeline in a manner to ensure the public safety. Further, AGDC would comply with all Federal and state pipeline safety regulations in the design, construction and operation of the pipeline, and in particular, those specified in 49 CFR 190 to 199. This information will be gathered during the USACE 404 permitting process.

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L24	9	Denali Citizens Council				The mitigations and location-specific descriptions are vaguely described, and an incredible amount of information is left to future permitting processes or plans, or not adequately described in this EIS. It is our opinion that, if the project were ever to be seriously considered, there are a number of EIS-level implementation plans still needed to cover succeeding phases of this project.	The mitigation section has been rewritten to include the analysis and effectiveness of AGDCs proposed mitigation measures. Specific plans have not been developed by AGDC at present, but contents of those plans have been included in the discussion as this proposed Project is still in the conceptual stage.
L24	10	Denali Citizens Council				It is stated that, *"Project-related effects to soils and geology would be mitigated with measures identified during the Project's final design phase such as the implementation of construction BMPs."* This does not provide adequate information to assess the cumulative impacts, or ensure that they are acceptable. This EIS should provide public opportunities for input on mitigation measures and best management practices. These standards should be clearly stated now, rather than during the "final design" phases.	Section 5.23 of the DEIS contains the mitigation measures proposed by AGDC and others. These measures include development and use of best management practices. Mitigation and BMPs will be included with plans AGDC will develop for construction and operation, as well as requirements of project permits.
L24	11	Denali Citizens Council	General			The project divides the Denali Borough into two vast regions, lumping the area between Fairbanks and Denali National Park, and south from DNPP to tidewater. Lumped together as it is, the impacts in and around the Denali Borough (and other regions for that matter) are difficult to ascertain.	Comment acknowledged. This information will be gathered during the USACE 404 permitting process.
L24	12	Denali Citizens Council	General			because all of the parts and pieces of the EIS are divided into separate documents (both online, and the digital copy provided locally at the public library), it is difficult to search through related actions and issues discussed in different sections of the EIS.	The FEIS will be made available as a searchable document on the project website (www.asapeis.com).
L24	13	Denali Citizens Council				Expansion to the intertie is mentioned as a connected action in the Executive Summary, but not explained in other sections of the EIS. This	The DEIS visual resources section identifies the section of the route alignment of the Proposed Action that crosses east from the Parks Highway and traverses a

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						action, combined with clearing of the pipeline right-of-way, would mean significant habitat fragmentation and impacts to visual resources, of particular concern considering the proximity to Denali National Park and Preserve. Thousands of people visit Denali National Park and Preserve each year to enjoy the beauty of this wilderness park. We ask that every effort be made to hide the visible impacts of the pipeline from viewpoints along the Denali Park Road and popular visitor destinations.	hillside to reach the Yanert Valley as the section that may result in moderate to high visual impacts even during operations and maintenance phases, as it is a hill cut in an area that would be visible from a travel route and recreation sites in DPP. However, as noted in the section, impacts are mitigated due to the presence of existing development in the area (including other linear features), the distance to the hill cut from many viewing locations, as well as revegetation following construction.
L24	14	Denali Citizens Council				The Executive Summary (page ES-20) states that *"As a result of the anticipated increase in use, airports that would be used to support construction of the ASAP Project may require upgrades to improve runways, lighting, communications, or navigational aids."* The Healy airstrip is identified. Could other local airports be considered for possible "improvement"? Further discussion of airport improvements does not appear in Section 3 as a connected action. Who would be responsible for these upgrades, and who would be expected to cover these costs?	AGDC has not definitively identified any public facilities that will for sure require upgrades. The mention of the Healy Airport was one example that may be relevant as the project progresses. Further decisions regarding airport improvements are generally under the jurisdiction of the State of Alaska Department of Transportation and Public Facilities. This information will be gathered during the USACE 404 permitting process.
L24	15	Denali Citizens Council				Commenter is concerned with resident's health issues being inadequately addressed in the DEIS.	The Health Effects Categories used in Section 5.15 were taken from the Alaska HIA Toolkit and based on a screening and scoping process that included public comment.
L24	16	Denali Citizens Council	General			Commenter is concerned with private property owner's rights being inadequately addressed in the DEIS.	Approximately 5% of the entire alignment is owned privately. The remaining 95% is in some form of public ownership. AGDC is currently working with the majority of public landowners. Negotiations with private landowners will not occur until the project funding is in place and the alignment is finalized. AGDC will negotiate in good faith with all impacted landowners and address their concerns and issues one at a time. This information will be gathered during the USACE 404 permitting process.

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L24	17	Denali Citizens Council				The EIS does not provide enough information to address the cumulative impacts that current and future surface and sub-surface withdrawals would have on the health of local residents.	This comment is in reference to water withdrawals. Details on proposed water requirements for each Spread are included in Table 5.2-22. Final locations of waterbodies proposed for water withdrawal along the entire route will be defined later in the process after additional analysis is complete. Also, Table 5.2.1 illustrates the fresh surface water withdrawals by borough - This information is updated by the USGS every 5 years and is the primary or only accessible water information available to indicate surface water use for the Denali borough. Final locations of all lakes used for water withdrawal will be determined at a later stage in this process; the volumes to be withdrawn will be permitted to protect water resources for fish, wildlife and human use. Several mitigation measures have been proposed and overall cumulative effects of water use in the area would be temporary (construction) or neutral due to agency and AGDC collaboration to prevent long term effects to surface and groundwater resources.
L24	18	Denali Citizens Council				It is unclear where the large quantities of water needed for this project would be withdrawn. Water requirements within the Denali Borough are unclear, as it the Borough is divided between two vast “spreads” (Table 5.2-22). The cumulative need for water identified in these two “spreads” totals over 400 million gallons of water. Without identifying the locations of surface water withdrawal, or even how much would be withdrawn from a more narrowly defined region (a specific watershed for example) there is not enough information to come to conclusions on the cumulative impacts to surface water, and the associated impacts with groundwater renewal and other natural processes, or the impacts to humans or habitat. It is presumptive to assume that there will be little impact to water resources without	All of the information that we currently have for the water withdrawal locations and quantities is included in Section 5.2 Table 5.2-22. Final determination of waterbodies for withdrawal will be defined later in the process. Sources will be permitted by ADFG and ADNR as needed to reduce adverse impacts to fish and their habitat. AGDC proposed mitigation measures for water withdrawal are provided in Section 5.23.2 Specific information on the waterbodies to be used for water withdrawal is not available at this time, but will be developed during more detailed engineering and in applications for water use permits. See Table 5.2-22 for more detail on water use by section and season. Response based on information from AGDC.

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						identifying more specifically where this water would come from.	
L24	19	Denali Citizens Council				Identified surface and subsurface water availability, quality, and current uses within the Denali Borough are severely lacking. For example, current surface water withdrawals in the Denali Borough associated with public supply, domestic self-supplied, industrial self-supplied, irrigation, livestock, aquaculture, and mining are "unknown." Only surface water use associated with thermoelectric power is "known."	Table 5.2-1. Includes the most recent USGS water use information published. Data is updated every 5 years; the 2010 data has not been released yet. This information will be gathered during the USACE 404 permitting process.
L24	20	Denali Citizens Council				Current and approved future developments in the Denali Borough that would withdraw large amounts of water from local water bodies are dismissed or not addressed in this EIS. This includes water use associated with power generation, underground coal gasification and coalbed methane/natural gas exploration.	A full quantitative and qualitative analysis of the impacts to wetlands will be completed following final design and will be incorporated into any permit applications or NEPA documents that are generated at that time. This information will be gathered during the USACE 404 permitting process.
L24	21	Denali Citizens Council	5.9			Impacts to property owners could be substantial, and are left unaddressed. The EIS states (page 5.9-13) that, *"Private lands in the Project area are used for residential, agricultural, and commercial purposes. As private land, land uses are subject to approvals of the landowner."* This does not take into consideration that private land use may be appropriated through the process of eminent domain. This does not give landowners "approval" of land uses, and should be explicitly addressed.	Approximately 5% of the entire alignment is owned privately. The remaining 95% is in some form of public ownership. AGDC is currently working with the majority of public landowners. Negotiations with private landowners will not occur until the project funding is in place and the alignment is finalized. AGDC will negotiate in good faith with all impacted landowners and address their concerns and issues one at a time. This information will be gathered during the USACE 404 permitting process.
L24	22	Denali Citizens Council	General			Development on some lands may be unacceptable, for a variety of reasons, and should not be approved based on mitigations alone.	Comment acknowledged. This information will be gathered during the USACE 404 permitting process.

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L24	23	Denali Citizens Council				The route bypassing Denali National Park into the Yanert Valley has multiple negative impacts. Cutting over to the east from the Nenana Canyon into the Montana Creek Valley will create erosion problems on the side of Sugarloaf Mountain, and will create a visible scar along the pathway of the pipeline, within the viewshed of virtually the entire entrance area of Denali National Park and Preserve.	The DEIS visual resources section identifies the section of the route alignment of the Proposed Action that crosses east from the Parks Highway and traverses a hillside to reach the Yanert Valley as a section that may result in moderate to high visual impacts even during operations and maintenance phases, as it is a hill cut in an area that would be visible from a travel route and recreation sites in DPP. However, as noted in the section, impacts are mitigated due to the presence of existing development in the area (including other linear features), the distance to the hill cut from many viewing locations, as well as revegetation following construction.
L24	24	Denali Citizens Council				The Yanert Valley, through which this pipeline would travel on the bypass route, is a major recreational area, and although the pipeline is currently designed to occupy the North – South intertie corridor in part of the Yanert Valley, additional clearing for pipeline infrastructure will no doubt be required, as well as fencing for areas that must be kept secure. Such activities could easily interfere with recreation and complicate the movements of wildlife in this area.	Section 5.10.2.3 was edited to reference recreation in the Yanert Valley. Project construction and operations effects in this area are addressed in the analysis, including restrictions on access. During operations, recreation-related impacts would be minimal as the pipeline would primarily be located underground. Potential impacts on game species and hunting were added to Section 5.10.2.3.
L24	25	Denali Citizens Council	General			Access to this part of the pipeline from the Parks Highway would be limited. Locals would oppose the building of access roads. Such isolation will complicate both spill and accident-response and render general maintenance more expensive.	Final access road locations and their status after construction would be determined during the permitting process. Ongoing maintenance, safety and upset considerations would be a key aspect of that permitting process as required by federal and state regulations.

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L24	26	Denali Citizens Council				If the ASAP is to be constructed, we prefer using the Parks Highway corridor route through the national park, to avoid the Yanert bypass. Legislation defining a process to obtain a right of way through the national park is pending in Congress, so the national park route, though carrying its own impacts, is possible.	Section 4.4.2.3 of the FEIS states: "Currently, federal laws would not allow construction of this route variation within Denali National Park (see further discussion of applicable National Park Service regulations in Section 1.2.6.3). Federal legislation that would allow the route variation has been introduced by the Alaska delegation, and is currently being considered by the U.S. Congress. If such legislation is passed into law, the NPS would have authority to issue a ROW permit for a pipeline route which would result in the fewest or least severe adverse impacts upon the Park."
L24	27	Denali Citizens Council				The narrow canyon of the Nenana River will make it very difficult to site a pipeline along the highway, so extreme caution will be necessary to ensure safety and maintain a reasonable flow of traffic. The one mile stretch through “Glitter Gulch” that is lined with hotels, restaurants, and wayward pedestrians will create challenges for builders and safety problems during the busy summer season.	If the Denali National Park Route Variation was to be constructed, it would be during the winter when there is very little commercial and recreational activity in the Denali Park commercial area. The previous sentence has been added to Section 4.4.2.3 of the FEIS.
L24	28	Denali Citizens Council				The locations of aboveground facilities and other temporary and permanent land use should be identified in a way that is understandable and clear, so that the public has a legitimate opportunity to fully realize the cumulative effects, and have the opportunity to point out these localized effects to Alaska Gasline Development Corporation (AGDC). Identifying the locations of aboveground facilities and other land use in an assortment of tables and maps, scattered throughout the EIS with minimal descriptions, is inadequate.	The locations of aboveground facilities are listed and discussed in multiple locations in order to ensure all potential impacts from those facilities are captured in the EIS. Figures 2.1-1 through 2.1-5 depict the locations of the aboveground facilities, to the extent that is currently known. Table 2.1-2 Aboveground Facilities for the Proposed Projects provides details on aboveground facilities, while Table 2.1-3 Locations and Land Requirements for the Proposed Project provides detailed information of temporary and permanent land use. Section 6.0, Cumulative Effects, again looks at potential cumulative impacts to all resources. Final locations for all facilities will be determined during final design, prior to construction and are not available at this time. The location information provided in the DEIS is the most accurate information available at this time. This information will be gathered during the USACE 404 permitting process. The USACE and cooperating

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							agencies have been provided with digital mapping for verification of wetland data.
L24	29	Denali Citizens Council				Material sites should be included in tables that identify disturbed acreage (Table 2.1-3). While it's acknowledged that the extraction of material from sites will have impacts, the EIS does not include material sites along with other areas affected by project construction and operations.	Potential material sites have only been identified at this time. Usage of particular sites will be determined during final design and issues related to access, public safety and human health will be taken into consideration along with construction requirements when choosing material site locations. This information will be gathered during the USACE 404 permitting process. The USACE and cooperating agencies have been provided with digital mapping for verification of wetland data.
L24	30	Denali Citizens Council				While the EIS identifies other plans for use of these material sites (Table X), there is inadequate discussion of how material sites will be shared with other current and future uses. Deferring this until later phases will only serve to exacerbate issues with material site development and expansion, and should be more thoroughly discussed here. The EIS states that, "Except for competition for scarce gravel resources, the potential for substantial negative cumulative impacts is low." The scarcity of gravel resources will certainly be a major consideration in development of this pipeline, and should be given more thorough consideration in this EIS.	Table 5.1-4 notes that a total of 13,079,000 cubic yards will be needed for the mainline construction. The identified material sites have approximately 194,123,000 cy of material available. Further evaluation of material sites will be conducted during more detailed design phase of the project.
L24	31	Denali Citizens Council	5.15			With the large number of identified material sites, a number of gravel pits have been identified that would have substantial impacts to human health and safety. Identified material sites within the town of Healy and adjacent to the local school would produce increased traffic and dust, and create safety issues for local residents, including children and families traveling to school. They should not be used, or minimally used.	The requested information has been added to Section 5.15.1.4 - Material Sites. The statement is: "Every effort will be expended to ensure that these material sites are not located in close proximity to areas of human activity."

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L24	32	Denali Citizens Council				Appendix D provides a mile point and GPS coordinates along the pipeline mainline, but this only identifies where the access road originates, and not where it goes, or the route it would take to get there. Roads in and around residential and developed areas in the Denali Borough are included, and should be available for public review. The EIS should provide a full description and/or map of access routes that would be improved or developed as part of this project.	The maps in Appendix C now include an overlay of the access roads on the pipeline alignment map. Additional access road information including the type of access road and the material to be used for construction is available in Appendix D of the DEIS.
L24	33	Denali Citizens Council				The Draft EIS suggests that the ROW would need to be more than doubled in some areas to "implement specialized grading techniques" or accommodate other site features, but does not identify where this is necessary. AGDC should provide exact locations of such substantial increases in width, so that the public has the information it needs to comment on potential impacts to specific sites. Considering the proximity of residences to the highway corridor, this would tremendously impact residents and business owners along the Parks Highway throughout the Denali Borough. Areas that require a widened right-of-way along the DNPP route variation should be identified before a route is selected.	The 230 ft ROW width requirement has been replaced by the identification of specific TEWs. The USACE and cooperating agencies have been provided with digital mapping for verification of wetland data.
L24	34	Denali Citizens Council				While some of the impacts to water bodies during construction may be localized and temporary, the cumulative impacts of construction activities in these waters will very likely have a detrimental effect that would last for a much longer period of time, and yet is dismissed.	A full quantitative and qualitative analysis of the impacts to wetlands will be completed following final design and will be incorporated into any permit applications or NEPA documents that are generated at that time. The USACE and cooperating agencies have been provided with digital mapping for verification of wetland data.

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L24	35	Denali Citizens Council				Effects of pipeline temperatures through discontinuous permafrost, and under bodies of water are unclear. The Draft EIS states that, "In concept, *the pipeline would be operated at below freezing temperatures in predominantly permafrost terrains, and above freezing temperatures in predominantly thawed ground settings (page 5.1-20)."* It is also stated that, *"Pipeline design would use engineering controls such as insulation and strategic use of non-frost-susceptible fill to control the thermal signature of the pipeline in discontinuous permafrost (page 5.1-25)."* This EIS should discuss more thoroughly the mitigations to relieve impacts from the thermal signature of the pipeline through discontinuous permafrost. Specifically, it should include a discussion of the success of different forms of "engineering controls" in other areas with discontinuous permafrost in order to mitigate effects from the thermal signature of the pipeline. The Draft EIS does not provide information about how or whether AGDC would regulate temperatures through discontinuous permafrost, without additional aboveground facilities. It should not be assumed (i.e. "in concept") that the temperature of the pipeline would be above or below freezing temperatures as it travels through discontinuous permafrost. The Draft EIS needs to clearly discuss the environmental consequences of running a pipeline at below freezing temperatures through discontinuous permafrost or explain more clearly how the temperatures will be moderated without aboveground facilities.	All ARMS were removed from the chapter and the analysis and effectiveness of AGDC proposed mitigation is now included in section 5.23.2.1
L24	36	Denali Citizens Council				The recreational use of surface water should be given consideration in this EIS, especially considering the importance of water, especially in the Nenana River watershed, for recreation.	Water-based recreation activities are referenced throughout Section 5.10.1; additional information on water recreation has been added to the Affected Environment. In addition, additional clarification on

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						Recreational uses provide substantial income to the Denali Borough, and impacts to water quantity would impact these values.	impacts to water recreation activities have been included in Section 5.10.2, although the section already discusses impacts on fishing and other stream-based activities.
L24	37	Denali Citizens Council	5.6			Open cut isolation or horizontal directional drilling should be used at all stream crossings that contain resident or anadromous fish, or that are tributaries to bodies of water that contain resident or anadromous fish. Water body crossings should only be done during winter months when fish are not present. As proposed, several of these constructed crossings would occur during the summer season (Appendix E), including the Yanert Fork. A number of creek crossings, many of them tributaries to the Nenana River are scheduled for construction during the summer or fall, including Antler, Coyote, Dragonfly, Eagle, Fox, Grizzly, Hornet, Junco, Kingfisher, and Montana Creeks.	The final schedule for stream crossing methods for construction will be determined from ADFG consultations. Text has been added to Section 5.6. This information will be gathered during the USACE 404 permitting process.
L24	38	Denali Citizens Council				There is a considerable amount of discharge into the Nenana River, including wastewater from Usibelli Coal Mine, GVEA's Healy Power Plant, the National Park Service, and a variety of smaller scale private and commercial sources. Water in the Nenana River and associated tributaries (and adjacent water bodies that provide water through seepage and groundwater recharge) is critical to alleviate impacts from these discharges. A reduction in flow in the Nenana River, or its tributaries, could change the effects of discharges into the river, and should be addressed in this EIS.	AGDC does not intend to engage in activities that will result in a permanent reduction in flow of the Nenana River or its tributaries. Any in-water work on any rivers or streams will be conducted under the authority of permits issued by the USACE, ADNR, ADF&G and ADEC where those agencies have regulatory authority.
L24	39	Denali Citizens Council				The EIS states that "The applicant is not planning to use any synthetic additives at this time." Synthetic additives in drilling muds should not be allowed for water body crossings (including wetlands). If synthetic additives are to be allowed, this EIS should identify them.	The text has been revised for accuracy to state that synthetic additives would not be used.

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L24	40	Denali Citizens Council	5.5			The clearing of the right-of-way, and maintenance in a non-forested state, will increase habitat fragmentation. Fencing, access roads and lighting can be detrimental to wildlife movements.	The text has been revised for accuracy by adding lighting of facilities impacting wildlife. Text revision is located in section 5.5.2 - Environmental Consequences. Sentence begins with "Habitat fragmentation effects would…" Additional text revision located in section 5.5.2.2 - Operations and Maintenance. Sentence begins with "Lighting installed at permanent facilities..."
L24	41	Denali Citizens Council				Visitors to the area are characterized as mostly consumptive users of resources, such as hunters and fisherman. This may be true of some visitors to the area, but not for a large majority of visitors. In fact, they are mostly non-consumptive users of resources, and come from all over the world for the wild landscape and superlative opportunities to view wildlife and the tallest mountain in North America in a wilderness setting. Discussion of tourism makes no distinction between Denali National Park and Preserve (DNPP) and other areas throughout Alaska, and no distinction between travelers coming to shoot a moose (or bear, or wolf) with a gun or a camera. Most of DNPP's visitors, hundreds of thousands of them, come from around the world armed only with a camera. The experiences they seek (and the high value they place on the area's resources, beyond simply getting there) are very different from those of a hunter or fisherman, and should be given adequate consideration, which is not currently present in this EIS.	Section 5.10 addresses all types of recreation activities in proximity to the pipeline route, including consumptive and non-consumptive uses (see Section 5.10.1.4). The impact analysis is intended to address all types of recreation uses, generally, and does not focus on specific activities unless noted.
L24	42	Denali Citizens Council				Denali National Park and Preserve draws thousands of visitors from around the world, largely during the summer season. This influx of visitors is not dependent on resources such as fishing or hunting, as suggested in the Draft EIS, nor is it limited to "the spring and early summer…and fall." In general, Denali sees increased recreation during snow-free months,	A description of Denali National Park and Preserve is presented in Section 5.10.1.4. The description references a wide variety of recreation uses, not just hunting and fishing. The impact analysis covering Denali National Park and Preserve is presented in Section 5.10.2.3, which notes that construction will occur in the winter months, thereby avoiding potential recreation impacts during the peak summer season.

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						from spring to fall. While many visitors recreate primarily in the Park, an increasing number of tour opportunities are available in the surrounding area, and any construction activities in the summer will have substantial (if temporary) impacts. Considering the global reputation of Denali National Park, this impact should not be overlooked.	
L24	43	Denali Citizens Council				The seasonal influx of visitors currently leads to substantial traffic congestion, especially around the park entrance area, but also in surrounding communities. Increased traffic to and from material sites, and at construction sites, will put a significant burden on communities in the Denali Borough.	USACE acknowledges the concerns of the Denali Citizens Council with regard to traffic and congestion during construction. Section 5.23.2.12 (Social and Economic Resources Mitigation) specifies three mitigation measures (nos. 2, 3, and 4) that address this concern.
L24	44	Denali Citizens Council	5.10			Construction and maintenance during the summer season will also put an increased burden on local services. Although more services are available in the summer season, the services available are not sufficient to support tourism and a 500 person work camp. Given the substantial influx of people into this area during the summer season, construction and maintenance during the summer months would have substantial impacts and should be minimized as much as possible. These impacts should be more clearly discussed in the Draft EIS. Also, there are a number of errors in the listing of services provided in the Denali Borough (Section X).	The DEIS includes an expanded analysis of recreation/tourism impacts in Section 5.10.2.2 Recreation to address effects from changes in public service levels attributed to the Project .

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L24	45	Denali Citizens Council				Maintaining a cleared right-of-way for the ASAP pipeline will have significant visual impacts to the area surrounding Denali National Park and Preserve, whether or not the alternative route is selected. While the visual impacts would be minimized by using the existing Parks Highway right-of-way, increased clearing along the highway will change the visual character of the area.	Increased clearing of vegetation along the Parks Highway for the ASAP right of way would affect the visual character, but long-term effects following revegetation are expected to be weak to moderate due to low visual contrast to the existing natural and developed landscape. Existing linear features limit the line contrast, while revegetation will limit texture and color contrast. Form contrast will be greatest in areas with trees. Visual effects of material sites are discussed in Section 5.11.2.2 (Material Sites). As noted in the text, visual effects would depend on the location of these sites, which has not been determined. However, if as expected, these facilities are located in areas with low visual sensitivity and lower value scenic resources, effects would be minimized.
L24	46	Denali Citizens Council	5.10			In addition, if seismic or other conditions make it necessary to construct the pipeline aboveground through any part of this region, it will create visual impacts, especially in proximity to Denali National Park. Many visitors travel along the Parks Highway from Fairbanks or Anchorage, via the George Parks Highway or the Alaska Railroad. Tourism to this area provides significant economic benefit to local residents and the state, and every effort should be made to minimize the visual impacts. The highway in this region is officially declared a Scenic Byway.	The proposed pipeline would be constructed underground and is not expected to adversely affect recreation uses and tourism based on degradation of the visual quality of the area over the long term. Short-term recreation impacts from landscape alterations during construction are included in Section 5.10.2.2. The visual section of the EIS states in Section 5.11.2.2 that the majority of the mainline pipeline would be constructed below ground. Above ground options would be discussed in the Alternatives section, but are not analyzed in the resource sections as they are not selected Alternatives in the EIS.
L24	47	Denali Citizens Council				Heavy use of material sites along the Parks Highway should be considered along with other visual impacts.	Visual effects of material sites are discussed in Section 5.11.2.2 (Material Sites). As noted in the text, visual effects would depend on the location of these sites, which has not been determined. However, if as expected, these facilities are located in areas with low visual sensitivity and lower value scenic resources, effects would be minimized. This information will be gathered during the USACE 404 permitting process.

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L24	48	Denali Citizens Council				While there are currently visual impacts to the view from the park entrance area, namely the cluster of development just outside the park entrance area, this should not be used as a reason to increase visual impacts. Such incremental increased will be detrimental to the integrity and quality of the visitor experience to Denali National Park and Preserve, and should be given adequate consideration.	The level of visual impact depends on three factors: distance, viewer sensitivity, and contrast to existing visual resources. Existing visual resources in the park entrance area include the cluster of development, which reduces the level of visual contrast that the route would create in this location. Existing development is not a reason to increase visual impacts, but it does reduce the visual contrast, and therefore the visual impact, of new development in the nearby vicinity. Increased clearing of vegetation along the Parks Highway for the ASAP right of way would affect the visual character, but long-term effects following revegetation are expected to be weak to moderate due to low visual contrast to the existing natural and developed landscape. Existing linear features limit the line contrast, while revegetation will limit texture and color contrast. Form contrast will be greatest in areas with trees.
L24	49	Denali Citizens Council				Alternatives in the Draft EIS for laying pipeline in areas with high seismic activity include above- and belowground options. An aboveground option would have substantial impacts to visibility, a highly valued resource in this area. Considering the Denali Borough's economic value to the state as a tourism destination, this impact should be considered carefully. It should be clearly identified whether the pipeline would run above- or belowground, and what the associated impacts to visibility would be before a route variation is selected.	As provided in Section 5.12.2.1, the importance of tourism in the Denali Borough is illustrated by the high percentage of employment in the arts, recreation, accommodation and food service sectors (48.8% of total jobs). The visual section of the DEIS clearly states in Section 5.11.2.2 that the majority of the mainline pipeline would be constructed belowground. Above ground options would be discussed in the Alternatives section, but are not analyzed in the resource sections as they are not selected Alternatives in the DEIS. The proposed pipeline would be constructed underground and is not expected to adversely affect recreation uses and tourism based on degradation of the visual quality of the area over the long term. Short-term recreation impacts from landscape alterations during construction are included in Section 5.10.3.2. The visual section of the DEIS clearly states in Section 5.11.2.2 that the majority of the mainline pipeline would be constructed belowground. Above ground options would be discussed in the Alternatives section, but are

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							not analyzed in the resource sections as they are not selected Alternatives in the DEIS.
L24	50	Denali Citizens Council				A full visual impact analysis of both the proposed mainline route (completed, Appendix K), and route DNPP variation (not included as part of the analysis in this EIS) should be conducted for comparison before selection of an alternative route.	The KOP's selected for visual simulations and contrast rating analysis are expected to be representative of the types of impacts of constructing and operating the ASAP pipeline, particularly those associated with the high viewer sensitivity areas surrounding Denali National Park and Preserve. The visual section of the DEIS states in Section 5.11.2.2 that the majority of the mainline pipeline would be constructed belowground. Above ground options should be discussed in the Alternatives section.
L24	51	Denali Citizens Council	General			The scope of this project, and the potential associated impacts, make it critical to allow for local comments on site-specific proposals. Recent meetings were scheduled in the southern reaches of the Denali Borough, in the middle of the day. This minimizes the public opportunity to get more information and comment in person.	Comment acknowledged. During the public comment period for the Corps 404 application the community may request a public hearing if additional information can be garnered from doing so.
L24	52	Denali Citizens Council	General			It seems that it is in the best interest of AGDC, the state, the Borough, and local residents, for AGDC to work cooperatively with local municipalities to solicit more detailed information. For this reason we support the creation of some form of municipality or citizen advisory board. An afternoon meeting in the middle of the workweek, an hour away from the most densely populated area in the Denali Borough (Healy) is insufficient.	Comment acknowledged. During the Corps 404 permitting process the community can ask for a public hearing if there is additional information to provide on the project that has not been included and would help the Corps make its permitting decision.
L24	53	Denali Citizens Council	5.15			There are a number of inaccuracies about the services available in the Denali Borough. Because these services are used to determine the community's capacity to handle the influx of construction workers, AGDC should consult the Denali Borough (and other municipalities for that matter) to update the EIS with accurate	The revisions were made to the Denali Borough sub-section of Section 5.15.3.2 - Community Profiles. We phoned the Denali Borough Department of Commerce (listed as the contact for community information in the Alaska Community Database, 907-683-4636) and spoke with Connie MacMaster in Healy. We verified the names of the clinics and added the information that was

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						information. A local clinic (the Interior Community Health Clinic, inaccurately named "X" in the EIS) provides some medical services year-round; a physician does not staff it. There are no dental services available within a hundred miles. A grocery store listed in the EIS is only open four months a year.	relevant. To further improve the knowledge about community health services, we added the following statement to the end of Section 5.15.3.2 - Community Profiles under the heading Health Related Services within the PACs During Construction and Operation of the Proposed Project: "The community information presented in this section has been developed from local sources (e.g. community newspapers and websites), State of Alaska government publications and websites (e.g. the Alaska Community Database), and information published online and in print by various public awareness and advocacy groups. Over time, it is possible that the quantity and level of health related services within each PAC may change. For that reason it is recommended that AGDC set up an outreach program to coordinate with the PACs to maintain and update an inventory of health related services. During construction and operation of the proposed Project, knowledge of the available services will help minimize the potential impacts to the PACs."
L25	1	Doyon Limited				Section 4.2.2 the COE DE IS document notes that hydrocarbon exploration in the Nenana basin is suspended and no results have been made public. That statement is incorrect. Doyon, Limited is an investor and day to day designated manager/operator of a venture exploring for hydrocarbons in the Nenana basin. Our group holds a State of Alaska oil and gas exploration license to almost 500,000 acres there and an oil and gas lease to Mental Health Trust lands in the basin.	Section 4.2.2 has been updated and revised to state: "... while no commercial discovery was made, the presence of an operating petroleum system in the basin was confirmed (Alaska Journal of Commerce 2012). Doyon and Partners continues its Nenana Basin exploration program."
L26	1	Robert Merrow				I strongly believe that the No Action Alternative is the preferred alternative.	Comment acknowledged.

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L26	2	Robert Merrow				According to the Alaska Earthquake Information Center, the M7.9 2002 Denali Fault earthquake resulted in vertical offsets of 4 meters and horizontal offsets of 8.8 meters. Would these displacements not be considered several meters and thus sufficient to result in the failure of a high pressure gas line? If I'm not mistaken, this seismic event even resulted in a shutdown of TAPS. The Denali Fault is only one of five that you propose crossing.	The design approaches being consider for areas of high seismic activity and / fault zones will take this into account through the entire project. This information will be gathered during the USACE 404 permitting process.
L26	3	Robert Merrow				I believe seismic concerns were insufficiently addressed in the DEIS. The reliability and safety section of the draft fails to convince me that the project can even be accomplished safely.	AGDC will design, construct and operate the pipeline in a manner to ensure the public safety. Further, AGDC would comply with all Federal and state pipeline safety regulations in the design, construction and operation of the pipeline, and in particular, those specified in 49 CFR 190 to 199.
L26	4	Robert Merrow				I feel that the discussion of the Parks Highway Alternative and the Richardson Highway Alternative failed to compare the number of faults that the proposed alignments would cross.	The 2009 Stand Alone Pipeline Alternatives Analysis conducted by the State of Alaska (State of Alaska 2009), Page 3-22 3.4 - Special Design Areas, identified 7 active faults associated with the Richardson Highway Route and 7 active faults associated with the Parks Highway Route. This information has been added to FEIS Table 4.4-1: Parks Highway Route and Richardson Highway Route Alternatives Comparison Summary.
L26	5	Robert Merrow				I believe routing any pipeline through the Minto flats is a bad idea. Your maps indicate an alignment which leaves the highway at Livengood and returns to the road at Nenana. I have spent a significant amount of time fighting forest fires in this area. It is wet, really wet, as in muskeg, as in hard to find a place to land a helicopter in, and there are numerous fires there almost every year. The brief mention of fires in the DEIS fails to acknowledge the fire frequency in this particular area.	The pipeline will be buried through the Minto Flats section to reduce susceptibility to fire.

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L26	6	Robert Merrow				Commenter is concerned about the impact of the project to the moose population of the Minto flats area. Aside from direct impacts on the moose population during construction, new access roads in this area will make a remote, difficult to access game unit into one which can be accessed by anyone with a four-wheeler, and inevitably lead to greater mortality.	Section 5.23.5 - Wildlife, AGDC proposed mitigation measure #10 states public access to the ROW would be limited for recreation or hunting by blocking entry areas with large boulders, berms, or fencing (AGDC 2011). This section also includes an analysis and effectiveness of the mitigation proposed.
L26	7	Robert Merrow				I feel that the Moody Montana Creek routing is absurd and suspect it was included solely to make the Denali Park Alternative seem reasonable in comparison. As I understand the situation, the National Park Service lacks the authority to even grant a right-of-way for the project.	Approximately 82 percent of the proposed Project route would be co-located with or would closely parallel existing pipeline or highway ROW. Collocation is desirable as a means of concentrating development within established corridors and minimizing environmental impacts. The Alaska Intertie Route Variation (in the vicinity of Moody Creek) was considered as a route variation that would utilize and existing transmission line corridor and would avoid Denali National Park (NP). Section 4.4.2.2 provides a description and analysis of the Alaska Intertie Route Variation and concludes that the route variation is not considered feasible, and would not present environmental advantages over the proposed Project route for this segment.
L26	8	Robert Merrow				Yet another routing concern of mine is the fact that your proposed pipeline alignment will pass within a stone's throw of my home at mile 214 Parks Highway, all of its high pressure gas zipping merrily along to markets in Anchorage, while I continue to heat my home with expensive fuel oil. So, you propose that I and local residents bear a disproportionate amount of the risk (see seismic/engineering concerns) associated with this project while denying us any of the benefits.	As provided in Section 5.1.3, the proposed pipeline and associated facilities would be designed in accordance with engineering criteria related to permafrost, seismic events, and other geological hazards to comply with applicable design codes. A connected action for the proposed Project includes in-state distribution of propane and butane for customers along the highway system (see Section 3.2.3).
L26	9	Robert Merrow				Since I happen to live in a rural area, within a rural borough, you propose routing a pipeline past my house which will be subject to the lowest safety standards, i.e. 49 CFR 192 Class	AGDC will design, construct and operate the pipeline in a manner to ensure the public safety. Further, AGDC would comply with all Federal and state pipeline safety regulations in the design, construction and operation of

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						1. Honestly, I would really prefer the more rigorous safety requirements reserved for more populated areas.	the pipeline, and in particular, those specified in 49 CFR 190 to 199.
L26	10	Robert Merrow	General			I feel pipeline construction will have unacceptable consequences for birds and game animals. The proposed new access roads, ROW corridor, borrow pits for material, and pump stations will ultimately result in habitat fragmentation and loss.	Comment acknowledged.
L26	11	Robert Merrow	5.5			Illegal hunting/sport killing by construction crews is inevitable and likely to be overlooked as crews with no connection to the local area rush to meet project deadlines. Upland game birds, moose, caribou, and predators will likely all experience increased mortality both during construction and afterwards when access via new roads is easy.	The text has been revised for accuracy to state that unnecessary mortality could occur from increased access and construction activities. Hunting by construction crews will not be tolerated by AGDC. The location of the text revision is in Section 5.5.2, beginning with "During the post-construction period…"
L26	12	Robert Merrow				I am in favor of the no action alternative because I believe the ASAP project fails to adequately address the seismic considerations required for the preservation of life and property, follows a proposed alignment with several flaws, and will result in habitat fragmentation and loss thereby negatively affecting wildlife.	Comment acknowledged.
L27	1	Hannah Ragland				Given the exceptional nature of such a high--pressure line, especially one that is traveling through residential and developed areas, additional discussion of safety concerns is needed.	AGDC will design, construct and operate the pipeline in a manner to ensure the public safety. Further, AGDC would comply with all Federal and state pipeline safety regulations in the design, construction and operation of the pipeline, and in particular, those specified in 49 CFR 190 to 199.
L27	2	Hannah Ragland				The EIS states that ASAP "would be the first 2,500 psi transmission pipeline to operate in a public area within the USA," adding that "this proposed pipeline would be among the highest pressures currently planned for natural gas transmission lines in the US." Yet, there is little discussion of the safety concerns of such a high-- pressure line traveling through residential	AGDC will design, construct and operate the pipeline in a manner to ensure the public safety. Further, AGDC would comply with all Federal and state pipeline safety regulations in the design, construction and operation of the pipeline, and in particular, those specified in 49 CFR 190 to 199.

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						areas. I would like to see more discussion about this.	
L27	3	Hannah Ragland				*Commenter would like to see discussion of an alternative that considers using a line with less pressure, at least through areas with concentrated use and development.*	A pipeline with less pressure would require a larger diameter pipe to transport the project design capacity of 440 MMscfd of natural gas. At a lower pressure, the pipeline would not be able to transport the design capacity of 60 MMscfd of Natural Gas Liquids (NGLs) as the higher pressure is necessity to keep NGLs in a gaseous state during transport. As stated in Section 4.3.2, "Analysis indicated that the optimum pipeline diameter in terms of cost and environmental impact considerations for the proposed 500 MMscfd, 737-mile-long pipeline Project would be between 24 and 18 inches (AGDC 2010b)." The mainline would be operated at 2500 psi and the Fairbanks lateral would be operated at 1500 psi. Pipeline Reliability and Safety is address in Section 5.19 of the FEIS. The pipeline would be designed, constructed, operated and maintained in accordance with applicable U.S Department of Transportation pipeline safety standards. These standards require higher safety factors in pipeline design, testing and operation for populated areas.
L27	4	Hannah Ragland				Where would response come from in the case of an emergency situation, such as system blowdown or leaks?	AGDC would develop an Operations and Maintenance (O&M), Emergency Response, and other plans that would outline safety measures that would be implemented during normal and abnormal Project operation This information will be gathered during the USACE 404 permitting process.
L27	5	Hannah Ragland				Construction plans and mitigations related to seismicity, mass wasting and the unique conditions associated with permafrost (including thaw due to disturbance, frost heaves, etc.) are vaguely discussed and not clearly identified. Delaying development of these mitigations until a further date leaves it unclear at this time how these concerns would be addressed, and what this would look like on the ground.	The construction methods most commonly used have been identified; detailed design and construction techniques will vary along segments of the pipeline. Frost heave and thaw mitigation measures were expanded as suggested. See Section 5.23 for a description of these mitigation measures.

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L27	6	Hannah Ragland				There is little discussion of how different construction options will be selected (and their various costs and benefits) in areas of high seismicity. Fault lines are prevalent in the Denali Borough along the proposed route and the Denali National Park and Preserve (DNPP) route variation. This is a critical concern throughout the Denali Borough and should be more thoroughly discussed.	The design and construction used along the pipeline route will be developed using the most appropriate for the location that each part or segment of the project is in, the design approach will likely change as environmental factors vary throughout the project.
L27	7	Hannah Ragland				A mainline valve (MLV) is identified at mile 538.3 of the mainline. This is adjacent to the developed entrance area outside DNPP, at a point where the Nenana River valley narrows into a rocky canyon, with a considerable amount of erosion and mass wasting. It is unclear where exactly this MLV would be located, as its location is listed as a mile point (in Table 5.11--2, oddly included with Visual Resources, but not in sections related to land use or other facilities), and is not identified in any maps that I have found in the EIS. If this is indeed the proposed location, this MLV should be relocated because of safety concerns, both due to the narrowness of the Nenana Canyon in this area, traffic congestion as the road funnels into the canyon, and, of course, falling rocks. It should also be noted that this particular MLV is 27 miles away from the next MLV to the north, while the EIS states that MLVs are required by law to be placed (no more than) every 20 miles. Mitigation measures do not, and could not, address this concern. It is unlikely that this is the only MLV site along the length of the pipeline, or in the Denali Borough that is unreasonable due to safety or other concerns, which is why alternative sites should be identified and considered, and available for public comment.	Section 2.1.2 Aboveground Facilities, states: "MLVs would be located at intervals not greater than 20 miles. Approximately 37 MLVs will be necessary to accommodate this spacing requirement. However, the specific locations of MLVs will be determined during the pipeline design process." Table 5.11 of the FEIS has been revised to delete specific MLV locations and to be consistent with Section 2.1.2. This information will be gathered during the USACE 404 permitting process.

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L27	8	Hannah Ragland				In general, any aboveground facility, including MLVs, should not be allowed in residential areas, or in other areas of concentrated public use, or used only when absolutely necessary. In the case of an event that requires increased activity at these aboveground sites (such as a system blowdown), the impact to residential areas and other developed areas in the Denali Borough, would be considerable.	Section 2.1.2 Aboveground Facilities, states: "MLVs would be located at intervals not greater than 20 miles. Approximately 37 MLVs will be necessary to accommodate this spacing requirement. However, the specific locations of MLVs will be determined during the pipeline design process." Section 2.1.2 Aboveground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6.Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final engineering, but for the purposes of this document, the analysis includes the locations of the compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed." This information will be gathered during the USACE 404 permitting process.
L27	9	Hannah Ragland	5.20			The EIS states: "Whether or not the proposed Project is constructed and operated, there are significant cumulative effects of other present and proposed oil and gas projects and state and federal activities." What would the associated actions be if a gas discovery was made along the proposed pipeline corridor and the developer wanted to distribute through the proposed pipeline? If allowed, this would substantially add to potential health and safety impacts. Whether or not future inputs would be allowed should be discussed in this EIS.	As stated at the beginning of Section 5.20.5.2: Energy developments for which no formal proposal has been submitted or which seem unlikely to occur within the foreseeable future are considered speculative. These may include projects that are discussed in the public arena, but which propose technologies that are not yet proven to be cost effective in the Alaskan environment, or are prohibited by law or for which there is no current proposal before an authorizing land management agency. Speculative developments are not considered reasonably foreseeable and are not analyzed as part of the cumulative effects assessment. At this juncture, while there has been historic exploratory drilling activity at Umiat and even present exploratory drilling activity at Gubik, along with proposed exploratory drilling activity in the Nenana Basin and the Yukon Flats National Wildlife Refuge, there is no publicly available information to indicate that development of the gas resources at any of these locations is reasonably foreseeable at this time.

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							Exploratory drilling occurs frequently while full-scale development projects which would produce future natural gas resources occur far less frequently.
L27	10	Hannah Ragland				It is stated that, "Project---related effects to soils and geology would be mitigated with measures identified during the Project's final design phase such as the implementation of construction BMPs." This does not provide adequate information to assess the cumulative impacts, or ensure that they are acceptable. This EIS should provide public opportunities for input on mitigation measures and best management practices. These standards should be clearly stated now, rather than during the "final design" phases.	Section 5.23 of the FEIS contains the mitigation measures proposed by AGDC. These measures include development and use of best management practices. Mitigation and BMPs, as well as requirements of project permits, will be included with plans AGDC will develop for construction and operation.
L27	11	Hannah Ragland	General			The project divides the Denali Borough into two vast regions, lumping the area between the Fairbanks Lateral (or Yukon River, or other locations, depending on the table and EIS section) and DNPP/Healy, and from DNPP/Healy south to tidewater. Lumped together as it is, the impacts in and around the Denali Borough (and other regions for that matter) are difficult to ascertain. The EIS should divide the pipeline corridor into smaller regions (such as Borough, or watershed) to clarify what impacts to resources (i.e. materials needed, water withdrawal, etc.) would be.	The project is described in the context of areas that are relevant to each resource, such as ecoregions, watersheds, census areas, and planning areas. The analysis of impacts is divided into 3 linear units so that the Denali NPP Route Variation impacts can be compared to the segment of the ASAP mainline that it would replace.
L27	12	Hannah Ragland	3.0			Expansion to the intertie is mentioned as a connected action in the Executive Summary, but dismissed as minimal in other sections of the EIS. This action, combined with clearing of the pipeline right---of---way, would mean significant, long--- term, impacts to habitat fragmentation and visual resources, of particular concern considering the proximity to DNPP.	The expansion to the Alaska Intertie is not a connected action. Co-location of the ASAP with the Alaska Intertie in the vicinity of Denali National Park is identified and analyzed as a potential route variation in Section 4.4.2.2 of the FEIS, which states: "The Alaska Intertie Route Variation is not considered practical or feasible from the technical standpoint and is therefore not a reasonable route variation alternative." Potential ASAP impacts associated with habitat fragmentation and rehabilitation

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							are described in FEIS Section 5.3.2.2, and visual impacts are described in FEIS Section 5.11. FEIS Appendix K is a visual impact analysis report for Denali National Park.
L27	13	Hannah Ragland				The Executive Summary (page ES---20) states: "As a result of the anticipated increase in use, airports that would be used to support construction of the ASAP Project may require upgrades to improve runways, lighting, communications, or navigational aids." Further discussion of airport improvements does not appear in as a connected action. The Healy airstrip is identified in the EIS. Who would be responsible for these upgrades, and who would be expected to cover these costs?	Section 2.1.3.3 of the Project Description states "…14 existing air strips or airports would be used to transport equipment and materials and workers to the Project area. Several of these air facilities would be located at the stationary construction camps or pipe storage and lay down yards. The AGDC anticipates that there could be a need to upgrade existing airports and airstrips by carrying out improvements to runways, runway lights, and communication and navigation aids." The AGDC has no specific plans for airport improvements at present. Additional discussion of cumulative effects to airports is presented in Section 5.20.5.4 of the FEIS. This information will be gathered during the USACE 404 permitting process.
L27	14	Hannah Ragland				The EIS acknowledges that conflicts with competing uses of material sites could be an issue, and states that: "Substantial expansion of existing approved borrow sources or development of new borrow sources would require further analysis." When would this further analysis occur?	Potential material sites have only been identified at this time. Usage of particular sites will be determined during final design and issues related to access, public safety and human health will be taken into consideration along with construction requirements when choosing material site locations.
L27	15	Hannah Ragland				Will the cumulative impacts of material site expansion or development be considered, or would this simply involve permitting through DNR? Consideration of cumulative impacts of material site expansion or development would be inadequate if sites are permitted individually, and not considered as part of the cumulative impacts associated with this proposed project. Material sites should be included in tables that identify disturbed acreage (Table 2.1--3).	The AGDC has identified 546 existing material sites using the ADOT&PF material site information sources and expects that the use of these sites would be sufficient to meet the proposed Project's needs. Cumulative effects of additional sites or of expanding new sites are not identified at this time. This information will be gathered during the USACE 404 permitting process.
L27	16	Hannah Ragland				Also, it is unclear whether different forms of pipeline construction (i.e. above or below--	Different amounts of fill will be required depending on the burial depth, which will be determined by

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						-ground, or in areas of high seismicity) would require different amounts of material. Please clarify.	environmental factors and site conditions.
L27	17	Hannah Ragland				The EIS states that, "the construction ROW would be reduced, or "necked down," in some areas to minimize impacts to sensitive resources, such as residences or wetlands. These locations would be determined during permitting and final engineering." The ROW application has already been submitted and approved, with consideration of sensitive resources, wetlands, or residences deferred to the EIS process. If there is to be consideration of these sensitive areas (which there should be), when exactly would that occur?	The State of Alaska has granted a legal ROW for the ASAP on state owned lands. The required legal ROW on Federal and private lands has not yet been obtained by AGDC. Authorized work areas within obtained legal ROWs would be determined during permitting and final engineering. This information will be gathered during the USACE 404 permitting process.
L27	18	Hannah Ragland	Appendix C			Identifying the locations of aboveground facilities and other land use in an assortment of tables and maps, scattered throughout the EIS with minimal descriptions, is inadequate. Information about all proposed land use should be included in the Land Use section of this EIS.	The maps in Appendix C now include an overlay of the access roads on the pipeline alignment map as well as the locations of above-ground facilities. Additional access road information including the type of access road and the material to be used for construction is available in Appendix D of the DEIS. Appendices D and P present in tabular format the locations, by milepost, of the access roads and material sites, respectively. Providing large scale maps of the entire route showing locations of all above ground facilities, access roads and material sites is not practical in the document. The detailed analyses of these facilities will occur later during the permitting process. During this process maps will be available via links to a website containing readable maps.
L27	19	Hannah Ragland				With the large number of identified material sites, a number of gravel pits have been identified that would have substantial impacts to human health and safety. For example, identified material sites within the town of Healy (#37---2--140---2 and #37---2--- 006---2A) and adjacent to the local school (#638---001---2) would produce increased traffic and dust, and create	Potential material sites have only been identified at this time. Usage of particular sites will be determined during final design and issues related to access, public safety and human health will be taken into consideration along with construction requirements when choosing material site locations. This information will be gathered during the USACE 404 permitting process.

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						safety issues for local residents, including children and families traveling to school. They should not be used, or minimally used.	
L27	20	Hannah Ragland	Appendix C			The EIS should provide a full description and/or map of access routes that would be improved or developed as part of this project, available for public review. While Appendix D provides a mile point and GPS coordinates along the pipeline mainline, this only identifies where the access road originates, and not where it goes, or the route it would take to get there. Roads in and around residential and developed areas in the Denali Borough are included in this list, and their routes should be made available for public review.	The maps in Appendix C now include an overlay of the access roads on the pipeline alignment map. Additional access road information including the type of access road and the material to be used for construction is available in Appendix D of the DEIS. Appendices D and P present in tabular format the locations, by milepost, of the access roads and material sites, respectively. Providing large scale maps of the entire route showing locations of all above ground facilities, access roads and material sites is not practical in the document. The detailed analyses of these facilities will occur later during the permitting process. During this process maps will be available via links to a website containing readable maps.
L27	21	Hannah Ragland				Areas that require a widened right---of---way along the DNPP route variation should be identified before a route is selected. The Draft EIS suggests that the ROW would need to be more than doubled in some areas to "implement specialized grading techniques" or accommodate other site features, but does not identify where this is necessary. AGDC should provide exact locations of such substantial increases in width, so that the public has the information it needs to comment on potential impacts to specific sites. Considering the proximity of developed areas to the highway corridor, this would tremendously impact residents and business owners adjacent to the Parks Highway throughout the Denali Borough.	The USACE and cooperating agencies have been provided with digital mapping for verification of wetland data. The 230 ft ROW width requirement has been replaced by the identification of specific TEWs.
L27	22	Hannah Ragland	5.9			The EIS states (page 5.9---13) that, "Private lands in the Project area are used for residential, agricultural, and commercial purposes. As private land, land uses are subject to approvals of the landowner." This does not take into	Approximately 5% of the entire alignment is owned privately. The remaining 95% is in some form of public ownership. AGDC is currently working with the majority of public landowners. Negotiations with private landowners will not occur until the project funding is in

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						consideration that private land use may be appropriated through the process of eminent domain. This does not give landowners "approval" of land uses, and should be explicitly addressed.	place and the alignment is finalized. AGDC will negotiate in good faith with all impacted landowners and address their concerns and issues one at a time. This information will be gathered during the USACE 404 permitting process.
L27	23	Hannah Ragland	5.9			Mitigation measures related to developed areas should give special consideration (for example covering trenches) in any area where occupied private property or businesses exist, whether or not a structure is located within a certain distance from the pipeline right---of---way.	Mitigation measures proposed by AGDC are described and analyzed in Section 5.23 of the FEIS. Additional mitigation measures will be considered by the USACE in the permitting process.
L27	24	Hannah Ragland				Effects of pipeline temperatures through discontinuous permafrost, and under bodies of water are unclear. The Draft EIS states that, "In concept, the pipeline would be operated at below freezing temperatures in predominantly permafrost terrains, and above freezing temperatures in predominantly thawed---ground settings (page 5.1---20)." It is also stated that, "Pipeline design would use engineering controls such as insulation and strategic use of non---frost---susceptible fill to control the thermal signature of the pipeline in discontinuous permafrost (page 5.1---25)." This EIS should discuss more thoroughly the mitigations to relieve impacts from the thermal signature of the pipeline through discontinuous permafrost. Specifically, it should provide more information on the success of different forms of "engineering controls" in other areas with discontinuous permafrost in order to mitigate effects from the thermal signature of the pipeline. What future actions would be taken to resolve problems with water temperatures if water bodies are negatively impacted? Will there be any monitoring to ensure that attempts to mitigate this problem are successful?	All ARMS were removed from the mitigation chapter and analysis and the effectiveness of AGDC proposed mitigation is included in 5.23.2.1

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L27	25	Hannah Ragland	5.10			The recreational use of surface water should be given consideration in this EIS, especially considering the importance of water, especially in the Nenana River watershed, for recreation. This activity is highly dependent on water quantity, and recreational uses provide substantial income to the Denali Borough.	Water-based recreation activities are referenced throughout Section 5.10.1; additional information on water recreation has been added to the Affected Environment, including whitewater rafting in the Denali NPP. Further, additional clarification on impacts to water recreation has been included in Section 5.10.2, although the section already discusses impacts on fishing and other stream-based activities.
L27	26	Hannah Ragland				Open cut isolation or horizontal directional drilling should be used at all stream crossings that contain resident or anadromous fish, or that are tributaries to bodies of water that contain resident or anadromous fish. Water body crossings should only be done during winter months when fish are not present.	Stream crossing mitigation measures have been identified in Section 5.23.2. These include using existing bridges where feasible and using HDD or other trenchless technology to minimize disturbance where warranted. Additional recommended mitigation for stream crossings includes crossing waterbodies in the winter. All crossings will require a permit by ADFG and a site specific crossing plan.
L27	27	Hannah Ragland				Creeks that drain into fish---bearing waters directly after the pipeline crossing should also use open cut isolation or horizontal directional drilling in order to mitigate the cumulative impacts to fish---bearing waters.	Stream crossing mitigation measures have been identified in Section 5.23.2. These include using existing bridges where feasible and using HDD or other trenchless technology to minimize disturbance where warranted. Additional recommended mitigation for stream crossings includes crossing waterbodies in the winter. All crossings will require a permit by ADFG and a site specific crossing plan.
L27	28	Hannah Ragland				There should be no creek crossings during summer months. A number of water crossings, many of them tributaries to the Nenana River are scheduled for construction during the summer or fall (Appendix E), including the Yanert Fork and Antler, Coyote, Dragonfly, Eagle, Fox, Grizzly, Hornet, Junco, Kingfisher, and Montana Creeks. The cumulative impacts to water quality to these and other tributaries to the Nenana River are considerable, and mitigation measures are inadequate to protect the integrity of these streams, and the cumulative impacts on the Nenana River watershed that widespread construction, especially during the summer, will	Stream crossing mitigation measures have been identified in Section 5.23.2. These include using existing bridges where feasible and using HDD or other trenchless technology to minimize disturbance where warranted. Additional recommended mitigation for stream crossings includes crossing waterbodies in the winter. All crossings will require a permit by ADFG and a site specific crossing plan. The current estimated schedule (Appendix E, ST_350 to ST_353) indicated construction during Summer 1. However, each stream would be permitted individually and collaborations between AGDC and ADFG, NMFS to schedule each crossing to reduce impacts to the extent most practicable.

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						have.	
L27	29	Hannah Ragland				The EIS states: "The applicant is not planning to use any synthetic additives at this time." Synthetic additives in drilling muds should not be allowed for water body crossings (including wetlands), or adjacent to areas with residential water uses. If synthetic additives are to be allowed, this EIS should identify them.	The text has been revised for accuracy to state that synthetic additives would not be used.
L27	30	Hannah Ragland				What, if any, monitoring will occur to ensure that mitigations are successful, and to determine the impacts to bodies of water?	Section 5.23.2 provides planned mitigation measures to protect water resources A recommended measure stated in the section is to develop a monitoring plan to prevent potential impacts to source water protection areas throughout the life of the project. This information will be gathered during the USACE 404 permitting process.
L27	31	Hannah Ragland				It is unclear where the large quantities of water needed for this project would be withdrawn. Water withdrawals within the Denali Borough are unclear, as it the Borough is divided between two vast "spreads" (Table 5.2---22). The cumulative need for water identified in these two "spreads" totals over 400 million gallons of water. Without identifying (at least general) locations of surface water withdrawal, or even how much would be withdrawn from a more narrowly defined region (a specific watershed for example) there is not enough information to come to conclusions on the cumulative impacts to surface water, and the associated impacts with groundwater renewal and other natural processes, or the impacts to humans or habitat. It is presumptive to assume that there will be little impact to water resources without identifying more specifically where this water would come from.	This is all of the information that we currently have for the water withdrawal locations and quantities. Final determination of waterbodies for withdrawal will be defined later in the process. Sources will be permitted by ADFG and ADNR as needed to reduce adverse impacts to fish and their habitat. This information will be gathered during the USACE 404 permitting process.

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L27	32	Hannah Ragland	5.23			Is hydrostatic testing of the pipeline anticipated during pipeline operations, in addition to preconstruction? If so, it should be included in discussion of water resources (and associated impacts to fish), and addressed in terms of the cumulative impacts of this project.	Hydrostatic testing will only occur during construction. Section 5.23.2 identifies mitigation measures associated with hydrostatic testing
L27	33	Hannah Ragland				Current and approved future developments in the Denali Borough that would withdraw large amounts of water from local water bodies are dismissed or not addressed in this EIS. This includes water use associated with power generation, underground coal gasification and coal bed methane/natural gas exploration.	A full quantitative and qualitative analysis of the impacts to wetlands will be completed following final design and will be incorporated into any permit applications or NEPA documents that are generated at that time. There is a similar comment above. This information will be gathered during the USACE 404 permitting process.
L27	34	Hannah Ragland				Identified surface and subsurface water availability, quality, and current uses within the Denali Borough are severely lacking and should be further explored. For example, current surface water withdrawals in the Denali Borough associated with public supply, domestic self---supplied, industrial self---supplied, irrigation, livestock, aquaculture, and mining are "unknown." Only surface water use associated with thermoelectric power is "known."	This is all of the information that we currently have for the water withdrawal locations and quantities. Final determination of waterbodies for withdrawal will be defined later in the process. Sources will be permitted by ADFG and ADNR as needed to reduce adverse impacts to fish and their habitat. This information will be gathered during the USACE 404 permitting process.
L27	35	Hannah Ragland				The EIS states: "Supplemental site---specific fishery data for lakes south of Galbraith Lake where water would be withdrawn are not yet available. Additional site---specific data for each lake would be required to meet ADF&G and ADNR permit requirements." Deferring identification of these sensitive resources is insufficient for a full review of the impacts of water withdrawal to resources.	This is all of the information that we currently have for the water withdrawal locations and quantities. Final determination of waterbodies for withdrawal will be defined later in the process. Sources will be permitted by ADFG and ADNR as needed to reduce adverse impacts to fish and their habitat. This information will be gathered during the USACE 404 permitting process.

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L27	36	Hannah Ragland				There is currently a considerable amount of discharge into the Nenana River, including wastewater from Usibelli Coal Mine, GVEA's Healy Power Plant, the National Park Service, and a variety of smaller scale private and commercial sources. Water in the Nenana River and associated tributaries (and adjacent waterbodies that provide water through seepage and groundwater recharge) is critical to alleviate impacts from these discharges. A reduction of flow in the Nenana River, or its tributaries, could change the effects of discharges into the river, and should be addressed in this EIS.	AGDC does not intend to engage in activities that will result in a permanent reduction in flow of the Nenana River or its tributaries. Any in-water work on any rivers or streams will be conducted under the authority of permits issued by the USACE, ADNR, ADF&G and ADEC where those agencies have regulatory authority.
L27	37	Hannah Ragland				The value of recreational resources in the Denali Borough and adjacent DNPP should be emphasized, and development and operations should give adequate consideration to these values.	Recreation uses at Denali National Park and Preserve and associated impacts are covered in Section 5.10. Section 5.10 addresses all types of recreation activities in proximity to the pipeline route, including consumptive and non-consumptive uses (see Section 5.10.1.4). The impact analysis is intended to address all types of recreation uses, generally, and does not focus on specific activities unless noted.
L27	38	Hannah Ragland				Recreational users are generalized as mostly consumptive users of resources, such as hunters and fisherman. This may be true of some visitors to the area or to Alaska, but not for a large majority of visitors to DNPP. Visitors to DNPP are mostly non--- consumptive users of resources, and come from all over the world for the wild landscape and superlative opportunities to view wildlife and the tallest mountain in North America in a wilderness setting. Discussion of tourism makes no distinction between DNPP and other areas throughout Alaska, and no distinction between visitors coming to shoot a moose (or bear, or wolf) with a gun or with a camera. Most of DNPP's hundreds of thousands of visitors come from around the world armed only with a camera. The experiences they seek	Section 5.10 addresses all types of recreation activities in proximity to the pipeline route, including consumptive and non-consumptive uses (see Section 5.10.1.4). The impact analysis is intended to address all types of recreation uses, generally, and does not focus on specific activities unless noted.

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						(and the high value they place on the area's resources, beyond simply getting somewhere) are very different from a hunter or fisherman, and involve different timelines. This should be given adequate consideration, which is not currently present in this EIS.	
L27	39	Hannah Ragland				The seasonal influx of visitors currently leads to substantial traffic congestion, especially around the park entrance area, but also in surrounding communities. Increased traffic to and from material sites, and at construction sites, will put a significant burden on communities in the Denali Borough, along with residential users. These impacts should be given more consideration in the determination of scheduling and aboveground facility locations.	USACE acknowledges the concerns of the Denali Citizens Council with regard to traffic and congestion during construction. Further, as described in section 5.23, AGDC has committed to develop and implement traffic control plans to minimize negative impacts to transportation corridors. Construction through the area would primarily be in Winter 2, (see Appendix E, ST_336 and further south), but some of the crossings are proposed for the fall and summer 1. Each stream would be permitted individually and collaborations between AGDC and ADFG, NMFS to schedule each crossing to reduce impacts to the extent most practicable.
L27	40	Hannah Ragland				Construction and maintenance during the summer season will put an increased burden on local services. Although more services are available in the summer season, the services available are not sufficient to support tourism and a 500 person work camp. Given the substantial influx of visitors to the Denali Borough during the summer season, construction and maintenance during the summer months would have substantial impacts and should be minimized as much as possible. These impacts should be more clearly discussed in the Draft EIS.	As noted in the DEIS, the influx of workers will be housed at AGDC work camps where they will be provided with housing, meals, medical attention, and transportation to and from job sites. Also, construction will be conducted primarily during winter months in Denali National Park and Preserve. It is not anticipated that local services for food and medicine will be adversely impacted.

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L27	41	Hannah Ragland				Maintaining a cleared right---of---way for the ASAP pipeline will have significant visual impacts to the area surrounding Denali National Park and Preserve, whether or not the alternative route is selected. While using the existing Parks Highway right---of--- way would minimize visual impacts, increased clearing along the highway will change the visual character of the area. Many visitors travel along the Parks Highway from Fairbanks or Anchorage, via the George Parks Highway or the Alaska Railroad. Tourism to this area provides significant economic benefit to local residents, the Denali Borough, and the state. Every effort should be made to minimize the visual impacts.	Increased clearing of vegetation along the Parks Highway for the ASAP right of way would affect the visual character, but long-term effects following revegetation are expected to be weak to moderate due to low visual contrast to the existing natural and developed landscape. Existing linear features limit the line contrast, while revegetation will limit texture and color contrast. Form contrast will be greatest in areas with trees. Visual effects of material sites are discussed in Section 5.11.2.2 (Material Sites). As noted in the text, visual effects would depend on the location of these sites, which has not been determined. If sites are located within view of drivers on the Parks Highway, then visual impacts would be increased relative to locations not visible from high use travel corridors or other areas of increased sensitivity. However, if as expected, these facilities are located in areas with low visual sensitivity and lower value scenic resources, effects would be minimized.
L27	42	Hannah Ragland				Extensive use of gravel pits along the ROW will have long---term impacts to visual resources along the George Parks Highway, a recognized state and national scenic byway. Use of material sites along the Parks Highway should be considered as a long---term cumulative impact to visual resources (in addition to other environmental resources).	Visual effects of material sites are discussed in Section 5.11.2.2 (Material Sites). As noted in the text, visual effects would depend on the location of these sites, which has not been determined. If sites are located within view of drivers on the Parks Highway, then visual impacts would be increased relative to locations not visible from high use travel corridors or other areas of increased sensitivity. However, if as expected, these facilities are located in areas with low visual sensitivity and lower value scenic resources, effects would be minimized. The level of visual impact depends on three factors: distance, viewer sensitivity, and contrast to existing visual resources. Existing visual resources in the park entrance area include the cluster of development, which reduces the level of visual contrast that the route would create in this location.

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L27	43	Hannah Ragland				While there are currently visual impacts to the view from the park entrance area, namely the cluster of development just outside the park entrance area, this should not be used as a reason to increase visual impacts. Such incremental increased will be detrimental to the integrity and quality of the visitor experience to DNPP, and should be given adequate consideration.	The level of visual impact depends on three factors: distance, viewer sensitivity, and contrast to existing visual resources. Existing visual resources in the park entrance area include the cluster of development, which reduces the level of visual contrast that the route would create in this location. Existing development is not a reason to increase visual impacts, but it does reduce the visual contrast, and therefore the visual impact, of new development in the nearby vicinity. The area near MP 540 where the route departs from the Parks Highway and traverses a side slope is located in an area with existing commercial development and linear roads that reduce visual contrast of the proposed hill cut and pipeline route. As noted in the comment, this context of nearby visual resources is important to identifying the level of contrast. The photo has been added to the analysis in Section 5.11.2.2. As in section 5.11.2.3 (Construction), during construction, impacts of the Denali National Park Route Variation, is expected to result in short-term high visual impacts to travelers on the Parks Highway as well as visitors to eastern Park lands and tourist facilities near the Park entrance, particularly if construction occurs during the high visitor season from May to mid-September. However, once the area is revegetated, long term visual impacts of the ROW clearing along the Parks Highway are expected to be weak as the route parallels the linear feature of the highway (reducing line contrast) and would be revegetated, reducing texture and color contrast, and are thus not expected to modify the long-term visual character of the area. Also, while there is an aboveground segment of the route as it crosses the pedestrian/bicycle bridge, visual impacts are expected to be primarily limited to the construction time period as the pipeline is expected to only be visible to travelers on the Nenana River and not those on the Parks Highway or on the bridge itself.

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L27	44	Hannah Ragland				Alternatives in the Draft EIS for laying pipeline in areas with high seismic activity include above--- and belowground options. An aboveground option would have substantial impacts to visibility, a highly valued resource in this area. Considering the Denali Borough's economic value to the state as a tourism destination, this impact should be considered carefully. It should be clearly identified whether the pipeline would run above--- or belowground, and what the associated impacts to visibility would be before a route variation is selected.	The visual section of the DEIS clearly states in Section 5.11.2.2 that the majority of the mainline pipeline would be constructed belowground. Above ground options should be discussed in the Alternatives section. Simulations of the Denali National Park Route Variation were completed for KOPs located at MP 234 on the Parks Highway south of DPP entrance and at the Mt. Healy Overlook Trail. AS described in Section 5.11.2.3, the Denali National Park Route Variation is expected to follow the Parks Highway ROW for the approximately 7 miles that the route is located within the DPP boundaries. KOP at MP 234 on the Parks Highway represents the visual contrast of the route as seen from the Parks Highway, which is the primary travel route in the area. There is an identical comment above check or consistency
L27	45	Hannah Ragland				A full visual impact comparison and analysis of both the proposed mainline route (completed, Appendix K), and route DNPP variation should be conducted for comparison before selection of an alternative route.	Simulations of the Denali National Park Route Variation were completed for KOPs located at MP 234 on the Parks Highway south of DPP entrance and at the Mt. Healy Overlook Trail. AS described in Section 5.11.2.3, the DNPP is expected to follow the Parks Highway ROW for the approximately 7 miles that the route is located within the DPP boundaries. KOP at MP 234 on the Parks Highway represents the visual contrast of the route as seen from the Parks Highway, which is the primary travel route in the area. As provided in Section 5.12.2.1, the importance of tourism in the Denali Borough is illustrated by the high percentage of employment in the arts, recreation, accommodation and food service sectors (48.8% of total jobs). The visual section of the DEIS clearly states in Section 5.11.2.2 that the majority of the mainline pipeline would be constructed belowground. Above ground options would be discussed in the Alternatives section, but are not analyzed in the resource sections as they are not selected Alternatives in the DEIS.

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L27	46	Hannah Ragland	5.15			There are a number of inaccuracies about the services available in the Denali Borough. Because these services are used to determine the community's capacity to handle the influx of construction workers (and associated health impacts), AGDC should consult the Denali Borough (and other municipalities for that matter) to update the EIS with accurate information.	This comment is listed as part of section 5.12 (Socioeconomics) but references inaccuracies in the listed local services with respect to public health. In the last round of comments we reviewed the services identified for the Denali Borough in Section 5.15.3.2, the Community Profiles section. We revised a statement about the availability of medical care facilities near Healy (Part of the Denali Borough) to be more specific. We revised the statement to read: "The Tri-Valley Community Center, a qualified emergency care center affiliated with the Interior Community Health Center in Fairbanks, provides local health care. * Specialized care (Railbelt Mental Health & Addictions and Healy Senior Center) and auxiliary health care are also offered." The starred footnote to this statement acknowledges the public comment by stating: "A public comment was received indicating that the Tri-Valley Community Center provides some medical services year-round but is not staffed by a physician. " We checked the Alaska Community Database for the towns in the Denali Borough (Anderson, Healy, McKinley Park, and Cantwell). In addition to clarification for Healy noted above, we clarified that ambulance service in McKinley Park exists in the summer. Otherwise, the current AK community database entries are reflected in the text. The commenter requests that AGDC should consult with the Denali Borough (and others) to update the EIS with accurate information. We phoned the Denali Borough Department of Commerce (listed as the contact for community information in the Alaska Community Database (907-683-4636 and spoke with Connie MacMaster in Healy. Summarized the information for the 4 Denali Borough towns with regard to medical services and asked Connie if the information we had was correct. We also asked if there had been any major changes in public health services in the past few years. Connie was able to tell us about the Canyon Clinic at

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							Denali which we added to the section and stated that no major changes had occurred with regard to health services in the past few years. We agree that updated information on public health services is important for a project that will span many years. As a result of this and other comments we added the following statement to the end of Section 5.15.3.2 Community Profiles under the heading: Health Related Services within the PACs During Construction and Operation of the Proposed Project. "The community information presented in this section has been developed from local sources (e.g. community newspapers, and websites), State of Alaska government publications and websites (e.g. the Alaska Community Database), and information published online and in print by various public awareness and advocacy groups. Over time, it is possible that the quantity and level of health related services within each PAC may change. For that reason it is recommended that ACGD set up an outreach program to coordinate with the PACs to maintain and update an inventory of health related services. During construction and operation of the proposed Project, knowledge of the available services will help minimize the potential impacts to the PACs."
L27	47	Hannah Ragland				The scope of this project, and the potential associated impacts, make it critical to allow for local comments on site---specific proposals. Recent meetings were scheduled in the southern reaches of the Denali Borough, in the middle of the day, during the workweek. This minimizes public opportunities to get more information and comment in person. Meetings in Healy should be scheduled during the Final EIS comment period.	Comment acknowledged.

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L27	48	Hannah Ragland				It is in the best interest of AGDC, the state, the Borough, and local residents, for AGDC to work cooperatively with local municipalities to solicit more detailed information about the affected area. For this reason I support the creation of some form of municipality or citizen advisory board. This would help to disseminate information about local impacts, and provide meaningful feedback.	Comment acknowledged.
L27	49	Hannah Ragland				Because all of the parts and pieces of the EIS are divided into separate documents (both online, and the digital copy provided locally at the public library), it is difficult to search through related actions and issues discussed in different sections of the EIS. This makes it difficult to provide meaningful public comments. Information about specific resources should be included in the same section, or references to topics repeated throughout the EIS should be provided in some sort of glossary.	Comment acknowledged.
L28	1	AGDC				EIS Abstract: The proposed pipeline will not extend to “Point MacKenzie, Alaska” but instead will terminate approximately 16 miles from Point MacKenzie. Other statements are made that the pipeline end point and associated NGL facility will be located at Wasilla, Alaska, which is also incorrect. The pipeline terminates at milepost (MP) 737, connecting at MP 39 of the Beluga Pipeline near Big Lake (ENSTAR Beluga Distribution System).	The proposed pipeline will extend to Point MacKenzie, Alaska. Point MacKenzie is a census-designated place (CDP) in Matanuska-Susitna Borough, Alaska, United States. It is part of the Anchorage, Alaska Metropolitan Statistical Area. Point MacKenzie is discussed in Section 5.9.1.10.
L28	2	AGDC	Abstract			EIS Abstract: The first sentence of this section says that the U.S. Army Corps of Engineers (USACE) received a “complete permit application” from AGDC on November 1, 2011. This is not correct. The word “complete” should be deleted.	Text has been revised to state: "On November 1, 2011, the USACE, Alaska District received the Alaska Gasline Development Corporation’s (the Applicant’s) draft permit application to construct and operate the proposed Alaska Stand Alone Gas Pipeline Project (Project). The applicant is gathering the information necessary for a complete application."

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L28	3	AGDC				EIS Page ES-7: The last paragraph on page ES 7 discusses the Denali National Park and Preserve (NPP) Route Variation and states that AGDC will work with the National Park Service (NPS) to "assure that the route or mode would be the LEDPA [least environmentally damaging practicable alternative]." However, the Alaska Gasline Development Corporation (AGDC) does not believe that the Denali NPP Route Variation is the LEDPA and is not intending to work with NPS, or promoting this variation, to make it the LEDPA. Moreover, the pending legislation referred to in this paragraph would not authorize NPS to issue a right-of-way (ROW) in Denali NPP if it is the LEDPA. "LEDPA" is a Clean Water Act term that is not directly applicable in this context. Rather, S. 302 would authorize issuance of a ROW, subject to other requirements in the Alaska National Interest Lands Conservation Act (ANILCA) Title XI that are impracticable for AGDC to comply with, if "the route of the right of way is the route through the Park with the least adverse environmental effects for the Park[.]" For example, compare with DEIS Section 4.4.2.3, page 4 17, which contains a more accurate description of what S. 302 would accomplish but which repeats other flaws.	The Denali National Park Route Variation is not the proposed action and is considered as a route variation alternative to the proposed action in the FEIS. Route variations were identified to resolve or potentially reduce construction impacts to localized, specific resources such as cultural resources sites, wetlands, streams, recreational lands, residences, or terrain conditions. The LEDPA has not yet been determined by the U.S. Army Corps of Engineers. The text in the Executive Summary has been revised to delete references to the LEDPA and to be consistent with Section 4.4.2.3 as suggested. The subject sentence reads "If such legislation is passed into law, the NPS would have authority to issue a ROW permit for a pipeline route which would result in the fewest or least severe adverse impacts upon the Park."
L28	4	AGDC	ES			EIS Page ES-12: This section includes a photo of "Yukon Flats" with the discussion of project impacts on wetlands. However, the proposed ASAP route does not enter the Yukon Flats National Wildlife Refuge. Including this photo is potentially confusing to the public because it implies the project traverses a federally protected wildlife refuge when it does not. The photo should be replaced.	Photo of Yukon Flats has been removed from the Executive Summary.

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L28	5	AGDC	ES			EIS Pages ES-14, ES-15: The analysis of effects on threatened and endangered (T&E) species within the entire DEIS needs to be reviewed and edited to improve accuracy and consistency. There are numerous inconsistencies across the DEIS with respect to this topic. Within this portion of the Executive Summary, there is a reference in the first paragraph to the project area including sea otter critical habitat. However, DEIS Section 5.8.4.12, which discusses effects on sea otters, while stating that critical habitat has been designated, never discusses anything about effects of the proposed action on critical habitat. The same first paragraph on page ES 14 refers to the Eskimo Curlew, which is a species that has not been seen for 50 years and is acknowledged later in the DEIS to be considered extinct (Section 5.8.4.14). On page ES 15 it states that polar bear critical habitat is "likely to be adversely affected." This statement confuses concepts and is misleading. The project is likely to adversely affect small numbers of individual polar bears by deflecting them to other areas without injury or mortality. The project will be located within a portion of designated polar bear critical habitat, but will not adversely modify or destroy critical habitat as those terms are used in the Endangered Species Act (ESA). As explained in the accompanying paragraph, the location of project infrastructure and facilities, although located within polar bear critical habitat, is not in an area suitable for denning or known to be used by polar bears. The introductory paragraph on page ES 14 lists all of the T&E species, but does not mention the yellow billed loon (a "candidate" species) even though YBLs are later discussed on page ES 15 and in Section 5.8. These are just examples.	Text was clarified in the T and E chapter 5.8.4.12 and ES Environmental Analysis, T and E - to discuss sea otter critical habitat and effects of the proposed Project. The Eskimo curlew's status of likely being extinct is also discussed in the T and E chapter. Potential impacts to the polar bear Section 5.8.4.9 and clarification of the project likely to adversely modify a few bears was added in the T and E chapter and the ES Environmental Analysis, T and E. The yellow billed loon was added in the text of the ES to match the T and E chapter 5.8.4.16. Polar bear text in ES is consistent with the T and E resource chapter 5.8.

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L28	6	AGDC	1.0			EIS Section 1.2.4.2, Page 1-10: The first bulleted paragraph in this subsection states that ANILCA Title XI would apply to the Denali NPP Route Variation. A correct statement would be that the Denali NPP Route Variation is currently unlawful, and that ANILCA Title XI would apply to the Denali NPP Route Variation if Congress were to pass S. 302 authorizing the project to traverse a section of the Denali NPP if certain specified requirements are met.	The second sentence of the referenced bulleted paragraph states: "Transportation systems that are proposed to cross a CSU created or expanded by ANILCA require an act of Congress if such transportation system would cross any congressionally-designated wilderness area, or if there is no existing authority for granting a ROW for the particular type of transportation system proposed, such as a natural gas pipeline across NPS units in Alaska."
L28	7	AGDC	2.0			EIS Section 2.1.3.3, Page 2-15, last paragraph: As a general comment, the DEIS needs to better address instances where it is stated that information is missing or unavailable. On this page, in the last paragraph, the point is made that site specific temporary extra workspaces (TEWS) have not been identified and so these areas have not been included in the project impact calculations and assessment. Simply making this statement does not comport with the requirements of the National Environmental Policy Act (NEPA). NEPA regulations at 40 C.F.R. § 1502.22 address incomplete or unavailable information. In basic terms, the regulations state that a threshold determination should be made whether the missing information is both relevant and essential to a reasoned choice among alternatives, and if so, whether the costs of obtaining the information are exorbitant. Depending upon these findings, the regulation specifies additional considerations and findings that should be made. In this instance, we think that the information is generally relevant, but certainly not essential to a choice among alternatives. The specific TEWS are reasonably expected to involve a relatively small area and to have temporary effects, and the choice of alternatives is not at all likely to be	The last paragraph of Section 2.1.3.3 has been deleted from the text of the EIS and a more complete description of the TEWs has been crafted within the section. The TEWS would range in size from less than one half acre to 9 acres, most would be occupy less than 1 acre. A total of 1,902 TEWS are proposed. The total area occupied by all proposed TEWS would be approximately 982 acres.

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						influenced by knowing the specific TEWS given the limited scope of the alternatives. We recommend addressing these points, or such points as USACE may deem appropriate to comply with § 1502.22, in a footnote.	
L28	8	AGDC				EIS Section 2.3.1, Page 2-47: This section states that the Cook Inlet NGL facility, which is to be located adjacent to the end point of the pipeline, will be in Wasilla, Alaska. However, the NGL facility will not be located in Wasilla. The pipeline terminates at milepost (MP) 737, connecting at MP 39 of the Beluga Pipeline near Big Lake (ENSTAR Beluga Distribution System).	Location reference changed to Big Lake.
L28	9	AGDC				EIS Section 3, Page 3-1: Overall, this section is much improved from the PDEIS. If USACE receives critical comments on this section, it should consider elaborating on the explanation in the DEIS based upon the USACE's record memo that details the context and underlying rationale.	Comment acknowledged.
L28	10	AGDC				EIS Section 3.3, Page 3-6: The discussion of environmental effects should be enhanced, particularly with respect to the connecting pipelines. It should be possible to estimate the relatively short length of the pipelines and the approximate number of associated vertical support members (VSMs) required, thereby allowing for a reasonable approximate estimate of the affected area. Given the limited scope of this connected action and its foreseeable effects, it should be possible to provide more specific details.	In response to this comment, further information regarding the connecting pipelines was requested from AGDC. The response provided by AGDC estimated the distance between the two gas facilities to be approximately 1000 ft, and states: "The connecting lines constitute a connected action to the ASAP Project, and as such, AGDC does not know what size the VSMs will be, how far apart they will be, and what configuration will be used." Section 3.1 of the FEIS has been revised to state: "The distance between the two gas facilities would be approximately 1,000 feet." Table 3.2-1 has been revised to state: "If construction activities would be contained within a 100 ft wide ROW, the maximum area affected would be approximately 2.3 acres."

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L28	11	AGDC				EIS Section 4.0, Page 4-1: NEPA requires consideration of a reasonable range of alternatives, not all reasonable alternatives. This clarification would be a useful one to make. Also, the statement in footnote 1 is made without citation to any authority. Where has the Council on Environmental Quality (CEQ) defined "reasonable alternatives" to mean what is stated in footnote 1?	The Council on Environmental Quality (CEQ) - Regulations for Implementing NEPA, 40 CFR Part 1502.14, Alternatives Including the Proposed Action, states: "...In this section agencies shall; (a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated..." Footnote 1 has been revised to include the source: (Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed. Reg. 18026 (1981). Ed. Note. March 16, 1981)
L28	12	AGDC				EIS Section 4.4.2.3, Page 4-17, 2nd paragraph: The text in the second paragraph again refers to the Denali NPP Route Variation as the "proposed route variation" even though no one, and certainly not AGDC, is proposing it. This paragraph again implies that the Denali NPP Route Variation is desired and is awaiting passage by Congress of a bill allowing it to proceed. Insofar as AGDC is aware, this alternative is a vestige of past discussions with a different potential applicant under circumstances in which it may have been erroneously assumed by the NPS that the ASAP Project would supply natural gas directly to the NPS within Denali NPP. Even were the pending bill to pass, which is speculative, the Denali NPP Route Variation would remain impracticable and contrary to the land use and recreational interests and values that underlay establishment and management of the Denali NPP. These conflicts are not mentioned, but they should be because they are a significant environmental impacts consideration.	In Section 4.4.2.3, references to the "proposed Project route" and the "proposed route" pertain the ASAP route as proposed by AGDC. The Denali National Park Route Variation is consistently referred to as the "Denali National Park Route Variation" and "the route variation". Section 4.4.2.3 further states " Currently, federal laws would not allow construction of this route variation within Denali National Park (see further discussion of applicable National Park Service regulations in Section 1.2.6.3). Federal legislation that would allow the route variation has been introduced by the Alaska delegation, and is currently being considered by the U.S. Congress." Section 4.4.2.3 concludes that the Denali National Park Route Variation is a reasonable alternative. The potential impacts of the Denali National Park Route Variation have been analyzed in detail in Section 5 of the FEIS.

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L28	13	AGDC				EIS Section 4.6, Page 4-23, Table 4.6-1: The entry in this table regarding the Denali NPP Route Variation, under the category of conclusion, is not correct. It is not true that the Denali NPP Route Variation is “a reasonable, constructible alternative.” Currently, the Denali NPP Route Variation is prohibited by law, and it would require an act of Congress to change this circumstance. Given that such a bill has been introduced, it may be reasonable for USACE to consider this alternative for NEPA purposes, but the conclusion needs to state that the route is currently unlawful, and that there are issues regarding compatibility with national park values and uses.	The issues raised in this comment are addressed in Section 4.4.2.3 of the FEIS. For clarification, a footnote to the text in summary Table 4.6-1 has been added and states: "Federal legislation that would allow the route variation that has been introduced by the Alaska delegation, and is currently being considered by the U.S. Congress."
L28	14	AGDC	6.0			EIS Section 5.0, Page 5-1: This section provides introductory text regarding assessment of impacts. Under NEPA, assessing impacts for their significance is a function of intensity and context. See 40 C.F.R. § 1508.27, which defines “significantly”. Intensity is determined by a combination of the magnitude of the effect (major, moderate, minor/negligible or none); duration (long term or temporary); probability (likely, possible, unlikely); and geographic extent (local or limited, or extensive). Context is generally a function of the relative suitability of a proposal given its location (i.e., the setting). Accordingly, for example, locating a pipeline within an existing industrial complex or transmission corridor has less impact than locating the same pipeline within a wilderness or national park because in the former context the pipeline is a consistent use, whereas in the latter context the pipeline is an inconsistent use. Based upon intensity and context, NEPA documents typically make findings that the impact of the proposal or alternatives on a given	Impact rankings have been added to the EIS in Section 6.1. The tables in Chapter 6 define and assign rankings (low (L), medium (M), and high (H)) to the potential effects of the proposed Project.

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						element of the environment is "significant," "moderate," "negligible", or "none." As drafted, this section discusses duration, but does not otherwise identify the standard NEPA indexes of impacts assessment, such as magnitude and probability (except in the public health assessment in Section 5.15), and also does not mention context, which is an important significance factor for the Denali NPP Route Variation. Moreover, the entire DEIS does not consistently use standard assessment terms, such as "significant," "moderate", and "negligible" or "none" regarding overall impacts, and instead often uses the term "considerable" to encompass both "significant" and "moderate" impacts. However, "considerable" is not a term of art under NEPA and conveys limited information given its subjective meaning.	
L28	15	AGDC	5.23			EIS Section 5.0, Page 5-1: The DEIS makes a broad statement in each section that the project would use the mitigation procedures identified in the March 2011 Applicant Proposed Mitigation Measures document (Appendix H of the DEIS), but the DEIS also notes several additional mitigation measures for each resource as "recommended". The text states that "Mitigation measures that could further reduce impacts are identified for each affected resource in Sections 5.1 through 5.19." It is important that the mitigation measures identified as the applicant's in each subsection of Section 5 match those in Appendix H. With regard to other possible mitigation measures identified in the DEIS, it is appropriate for a NEPA document to identify and to analyze the effectiveness of potential mitigation measures beyond those proposed by the applicant. However, NEPA is an entirely procedural statute. NEPA process informs, but	A mitigation chapter has been added to the FEIS. Please see Section 5.23. The mitigation chapter 5.23 has been edited to remove all (Additional Recommended Mitigation - ARMs) and provide an analysis and effectiveness of AGDCs proposed mitigation.

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						does not dictate, permitting decisions. Because NEPA does authorize any substantive decisions, such as adoption or imposition of mitigation, it is not appropriate to characterize as "recommended" any additional mitigation that may be analyzed in the NEPA document. Moreover, to the extent additional measures are included, doing so is only useful if their potential benefits are clearly identified.	
L28	16	AGDC	5.2			EIS Section 5.2.2.2, Page 5.2-69, and "Denali National Park Route Variation": 1. This section is labeled to address the Proposed Action. Perhaps there is a missing new section number for consideration of alternatives. 2. This section reflects a tone of advocacy evident across virtually all sections of the DEIS that address the Denali NPP Route Variation. There is no attempt to put the comparison in context with the overall project (i.e., that this comparison concerns a very small segment of the project) where the relevant comparison is really about visual effects versus land use conflicts. Although this and many other Denali NPP sections state that the differences between the Denali NPP and the proposed route are "considerable" and favorable to the Denali NPP Route Variation, with very limited exceptions, both alternatives present impacts that are very limited and at least essentially identical. This section also emphasizes differences regarding wetlands and vegetation that are addressed elsewhere, but does not mention context/compatibility concerns inherent in locating an industrial facility in a national park.	The Denali National Park Route Variation is considered as a route variation alternative to a segment of the proposed action in the FEIS. Route variations were identified to potentially resolve or reduce construction impacts to localized, specific resources such as cultural resources sites, wetlands, streams, recreational lands, residences, or terrain conditions. The Denali National Park Route Variation has been analyzed in detail in Section 5 of the FEIS. The proposed project's Mile 540 to Mile 555 segment has also been analyzed to provide for a comparative analysis to the segment of the proposed project that the Denali National Park Route Variation would replace. Issues regarding land use compatibility are addressed in Section 1.2.4.2 National Park Service and Section 5.9 Land Use of the FEIS. Comment had not been addressed in WAT (5.2) previously. Text was edited in section 5.2.2.2 under Denali National Park route to correct for the inappropriate tone that may indicate advocating for one variation or the other and comparison of the Denali National Park route to the mainline route was removed. Specific text: The Mainline pipeline route from MP 540 to MP 555 proposes to cross six drainages (Montana, Yanert, Carlo and three other unnamed drainages) via open-cut methods (AGDC 2011d) (Table 5.2-24). Construction in these streams would result in potentially short term and long-term impacts as noted above under open-cut methods. Final pipeline crossing location and stream crossing methods will be determined later in the

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							planning process as part of the permitting requirements of the proposed Project.
L28	17	AGDC	5.2			EIS Section 5.2.2.2, Page 5.2-79, Table 5.2-27: This table is an example of use of a rating system for impacts that compares "considerable" to "negligible." Typically, impacts are rated as "significant," "moderate," "negligible," or "absent." Also, it is not demonstrated that the impacts of excavation in a water body, particularly if done during the winter, would be significant. The impacts would be very short term (1 to 3 days) per location, and very local in extent. It is likely the impacts from in-water excavation will vary from limited to potentially significant depending on stream size, receptors, season, mitigation measures, and other factors.	Addressed text in Table 5.2-26 and 5.2-27 to include all 4 categories and add the appropriate ranking. Also edited text in the body of the document to be consistent with the tables. Cross referenced with the conclusions chapter for effects ranking.
L28	18	AGDC	5.3			EIS Section 5.3.1.4, 5.3.2.2; Pages 5.3-14, 5.3-22 and elsewhere: Non native and invasive plants are discussed. Specific examples are not given, although some specific plants are noted in the wetlands section (page 5.4 18). The actual plants that may result in an impact should be identified, or the vegetation section is speculative. The existence of non native and invasive plants along the Dalton and Parks highways is noted. However, if these are the result of deliberate re vegetation, they are easily mitigated for the ASAP ROW. It is also necessary to describe if they have spread beyond the maintained highway ROW or are restricted to disturbed areas. These are important consideration for assessing impacts of the project.	The text has been revised to include specific examples of the most invasive plant species in Alaska as well as text that states invasive species are associated with disturbance and not areas beyond disturbance. The list of invasive plants is located in section 5.3.2.2 and has been edited to list the species in bullet form for easier identification of the species list in the document.

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L28	19	AGDC	5.3			EIS Section 5.3.2.2, Page 5.3-27: AGDC comments on earlier sections of the DEIS contain detailed discussion of the inappropriate manner in which the Denali NPP Route Variation is discussed in the DEIS (e.g., see comments on DEIS pages ES-7, 4-17, 4-23, 5-1, 5.2-69). This section again states that impacts to vegetation will be "considerable," which is not defined, when in fact, the impacts to vegetation for both routes of this very limited section are not an important environmental consideration. No distinction is drawn between impacts to vegetation within a national park established as a "preserve" of national significance, and vegetation on state and private lands that the state has already authorized by issuing a ROW and that have not been designated for preservation at all.	The text has been revised to remove the word considerable and clearly defined the acreage comparison from current developed land % for each route and % of vegetation type to be developed.
L28	20	AGDC				EIS Section 5.4.1, Page 5.4-2, 1st paragraph: In the PJD (AES 2011), wetlands HGM classes were based on the Magee and Hollands Functional Capacity methodology, not Brinson. Please revise accordingly. The correct HGM classes are: Depressional, Slope, Flat, Riverine, and Lacustrine Fringe (Page 12 of 2011 PJD).	The text has been revised for accuracy to change citation to Magee and Hollands
L28	21	AGDC	5.4			EIS Section 5.4.1, Page 5.4-2, 2nd paragraph: The text states a third classification system (NLCD) was used where NWI and HGM were not used. Please clarify whether the use of NLCD was by the DEIS authors; the Preliminary Jurisdictional Determination (PJD) contained in AES (2011) has no reference to NLCD or to using NLCD for any mapping or wetlands determinations.	Text was added to section 5.4.3.2 to state: Additional wetland determinations will be completed in order to comply with permit requirements.

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L28	22	AGDC				EIS Section 5.4.2.1, Page 5.4-10: The 2,000 foot planning corridor included in the 2011 PJD does not include wetlands mapping or acreage summaries for the Denali NPP Route Variation. Total acreage calculations in the 2011 PJD are for the 300 foot corridor only. No acreage calculations were performed for the 2,000 foot planning corridor. Section 3.3 of the 2011 PJD states that all data points associated with the Denali NPP were removed from the PJD since the alignment was removed from the park property. Because Section 5.4.1 of the DEIS indicates the 2011 PJD was used to evaluate impacts within the 2,000 foot planning corridor, the DEIS should properly cite the source of the wetlands information about the Denali NPP variation.	The text has been revised for accuracy to include that all data points associated with the Denali NPP were removed from the PJD since the alignment was removed from the park property. Appropriate citations have been made in the text.
L28	23	AGDC	5.4			EIS Section 5.4.2.1, Page 5.4-10, Figures 5.4-6 and 5.4-7: Revise with appropriate citations to indicate calculations were not part of the 2011 PJD.	Appropriate citations have been added. The citations were revised to clarify that the source of the wetland delineations is the PJD (AES, 2011), the source of the ROW footprint is AGDC (AGDC 5/21/12), but the wetland acreage impacts for the ROWs were calculated by Cardno ENTRIX. Example from table footnote: All ROW wetland acreage calculations are derived from spatial analysis completed by Cardno ENTRIX. Acreage calculations are based on Temporary Construction Easement (AGDC 05-21-12) Source: AES 2011
L28	24	AGDC	5.4			EIS Section 5.4.2.2, Pages 5.4-12 & 5.4-13, Figures 5.4-8 & 5.4-11: Include appropriate citation, as it is implied that the 2011 PJD was used to derive these data.	Appropriate citations have been added. The citations were revised to clarify that the source of the wetland delineations is the PJD (AES, 2011), the source of the ROW footprint is AGDC (AGDC 5/21/12), but the wetland acreage impacts for the ROWs were calculated by Cardno ENTRIX. Example from table footnote: All ROW wetland acreage calculations are derived from spatial analysis completed by Cardno ENTRIX. Acreage calculations are based on Temporary Construction Easement (AGDC 05-21-12).

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L28	25	AGDC				EIS Section 5.4.2.2, Page 5.4-12, 2nd paragraph, 1st sentence: AES (2011) makes no reference to variable construction ROW widths being evaluated in the PJD. Revise citation accordingly.	Appropriate citations have been added.
L28	26	AGDC	5.4			EIS Section 5.4.3, Page 5.4-15, Table 5.4-2: The source for the table is the PJD (AES 2011); however, this source contains acreage calculations only for 300 foot corridor and does not contain mapping at all for the Denali NPP Route Variation.	Appropriate citations have been added. The citations were revised to clarify that the source of the wetland delineations is the PJD (AES, 2011), the source of the ROW footprint is AGDC (AGDC 5/21/12), but the wetland acreage impacts for the ROWs were calculated by Cardno ENTRIX. Example from table footnote: All ROW wetland acreage calculations are derived from spatial analysis completed by Cardno ENTRIX. Acreage calculations are based on Temporary Construction Easement (AGDC 05-21-12) Source: AES 2011
L28	27	AGDC				EIS Section 5.4.3, Pages 5.4-16 & 5.4-22, Tables 5.4-3 & 5.4-5: For Tables 5.4-3 and 5.4-5, revise the citation for HGM from Brinson to Magee & Hollands in accordance with the PJD (AES 2011). Also, as in Table 5.4 2, the PJD does not evaluate the construction ROW or the Denali NPP Route Variation. Revise the citation accordingly. Tables 5.4 3 and 5.4-5 include "Uplands", which is not one of the HGM classifications, and the table title indicates the acreage relates to wetlands. Even though the table indicates a subtotal for wetlands, please remove "Uplands" from the table as they are not part of an HGM wetland class, and they should not be included in the total wetlands acreage calculation (as per table title). Including them can mislead the reader to understand that HGM wetlands impacts are 5,169 acres more than are actually present. Revise totals accordingly.	Appropriate citations have been added.

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L28	28	AGDC	5.4			EIS Section 5.4.3.2, Page 5.4-24, last paragraph: The PJD (AES 2011) is included as the citation for deriving impacts for the Yukon River options. The PJD only evaluates impacts for the 300 foot corridor. The text should clarify the source used.	Appropriate citations have been added. The citations were revised to clarify that the source of the wetland delineations is the PJD (AES, 2011), the source of the ROW footprint is AGDC (AGDC 5/21/12), but the wetland acreage impacts for the ROWs were calculated by Cardno ENTRIX. Example from table footnote: All ROW wetland acreage calculations are derived from spatial analysis completed by Cardno ENTRIX. Acreage calculations are based on Temporary Construction Easement (AGDC 05-21-12) Source: AES 2011
L28	29	AGDC				EIS Section 5.4.3.2, Page 5.4-25, "Denali National Park Route Variation": AGDC comments on earlier sections of the DEIS contain detailed discussion of the inappropriate manner in which the Denali NPP Route Variation is discussed in the DEIS (e.g., comments on DEIS pages ES-7, 4-17, 4-23, 5-1, 5.2-69).	The text has been revised for accuracy for describing the comparisons for the Denali National Park route to the mainline route.
L28	30	AGDC	5.4			EIS Section 5.4.3.2, Page 5.4-25, "Denali National Park Route Variation": Since the PJD specifically removed the Denali NPP Route Variation from the report, please include the source of this information on wetlands impacts. Remove all references to AES (2011) from the Denali NPP evaluation. The current language in paragraphs 2, 3, and 4 is confusing. The reader cannot determine if the impacts are associated with the proposed alignment or the Denali NPP Route Variation.	Text has been revised in Section 5.4.3.2 Denali National Park Route Variation to state: The majority of wetlands impacted (85 percent) along the Denali National Park Route Variation would be scrub/shrub. The types of wetland impacts noted above from construction activities of the mainline route would also apply to the Denali National Park Route Variation.
L28	31	AGDC				EIS Section 5.4.3.2, Page 5.4-27, Table 5.4-6: Remove “Uplands” from table and revise calculations. At present, the table (according to title) includes uplands in wetland calculations, which artificially elevates the acreage impact prediction.	The text has been revised for accuracy to remove uplands from all tables.

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L28	32	AGDC	5.4			EIS Section 5.4.3.2, Pages 5.4-29 and 5.4-30, "Fragmentation": Due to the relatively few roads and their size in relation to the overall wetland coverage, fragmentation could be minor and would likely not "bisect" wetlands. It is likely that "sliver takes" would occur. Please substantiate this comment by showing figures/calculations indicating "bisection" and major or moderate fragmentation would occur. Based on the total road acreage listed (30 acres) and the total number of wetlands present in the construction ROW only (~5400, Table 5.4 2), the overall access road impacts would be just over 0.5% of the total wetlands present in the ROW assuming all 30 acres of roads will impact wetlands. Because it is likely the project sponsor will be required to locate roads to avoid/minimize impacts, the total impacts are likely to be even less.	The text has been revised for accuracy. Fragmentation is an impact to wetlands from access road development. Text revision is located in section 5.4.3.2 - Proposed Action, Environmental Consequences, Fragmentation under Aboveground Facilities by Segment.
L28	33	AGDC	5.5			EIS Section 5.5, General: The environmental consequences need to be put in perspective of the magnitude of the area impacted relative to all of that available (e.g., how much wildlife habitat is disturbed in the ROW, compared to the available habitat in the surrounding area?). The vastness of the undeveloped areas adjacent to the ASAP ROW suggests that the loss of habitat (e.g., nest trees) or disturbance impacts would be insignificant compared to adjacent un impacted areas. This perspective should be integrated into all of the discussion about impacts on wildlife. This perspective on impacts is a critical factor for a pipeline in a transportation corridor.	The text has been revised for accuracy to indicate that the project will not limit habitat for wildlife. Text revision is located in section 5.5.2 - Environmental Consequences.

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L28	34	AGDC	5.5			EIS Section 5.5.1.1, Page 5.5-5, "Big Game Animals": The text does not adequately present issues for bison. First, plains bison are currently in four populations (Delta, Copper River, Chitina River, and Farewell). The Delta herd and Farewell herd may be close to the ASAP ROW alternative routes. The harvest of bison noted on page 5.5 5 should be identified as from these plains bison, and this species should be added to Table 5.5 2 and a section added to the text. The wood bison is mentioned on page 5.5 5 as to be potentially introduced to the Yukon Flats National Wildlife Refuge (NWR). It is also described in the T&E section. There are other locations besides the Yukon Flats NWR that are being considered for wood bison introduction (e.g., Minto Flats, Innoko). However, the plans for this introduction are not definitive, and wood bison may be inappropriate for consideration in the ASAP DEIS. Note that the Biological Assessment (of T&E species) makes no mention of wood bison. It may be appropriate to delete them from the Wildlife section, T&E section, and Executive Summary.	The text has been revised to delete wood bison from Section 5.8 (threatened and endanger species). Large terrestrial mammals was added instead of big game in some instances.
L28	35	AGDC	5.5			EIS Section 5.5.1.1, Pages 5.5-6 & 5.5-7: Timing of construction activity to avoid caribou migration periods could be incorporated into the project planning with local community and Alaska Department of Fish and Games (ADF&G) involvement. In addition, construction will be in one season only so it is important to note the limited time over which impacts will occur. (See Cronin et al. 1994. Mitigation of the effects of oil field development and transportation corridors on caribou. A Report to the Alaska Oil and Gas Association by LGL Alaska Research Associates.	The text has been revised for accuracy to include caribou impacts would be short term along migration route.

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L28	36	AGDC	5.5			EIS Section 5.5.2, Page 5.5-30: Fragmentation of habitat is discussed in the Vegetation section (page 5.3 32), Executive Summary (page ES 13), and the Wildlife section (pages 5.5 30, 5.5 31). A common sense approach is needed. What wildlife species habitat will be fragmented by the ASAP? None are identified. It is not reasonable to think that a 30 foot ROW for a buried pipeline will fragment habitat for anything except perhaps very small mammals (e.g., voles, shrews). Most wildlife species will experience an increase in habitat diversity with the ASAP ROW. Species such as moose, caribou, muskox, bison, hares, and maybe sheep will find grazing forage in the ROW. Fragmentation is a general buzzword, and needs clear definition and rigorous analysis for each species potentially impacted by this specific project. It seems unlikely that it will occur to any meaningful extent. The text on this topic on page 5.5 30 needs revision.	The text has been revised to state that some species will benefit from new growth as forage in the ROW but also that forested areas would produce the most fragmentation for habitat. Text revision is located in section 5.5.2 - Environmental Consequences section. Sentence begins with "The amount of habitat loss or disturbance proposed..." Content in last column on proposed conservation measures was deleted as it was not specifically AGDC proposed mitigation.
L28	37	AGDC	5.5			EIS Section 5.5.2, Pages 5.5-33 through 5.5-37, "Sensitive Wildlife Habitats": The subsection on page 5.5 37 and Table 5.5 6 on “sensitive wildlife habitats” are not well defined. The concept refers to local habitats with particularly high risk of disturbance during particular time periods. This should be addressed in the text for each species.	The text has been revised to include the type of specific sensitive habitat for each species listed.

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L28	38	AGDC	5.5			EIS Section 5.5.2.2, Page 5.5-39, Table 5.5-8: This table projects the "displacement" of nearly 240,000 birds based on loss of nesting habitat. It is one thing to note the losses of nesting habitat, but it is another to project that such losses will displace hundreds of thousands of migratory birds. The figures in this table do not represent good science. In much of Alaska, including for sensitive species, nesting habitat is not a limiting factor. Such is the case with the listed species. In this context, while it is relevant to identify that habitat suitable for nesting will be lost, it is not reasonable to quantitatively project a one to one loss of nesting habitat to displaced birds given that other adjacent nesting habitat is readily available. This table should be eliminated because it is not correct that the project will displace hundreds of thousands of birds, or that the loss of nesting habitat for this project will have any detectable impact on bird nesting abundance. Compare, for example, DEIS page 5.8 25, which discusses impacts to eiders and states that habitat loss is not likely to have an adverse impact because nesting habitat on the North Slope is not a limiting factor.	The text has been revised to delete the referenced table.
L28	39	AGDC	5.5			EIS Section 5.5.2.3, Page 5.5-43: AGDC comments on earlier sections of the DEIS contain detailed discussion of the inappropriate manner in which the Denali NPP Route Variation is discussed in the DEIS (e.g., comments on DEIS pages ES-7, 4-17, 4-23, 5-1, 5.2-69). This section states, without basis, that the Denali NPP Route Variation will have less impact because it affects "fewer habitats important to wildlife and birds." However, there is no information establishing that the small amount of affected acreage is important to	The text has been revised for comparisons between the mainline route and Denali National Park route. Text revision is located in section 5.5.2.3 (Denali National Park Route Variation), subsection 'Operation'. Sentence begins with "General operational impacts associated with the Denali..."

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						wildlife and birds (it is not) or limiting (it is not). The relevance of the Denali NPP Route Variation is not because the impacts to wildlife or birds are anticipated to be different than for the proposed route. In all likelihood, the impacts — which are likely to be negligible — are essentially similar.	
L28	40	AGDC	5.6			EIS Section 5.6.2.2, Page 5.6-23, "Horizontal Directional Drilling", 2nd paragraph: The term “frac out” is very misleading in that it implies that the horizontal directional drilling (HDD) process involves fracturing substrate in order to advance the boring, which is not the case. Fluid loss during drilling should be discussed as just that and not fracking, which is not a process proposed for this project. Consider using a good reference on HDD and discussing the environmental consequences of fluid loss during the process.	The text has been revised to remove the frack out term and HDD methods were researched for clarity. Text revision is located in section 5.6.2.2 - Proposed Action, subsection Horizontal Directional Drilling Method. Sentence begins with "Impacts to fish resources from HDD could occur..."
L28	41	AGDC	5.6			EIS Section 5.6.2.3, Page 5.6-30: 1. AGDC comments on earlier sections of the DEIS contain detailed discussion of the inappropriate manner in which the Denali NPP Route Variation is discussed in the DEIS (e.g., comments on DEIS pages ES-7, 4-17, 4-23, 5-1, 5.2-69). Section 5.6.2.3 states that impacts to fishery resources would be “similar” for the two routes for construction, and states that potential impacts during operations identified for the Denali NPP Route Variation “would apply” to the proposed route also. Yet, the concluding sentence states, without basis, that impacts to fisheries resources “would be considerable compared to impacts” from the Denali NPP Route Variation. This finding is unsupported and not correct. The impacts from both would be very limited and similar. 2. See previous comment regarding missing or	The text has been revised to clarify the HDD and bridge impacts for the Denali National Park and Preserve, and clarify the operational impacts from the 6 stream crossings for the mainline proposed route. Text revision is located in section 5.6.2.3 - Route Alternatives and Variations, subsections Construction and Operations.

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						unavailable information. Under the "Construction" subheading, in the last sentence, the DEIS states that impacts to fisheries resources from construction of the pipeline cannot be determined. This statement is not consistent with prior statements about what the impacts would likely be. In fact, there is a great deal of information about the impacts of stream crossings as proposed to fish given the proposed mitigation (as now appears at pages 5.6 31 through 5.6 33). Moreover, if this is missing information, then an analysis of the requirements of 40 C.F.R. § 1502.22 is required.	
L28	42	AGDC	5.7			EIS Section 5.7.2.3, Page 5.7-21: This section states that the Denali NPP Route Variation would not impact marine mammals. There is no reference in the section to the proposed route for this section, which also would not impact marine mammals.	The text has been revised to clarify that the alternative or the mainline route would not affect marine mammals. Text revision is located in section 5.7.2.3 - Route Alternatives and Variation, subsection Denali National Park Route Variation.
L28	43	AGDC	5.8			EIS Section 5.8, General: This section should be reviewed with other sections and the Executive Summary for consistency.	All T and E content in the Executive summary was updated to match the T and E Resource chapter. The T and E content is included under Environmental Analysis, T and E subheading. Critical habitat was specified to include the Southwest stock of Northern sea otter. The Eskimo Curlew is added to the ES and states "The Eskimo Curlew is thought to be extinct since the last sighting was in 1962." Yellow-billed loon has been added as a candidate species. Text has been added to state that the construction and operations of the GCF "may cause disturbance to a few polar bears and potentially their prey (ringed and bearded seal) from increased vessel activity. The Project would not likely adversely modify or destroy polar bear critical habitat. Modification to areas of polar bear terrestrial denning critical habitat would occur for the proposed Project. The proposed Project area has not been known to inhabit any polar

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							bear dens and the area does not possess preferred den habitat characteristics." Text has been revised to state "The spectacled eider breeding habitat could be disturbed for the construction and operations of the proposed Project due to the potential loss of nesting and breeding habitat. Habitat loss is not likely to adversely affect spectacled eiders since nesting habitat for spectacled eiders is not limiting on the North Slope of Alaska. Potential disturbance to any nesting spectacled eiders in the Project area would be minimized through construction timing." Text has been added to state "No critical habitat for Steller's eiders has been designated on the ACP. The proposed Project is not anticipated to disturb nesting Steller's eiders or their nesting habitat." Last, a sentence was added stating: "Construction activities for the portion of the pipeline from the GCF to MP 70 could disturb a small number of nesting yellow-billed loons; although most construction would occur during the winter when yellow-billed loons are not present on the North Slope."
L28	44	AGDC	5.8			EIS Section 5.8.2 & 5.8.3, Pages 5.8-1 & 5.8-2: These sections imply that species not listed as threatened or endangered under the Endangered Species Act (ESA) are not federally protected. That assumption is not always true. For example, all marine mammals are federally protected under the Marine Mammal Protection Act, and all migratory birds are federally protected under the Migratory Bird Treaty Act, whether or not the species is listed as threatened or endangered under the ESA. Amend text and headings appropriately.	The text has been revised for accuracy. Text revision located in section 5.8.2 - ESA Protected, Candidate and Delisted Species.

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L28	45	AGDC	5.8			EIS Section 5.8.3, Page 5.8-3, Table 5.8-1: Wood bison do not occur in the ASAP area. Their proposed introduction is delayed because they are on the federal ESA list. Consider deleting wood bison from this section. Be sure the column on "Preliminary Findings Summary" is consistent with the text. Note that salmon Evolutionary Significant Units (ESUs) described in the Fisheries section are not in the table. Suggest identifying in the table the specific Distinct Population Segments (DPS) (stocks) of beluga whale, sea otter and Steller sea lion that are listed. Explicitly identify the stocks as DPS.	Wood bison were deleted from chapter, DPS was addressed and updated, ESU for fish was updated.
L28	46	AGDC	5.8			EIS Section 5.8.3, Page 5.8-3, Table 5.8-1: The stated finding of "NLAA/NLAM" ("may affect, not likely to adversely affect" /"not likely to adversely modify") for polar bears in this table is wrong. Small numbers of individual polar bears may experience a "take" through hazing from facilities or incidental interactions with humans [see p. 5.8 16 (acknowledging take of small numbers of polar bears)]. See also DEIS Appendix I, Section 5.4. It is correct that the project is "not likely to adversely modify" (NLAM) critical habitat.	Text has been changed in the T and E chapter to be LAA. Table 5.8-1 has been corrected in section 5.8.3.
L28	47	AGDC	5.8			EIS Section 5.8.3, Page 5.8-3, Table 5.8-1: The Biological Assessment (BA) is cited as the source for the information in this table; however, the information did not come from the BA, as most of the findings differ from those in the BA (Appendix I). Furthermore, the wood bison, sea otter, Eskimo curlew, and yellow billed loon were not considered in the BA.	The text has been revised for accuracy and cited appropriately. Table 5.8-1 has been corrected in section 5.8.3. All species listed are referenced in the BA, BO and USFWS listed and candidate species in Alaska website noted in the footnotes for Table 5.8-1

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L28	48	AGDC	5.8			EIS Section 5.8.3, Page 5.8-3, Table 5.8-1: Assessment of effects on threatened and endangered species differs with respect to NEPA and Section 7 of the ESA. NEPA requires an assessment on the population level, while ESA requires an assessment on the individual level (constituting a take). Findings for effects on T&E species in the EIS should state the degree of effect on the species (no effect, negligible, insignificant, significant, etc.). The DEIS should not refer to findings from the Biological Assessment, as they are not relevant for the level of impacts analysis required under NEPA. The terminology used in Table 5.8 1 is a byproduct of the Section 7 assessment of effects.	The project would not significantly affect T and E species. Table 5.8-1 was edited to include a column titled "Population Level Effect
L28	49	AGDC	5.9			EIS Section 5.9.1.2, Page 5.9-15: This section addresses land use impacts from the Denali NPP Route Variation. AGDC comments on earlier sections of the DEIS contain detailed discussion of the inappropriate manner in which the Denali NPP Route Variation is discussed in the DEIS (e.g., comments on DEIS pages ES-7, 4-17, 4-23, 5-1, 5.2-69). Land use is a key “context” impact factor difference between this variation and the proposed route. It is controversial, in Alaska and elsewhere, to locate industrial infrastructure within an area set aside as a national park and preserve. However, this section fails to discuss this issue.	Table 5.9-13 discusses what would be required to allow the pipeline within the Denali NPP.
L28	50	AGDC	4.0			EIS Section 5.9.1.4, Page 5.9-21: AGDC has not proposed any access roads along the Denali NPP Route Variation because it is not proposing the Denali NPP Route Variation. The assumption that there will be no need for any access roads were this route adopted is not accurate.	As described in Section 4.4.2.3, the Denali NPP Route Variation would be co-located with the Parks Highway; therefore, there would be no need for access roads under the Denali NPP Route Variation.

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L28	51	AGDC	5.9			EIS Section 5.9.2.2, Page 5.9-39, Table 5.9-13: This table reflects a biased statement of land use plans relative to the Denali NPP Route Variation. The focus of the text is on pending legislation, which if it passed, would allow the NPS to issue a ROW within the Denali NPP. However, currently, such a ROW is illegal and it is speculative whether the legislation that has been introduced will pass. If it does pass, it remains speculative whether other applicable requirements could be met. Currently, beyond authorization for a ROW for the pipeline, location of a natural gas transmission facility within the Denali NPP would be directly contrary to the purposes and uses for which the Denali NPP was established.	As stated in Section 5.9.2.3 (Denali National Park and Preserve), "Federal laws do not allow construction of this route variation within Denali NPP." Regarding the pending legislation, the project could be approved to cross the Denali NPP by an act of Congress, as stated in the table. The following text has been added to the table: "The project would be inconsistent with the purposes for which the Denali NPP is to be managed as established by Sections 101 and 202 of ANILCA."
L28	52	AGDC				EIS Section 5.11, General: 1. This section, particularly at or about pages 5.11 17 to 5.11 20, shows seven photos of essentially the same 1-mile stretch of the proposed route outside the Denali NPP from vantage points within the Denali NPP. These photos exclude the pre existing impact of development at Glitter Gulch immediately adjacent to the area shown in the photos. The photo presented on page 8 of the 12/6/2011 Visual Impact Analysis Report included in Appendix K of the DEIS shows a broader and more accurate panorama view including Glitter Gulch. 2. More generally, this section states or implies that the impact of constructing and maintaining an industrial gasline in a national park and preserve, including excavation along the road through the Park that a large percentage of Park visitors will traverse, and hanging the pipeline on a pedestrian bridge across the Nenana River that a substantial number of Park visitors use, will not change the underlying visual character of	The area near MP 540 where the route departs from the Parks Highway and traverses a side slope is the located in an area with existing commercial development and linear roads that reduce visual contrast of the proposed hill cut and pipeline route. As noted in the comment, this context of nearby visual resources is important to identifying the level of contrast. The photo has been added to the analysis in Section 5.11.2.2. As in Section 5.11.2.3, during construction, impacts of the Denali National Park Route Variation, are expected to result in short-term high visual impacts to travelers on the Parks Highway as well as visitors to eastern Park lands and tourist facilities near the Park entrance, particularly if construction occurs during the high visitor season from May to mid-September. However, once the area is revegetated, long term visual impacts of the ROW clearing along the Parks Highway are expected to be weak as the route parallels the linear feature of the highway (reducing line contrast) and would be revegetated, reducing texture and color contrast, and are thus not expected to modify the long-term visual character of the area. Also, while there is an

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						the Park for those visiting the Park to enjoy its preserved natural values. This section also states or implies that distant views from within the far eastern edge of the Park of a short stretch of the pipeline located outside the Park will potentially alter the character of and visitor experience in a national park that is larger than some U.S. states. This finding is illogical.	aboveground segment of the route as it crosses the pedestrian/bicycle bridge, visual impacts are expected to be primarily limited to the construction time period as the pipeline is expected to only be visible to travelers on the Nenana River and not those on the Parks Highway or on the bridge itself. As noted in the comment, views of the hill cut near MP 540 (Proposed Action), such as from Government Hill, would be fairly distant to most viewers within Denali National Park and Preserve. However, the view would be less distant to travelers on the Parks Highway. Additionally, this section of the route is the most prominent hill cut, and would result in long-term modifications to landscape form and line, with the potential to result in moderate to high impacts as indicated by the visual simulations completed by Design Alaska. The size of Denali National Park and Preserve and the fact that the route would not be visible from most areas of the park does not affect the visual contrast rating or impact findings from areas where the route would be visible. The KOP's selected for visual simulations and contrast rating analysis are expected to be representative of the types of impacts of constructing and operating the ASAP pipeline, particularly those associated with the high viewer sensitivity areas surrounding Denali National Park and Preserve.
L28	53	AGDC	5.23			EIS Section 5.12.4, Pages 5.12-50, -51: Mitigation measures listed in Appendix H are not identified in this section. Include the list of proposed measures.	A new mitigation chapter has also been added to the EIS (Section 5.23). All recommended mitigation has been removed and AGDCs proposed mitigation has been analyzed for effectiveness
L28	54	AGDC				EIS Section 5.13, General: It is recommended that the author state when the Alaska Heritage Resource Survey (AHRS) was reviewed and hence when the tally of AHRS sites or reported sites was obtained. These numbers will undoubtedly change as cultural surveys are being conducted. The reviewer acknowledges that tables with AHRS and RS2477 sites are	Edited as follows: "• Alaska Heritage Resource Survey (AHRS) (reviewed and updated for this EIS in April of 2011) files"

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						cited; however, not all places in the text are. One example is the discussion of effects to sites within the Fairbanks Lateral (pages 5.13 34 to 5.13 35).	
L28	55	AGDC				EIS Section 5.13.3, Page 5.13-28, last sentence on pg: AGDC is surveying to identify, evaluate, and document historic properties within a 90 m (300-ft) corridor centered on the proposed pipeline centerline (which is in the ROW), not within 90 m of the ROW.	Edited as follows: "The AGDC is conducting a concurrent process of cultural resources field surveys to identify, evaluate and document historic properties within the ROW (a 90 meters (300ft) corridor centered on the proposed pipeline centerline) to comply with the NHPA."
L28	56	AGDC				EIS Section 5.13.3.1, Page 5.13-30: The text appears to assume that all effects will be adverse and that there will be no positive or neutral effects. If this is the case, the reasons for that assumption should be given.	The assumption states that if an aspect of Project affects the characteristics of cultural resources that make it eligible for National Register, then it would be an adverse effect. SR&BA added the word "negatively affects" for clarity.
L28	57	AGDC				EIS Section 5.13.3.3, Page 5.13-36, "Compressor Stations, Construction, Direct Effects": This section does not identify what the potential effects could be. A similar comment can be made on several other subsections. It is recommended that a discussion be included of the type of potential effects and when possible, how the properties will be affected.	The EIS identifies the type of potential effects at the beginning of Section 5.13.3. The EIS included this statement at the beginning of the EC section rather than restating for each individual component. The text regarding direct affects is as follows: "Physical destruction of or damage to all or part of the resource, removal of the resource from its original location, change of the character of the resource's use or of physical features within the resource's setting that contribute to its historic significance, change in access to traditional use sites by traditional users, or loss of cultural identity with a resource." In an effort to reduce redundancy, this language has not been included each time direct effects are mentioned.
L28	58	AGDC				EIS Section 5.13.3.3, Page 5.13-39, "Operations and Maintenance Buildings, Construction, Direct Effects": It seems the effects would be the same as those mentioned for other proposed facilities rather than, "no direct effects would be anticipated as the structures will be collocated with other proposed facilities considered above."	Edited text as follows: "Support facilities would occur within the footprint of the GCF at Prudhoe Bay, the straddle and off-take facility, and the Cook Inlet NGLEP Facility, and direct/indirect effects would be the same as described above."

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						The same comment applies to Operations and Maintenance, Direct Effects on the same page and Indirect Effects on page 5.13 40.	
L28	59	AGDC				EIS Section 5.14.2.1, Page 5.14-6, "Study Area": This section assumes that subsistence use areas up to 30 miles from the project are within the affected environment, but lacks an adequate justification as to why a boundary as large as 30 miles was used. The second paragraph of this section states, “Thirty miles was used as a cutoff because most communities and/or subsistence use area near the proposed Project alternatives are within 30 miles.” This is a circular definition of the boundary. Additionally, the section lacks a discussion as to how the project may affect subsistence resources, use, and activities 30 miles away.	Available subsistence use area data closest to the Project were reviewed, as well as proximity of communities closest to the Project. Thirty miles encompassed all nearby communities, and use areas ranged from direct overlap with the Project to hundreds of miles away from the Project. To capture the broadest effect to subsistence uses, the EIS included both the communities and use areas that were 30 miles away from the Project. Based upon a compilation and analysis of subsistence use area data that have been collected over the last 40 years within the State of Alaska, community subsistence use areas vary between study years, in some cases large distances. The study team selected 30 miles as a conservative estimate that would encompass the variability in use areas from year to year. Thirty miles also encompasses an area where migrating resources that travel through a project area may be disrupted and affect nearby community subsistence uses. Lastly, the 30 mile boundary has been used by FERC in a similar pipeline project as an acceptable boundary for a subsistence study area. The referenced circular definition of the boundary was removed and revised for clarity as follows in Section 5.14.2.1: "Based on a compilation and analysis of subsistence use area data that have been collected over the last 40 years within the State of Alaska, community subsistence use areas vary between study years, in some cases by large distances. The study team selected 30 miles as a conservative estimate that would encompass the variability in use areas over time. Communities whose subsistence use areas are 30 miles away may still be affected if migrating resources are disrupted and not available at the usual time and place where subsistence users can harvest them."

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L28	60	AGDC				EIS Section 5.14.2.2, General, "Community Subsistence Patterns": While data is lacking for the subsistence use areas and harvests for many of the communities noted in this section, some discussion of the subsistence use is warranted. Understandably it is difficult to quantify the affected environment and the potential project impacts. It is advised that a discussion be added to the section that addresses the implications of data gaps and thus an evaluation of impacts. An additional aid to the reader would be a table or list of communities and/or areas that highlight the data gaps. This would be most useful in the beginning of the section and perhaps a reference back to that list or table in the environmental consequences discussion (Section 5.14.3, page 5.14 65).	A data gap analysis was not conducted for this EIS. However, Table 5.14-2 provides a list of the available subsistence data by community. This EIS can only describe subsistence uses for communities for which there are data, and thus cannot provide a discussion of subsistence uses if those uses have not been documented. Edits to the EIS in response to this comment provide a brief discussion of the communities lacking data and implications for evaluation of impacts as follows: "Because a number of communities lack subsistence documentation, this EIS is not able to characterize their subsistence uses, and thus it is difficult to describe the impacts for potentially affected study communities which are lacking subsistence data. Many of the studies that do exist for potentially affected study communities are two or more decades old and caution is advised when using older data to characterize current uses."
L28	61	AGDC	5.14			EIS Section 5.14.2.2, Pages 5.14-58 through 5.14-61: It is understandable that subsistence use areas for some of Southcentral communities are not discussed — because such areas do not exist for these communities; however, there should discussion of the subsistence harvest patterns/use of the residents of these communities. "Under Alaska law, when there is sufficient harvestable surplus to provide for all subsistence and other uses, all residents qualify as eligible subsistence users" (page 5.14 4, 1st paragraph, last sentence). Some discussion of subsistence use by these residents is warranted.	We were unable to locate subsistence harvest/use reports from the ADF&G for the Southcentral communities of Big Lake, Eklutna, Houston, Knik/Fairview Palmer, Skwentna, Susitna, Wasilla, and Willow. As noted by the commenter, this isn't surprising because these communities are not typically associated with subsistence use and are noted in the EIS as "non-rural communities near Palmer, Wasilla, and Anchorage." The text regarding Subsistence use in the Southcentral region states: "Unlike the other regions previously discussed in this section, much of the Southcentral region lies within the state's Anchorage-Matsu-Kenai non-subsistence area (Figure 5.14-2). Under state definitions, all harvests of wildlife and fish within this non-subsistence area do not qualify as subsistence activities and are instead managed under general sport hunting regulations, or by personal use or sport fishing regulations. All residents

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							outside the federally designated Wasilla-Palmer and Anchorage non-rural areas are considered rural and are eligible for subsistence harvesting on federal lands (Figure 5.14-2). However, there are no major tracts of federal public lands in or near the proposed Project within the Southcentral area, and any harvests of fish or wildlife on Project area lands within the Southcentral region do not qualify as federal subsistence activities.
L28	62	AGDC	5.14			EIS Section 5.14.3, General: Please cite the sources used to evaluate what activities may affect resources and activities. The DEIS makes many claims as to what resources will be affected by what activities, but does not provide supporting references. Other EISs and environmental impact studies have been conducted within and near this project area that could be cited. Additionally, Appendix L provided by the BLM can be incorporated/cited in this section and used as a starting point for references.	The authors provided list of the EIS and other studies consulted to develop the Environmental consequences section. These references have been added to Section 5.14.3 where the nature of the environmental consequences are introduced so that readers can refer to these other studies. The following text was added to the EIS to remind the reader: "When possible, impacts to resource availability are based on identified impacts in Section 5.5. Wildlife, Section 5.6 Fisheries, and Section 5.8 Threatened and Endangered Species." In addition, two references provided by BLM in Appendix L were incorporated that addressed impacts.
L28	63	AGDC				EIS Section 5.14.3, Page 5.14-65: A clear definition of the potential impacts would be beneficial at the beginning of Section 5.14.3.	Added following explanation of subsistence use area, resource availability, user access, and competition impacts: "If a portion of a community's subsistence use area were within the Project, then a direct effect on subsistence use would occur. With the exception of downstream effects, the farther a community's subsistence use area is from the Project, the less the potential exists for a direct impact on residents' subsistence uses. Successful subsistence harvests depend on continued access to subsistence resources without physical, regulatory, or social barriers. Access could be negatively affected or enhanced with a project. Successful subsistence harvests depend on continued resource availability in adequate numbers and health in traditional use areas. Subsistence availability is affected by resource mortality or health changes, displacement from traditional harvest locations, or contamination (including actual and/or

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							perceived contamination of resources and habitat or habituation of resources to development activities). Changes in access can result in changes in competition for resources. Increased access to an area may result in more competition for resources from outsiders and/or from community or nearby community residents who did not previously use the area. A decrease in access may decrease competition in the potentially affected area and introduce additional competition in new areas because harvesters can no longer access previously used hunting or fishing areas. A decrease in resource availability may result in increased competition among harvesters as they try to meet their harvest needs from a depleted or displaced resource stock."
L28	64	AGDC				EIS Section 5.16.1.2, Pages 5.16-14 & 5.16-15, "Climate Change": Section 5.16.1.2 should be deleted from the EIS. This section discusses climate change and conclusions of the United Nations Convention on Climate Change. This discussion is not relevant to the project other than that the U.S Environmental Protection Agency (EPA) has adopted the emission of CO2 as a criteria pollutant. Instead, the DEIS should discuss how the emissions of greenhouse gases may be regulated under EPA and the Alaska Department of Environmental Conservation (ADEC). Such discussion would fit best in Section 5.16.1.6, Regulatory Requirements (Title I NSR Review, page 5.16 11) and Greenhouse Gases (page 5.16 17). Following is suggested language for discussing this issue: A new major source threshold for greenhouse gases (GHG) has recently been established by EPA in its June 3, 2010 “Tailoring Rule” and will go into effect in several steps. The first two steps occurred in 2011. Alaska is adopting by reference the federal GHG “Tailoring Rule” that establishes the new Step 1 and 2 thresholds,	Section 5.16.1.2 presents an overview of climate change and greenhouse gases, as required by the CEQ in NEPA documents. Greenhouse gas regulations are discussed as appropriate under Section 5.16.1.6, Regulatory Requirements.

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						and will not require any changes to the Alaska statute to implement the rule. Alaska has asked EPA to parallel process the SIP revision (a procedural requirement to grant Alaska the authority to implement the rule) and expects the SIP to be approved quickly. This approval, when granted, will mean that Alaska will have the authority to issue PSD permits for GHG directly without the need for a separate GHG related permit from EPA. On July 1, 2011 (Step 2 of the Tailoring Rule), facilities with potential emissions greater than 100,000 tpy of GHG on a CO2 equivalent (CO2-e) basis are considered major sources for PSD permitting.	
L28	65	AGDC				EIS Section 5.16.2.2, Pages 5.16-22 & 5.16-23, Table 5.16-6 and footnote "f": This table in the row marked “open burning” and in the related footnote “f” states that open burning emissions are “TBD” (to be determined). Compliance with 40 C.F.R. § 1502.22 regarding missing or unavailable information should be addressed.	Section 2.0, Project Description, Subsection 2.1.3.3, Extra Work Areas Outside of Right-of-Way, indicates that, 'The AGDC would develop a Comprehensive Waste Management Plan that would include details of how waste would be handled in these areas. Solid waste produced at camps would be reused, recycled, burnt, or disposed of at ADEC approved disposal sites in accordance with applicable regulations.' In addition, Subsection 2.2.2.2, Clearing, Grading, and Work Pads, indicates, 'Brush, trees, roots, and other obstructions such as large rocks and stumps would be cleared from all construction work areas. The AGDC would complete a merchantable timber survey, and would determine removal methods based on the location of these resources. Stumps would be removed from the proposed construction ROW. Cleared woody debris would be chipped and left in place, burned, provided to local populations for firewood, or otherwise disposed of according to local restrictions, regulatory requirements, and landowner agreements.' Section 5.16.2.2, Proposed Action, Open Burning, has been updated in the FEIS to include estimated air emissions from open burning as provided by AGDC. Tables 5.16-6, 5.16-7 and 5.16-17 for the Mainline, Fairbanks Lateral, and the Denali

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							National Park Route Variation, respectively, have been updated to include emissions from open burning. New Appendix O includes open burning emissions provided by AGDC.
L28	66	AGDC	5.20			EIS Section 5.20.5.4, Pages 5.20-64 thru 5.20-67, "Air Quality Greenhouse Gases and Climate Change": It is important that the DEIS cover the subject of greenhouse gas (GHG) emissions and climate change, and USACE is commended for doing so. There are, however, some issues to consider: 1. Placing the discussion of GHG emissions and climate change under the subheading of "Tourism and Recreation" cumulative effects seems very obscure. Please consider making this its own subsection. 2. On page 5.20 64, the DEIS states in the next-to-last paragraph on the page that "analysis of greenhouse gas emissions from consumption of produced natural gas is not part of this discussion." There is no further explanation. NEPA requires analysis of direct and indirect effects. If USACE's view is that consumer use of natural gas transmitted to market in the proposed project is not a foreseeable result of the project, it needs to say so, but such a conclusion would likely be difficult to sustain. If consumer use is a foreseeable indirect effect, then at least some narrative and qualitative consideration of the issue are necessary. Conceptually, two things seem reasonably likely. First, consumer use of natural gas in Fairbanks will reduce GHG emissions over current fuel sources and uses, thereby making a positive contribution. Second, consumer use of natural gas in the Cook Inlet region will replace existing natural gas sources and provide an energy source for future growth that would otherwise be	In response to this comment, this section has been relocated under the heading "Air Quality, Greenhouse Gases, and Global Climate Change" in chapter 5.20 and the section has been expanded to include important information on GHG emissions by fuel type and use as wells as a discussion of the impact of consumption of the delivered natural gas as a substitute for other heating fuels in Fairbanks. In addition we added an annual amount of CO2-e expected from consumption of the 500MMscfd of delivered natural gas. It states: "Based on calculations available from the Department of Energy's Energy Information Administration consumption of the predicted amount of natural gas (500 MMscfd) in Alaska will generate 9.4 million metric tons of carbon dioxide equivalent each year. To put this in perspective, the annual amount of greenhouse gases generated in the US in 2009 was approximately 5,500 million metric of carbon dioxide equivalent. As noted above, the ASAP natural gas would be used as a substitute for burning oil, coal, and wood in the Fairbanks area, and because combustion of natural gas emits fewer greenhouse gases than the other fuels (Table 25.20-8), the use of ASAP gas would represent an overall reduction in US greenhouse gas emissions."

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						met by other energy sources. Accordingly, it is very unlikely that consumer use of natural gas from the project is foreseeably expected to result in any increase in GHG emissions and climate change, in comparison to consumer usage without the project. Indeed, because of improvements at Fairbanks, there may be a marginal decrease (benefit). Whatever USACE concludes, it needs to more than just state, without explanation, that the consequence of consumer use of natural gas from this project "is not part of the discussion."	
L28	67	AGDC				EIS Section 5.20.6.2, Pages 5.20-38 & 5.20-5, Tables 5.20-4 & 5.20-5: Tables 5.20 4 and Tables 5.20-5 do not evaluate the other two hydro projects listed in the DEIS; the tables only seem to evaluate the Watana project. Because the Watana project is approximately 60 miles east of the ASAP Project, the text should make it very clear how the spatial extent of potential impacts was determined. Also, the table does not define severity of effect that would allow for an objective determination.	The Watana project is the only hydro project being considered. Reference to the other two hydro projects has been deleted. Severity of effects is listed in the impact rankings in Section 6.1.
L28	68	AGDC	5.20			EIS Section 5.20.7, Page 5.20-74, Table 5.20-9: Table 5.20 9, Cumulative Effects Summary by Resource, should provide the severity of cumulative effects so that an objective comparison can be made.	The extent of the potential cumulative impacts, if any, is included in the second column of Table 5.20-9 (Project Cumulative Effect Summary). The table has been updated where appropriate to reflect CEQ NEPA guidance of: Magnitude (major, moderate, or minor); Duration (long term, medium term, or temporary); Potential (probably, possible, or unlikely); and Geographic Extent (extensive, local or limited).
L28	69	AGDC	6.0			EIS Section 6, Pages 6-2 through 6-24, Table 6.0-1: The column titled "Additional Recommended Mitigation" should be called "Applicant Proposed Mitigation," and the source should be Appendix H.	Text has been revised. A new mitigation chapter has also been added to the EIS (Section 5.23). All recommended mitigation has been removed and AGDCs proposed mitigation has been analyzed for effectiveness

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L28	70	AGDC	Appendix K			EIS Appendix K, Pages 2 through 45 of PDF: This appendix contains both the draft and final versions of the Visual Impact Analysis Report for Denali National Park. Please delete the draft 9/20/11 version contained in pages 2 through 45 of the DEIS pdf file.	Appendix modified as suggested
L29	1	Alaska Department of Health and Social Services	5.15	5.15.1		Please ensure that the document always refers to human impacts as "potential" human impacts and be sure to include language alerting the reader that health benefits, as well as health impacts will be reviewed. Ensure all references to the project are "proposed" project.	Proposed Project has been substituted for project where appropriate. In key places in the text 'potential' human impacts are inserted. Additional text has been inserted to clarify that health benefits as well as potential adverse impacts are included.
L29	2	Alaska Department of Health and Social Services	5.15	5.15.1		The authors should mention closure of the project as well as construction and operation.	Abandonment of the project is discussed in Section 2.4. Reference to Section 2.4 has been made in Section 5.15.1.2 - Schedule.
L29	3	Alaska Department of Health and Social Services	5.15	5.15.2		The authors should correct "HIA impact assessment" and associated language in this section. HIA stands for Health Impact Assessment not "Health Impact Analysis". "HIA impact assessment process…" is redundant language.	The text has been revised in Section 5.15.
L29	4	Alaska Department of Health and Social Services	5.15	5.15.2		The authors should include language to point out that HIA only considers "outside the fence" issues and does not investigate health risks to the workforce while on duty. It should also emphasize the fact that HIA is not legally required or binding in Alaska. Both are clearly laid out in the introduction to the toolkit so please review and rewrite this section.	The text has been revised for accuracy.

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L29	5	Alaska Department of Health and Social Services	5.15	5.15.2.1		The authors should remove value laden language that assumes low impacts prior to conducting their analysis. The sentence that begins "A qualitative evaluation of public health impacts….." has appeared in earlier drafts and appears again here. This logic contradicts of basic principles in the HIA field regarding patterns of health impact related to transportation corridors domestically and internationally. Health Impacts follow and are usually exacerbated by transportation corridors. This statement also overlooks well known adverse experiences with the non-resident workforce during the TAPS era. The logic of low impacts because this is an existing corridor is not credible.	The sentence beginning "A qualitative evaluation..." has been removed.
L29	6	Alaska Department of Health and Social Services	5.15	5.15.2.1		The authors should recheck their document for consistent language. This section indicates that this HIA "does not address classical occupational health concerns" however the accidents and injuries section later spends nearly 10 pages focused specifically on worker safety with only a few paragraphs regarding community safety. The HIA Toolkit states that worker health and safety is beyond the purview of the HIA. The authors should remove worker safety information and include a broader set of intentional and unintentional injury statistics for PAC community members in the accidents and injuries section.	We did not delete this material for two reasons. First, in some cases (such as vehicle accident rates) it is not possible to separate worker casualties from casualties to others. Therefore the total casualties were used as a conservative estimate of impacts to members of the general public. Second, one of the issues included in the HIA are potential effects on crowding of health centers. Because workers on the proposed project might require use of state medical facilities it is appropriate to consider potential health impacts on the workforce.
L29	7	Alaska Department of Health and Social Services	5.15	5.15.2.1		Noise from compressor stations needs to be addressed in the public health section.	Section revised to provide explanatory material based on material contained in Sections 5.17 (Noise) and 5.14 (Subsistence).

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L29	8	Alaska Department of Health and Social Services	5.15	5.15.2.1	5.15-2	Table 5.15.2 should be preceded by a description of the content of the health effect categories as found in the HIA Toolkit, Section 4, and p 28-29. As presented here, readers will not understand the spectrum of health issues found in each category.	In earlier revisions, Table 5.15-2 contained an adapted version of the HEC table shown in the Alaska HIA toolkit. In response to this comment, we have revised the Public Health Section to include the complete text of the Alaska HIA Toolkit in Table 5.15-2 arranged to match the presentation of HECs in the main text (i.e., Water and Sanitation, followed by Accidents and Injuries... etc.)
L29	9	Alaska Department of Health and Social Services	5.15	5.15.2.1		The authors include language about intensity, but it is unclear where "intensity" factors into the analysis. Please remove this language or clarify.	Earlier versions of the Public Health chapter made reference to rating HECs based on intensity (similar to the method used for the other sections on environmental consequences). In particular, there was a statement that intensity was considered as part of the rating method for HECs in Section 5.15.2.1. That statement was erroneous and it has been removed. Currently the text references the word 'intensity' in a few places to describe a low magnitude rating as set forth in the Alaska HIA toolkit methodology.
L29	10	Alaska Department of Health and Social Services	5.15	5.15.3.3		The authors need to list the public health surveillance databases used for this report so readers can plainly see what sources were consulted.	We reviewed the text and ensured that the datasets were properly documented with references and where applicable we link to websites. We also added a short section titled Data Sets and Limitations within the Methodology Section (5.15.2).
L29	11	Alaska Department of Health and Social Services	5.15			The authors should use HECs to report baseline health data. For health "determinants" this study reviews basic demographics, economic, employment, and educational information. It also reviews access to health care, and a host of lifestyle choices: Physical activity, tobacco use, substance abuse, and a very lengthy listing (10 pages) of subsistence harvest tables. The section would be more clear if it used the HEC's in the toolkit to collect and report baseline information. For example, the current approach deals with substance abuse as a determinant, but fails to report on the role of substance use related to accidents and injuries which is more precise health information related specifically to	In earlier revisions, Table 5.15-2 contained an adapted version of the HEC table shown in the Alaska HIA toolkit. In response to this comment, we have revised the Public Health Section to include the complete text of the Alaska HIA Toolkit in Table 5.15-2 arranged to match the presentation of HECs in the main text (i.e., Water and Sanitation, Accidents and Injuries... etc.)

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						the HEC: Accidents and injuries.	
L29	12	Alaska Department of Health and Social Services	5.15	5.15.3.3	5.15-12	The source for this table should be ADHSS 2009a. Please correct this reference.	Reference has been corrected.
L29	13	Alaska Department of Health and Social Services	5.15	5.15.3.3		This data is from 2008, though the reference is 2011. The year needs to be included somewhere in the text somewhere to give an indication of how current the information is. This is also BRFSS data, which needs to be mentioned, because of how that data is collected (self-report via telephone). Please correct all other sections where only BRFSS data is reported.	In the course of responding to comments and expanding the sections on health indicators, we added data from the CDC BRFSS program. Specifically, we cited data from the BRFSS under the Access to Health Care section citing ADHSS 2010a; the Tobacco Use section under Lifestyle Choices as CDC 2009b; and in the Heart Disease and Cerebrovascular Disease (Stroke) section as CDC 2011a. At the first mention of the BRFSS program we added a footnote stating: "The BRFSS methodology has been used and evaluated by the CDC and participating states since 1984. Alaska has developed its own BRFSS method to account for many of the limitations listed below. In general, data from the CDC BRFSS and AK BRFSS are extremely reliable and valid however, there are some limitations associated with the method of data collection used for BRFSS. First, the BRFSS data are collected by telephone. Individuals who live in households without a residential telephone are not included. Therefore, the BRFSS might exclude persons of lower socioeconomic status or households with cellular phones only. Second, the survey is based on non-institutionalized populations and excludes persons residing elsewhere, such as nursing homes or long-term-care facilities. Third, the BRFSS data are self-reported by respondents, which can be subject to recall bias. Fourth, the sampling frame of the BRFSS is the entire state; therefore, some rural areas might be represented by relatively few interviews. Fifth, many analyses could not be conducted for rural areas because of small sample sizes. Sixth, health conditions are reported based on diagnoses, so the data could overlook individuals whose health problems have not been tested or recognized."

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L29	14	Alaska Department of Health and Social Services	5.15	5.15.3.3		Please provide a citation for your source of AI/AN marijuana use data.	This section has been rewritten for greater clarity and more references are included.
L29	15	Alaska Department of Health and Social Services	5.15	5.15.3.3		It is possible that there was a different survey format used in 2004 and salmon harvest was not addressed. Before concluding that salmon use was zero, verify if this question was asked in the 2004 surveys. If it was not asked, please change 2004 salmon use to N/A in your tables. This also applies to Nenana.	The text has been revised as requested to show that salmon data were not collected in 2004.
L29	16	Alaska Department of Health and Social Services	5.15	5.15.3.3	5.15-13	This table, as well as the other subsistence participation tables, is not presented clearly. Resources from each study year should be presented side by side (1984 salmon use next to 2004 for salmon use, for example) so that the reader can more easily see differences in each study year.	No change has been made to the format of the tables in response to this comment.
L29	17	Alaska Department of Health and Social Services	5.15	5.15.3.3		Please also discuss what percentage of people report eating the various subsistence foods, as opposed to solely the amount consumed by weight. See p. 43 of the AK Traditional Diet Report	The requested information has been added for the six subsistence foods among the top 50 reported for TCC by ATDP.
L29	18	Alaska Department of Health and Social Services	5.15	5.15.3.4		This section on Health Indicators is organized in a confusing fashion. It reports morbidity from cancer, Heart disease and cerebrovascular diseases, Chronic lung diseases, diabetes, infectious diseases, but includes a mortality table. Then it purports to describe mortality from accidents and injuries, traffic accidents, but then discusses morbidity from oral health issues and maternal child health issues. This creates a confusing picture for decision makers and leaves gaps in data collection and reporting.	Better descriptors have been provided and the order of presentation has been changed.

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L29	19	Alaska Department of Health and Social Services	5.15	5.15.3.4	Table 5.15.-20	Table 5.15.20 presents data from different time periods for different regions side by side. 2006-2008 for Yukon Koyukuk, 2008 for the state as a whole, and 2004-2008 for other regions. The bureau of vital statistics website can provide statistics for the entire 5 year period 2004-2008 for all of these regions, although some calculation is needed. Data from varied time periods should not be presented cohesively in a table. Either calculate these figures for the entire period 2004-2008 or make a distinction in the table to demonstrate to decision-makers that the data are not comparable.	In response to this comment, we have reformatted the table and used AKBVS sources to present data for the yeas 2000-2009 for each of the potentially affected communities (Table 5.15-20) Similarly, we have reformatted the table on suicide, homicide, and unintentional death (Table 5.15-23) for the period from 2007-2009 for all PACs.
L29	20	Alaska Department of Health and Social Services	5.15		5.15-20	There is more current data for this information on the AVBS website. Include the most current data possible.	In response to this comment, date has been updated based on latest available information from the online AKBVS system.
L29	21	Alaska Department of Health and Social Services	5.15	5.15.3.4		The authors should use the HECs to systematically report baseline data. If the authors were to report data systematically for the HEC Accidents and Injuries, they would, as an example, report injury outcomes (such as fatal and non-fatal injury [from the Alaska Trauma Registry]) and then injury determinants (such as law enforcement coverage of the areas of interest and the role of alcohol in both fatal and non-fatal injury). As another example, for the HEC: Non-infectious chronic diseases, they would report outcomes (cardiovascular and cancer mortality [from vital statistics] and then all cause morbidity [from the Alaska hospital discharge data set]). Organizing baseline information by the 8 HEC's and then reporting outcomes and determinants for each one is more clear.	The section on impacts is organized by HECs.
L29	22	Alaska Department of Health and Social Services	5.15	5.15.3.4		Mortality refers to death, morbidity refers to illness. This section is entitled Morbidity, but reports mortality statistics in Table 5.15-20.	The text has been revised for accuracy.

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L29	23	Alaska Department of Health and Social Services	5.15	5.15.3.4		Please correct this typo. The first sentence in the second cancer paragraph contains a typo. I believe it should read 'At the state level…'	Dr. Anderson is referring to a typo within the cancer section of 5.15.3.4 Health Indicators. Because the comments requested much more information on cancer and mortality, the original section has been rewritten and re-structured and the line referenced by Dr. Anderson was deleted as we expanded the section.
L29	24	Alaska Department of Health and Social Services	5.15	5.15.3.4		The authors should include cancer information that describes the type of cancer and its relative prevalence in the population. The cancer section conveys information of questionable use to decision makers. The incidence of cancer for a 14 year period is reported for each of the boroughs. However, cancer incidence is not clearly portrayed by cancer type. A table that portrays the borough in one column, its rate in the next column, and the breakdown of cancer rates by type in the final column would help decision makers understand cancer epidemiology in the various boroughs. Such a format would also allow future reviews to determine if the cancer epidemiology has changed.	We have added figures showing the rates of some cancers by region in the "Mortality Section under 5.15.3.4 section titled "Health Indicators".
L29	25	Alaska Department of Health and Social Services	5.15	5.15.3.4		Include recent information cancer incidence rates or some information on trends and information for the AI/AN population. The ANTHC EpiCenter has this information.	The text has been revised and two new figures have been added.
L29	26	Alaska Department of Health and Social Services	5.15	5.15.3.4		The first sentence may be true, but needs a solid medical reference.	The text has been revised and the sentence deleted in reorganized sections.
L29	27	Alaska Department of Health and Social Services	5.15	5.15.3.4		A project of this magnitude should give a careful examination of Heart disease and cerebrovascular disease. Self reported BRFSS data (a phone survey which is unreliable in most parts of the state without adequate phone service) paints a thin picture of this important health problem. Alaska published a careful report on this topic in the state (2009) and the	The text has been revised and additional material inserted to provide more information on heart disease and stroke.

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						authors can also review the annual report from ANTHC (2009) on this topic for Borough specific data. there is also an epidemiology bulletin on PM 2.5 that relates directly to this project (dust), the city of Fairbanks, and cerebrovascular diseases (www.epi.alaska.gov)	
L29	28	Alaska Department of Health and Social Services	5.15	5.15.3.4		There is more current AIAN data for COPD on the ANTHC EpiCenter website. Please update this section.	The text has been revised to include more recent data.
L29	29	Alaska Department of Health and Social Services	5.15	5.15.3.4		Please differentiate between Type I and Type II diabetes, even though some of the readership may not appreciate the distinction. The relevant health statistic is Type II DM.	The text has been revised for accuracy.
L29	30	Alaska Department of Health and Social Services	5.15	5.15.3.4		There is a typo for the rate of Chlamydia in the Northern region. It should be 2250 per 100,000 people. Correct this information.	The text has been revised for accuracy.
L29	31	Alaska Department of Health and Social Services	5.15	5.15.3.4		Re: reference of ADHSS 2011a. This is not the correct reference. According to the reference list, it appears that this is referencing the HIA toolkit. Please correct.	The correct reference is http://www.epi.hss.state.ak.us/bulletins/docs/b2011_10.pdf.
L29	32	Alaska Department of Health and Social Services	5.15	5.15.3.4		There is more recent Chlamydia data available from the CDC. Update this section with 2010 data.	The text has been revised for accuracy.
L29	33	Alaska Department of Health and Social Services	5.15	5.15.3.4		The paragraphs on Chlamydia do not flow well and leave the reader confused. For example, some AIAN specific data is interspersed with gender specific data and needs to be either rearranged or clarified.	This section has been rewritten for greater clarity.
L29	34	Alaska Department of Health and Social Services	5.15	5.15.3.4		There is more recent gonorrhea data available from the SOE. See the 2011 bulletin and update this section.	The text has been revised for accuracy.

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L29	35	Alaska Department of Health and Social Services	5.15	5.15.3.4		Include the U.S. average for gonococcal infections for appropriate comparison.	The text has been revised for accuracy.
L29	36	Alaska Department of Health and Social Services	5.15	5.15.3.4		There is a recent bulletin regarding an HIV outbreak in Fairbanks that needs to be mentioned in this section.	The text has been revised to incorporate reference.
L29	37	Alaska Department of Health and Social Services	5.15	5.15.3.4		Table 5.15.21: The title refers to Potentially Affected Communities, but these are boroughs. Please correct this language and also include the years covered in the table in the title.	The text has been revised for accuracy.
L29	38	Alaska Department of Health and Social Services	5.15	5.15.3.4	5.15-21	The title for this table needs to state that these statistics are for injury fatalities.	The text has been revised for accuracy.
L29	39	Alaska Department of Health and Social Services	5.15	5.15.3.4	5.15-21	This table is difficult to make comparisons and needs to be better presented. Present information in a bar chart or break into several tables.	The text has been revised for accuracy.
L29	40	Alaska Department of Health and Social Services	5.15	5.15.3.4		Again, comparison of borough level data that uses disparate time periods (e.g. 2008, 2004-2006, 2004-2008) to state data from one year is an error in data presentation. Please perform the calculations that allow you to present data from similar time periods for all elements in this table. As it stands, this table does not allow decision makers to easily compare boroughs.	In response to this comment: 1) Tables showing regions with different time periods have been revised to show the same time period (e.g., Table. 5-15.20). 2) Suicide, unintentional injury and homicide data for each region are now aligned to one time period as requested (See Table 5.15-23). 3) We have presented more detail in sections covering unintentional injury, suicide, and homicide (see same subheadings headings in text of Affected Environment and Environmental Consequences section) to provide the reader with a better understanding of the regional prevalence and importance of each.
L29	41	Alaska Department of Health and Social Services	5.15	5.15.3.4	5.15-21	There is more current data for this information on the AVBS website. Include the most current data possible.	The text has been revised to update the data to the latest available from the online AKBVS system.

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L29	42	Alaska Department of Health and Social Services	5.15	5.15.3.4		Intentional injuries: For what years is suicide the leading cause of intentional death? The time period for this information must be included. As it stands it is imprecise. Also, there are technically only two types of intentional death: homicide and suicide. So this statement could mislead the reader into thinking you are referring to all cause mortality.	The text has been revised for accuracy.
L29	43	Alaska Department of Health and Social Services	5.15	5.15.3.4		Homicide: This paragraph needs a time reference…for what period?	The text has been revised with dates and sources included.
L29	44	Alaska Department of Health and Social Services	5.15	5.15.3.4		Unintentional Injury: It would be important to note for the reader that poisoning in AK is typically alcohol or drug overdose when ICD9 codes are reviewed.	The text has been revised for accuracy.
L29	45	Alaska Department of Health and Social Services	5.15	5.15.3.4		It would be helpful to portray the AATD for the traffic fatalities section. A lot of data is available from Alaska DOT and NHTSA.	The text has been revised to provide comparisons with national norms.
L29	46	Alaska Department of Health and Social Services	5.15	5.15.3.4	5.15-51	Poisoning deaths are commonly alcohol poisoning by ICD9/10 code. This is important for the reader/decision maker to understand. A sentence should be inserted to clarify this concept.	The text has been revised for accuracy.
L29	47	Alaska Department of Health and Social Services	5.15	5.15.3.4		The first sentence in the traffic fatalities section on page 5.15-51 contains two stated averages and may be confusing to the reader. Please revise and remove parentheses.	The text has been revised for accuracy.
L29	48	Alaska Department of Health and Social Services	5.15	5.15.3.4		Information from the Alaska Section of Epi-Maternal and Child Health program needs to be included in this sub-section. Refer to http://www.epi.hss.state.ak.us/mchepi/default.stm and include relevant statistics.	The text has been revised for accuracy.
L29	49	Alaska Department of Health and Social Services	5.15	5.15.3.4		The most recent data should be presented when possible. Similar time periods also need to be presented. Update this information.	The text has been revised for accuracy.

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L29	50	Alaska Department of Health and Social Services	5.15	5.15.3.4		Include the time period for the borough-specific infant mortality data. Also, mention that the data is not statistically reliable, as was done in the tables in previous sub-sections	The text has been revised for accuracy.
L29	51	Alaska Department of Health and Social Services	5.15	5.15.3.4		There is no source cited for the teen birth information. Adequately reference this paragraph.	The text has been revised for accuracy.
L29	52	Alaska Department of Health and Social Services	5.15	5.15.3.4		The paragraphs on Chlamydia do not flow well and leave the reader confused. For example, some AIAN specific data is interspersed with gender specific data and needs to be either rearranged or clarified.	The text has been revised for accuracy.
L29	53	Alaska Department of Health and Social Services	5.15	5.15.3.4		Oral health is located in the Mortality section and would be better placed in the morbidity section.	The text has been reorganized.
L29	54	Alaska Department of Health and Social Services	5.15	5.15.3.4		Including prenatal care, low birth weight, and teen birth rates in the mortality section is awkward for readers and may confuse decision makers.	The text has been rewritten, but there is a clear linkage between these factors and infant mortality rates.
L29	55	Alaska Department of Health and Social Services	5.15	5.15.3.4		Same comment for gender based violence and child abuse statistics in the mortality section. This may confuse the reader who is looking for mortality data here.	This section has been relocated.
L29	56	Alaska Department of Health and Social Services	5.15	5.15.4		The scale of TAPs is presented, but there is no connection made regarding the scale of TAPs and the scale of the proposed project and potential environmental consequences. Provide a comparison to the proposed project. Anecdotal and documentary information regarding the negative human impacts of the TAPS project are widely circulated and available to the public. The authors should acknowledge the negative human health impacts experienced.	The text has been revised to add text to indicate that there are differences of opinion on the impacts of TAPS. It is not the purpose of this document to assess the impacts of TAPS. In response to this comment, text was added on the revenues provided the State from TAPS and cited some of the anecdotal issues related to social determinants of health in the appropriate sections.

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L29	57	Alaska Department of Health and Social Services	5.15	5.15.4		For the sentence beginning 'This is relevant because. 'explain the actual implication of a change in the baseline conditions, such as population, on the impacts.	This statement noted in the comment was in the beginning of the Environmental Consequences section comparing TAPS to the proposed project and has been removed in the latest version.
L29	58	Alaska Department of Health and Social Services	5.15	5.15.4.2		Only the potential positive impacts for the proposed action are mentioned, not the potential negative impacts. The potential negative impacts should not be downplayed and need to be included.	The text has been revised to add a list of the HECs with impacts rated as medium or high in this section. It is now more balanced.
L29	59	Alaska Department of Health and Social Services	5.15	5.15.4.2		Scoring sections are unclear. It is confusing about what is being scored, particularly in the longer sections. Add a sentence restating what is actually being scored.	The text has been revised to add a statement to each of the scoring systems to restate the HEC being scored as well as the score.
L29	60	Alaska Department of Health and Social Services	5.15	5.15.4.2		Only certain changes are considered when discussing whether the project has to potential to affect an HEC. Other changes could cause an impact. It reads like all of the 'changes' mentioned must occur in order for an effect to be possible and what that 'change' actually could be is not discussed. State that these are examples of changes that can occur and that not every change has to occur for there to be an impact. Also include a discussion on what these changes entail and provide examples. This comment applies for all HEC scoring sections.	Each HEC is ranked according to the methodology presented in the HIA toolkit and the discussion of what the scoring means is included in the public health section and readers are referred to the appropriate section. Each HEC is self contained and the potential changes associated with each HEC are listed shortly after introducing the HEC. It seems unnecessary to restate the changes in the ranking system. We did review the language in the ranking sections and made minor changes.
L29	61	Alaska Department of Health and Social Services	5.15			The authors should remove the large amount of data regarding accidents and injuries to the workforce since it is beyond the scope of the HIA. With the additional space, the authors should give careful consideration to the two leading causes of injury they identified during the baseline reporting section (poisoning and motor vehicle crashes for community members). The authors should also discuss other types of injury related to the leading causes of injury described in earlier tables.	With regard to the first comment, Discussions with Dr. Paul Anderson (AK State Epidemiologist) brought out the need to include more information on alcohol poisoning as a leading cause of death and the importance of suicide. Based on these discussions, these issues have been further developed in the Affected Environment section (see new tables, text and figures in the unintentional injury section and a new sub section titled 'The Role of Alcohol') and analyzed in the Environmental Consequences section under the Social Determinants of Health HEC. Accidents and Injuries related to the proposed Project are included in the

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							Accidents and Injuries HEC (as indicated by the Alaska HIA Toolkit guidance document). With regard to the second comment, the analysis in the public health section is not an estimate of OSHA occupational accidents (e.g., slips trips and falls). The analysis takes the available data and estimates the number of injuries and fatalities for everyone involved (workers and bystanders) because most of the data sources do not differentiate between workers and bystanders. We make the following statement in the text at the beginning of the analysis of the Accidents and Injuries HEC: "It is conventional practice to address only non-occupational health effects in an HIA. However, occupational injuries (fatal and nonfatal) are considered here because these could place demands on existing health care facilities (see next section) and, moreover, some data (such as for highway fatalities) do not distinguish between those occupationally injured and 'bystanders. These are addressed separately in this analysis." To estimate all casualties, we used the data (which doesn't distinguish between worker and bystander) to develop estimates of the fatal and nonfatal injuries associated with the proposed project for both workers and others. Again, the overall number is relevant because accidents and injuries can put pressure on local health care facilities and access. In the case of the proposed project, we demonstrate that fatal and non-fatal casualties are estimated to be low overall (see Table 5.15.-35).
L29	62	Alaska Department of Health and Social Services	5.15			The authors should also evaluate impacts from increased homicide rates, suicide rates, and increased incidence of assaults, especially sexual violence. These impacts occur during a "short-term" portion of the project, but all are long lasting in their negative health effect.	This comment is confusing because it suggests suicides, homicides and domestic violence should be included in the Accidents and Injuries HEC. Per the Alaska HIA toolkit guidance, they are located in the analysis of Social Determinants of Health. The latest revision has augmented information and analysis on domestic violence, suicide and homicide. These issues have been further developed in the affected environment sections (see new tables, text and figures in the unintentional injury section, and the section on

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							domestic violence) and are analyzed in the Environmental Consequences section under the Social Determinants of Health HEC.
L29	63	Alaska Department of Health and Social Services	5.15			The authors have actually presented data that supports the relationship between increased travel for subsistence and increased injury rates in table 5.15.21. Snow machines and ATVs are in the top echelons of injury cause, and are routinely used for the harvest of subsistence foods. It is epidemiologically plausible that increased travel distances result in increased exposure to the risk factor which could result in increased incidence of an injury type that is currently a problem in the regions listed. The authors should remove the statement that there are no data to support this hypothesis and include language that affirms the epidemiological relationship above.	In response to this comment, we have added the following footnote to the Accidents and Injuries HEC analysis associated with construction within the Environmental Consequences section: "Snowmachine and ATV accidents are a common occurrence in areas where subsistence users harvest resources (see Table 5.15-25). Alteration of access routes to subsistence areas might impact accident rates in the event that required harvest trip distances were substantially increased. The average annual number of ATV/snowmachine fatalities in the potentially affected Boroughs/CAs was 9.33 persons over the years 2007-2009 (ABVS, 2012) If average trip distances were to increase by 10% for example, and all ATV/snowmachine trips were for harvesting purposes, then the average incremental number of fatalities would be less than one person per year."
L29	64	Alaska Department of Health and Social Services	5.15	5.15.4.2		First bullet: Construction activities could change injury rates in the PACs and this is stated in the following paragraph. Remove this statement.	The text has been revised to remove this statement.
L29	65	Alaska Department of Health and Social Services	5.15	5.15.4.2	5.15-23	This table needs to be broken into smaller tables. There's a lot of data here and it would be easier for the reader to have several tables.	The text has been revised to split the original table (5.15-23) into 3 tables (5.15-25, -26, & -27).
L29	66	Alaska Department of Health and Social Services	5.15			The authors should not assume that out of state workers will "address their routine health concerns" while they are home because many will have emergent problems from chronic conditions and acute health problems would be dealt with locally. The authors should account for increased visits due to both chronic and acute health issues in this large work force.	The text has been revised to indicate that the maximum possible number of workers seeking care would be a minute fraction of the total served population.

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L29	67	Alaska Department of Health and Social Services	5.15			The authors incorrectly use the "healthy worker effect" (HWE) to make a deduction about potential utilization of health care services. It is incorrect to make a prediction about health care utilization using a theoretical principle that describes a type of statistical bias. These workers will still have chronic disease issues that need management such as diabetes, high blood pressure, and mental health conditions. In fact, many of them will be able to work only because they are under the close care of an occupational medicine physician or PA. Additionally, these workers will be just as susceptible to and seek care for all sorts of acute illnesses (URI, STI, GID, acute depression and anxiety, rashes, etc) and injury. If the authors can demonstrate another study that shows workers to utilize less health care when working in a remote, stressful, and austere environment simply because they are workers, it would be very helpful include the reference for the readership in order to support this claim. In reality, some may also move families to the area for the duration of the project and this further complicates the health care utilization picture.	The Healthy Worker effect (along with numerous references discussing application) is brought up once to discuss the potential for beneficial effects. We specifically state: "In practical terms this means that employed construction personnel are more likely to have lower mortality and morbidity than the overall Alaskan population, meaning that they are less likely to require medical attention (other than to deal with injuries). *This statement does not mean that workers will be either disease or injury free."* We then go on to show that the estimated maximum annual influx of construction workers represents only a small percentage of the existing population in Fairbanks and Anchorage (the locations where workers would be treated for serious sickness or injury) and therefore increased demand for health care for these workers is likely to be small.
L29	68	Alaska Department of Health and Social Services	5.15	5.15.4.2		2nd paragraph: This paragraph is confusing because there seems to be no flow connecting the points presented. Please clarify.	The text has been revised and the paragraph deleted.
L29	69	Alaska Department of Health and Social Services	5.15			The authors should not assume that SPCP, CWMP, and etc. will adequately address exposure potential to hazardous materials. The classic approach to demonstrate routes of exposure and amount of exposure is the Conceptual Site Model (CSM). As due diligence, the authors should develop and include a general CSM for the project footprint to provide a rational basis for their claim that exposure is "unlikely" or would not happen.	We have developed a CSM appropriate for the desktop level HIA presented in the Public Health chapter and included it in the latest version near the beginning of the Environmental Consequences section (See section 5.15.4.2).

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L29	70	Alaska Department of Health and Social Services	5.15	5.15.4.2		The potential change to dietary habits may not be temporary, even though the construction phase of the project is temporary.	The subsistence section indicates that the impact of the Project would be low. Using this data point, we cannot predict that a low impact to subsistence resources would result in long lasting impacts on the choice of diet. We have cited the exact language from the "Findings" section of the BLM's ANILCA 810 document in each area where conclusions are made about subsistence. The quotes can be found at the end of the Food, Nutrition, and Subsistence HEC analysis for Construction and for Operations and Maintenance and in the Cumulative Effects on Subsistence section towards the end of the Public Health chapter.
L29	71	Alaska Department of Health and Social Services	5.15			The authors should address the situation (loophole) where workers transport themselves to the worksite and then use personal vehicles to hunt near the areas where they are working. They may not hunt or fish on the lease site, but they may hunt and fish nearby which creates competition for subsistence users. There remain accounts of entire lakes that were just off of TAPS leases that were fished out entirely during TAPs construction.	We have edited the text to note the following in the Food, Subsistence, and Nutrition HEC. AGDC does not allow hunting, fishing, or harvest activities while in the leasehold or when being transported by company equipment. We acknowledged that anyone (resident or non-resident) worker could legally obtain a hunting or fishing permit and exercise their right while off the leasehold and off duty. We also cite the AGDC stipulations regarding hunting and fishing while working.
L29	72	Alaska Department of Health and Social Services	5.15			The authors incorrectly reference the comments of DHSS on the Pt. Thomson HIA regarding work camps. ADHSS determined that the FIFO system minimized contact with local communities since the camp for Pt. Thompson is remote. This is not the case for ASAP. ASAP is a totally different situation since the workers are near a transportation corridor and there is no evidence that the work camps will be closed. The authors should remove the reference to Pt. Thompson, and should clarify (or gain affirmation from AGDC) whether construction camps are "closed" or "open". If workers are allowed to leave the camp (and go to nearby communities) after their daily shifts are completed, the camps are open and the risk to	We added significantly more information on the possibility of access to and from work camps in the Infectious Disease HEC section. We also added a table of potential mitigation measures that may be applied to control access. A statement on the nature of work camps at Point Thomson is included but the reader is notified that the Point Thomson project was significantly different from the proposed Project. We advocate for educational outreach programs and free vaccines and shots on a voluntary basis.

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						communities is greater than the authors portray in their statements.	
L29	73	Alaska Department of Health and Social Services	5.15			The authors should include the possibility for positive impacts throughout their ranking system since not all impacts are negative. The simple addition of a +/- to the ranking approach would suffice. The authors should use this Non-communicable and chronic diseases section to point out the likely reduction (i.e. benefit) in acute non-infectious disease exacerbations in Fairbanks if cost effective natural gas was available. The document deals with this later under cumulative effects, but it should also factor into the ranking here.	We added +/- notation to the scoring section for each of the EHECS ranked during construction and in the summary table. We also added short statement documenting the use of the +/- signs in the methodology section (5.15.2).
L29	74	Alaska Department of Health and Social Services	5.15	5.15.5		Figure 5.15.5 represents a time period of relatively stable oil and gas activity in Alaska with no large scale development. In order for the authors to support their assertion that oil and gas development does not affect a change in this health topic, they would need to display data that cover the time period of the last large influx of workers to the region: TAPS. The period of worker influx creates short term and long term effects and the influx of EtOH should at least be mentioned as a possibility here.	We contacted the Alaska Native Epidemiology Center of Alaska, Native Tribal Health Consortium for more information on maternal alcohol use during pregnancy. We learned that data are not readily available prior to 1991 in published form. We have added the following footnote within the Social Determinants of Health analysis within Environmental Consequences section to acknowledge this comment and our pursuit of other data: One commenter noted that this period was relatively stable in terms of oil and gas in Alaska with no large scale development. This commenter requested that data on alcohol use during pregnancy be reported for earlier years, such as those during the period when TAPS was being constructed. Unfortunately, such data are not available (personal communication Dr. Ellen Provost (Director, Alaska Native Epidemiology Center of Alaska Native Tribal Health Consortium (907) 729-1900 and Dr. Peter Holck (907) 729-4561). Maternal alcohol use only started being recorded on birth certificates in 1988 and data are available only as far back as 1991 (Alaska Maternal and Child Health Data Books). There are some discrepancies between these two sources, but both indicate a declining trend over the period covered

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							in Figure 5.15-18. Drs. Provost and Holck also noted that the data on maternal alcohol use is self-reported and that social stigma over maternal alcohol use may have increased over the years, which may bias the data."
L29	75	Alaska Department of Health and Social Services	5.15			The authors assert that domestic violence and family stress will not be increased and in general the project is not expected to "materially exacerbate problems" in the potentially affected communities. The reality of local employment in Alaska, however, usually involves a multi- week rotation in which one or both parents are removed from a household. This places financial strains on families that must find and pay for child care. Locals who have previous experience with construction work schedules in numerous regions of Alaska associate this work schedule with family disruption (divorce, gaps in child care, extra-marital affairs, increases in family dysfunction, etc) and other relational problems. This would certainly be the experience for some families that have members working on the project. The authors should reconsider their assessment in acknowledge that for some families this experience will be destructive while for others it may be beneficial and positive.	We have added information in the Social Determinants of Health sections (both in the affected environment and in the consequences sections) to develop a more detailed perspective of the impacts of change on the Alaska Native home life and culture. We have added references on the issues related to long-term and short-term shift work, alcoholism, drug-use, and domestic violence. During our review of the scoring of the Social Determinants of Health, we changed the score during the construction phase from "low" to "medium" to account for the new information added based on the comment.
L29	76	Alaska Department of Health and Social Services	5.15			There are excellent articles by Chandler et. Al. that describe a loss of connection with a future as a primary source of depression and suicidal ideation in Alaskan Natives and First Nations groups in Canada. When individuals lose a sense of hope in the future, which is often associated with cultural isolation and cultural disintegration, they experience more depression and are at increased risk for suicide. The authors should remove their statement that "the construction phase is unlikely to have substantial	The text has been revised to add information on Drs. Chandler and Lalonde's work connecting self-continuity with lower rates of suicide and depression.

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						contribution", they should review the Chandler literature, and include language that acknowledges that further development increases the perception that Alaska Native culture and lands are being taken away which in turn contributes to depression and suicide risk.	
L29	77	Alaska Department of Health and Social Services	5.15			The authors should remove (throughout the document) all references to the approach and rankings taken for the Pt. Thomson HIA. Pt. Thomson is a small, isolated oil-pad on the North Slope. ASAP is a large pipeline that spans the entire state and will create a host of impacts across a much larger footprint.	We reviewed the public comments from the Minto meeting. As a result of those comments and agency comments, we have added information in the Social Determinants of health section (both in the affected environment and in the consequences sections) to develop a more detailed perspective of the impacts of change on the Alaska Native home life and culture. We have added references on the issues related to long-term and short-term shift work, alcoholism, drug-use, and domestic violence. During our review of the scoring of the Social Determinants of Health, we changed the score during the construction phase from “low” to “medium” to account for the new information added based on the comment.
L29	78	Alaska Department of Health and Social Services	5.15	5.15.4.2		It is impossible to know that the project will not increase exposure to toxic and hazardous substances in the PACs. The authors should include a conceptual site model to provide a rational basis for this statement.	In the absence of other data, we have to rely on the fact that the proposed Project will follow all state and national regulations regarding the use and storage of hazardous materials. The regulations are in place to prevent accidental release and other problems. The point of the required permits and adherence to regulations is protection. In response to this comment we have edited the statement. In addition, we have developed a CSM appropriate for the desktop level HIA presented in the Public Health chapter and included it in the latest version near the beginning of the Environmental Consequences section (See Section 5.15.4.2).

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L29	79	Alaska Department of Health and Social Services	5.15			Again, the authors should remove calculations and information regarding workplace safety and include information here on common forms of injury to the general public and the PACs.	We have chosen to show the impacts on both populations (the workers and the public) so that decision makers can have a better understanding of how accidents will impact both groups. In addition, it is expected that some of the workers will be local Alaskans so this information will be of interest to them as well. We have not made a change in response to this comment. Poisoning by alcohol and suicide are considered in detail in the Social Determinants of Health analysis as suggested by the Alaska HIA Toolkit (not in the Accidents and Injuries sections) The latest revision includes more data on suicide, homicide, and the role of alcohol (see subheadings) in both the Affected Environment and the Social Determinants of Health section in the Environmental Consequences section.
L29	80	Alaska Department of Health and Social Services	5.15	5.15.4.2		Accidents and injuries to non-workers could increase due to higher use of roads, etc.	We appreciate that more drivable area could lead to more accidents. We added information discussing this possibility along with an estimate of the increased accidents at the end of the first Accidents and Injuries section associated with construction in Environmental Consequences.
L29	81	Alaska Department of Health and Social Services	5.15			Again, the authors should remove all references to Pt. Thomson because the projects are not comparable.	We have corrected the spelling of the Point Thomson EIS and we have revised the text to ensure that the two references to the Point Thomson (PT) EIS are shown as a point of reference for previous work on the public health topic in Alaska. The first mention of the PT EIS is in 5.15.2 under Methodology. The other location is in the 'Perspectives' section of the analysis for the Infectious Disease HEC in Environmental Consequences again as a source of earlier work on Public Health in Alaska. No conclusions about the proposed project are drawn from the PT EIS document. We also added the following footnote to the "Perspectives" section with the evaluation of infectious diseases: "One commenter on an earlier draft noted that the Point Thomson project is located on the North Slope and may have limited applicability to other potentially affected

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							communities. This comment is acknowledged and should be considered by the reader."
L29	82	Alaska Department of Health and Social Services	5.15			Again, the authors should include a CSM as discussed above. The authors should not merely point to "regulations" but should include the relevant language to assure the reader that the regulation does indeed protect health.	We have developed a CSM appropriate for the desktop level HIA presented in the Public Health chapter and included it in the latest version near the beginning of the Environmental Consequences section.
L29	83	Alaska Department of Health and Social Services	5.15			The authors should revisit table 5.15-29 and re-evaluate construction related impacts from worker influx as related to 1) accidents and injuries (esp. drunk driving, alcohol poisoning, and travel for subsistence activities) 2) Health infrastructure (care for acute worker health issues) 3) Infectious diseases (it is hard to comprehend that the authors feel ID will be more during operations than construction) 4) SDH: during construction the sociocultural disruptions from worker influx into camps and communities will be significant and it is hard to see how the authors feel that the construction period will be low and the operations period will be medium. Please revisit all rankings in this table in light of the comments provided.	The authors reviewed the rankings and many of the questions raised by the commenter are answered by the use of the scoring system proposed in the HIA toolkit. For example, the operations phase is expected to last more than 10 years, thus the duration of the impact has to be regarded as 'very high' and is worth 3 points according to the ranking system. When the numerical values for the consequences are summed to rank the final impact, the additional points associated with the long term of operations put the impact in the medium category. In light of this and other comments, we revisited the ranking for infectious disease during the construction phase and increased the ranking from low to medium. In response we have added a discussion of potential mitigation strategies and made a recommendation.
L29	84	Alaska Department of Health and Social Services	5.15	5.15.4.2		Cumulative impacts should discuss the SDH in greater depth (such as anxiety of loss of a 'way of life') and should also mention the potential cumulative effects in conjunction with potentially multiple large-scale projects in the same area.	In response to this comment, more information on the loss of a way of life has been added in the discussion of suicide within the affected environment section of the document. This issue has been emphasized in other parts of the document as well.
L29	85	Alaska Department of Health and Social Services	5.15	5.15.4.2		Mitigation measures should be connected to the specific concerns and presented in this section, rather than summarizing several comments and referring the reader to another section. Statements such as 'taking all measures necessary' do not propose specific mitigation efforts to address specific potential health impacts. This section should be expanded.	A policy decision was made by the agency to include mitigation measures in a separate chapter but also include a summary in the main text. In response to this question we have added more information about mitigation measures associated with sexually transmitted diseases.

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L29	86	Alaska Department of Health and Social Services	5.15			General statements about causal health relationships are not well referenced in this document and are often made as assertions. Decision makers may not be familiar with the relationships between health contexts and health outcomes. Please provide references that support the relationship between economic, educational, and social contexts for health.	The text has been revised to add more information and references to the Affected Environment section.
L29	87	Alaska Department of Health and Social Services	5.15			Sections that contain large amounts of data for various communities/boroughs should be summarized in a table or map.	We agree that a more user-friendly version of the multiple data tables would be helpful to the reader. Time constraints did not allow for new versions of the tables already presented. But when data was added in response to Public and agency comments, we tried to use infographics rather than tables. For example, see the section on cancer and COPD in the Affected Environment sections.
L29	88	Alaska Department of Health and Social Services	5.15			A brief discussion of datasets used and their relative limitations needs to be included. The reader needs to be aware of the general methodology of the various data collection mechanisms, such as which datasets rely on self-reported data.	We reviewed the text and ensured that the datasets were properly documented with references and where applicable websites. We also added a short section titled Data Sets and Limitations within the Methodology section (5.15.2).
L29	89	Alaska Department of Health and Social Services	5.15			Anecdotal and documentary information regarding the negative human impacts of the TAPS project are widely circulated and available to the public. The authors should acknowledge the negative human health impacts experienced in Fairbanks and Anchorage due to construction forces.	The text has been revised to provide more information comparing this project to TAPS. As noted above, this DEIS is not a documentary of the perceived ills of TAPS. We did add some published information on the social impact of TAPS within Fairbanks (e.g., prostitution).

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L29	90	Alaska Department of Health and Social Services	5.15			The authors do not mention several other large scale projects proposed in the same area such as the Foothills West Transportation Project. Include a discussion on whether the PACs can handle changes due multiple large-scale projects, such as an extremely large influx of workers in Fairbanks.	We have edited the 'Additional Perspectives on Cumulative Effects' section to note up front that the list of the past, present, and future projects are listed in Table 5.20-1. In response to the comment we added the following text to the section summarizing cumulative effects of this project within the Additional Perspectives of Cumulative Effects section: In the case that some proposed oil and gas or infrastructure improvement activities are concurrent with the construction phase of the project, there would be the potential for the increased negative effects on public health from an influx of workers in localized areas. As shown in this section, these types of projects require a public review process and permits through various agencies that would require mitigation of negative impacts and the projects would be unlikely to have large impacts on public health." And added the following footnote about the Foothills project: "A public comment suggested that the Foothills West Transportation Access Project as an example of another project that would bring a large number of workers into an area already being used for the proposed project. The Foothills project would create a permanent, all season road and pipeline corridor from the Dalton Highway near Galbraith Lake to Umiat. Details about the employment and construction seasons are unpublished. Public meetings have taken place, but no formal documents describing the employment related to the project are available from the Foothills EIS website (http://www.foothillswesteis.com/). Without this information it is difficult to make assumptions about how the proposed Project and the Foothills project would impact public health."

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L29	91	Alaska Department of Health and Social Services	5.15			Conclusions of 'no effect' throughout the document should not be made, but should instead be described as 'unlikely' or 'very low' unless a conceptual site model is included that can provide a rational basis for this statement	Very early versions (mid 2011) of the Public Health chapter made reference to HECs with no effect (such as impacts of the proposed project on chronic disease, and exposure to hazardous waste). The early assessments have been replaced as the section has been improved based on comments and feedback. The current version presents conclusions using the language suggested by the Alaska HIA toolkit terminology for rating impacts to HECs. Currently there are now NO statements of 'no effect' for any of the HECs, rather for every HEC associated with the construction and operations phase we summarize the predicted impact using the suggested HIA toolkit rating system and language. The ratings are provided at the end of each HEC subsection within the consequences section of the Public Health chapter. A summary of the ratings are also presented in tabular format prior to the cumulative effects section (Table 5.15-37).
L29	92	Alaska Department of Health and Social Services	5.15			There is no substantive discussion of stakeholder meetings or comments/concerns. Public input is an essential part of the HIA process and must be described in this assessment. It is often helpful to include verbatim health comments from federal meetings or submitted comments.	The letters and comments from the stakeholder meetings held last Fall and Winter have been reviewed. Comments relevant to Public Health focused on siting issues and the potential for cultural change associated with another industrial project in Alaska. The Public Health section has been updated to reflect those comments, particularly with regard to social determinants of health. We also added text when commenter suggested specific effects within an HEC as appropriate.
L29	93	Alaska Department of Health and Social Services				The most recent data should be presented when possible. An attempt to present similar time periods should also be made.	We have tried to balance the data shown throughout this section so that similar time periods are chosen. However, the diverse source material data are not aligned to a single reference set of time periods and this confounds presentation and analysis. In response to this comment (particularly the 'most recent data' aspect, we updated several tables to the latest data available.

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L29	94	Alaska Department of Environmental Conservation, Air Quality Division	General			1. In a number of areas throughout the air quality section, the EIS notes that the Alaska Gasline Development Corporation (AGDC) need to undertake additional analysis. It is not always clear whether this analysis is specific to air quality permitting or if it is need for environmental impact analysis. I would be worthwhile to provide an opportunity for resource agencies and the public to comment on the additional analysis before the final Environmental Impact Statement (EIS) is issued.	Section 5.16, Air Quality, indicates that the AGDC will need to prepare an air quality analysis for permitting requirements under PSD and minor source permitting. Permitting activities are a separate activity outside the scope of the EIS. Section 5.16 includes a comprehensive air quality analysis required for the EIS based on currently available information. This information will be gathered during the USACE 404 permitting process.
L29	95	Alaska Department of Environmental Conservation, Air Quality Division	General			The EIS document concludes that potential air quality improvements in the Fairbanks area would result from residents switching to natural gas from more polluting sources. These improvements would require additional actions to be taken beyond just the construction of the proposed project. Please make it clear that there would need to be additional infrastructure and actions taken outside the scope of this proposed action in order for the air quality improvements to happen.	Air quality benefits are discussed in Section 5.15, Public Health, in Subsection 5.15.4.2 Proposed Action, as well as in Section 5.20, Cumulative Effects, in Subsection 5.20.6.3, Tourism, Recreation, and Wilderness Resources, Air Quality, Greenhouse Gases, and Global Climate Change. As noted in Table 6.0-1, Air Quality, 'In concert with a Fairbanks natural gas distribution system, natural gas made available by the ASAP would replace wood and fuel oil currently used for heating and power generation and could result in improvements to air quality in the Fairbanks area.'
L29	96	Alaska Department of Environmental Conservation, Air Quality Division	ES	Public Health		This section contains statements regarding health impacts that appear to be contradictory: • Residents of Fairbanks would benefit from improved air quality • Whether or not the proposed project goes forward would not materially affect the cumulative impacts of all other state, federal, and industrial developments. Please explain how these two statements are not contradictory.	In response to this comment, we have revised the section in the ES to read: "Measured against all cumulative health effects from state and federal programs, other oil and gas activities, and other industrial developments, the direct incremental impacts of the proposed Project on public health would not likely be large. An important positive cumulative effect of the proposed action is that residents in the Fairbanks region would benefit in health terms as a result of improved regional air quality resulting from the proposed Project and a Fairbanks gas distribution system. These benefits are described in detail in Section 5.15 of the DEIS. Adoption of the No Action Alternative will eliminate the incremental direct impacts but also forgo the cumulative benefit to health from improved regional air quality around Fairbanks. Direct and cumulative effects on

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							public health associated with the proposed action are discussed in Section 5.15. "
L29	97	Alaska Department of Environmental Conservation, Spill Prevention and Response Division	1.0	Authorities Applying to the Proposed Action	Table 1.5-1	In the section listing the legal authorities under the Alaska Department of Environmental Conservation (ADEC), please add a citation to Alaska Statute (AS) 46.04.050. This statute provides that an oil discharge prevention and contingency plan is not required for a natural gas production facility and a natural gas terminal facility, except for storage of refined petroleum products in a quantity that does not exceed 10,000 barrels (420,000 gallons). In the final listing for ADEC please change the term "non-crude oil" to "refined petroleum products" in the Authorizations column. Please also add another citation to the table that refers to Proof of Financial Responsibility when storage of refined petroleum products exceeds 10,000 barrels (420,000 gallons). The regulatory citation for these requirements can be found at AS 46.04.040(a) and AS 46.04.050(b). The regulatory intent of this authority is to protect public health by ensuring the ability of the facility owner or operator to respond to and address the damages cause by a spill.	FEIS Table 1.6-1, under the State, ADEC section has been updated as requested.
L29	98	Alaska Department of Environmental Conservation, Commissioner's Office	2.0	Aboveground Facilities for the Proposed Project	Table 2.1-2	A number of the facility and facility name listings have superscript that appear to refer to footnotes, but the corresponding footnotes appear to be absent.	Table 2.1-2 has been modified to include footnotes
L29	99	Alaska Department of Environmental Conservation, Spill Prevention and Response Division	2.0	2.1.2 Aboveground Facilities		Paragraph one on this page notes that additional facilities at the compressor stations would include utility piping and tanks farms. It would be helpful to provide the anticipated total storage capacity (in gallons) for refined petroleum products to be stored at each tank farm associated with the project.	Text was included in the Section 2.1.2 of the FEIS to clarify the storage of diesel at the facilities.

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L29	100	Alaska Department of Environmental Conservation, Commissioner's Office	2.0	Access Roads		The final paragraph in this section refers to "county roads" which do not exist in Alaska. Alaska political subdivisions are referred to as boroughs. Please remove the reference to county roads from the document.	The correction was made as requested and is located in the first sentence of the last paragraph of the Access Roads subsection of Section 2.1.3.3.
L29	101	Alaska Department of Environmental Conservation, Commissioner's Office	2.0	Hydrostatic Testing		This section notes that hydrostatic testing water would be discharged to upland areas to comply with discharge permit limitations in accordance with applicable regulations. It is not clear if the project intends to use freeze depressants (antifreeze) or other additives to the water used for hydrostatic testing. Please include this information in the document.	Section 2.2.2.6 describes the hydrostatic testing methods AGDC plans to employ.
L29	102	Alaska Department of Environmental Conservation, Spill Prevention and Response Division	3.0	NGL Fractionation Facility and Marine Terminal		The text on this page indicates that the approximate volumes of Natural Gas Liquids (NGLs) to be produced are 343 barrels per day (bpd) or 14,406 gallons per day. It also notes that depending on the location of the NGL fractionation facilities, storage facilities equal or similar in size to those identified for the Natural Gas Liquid Extraction Plant facility would also be necessary. It would be helpful to provide the estimated storage capacity volume anticipated for storing natural gas liquids at the NGL fractionation facility and at the marine terminal facility associated with the export of NGLs.	The estimated storage capacity at the NGL fractionation facility includes: storage tanks for 12,000 barrels of gasoline, three 120,000-gallon propane tanks, one 90,000-gallon propane tank, and two 375,000-barrel LPG tanks. These storage facilities would be constructed and operated to meet ADEC and EPA regulations for spill prevention and contingency planning. There would be no storage of NGLs associated with the marine terminal. This information has been added to FEIS Section 5.20.5.5, NGL Transportation Processing and Distribution.
L29	103	Alaska Department of Environmental Conservation, Air Quality Division	4.0	4.2.6 Coal and Coal Gas		The first paragraph notes that the existing Healy Clean Coal Project (HCCP) has been shut down since 2000. It should also be noted in this section that the Alaska Department of Environmental Conservation recently issued a permit for a restart of the project.	The following text has been added to the FEIS in Sections 4.2.6 and 5.20.6.1: "Restarting the Healy Clean Coal electrical generating facility is being considered and ADEC recently issued a permit for the restart of that project."
L29	104	Alaska Department of Environmental Conservation, Commissioner's Office	5.15	Workforce	Table 5.15-1	It appears from Table 5.15-1 that the volume of workers and facilities at the temporary construction camps means that these camps would not fall under the existing DEC temporary work camp general permit. We would advise	AGDC will consult with ADEC regarding temporary camp regulations following final design and/or during construction planning. This information will be gathered during the USACE 404 permitting process.

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						consulting with the department well in advance of the construction season to determine how the facility permitting will be approached.	
L29	105	Alaska Department of Environmental Conservation, Air Quality Division	5.15	Exposure to Hazardous Materials		At the top of the page, the abbreviation for Plan of Development (POD) is used. For clarity please add this abbreviation to the glossary list.	A master list of acronyms is provided in the Glossary directly following the Table of Contents. The definition of POD has been added.
L29	106	Alaska Department of Environmental Conservation, Air Quality Division	5.15	Exposure to Hazardous Materials		The first paragraph notes that "ADEC currently relies on two statutes that were based on Federal Clean Air Act". The statement should actually read "ADEC currently relies on two regulations that were based on the Federal Clean Air Act". The bullets following the first paragraph should read: 18 AAC 50.045(d) and 18 AAC 50.220	Revised as suggested. See section 5.15.4.2.
L29	107	Alaska Department of Environmental Conservation, Commissioner's Office	5.15		Figure 5.15-3	The map of the United States used provides a misleading comparison of Alaska's size in relation to the rest of the States. Please use a map that has Alaska portrayed at the same scale as the other states and in the correct geographic location, not located under California.	Revisions to this chapter addressed the original issue and removed the figure in question. Currently, in Chapter 5. 15 there is one image that portrays Alaska in the same image as the rest of the US. Fig. 5.15-15 shows age adjusted rates of chlamydia per 100,000 for US states in 2008. The point of this map, taken from a CDC publication, is to show that Alaska is on the high-end of for chlamydia rates in the US. While Alaska is not shown to scale, it is irrelevant to the utility of the map.

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L29	108	Alaska Department of Environmental Conservation, Air Quality Division	5.15			There is an extensive discussion of particulate matter emissions on these pages, including geography, non-attainment status, comparison of energy source's emissions, and SIP compliance alternatives. Much of this discussion would be more appropriately placed in the air quality section. At a minimum it should be referenced in the air quality section.	We refer to the Air Section 5.16 in several places. First, we refer to the fact that there is a chapter on Air Resources that we used to draw our conclusions (under the 'Assessment' heading in Section 5.15.2.1). We refer to the information on emissions from construction equipment in the CSM under Section 5.15.4.2 'Proposed Action'. The Air Section is referred to within the analysis of Exposure to Hazardous Materials with regard to air pollutants associated with the construction and operations and maintenance phases. We include air quality information in the public health section (with reference to Section 5.16) only to show how the cumulative effects of the proposed action and a gas distribution project in Fairbanks would improve air quality and subsequently health in the Fairbanks region.
L29	109	Alaska Department of Environmental Conservation, Air Quality Division	5.15	Fairbanks Geography and Climate		The material quoted in paragraph two on this page refers to "recent exceedances" for carbon monoxide (CO) levels. The report cited here is now ten years old and does not reflect the most updated air quality conditions in the Fairbanks area. Please remove this portion, update the information or otherwise clarify this section.	We chose to cite the 2002 report because it eloquently describes the weather problems that cause Fairbanks to have a PM2.5 problem and continue to be an EPA maintenance area for carbon monoxide. We did not reproduce an updated chart because showing a chart with no CO exceedances isn't relevant to the PM 2.5 discussion that is the backbone of the Cumulative Effects section. Under the subheading "Potential Health Effect Benefits to Fairbanks" within Cumulative Effects the text states: "Fairbanks is a non-attainment area for PM 2.5 and a maintenance area for carbon monoxide." This statement is footnoted with the following note: "The EPA designated the urban portion of the Fairbanks North Star Borough (FNSB) a non-attainment area for carbon monoxide (CO) in 1991. The FNSB has not violated the National Ambient Air Quality Standard (NAAQS) for carbon monoxide since 1999. The EPA approved the FNSB's CO attainment plan and the FNSB officially became a Carbon Monoxide Maintenance Area on September 27, 2004 (see ADEC 2011d)." When we quote the 2002 report we remind the reader that Fairbanks is currently a maintenance area for CO

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							and guide them via a website to the current CO chart as follows: "The Fairbanks area has not had an exceedance for carbon monoxide since the year 2000. The ADEC Department of Air Quality graphically shows the number of exceedances per year on their website at: http://dec.alaska.gov/air/anpms/comm/docs/Fairbanks_8Hr_CO_chart.pdf."
L29	110	Alaska Department of Environmental Conservation, Air Quality Division	5.16		Table 5.16-2	The greenhouse gas emissions reported for 2000 appear to be out of line with other year's emissions. ADEC Air Quality Division reviews EPA's online report for the emissions, which are presented correctly here. ADEC has contacted EPA about this outlier. They shared the data table from EIA that the emissions are calculated from, which supports the value cited, but agreed it looked out of place and are looking further into the issue. One solution would be to present the results of the state GHG inventory, which is cited later in the DEIS. That would solve the issue of slightly differing methodologies between the two reports. See later comment on Greenhouse Gas emissions on page 5.20-64.	Nationwide and statewide greenhouse gas emissions are presented in Table 5.16-2 for years 1990, 1995, 2000, 2005, 2006, and 2007. The data is important for context and comparison, and so they will both remain in the FEIS. A footnote has been added to the table indicating an investigation into 2000 nationwide value, which is higher than all other years. Section 5.16.1.2, Climate Change, of the FEIS has been updated to explain the methodology in which the federal and state inventories are prepared.
L29	111	Alaska Department of Environmental Conservation, Air Quality Division	5.16		Table 5.16-4	It is not clear what years are represented in the data for this table. The reference does not adequately describe the source of the data or how some of the values were determined. ADEC has additional data available on ozone and carbon monoxide specific to the North Slope, as well as more recent data.	The text before Table 5.16-4 indicates the years represented in the table. Specifically, the text in Section 5.16.1.5, Ambient Air Quality, of the DEIS, provides bullet points for each of the five air monitoring stations listed in Table 5.16-4 and provides the dates for the data in Table 5.16-4. ADEC posts data on their website from the monitoring stations that they operate. ADEC does not operate any monitoring stations on the North Slope near Prudhoe Bay. Applicants for an ADEC permit may be required to conduct site specific monitoring in support of a permit application; however this data is not available to us. As the data is unavailable to us, it is not known if there is data from the North Slope near Prudhoe Bay. Similarly, EPA only posts publically available monitoring data on their website. The most recent data for North Slope

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							Prudhoe Bay data that was available to us was provided in the EIS. The data did not include 1-hour ozone or carbon monoxide.
L29	112	Alaska Department of Environmental Conservation, Air Quality Division	5.16	Permit Descriptio ns		Suggest "PSD permits, which are required for major sources that are either new or being significantly modifying in an attainment area:" Same thing for the next bullet.	Language in Section 5.16.1.6 (Title I New Source Review (NSR)/Prevention of Significant Deterioration (PSD) Permits) regarding PSD permits has been modified for clarification.
L29	113	Alaska Department of Environmental Conservation, Air Quality Division	5.16			The document frequently identifies actions that "AGDC should" take. Suggest rewording to indicate that these actions are required for permitting, not optional. For example, AGDC will be required to determine regulation applicability for each emission unit for NSPS and NESHAPs.	Instances where it is indicated "AGDC should..." have been replaced with "AGDC would need to..." where appropriate with respect to permitting and rule requirements.
L29	114	Alaska Department of Environmental Conservation, Air Quality Division	5.16		Table 5.16-5	Please check table headings.	Headings in Table 5.16-5 were corrected for the FEIS to indicate "Construction Equipment" and "No. of Units".
L29	115	Alaska Department of Environmental Conservation, Air Quality Division	5.16			Text appears to be missing between the two paragraphs on this page where the discussion jumps from open burning to construction emissions calculations.	The paragraph in Section 5.16.2.2 following the Open Burning paragraph is a general discussion introducing the overall emissions from construction of the Project mainline. Section 5.16.2.2, Proposed Action, has been updated to clarify the transition between open burning and an introduction of emissions by relocating the second to last sentence of that paragraph to the beginning of the paragraph.
L29	116	Alaska Department of Environmental Conservation, Air Quality Division	5.16		Table 5.16-6	Particulate matter is presented in three different ways in the table: PM, PM10, and PM2.5. I would expect PM to be greater than PM10, and, similarly, expect PM10 to be greater than PM2.5. However in all the emission tables, all three PM emissions show the same values.	Emission factors for PM-10 and PM-2.5, which are subset of total PM, are not available for some sources. Therefore, the DEIS used a conservative approach and assumed that PM-2.5 and PM-10 emissions are equivalent to total PM (rather than just a portion of total PM). For the FEIS, Tables 5.16-6, 5.16-7, 5.16-9, 5.16-11, 5.16-13, 5.16-15, 5.16-16, and 5.16-17 have been updated to include clarification in the footnotes.

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L29	117	Alaska Department of Environmental Conservation, Air Quality Division	5.16		Table Notes	Please explain why California (EMFAC and Santa Barbara County) emission factors are being used in Alaska.	Emission factors used in air quality analyses are determined by the guidance provided by regulating air districts. In this case, the ADEC does not provide guidance. In the absence of this guidance, as is typical throughout the US, both California state and local emission factors are used based on their conservatism. Tables 5.16-6, 5.16-7, and 5.16-17 of the FEIS have been updated in the footnotes to explain the use of non-Alaska emission factors.
L29	118	Alaska Department of Environmental Conservation, Air Quality Division	5.16		Table Notes	Open burn emissions are noted as to be determined (TBD). A complete presentation of the project's effects needs to be available for review before the final EIS is prepared.	Section 5.16.2.2, Proposed Action, Open Burning, has been updated in the FEIS to include estimated air emissions from open burning as provided by AGDC. Tables 5.16-6, 5.16-7 and 5.16-17 for the Mainline, Fairbanks Lateral, and the Denali National Park Route Variation, respectively, have been updated to include emissions from open burning. New Appendix O includes open burning emissions provided by AGDC.
L29	119	Alaska Department of Environmental Conservation, Air Quality Division	5.16		Table 5.16-8	Table title indicates multiple spreads for the GCF operations; please clarify or correct.	Table title has been corrected to remove 'per spread'. The title of Table 5.16-8 now reads, "Operation and Maintenance Equipment" corrected from, "Operation and Maintenance Equipment per Spread".
L29	120	Alaska Department of Environmental Conservation, Air Quality Division	5.16.3			The project needs to demonstrate that it will meet General Conformity requirements in the Fairbanks area. Please show emission quantities and how they are calculated for any construction occurring within the nonattainment area and for any project facilities that would operate within the nonattainment area.	NOTE (from USACE): During the permitting process a conformity analysis will be required, it will be a parallel process
L29	121	Alaska Department of Environmental Conservation, Air Quality Division	General	Chap 5.16		Numerous tables and figures are given showing emission quantities. Calculation methodologies should be documented.	Emission calculations will be included in Appendix O in the FEIS. Appendix O includes the following tables: Table 1 Stationary Source Potential to Emit; Table 2 Construction Mobile Vehicle Potential to Emit; Table 3 Construction Mobile Heavy Equipment Potential to Emit; Table 4 Construction Miscellaneous Mobile Equipment (Compressors, Engines, Support Utilities) Potential to Emit; Table 5 Construction Non-Mobile

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							Source Potential to Emit; Table 6 Construction Fugitive Emissions; and Table 7 Open Burning Emissions.
L29	122	Alaska Department of Environmental Conservation, Air Quality Division	5.20	5.20.5.5		The costs cited in converting a home to natural gas fuel appear to only include the costs to get natural gas to the building, not changes to a furnace or other heating system. This underestimates the cost for the conversion.	Northern Economics published on this subject in June 2012. We have edited the Cumulative Effects Section 5.20 and Public Health Section 5.15.4.2 to include the Northern Economics assessment of the cost to covert, as well as the cost savings on fuel for the region associated with conversion. We also added information from the Northern Economics report to the sections on the expected improvement in air quality if the distribution system is built.
L29	123	Alaska Department of Environmental Conservation, Air Quality Division	5.20			The document states, "The cumulative effects on air quality … involve site specific data that would be developed during the PSD and Title V operating permit process." The dispersion modeling results should be included in the DEIS document as direct effects.	Section 5.16, Air Quality, indicates that the AGDC will need to prepare an air quality analysis for permitting requirements under PSD and minor source permitting. Permitting activities are a separate activity outside the scope of the EIS. Section 5.16 includes a comprehensive air quality analysis required for the EIS based on currently available information.

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L29	124	Alaska Department of Environmental Conservation, Air Quality Division	5.20			In paragraph one the document states, "Emissions from the new Project operations located within the Fairbanks North Star Borough Nonattainment would be strictly regulated." The project description does not include operational facilities within the nonattainment area. Please clarify.	As described in Section 5.16.1.4 of the DEIS, the project's Fairbanks Lateral would cross into the Fairbanks North Star Borough (FNSB) nonattainment boundary for PM-2.5 and would require a General Conformity Determination. Section 5.16.2 explains that emissions of PM-2.5 and each of the precursors that form it (SO2, NOx, VOCs, and ammonia) from the portion of the Fairbanks Lateral within the nonattainment area, as well as the four material sites and one construction camp, would be evaluated against the General Conformity applicability threshold levels of 100 TPY each and nonattainment area emissions budget. AGDC has not yet submitted information to USACE to prepare a General Conformity analysis. Information required to refine the emission estimates includes transportation equipment lists, construction schedules, and other similar details. Since the proposed Project would require several federal decisions to allow it to proceed, it is expected that the USACE, as the lead federal agency, will conduct the General Conformity analysis when the required information is received from AGDC. Given the current state of the design process, this analysis may occur independent of the publication of the FEIS, but would occur prior to any federal decision. Emissions for construction of the Fairbanks Lateral were provided in Table 5.16-7 of the DEIS. Emissions from material sites are included within construction of the Fairbanks Lateral. Emissions for the construction camp and pipeline yard were provided in Table 5.16-16 of the DEIS. Please note, these emissions are for the entire Fairbanks Lateral and not just the nonattainment portion. When the General Conformity is completed, it will provide emissions for the nonattainment portion only, and compare that to the General Conformity thresholds.
L29	125	Alaska Department of Environmental Conservation,	5.16	Greenhou se Gas Emissions		On page 5.16-4 greenhouse gas emissions from EPA are reported. This section compares project emissions to the state-prepared inventory.	It is important for context and comparison to include both nationwide and statewide values in the EIS, and so they will both remain. A footnote has been added to

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		Air Quality Division				Because the methodologies for these two inventories vary, please use one for consistency. See also comment above.	Table 5.16-2 indicating an investigation into 2000 values.
L29	126	Alaska Department of Environmental Conservation, Air Quality Division	5.20		Table 5.20-7	Because the total quantity of greenhouse emissions is important (as compared to localized concentrations of traditional air pollutants), please report the total emissions from construction instead (or in addition to) annual emissions.	Greenhouse gas emissions, like other emissions, are presented on a ton per year basis in order to compare total emissions for different alternatives, and for permit threshold triggers. For components of the proposed Project with more than one year of construction, total greenhouse gas emissions have been added to Table 5.20-10 (Proposed Project GHG Emissions) of the FEIS.
L29	127	Alaska Department of Environmental Conservation, Air Quality Division	Glossary	Bradley Lake		Please add G&T to the glossary.	G&T has been added to the Table of Contents pg. xlvii: "G&T The abbreviation for generation and transmission system."
L29	128	ADF&G	2.0	2.1.2.3		It is difficult to assess the potential impacts of gravel road construction and workpad construction without knowing how much of the project access and construction right-of-way will be constructed of snow or ice. This should be identified for each subsection of the proposed project. Regarding access roads, there is no information provided to evaluate the placement and potential impact of gravel roads, ice and snow roads; new versus existing roads; and temporary versus permanent roads.	The USACE and cooperating agencies were provided with digital mapping depicting access roads. Additional access road information including the type of access road and the material to be used for construction is available in Appendix D of the DEIS. Providing large scale maps of the entire route showing access roads is not practical in the document. Additional information will be available during the permitting process.
L29	129	ADF&G	2.0	2.2.2.5		Mechanisms for allowing water movement across the overfilled ditch backfill need to be discussed. Discussions of the effects of not accommodating water movement across the mounded ditch backfill need to be addressed in the Chapter 5, Environmental Consequences.	Text of DEIS was clarified in Section 2.2.2.5. Drainage issues will be addressed in the erosion and sediment control plan developed as part of the stormwater pollution prevention plan (SWPPP) for the project. Continuing maintenance of the right-of-way is addressed in Stipulations 2.4, Erosion and Sedimentation, and 2.6, Restoration and Revegetation, of the State Right-of-Way Lease for the Alaska Stand Alone Gas Pipeline/ASAP, ADL 418997, contained in Appendix M of the DEIS.0

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L29	130	ADF&G	2.2	2.2.3.2		Title 16 permits will be required for all crossings, and the crossing method will be determined at permitting. Each crossing will need to be evaluated individually. Trenching should only be considered as an alternative when the stream is small, all water can be flumed or otherwise diverted, and impacts will be less than alternative crossing methods. Timing windows may be applied for work in anadromous fish streams.	Stream crossing mitigation measures have been identified in Section 5.23.2. These include using existing bridges where feasible and using HDD or other trenchless technology to minimize disturbance where warranted. Additional recommended mitigation for stream crossings includes crossing waterbodies in the winter. All crossings will require a permit by ADFG and a site specific crossing plan.
L29	131	ADF&G	4.4	4.4.2.4		The logic regarding the rejection of the Port Mackenzie route variation is flawed. The Port Mac rail has obtained federal approvals and construction will begin this spring. Although the Port Mac route would be slightly longer, the entire Port Mac Rail route will be previously disturbed and it is desirable from an impact standpoint to co-locate linear projects such as a rail bed and a utility pipeline.	The proposed Port MacKenzie Rail Route Variation is examined in Section 4.4.2.4 of the FEIS. Based upon the analysis, the Port MacKenzie Rail Route Variation would not present environmental advantages over the proposed Project route. The findings are not based upon the current status of the proposed rail project; therefore, text related to current status has been deleted from FEIS Section 4.4.2.4.
L29	132	ADF&G	5.2	5.2		This section on Water Resources needs additional information presented to adequately describe the resource and potential effects of pipeline construction on the resource. There should be discussions of the characteristics of water availability within the subregions: winter availability, summer availability, runoff or glacial, and lake sources. The Environmental Consequences section could be improved with more detailed analyses of potential effects of the project to water resources. There needs to be less reliance on USGS web site summaries and more use of other published documents (e.g., university research, agency research and monitoring, industry-derived reports).	Table 5.2-22 has been updated to provide more detail on water use by construction spread and by season. However, information on the specific waterbodies to be used for water withdrawal is not available at this time. This will be determined during more detailed engineering, and in applications for water use permits.

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L29	133	ADF&G	5.2	5.2.1.5		Although depth and water quality information for lakes in the Arctic hydrologic subregion is presented in Tables 5.2-5 and 5.2-8, there is no discussion of how much of this water would be permitted for use for ice road and pad construction, pipeline hydrotesting or other construction related activities. Some information is presented in Table 5.6-5 and should be cross-referenced in this section.	Information from Table 5.6-5 in the chapter on fish has been cross referenced in the water chapter in sections 5.2.2.2 - Water Withdrawal and Section 5.2.2.2 - Ice Roads. Table 5.2-22 is now also referenced in section 5.6.2.2 of the fish chapter.
L29	134	ADF&G	5.2	5.2.1.5	Table 5.2-6	This table summarizing surface water quality, as well as similar tables for other subregions, should be deleted as five data points over 11 years does not adequately describe water quality in the area. The table should be replaced with a qualitative summary detailing general attributes (e.g., pH, alkalinity, general chemistry, dissolved oxygen content) of both rivers and lakes over the course of the year.	The text has been revised for accuracy to state that the historical data does not adequately characterize the water quality due to small sample size and infrequent sampling. The UAF Water and Environmental Research Center website was also consulted, but includes minimal information (few lakes sampled for a few months over 4 years). Some lakes were being pumped from, some were manmade. Text was added under 5.2.1.5 to include general water quality information of tundra lakes sampled by UAF. Minimal information was found on the ADNR website. Data does not adequately characterize the water.
L29	135	ADF&G	5.2	5.2.1.5	Table 5.2-9	The township, range, meridian data indicate these wells are in the Interior near Fairbanks, not in the Arctic as presented.	The text has been revised for accuracy to include the correct coordinates.
L29	136	ADF&G	5.2	5.2.1.5	Table 5.2-10	Stream discharge in cubic feet per second would be a more useful metric for describing peak stream flow rather than elevation data.	The text has been revised for accuracy to include CFS . Added a column in the tables to include stream flow.
L29	137	ADF&G	5.2	5.2.1.6	Table 5.2-11	This table summarizing surface water quality should be deleted as 11 data points over 33 years does not adequately describe water quality for riverine and lacustrine sources in the area. The table appears to only report riverine sources. The table should be replaced with a qualitative summary detailing general attributes (e.g., pH, alkalinity, general chemistry, dissolved oxygen content) of both rivers and lakes over the course of the year.	The text has been revised for accuracy to state that the historical data does not adequately characterize the water quality due to small sample size and infrequent sampling. The ADNR website was also consulted, but minimal information was found. Data does not adequately characterize the water quality due to small sample size and infrequent sampling. Some discharge data was found, but was infrequent, and did not provide a good analysis.

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L29	138	ADF&G	5.2	5.2.1.6	Table 5.2-15	Stream discharge in cubic feet per second would be a more useful metric for describing peak stream flow rather than elevation data.	Comment acknowledged. The text has been revised for accuracy to include CFS. Added a column in the tables to include stream flow.
L29	139	ADF&G	5.2	5.2.1.7	Table 5.2-16	The table appears to only report riverine sources. The table should be replaced with a qualitative summary detailing general attributes (e.g., pH, alkalinity, general chemistry, dissolved oxygen content) of both rivers and lakes over the course of the year.	Text was added to include water quality for 3 gauge stations that were missed into table 5.2-16. Gauge 15292800 was already included in the table and text of the document. These 3 gauges are added to Appendix G.
L29	140	ADF&G	5.2	5.2.1.7	Table 5.2-17	This table showing surface water quality data along the Port MacKenzie Rail Extension Project should identify what these sources are - pond, lake, or river. The date on which the data were collected also should be presented.	The text has been revised for accuracy to include source of data from streams.
L29	141	ADF&G	5.2	5.2.1.7	Table 5.2-21	Stream discharge in cubic feet per second would be a more useful metric for describing peak stream flow rather than elevation data.	The text has been revised for accuracy to include CFS. Added a column in the tables to include stream flow.
L29	142	ADF&G	5.2	5.2.2.2	Table 5.2-22	This table on project water requirements should present the estimated water volumes that would likely be permitted for each of the project segments.	Final location of waterbodies and permitted volume will be determined at a later date after additional sampling.
L29	143	ADF&G	5.2	5.2.2.2		There needs to be a complete listing (table and maps) of the location of all material and disposal sites by pipeline milepost, size (aerial extent and quantity of material present), and whether the sites are upland or riverine.	The text has been revised, details on exact locations of disposal waste has not been determined yet. This information will be gathered during the USACE 404 permitting process.
L29	144	ADF&G	5.2	5.2.3		ARM 6. Neither Cottonwood Creek nor Big Lake will be impacted by the proposed alignment.	The text has been revised for accuracy to state that Big Lake and Cottonwood creek would not be impacted
L29	145	ADF&G	5.5	5.5.1.1		The Dall's sheep populations discussed for the Brooks Range and the White Mountains are considerably east of the proposed pipeline alignment. The discussion should focus on sheep populations at Slope Mountain and along the Atigun River valley south to the upper Dietrich and Middle Fork Koyukuk river valleys.	The text has been revised to remove discussion of White Mountain and Brooks Range Dall sheep populations. Additional text has been added based on findings from Summerfield 1974 MS Thesis, and the Craig and Leonard 2009 BLM document.

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L29	146	ADF&G	5.5	5.5.3		The ADF&G blasting standards do not directly address wildlife impacts; the referenced plan needs to be developed in consultation with ADF&G and other agency wildlife biologists as appropriate.	A blasting and use of explosives plan is required under the ROW lease stipulation 1.4.3 (b). In section 5.23.6 - Mitigation, measure #5 includes a list of items to be covered in the Blasting and Control Plan and includes the analysis and effectiveness of the plan.
L29	147	ADF&G	5.6	5.6.1		Updated ADF&G Anadromous Waters Catalog data needs to be referenced in the DEIS. The Catalog is updated annually. The references cited were from 2010, 2004, and 2009, which were outdated at the time the DEIS was drafted.	The updated ADF&G data has been added and the reference has been changed to include the most recent citation (Johnson and Blanche 2011).
L29	148	ADF&G	5.6	5.6.1		Although Susitna River pink salmon are generally even-year dominant runs they are present in the system during both odd and even years.	The text has been revised in Section 5.6.1 to add "Pink salmon are primarily dominant during even year runs, but are also present in odd years."
L29	149	ADF&G	5.6	5.6.1		Particular attention should be paid to the Parks Highway crossings because of the status of the salmon runs of these streams. Because access to these streams is primarily from the road system, they receive relatively high sport angling effort and are managed conservatively. Popular Chinook salmon sport fisheries within this area include Willow, Little Willow, Caswell, Sheep, Goose, Greys, and Montana creeks, and the Kashwitna River.	The text has been revised.
L29	150	ADF&G	5.6	5.6.2.2	Figure 5.6.2	The alterative of constructing of new bridges to cross streams (specifically anadromous) where HDD is not feasible was not considered except for the Yukon River. This alternative should be considered for each crossing as part of the decision making process.	The text has been revised to state that final stream crossing methods will be determined during permitting of stream crossings.
L29	151	ADF&G	5.6	5.6.2.2.	Figure 5.6.2	Defaulting to open cut crossing methods based upon the absence of defined banks is not reasonable. The crossing method should be based primarily upon fish resource presence, and then stream morphology. The default action should be HDD or bridging, unless it can be determined that trenching can be conducted with	The text has been revised to state that final stream crossing methods will be determined during permitting of stream crossings.

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						minimal impact.	
L29	152	ADF&G	5.9	5.9.1.1		The second paragraph states that ADF&G manages the Minto Flats State Game Refuge, but should mention the Willow Mountain Critical Habitat Area, Creamers Field Migratory Waterfowl Refuge, Goose Bay State Game Refuge, and Susitna Flats State Game Refuge, all areas mentioned later in the DEIS. ADF&G Special Area Permits are issued for activities in state game refuges, critical habitat areas, and wildlife sanctuaries but not in federal wild and scenic rivers or in state parks.	The following paragraph has been added to section 5.9.1.1: "The Minto Flats State Game Refuge and the Palmer Hay Flats State Game Refuge are the only ADF&G-managed units that would be transected by project facilities. Other special areas managed by ADF&G that would be within the vicinity of the proposed project features, but would not be transected by the project facilities, are discussed in Section 5.10."
L29	153	ADF&G	5.9	5.9.1.10		This section is titled "Existing Land Use Plans" but under the section for ADF&G it only references the Minto Flats State Game Refuge Management Plan, and omits the plans for other legislatively designated areas (LDA) managed by ADF&G referenced later in the DEIS. There are also Management Plans for Susitna Flats State Game Refuge, Creamers Field Migratory Waterfowl Refuge, and Palmer Hay Flats State Game Refuge. Plans for Goose Bay State Game Refuge and Willow Mountain Critical Habitat Area do not yet have management plans.	The following paragraph has been added to section5.9.1.10: "The Minto Flats State Game Refuge and the Palmer Hay Flats State Game Refuge are the only ADF&G-managed units that would be transected by project facilities. Other special areas managed by ADF&G that would be within the vicinity of the proposed project features, but would not be transected by the project facilities, are discussed in Section 5.10."
L29	154	ADF&G	5.9	5.9-13	Table 5.9-13	This table only lists the Minto Flats State Game Refuge Management Plan. There are also management plans for Susitna Flats State Game Refuge, Creamers Field Migratory Waterfowl Refuge, and Palmer Hay Flats State Game Refuge.	Sections 5.9.1.1 and 5.9.1.10 now contain the following statement: "The Minto Flats State Game Refuge and the Palmer Hay Flats State Game Refuge are the only ADF&G-managed units that would be transected by project facilities. Other special areas managed by ADF&G that would be within the vicinity of the proposed project features, but would not be transected by the project facilities, are discussed in Section 5.10."

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L29	155	ADF&G	5.9	5.9.3.2		In addition to the proposed mitigation for any existing trails, including RS. 2477 and 17(b) easements, the Applicant should consider maintaining a Web site about the project throughout the construction period of the pipeline. The Web site could also be used to disseminate information such as any temporary detours around trailheads, alternative parking, and the time frame of construction activities. The Applicant also should consider advertising any temporary closures in local news papers, much like the Alaska Department of Transportation (ADOT) publishes notices of various road projects and the required detours during their road construction season.	Comment acknowledged
L29	156	ADF&G	5.10	5.10.1.2		This section lists Willow Mountain Critical Habitat Area and Palmer Hay Flats State Game Refuge as being managed by the ADNR. These legislatively designated areas are co-managed by ADF&G and ADNR. Alaska Statue 16.20.500 describes the purpose of Fish and Game Critical Habitat Areas (CHA) such as Willow Mountain CHA. AS 16.20.020 describes the purpose of State Game Refuges (SGR) such as Palmer Hay Flats SGR.	The text has been revised to reflect co-management responsibilities at Willow Mountain CHA and Palmer Hay Flats SGR.
L29	157	ADF&G	5.10	5.10.1.2		The paragraph on Willow Mountain Critical Habitat Area references the Alaska Statute that created the CHA, AS 16.20.620, but this information is omitted from the paragraphs about the other ADF&G legislatively designated areas (LDA). Goose Bay SGR was created pursuant to AS 16.20.030, Palmer Hay Flats SGR was created pursuant to AS 16.20.032, Susitna Flats SGR was created pursuant to AS 16.20.036 and Creamer's Field Migratory Waterfowl Refuge was created pursuant to AS 16.20.039	The text has been revised to reference the Alaska Statute for each ADF&G unit listed. Also, information was added for Minto Flats State Game Refuge (AS 16.20.037).

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L29	158	ADF&G	5.10	5.10.1.2		The paragraph regarding Palmer Hay Flats SGR states that public access is available from the Glenn Highway. Public access is also available off Hayfield Road at Cottonwood Creek.	The text has been revised to reflect the additional access point at Palmer Hay Flats SGR.
L29	159	ADF&G	5.10	5.10.1.2		The paragraph regarding Susitna Flats SGR states that public access is primarily by float plane or boat. Developed access is limited to the Little Su Public Use Facility (LSPUF) within the SGR which provides boat access to the Little Susitna River. This is an ADF&G owned facility that ADNR, Division of Parks and Outdoor Recreation manages through a concessionaire. In addition to aircraft access there are unimproved, road accessible points at several locations along the east boundary of the refuge.	The text has been revised to reflect additional information on public access at the Susitna Flats SGR.
L29	160	ADF&G	5.10	5.10.1.2		The paragraph regarding Goose Bay SGR states "However, there are currently no developed public access points or public use facilities in the refuge". A more accurate statement would be that there are no improved access facilities, as there is a gravel parking lot at one access point that leads to a trail into the SGR, just no developed facilities.	The text has been revised to reflect additional information on public access at the Goose Bay SGR.
L29	161	ADF&G	5.14	5.14.3	Table 5.14-14	Table 5.14-14 is still misleading. Previous comments supplied during cooperating agency comments on PDEIS were not addressed in this most recent version. Table 5.14-14 is still inconsistent with some of the statements made in other parts of the document. For example, Anaktuvuk Pass is listed as a community where the project intersects little to no portion of the subsistence use area; however, Page 5.14-17 states, "a portion of the Anaktuvuk Pass use area intersects with the proposed Project. Bisection of a subsistence use area as opposed to passing through a portion of the use area has not been demonstrated to represent significantly different impacts to subsistence.	The DEIS distinguished between use areas or communities that were "bisected" (e.g., cut through a major part of use area) versus those communities use areas where little to no portion of the project passed through the use area. Regarding Nuiqsut, the writer's drew on their previous knowledge of subsistence use areas documented over many studies for that community. Those areas intersected by the project are on the outer edges of the community's use and used by fewer harvesters. A paragraph was added regarding their rationale for stating that the magnitude of impacts would be greater for communities whose use areas are bisected by the project versus crossing a small portion or use areas furthest from the community. This paragraph uses Nuiqsut as an example and thus

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							addresses the commenter's concern regarding overlap with Nuiqsut use areas and the study team's decision that Nuiqsut subsistence uses would not be impacted to the same magnitude as other communities closer to the project. Overlapping harvester data for Barrow, Kaktovik, Anaktuvuk Pass, Tyonek, and Beluga was also reviewed to confirm this rationale."
L29	162	ADF&G	Appendix D			Detailed maps showing the locations of the proposed access roads would be useful for assessing potential impacts to various resources.	The USACE and cooperating agencies were provided with digital mapping depicting access roads. Additional access road information including the type of access road and the material to be used for construction is available in Appendix D of the DEIS.
L29	163	ADF&G	Appendix E		Table E-1	For each stream crossing, rather than using pipeline segment (i.e., gas conditioning facility to Mile 540) each stream should be referenced to its pipeline milepost to aid in evaluating potential impacts of the project.	An RFI has been submitted for this information and will be incorporated for the FEIS.
L29	164	ADF&G	Appendix E		Table E-1	The upper Kuparuk River is not anadromous at the proposed pipeline crossing.	Table 1 includes an "N" under the anadromous waters column for the Kuparuk River at stream crossing 133.62. It was removed from Table 2 because this stream crossing is not anadromous.
L29	165	ADF&G	Appendix E		Table E-2	For each stream crossing, rather than using pipeline segment (i.e., gas conditioning facility to Mile 540) each stream should be referenced to its pipeline milepost to aid in identifying the stream.	Appendix E includes a column illustrating the mileposts associated with stream crossings, including waterbody name, construction mode, construction season, method used and species.
L29	166	ADF&G	Appendix E		Table E-3	For each stream crossing, rather than using pipeline segment (i.e., gas conditioning facility to Mile 540) each stream should be referenced to its pipeline milepost to aid in identifying the stream. In addition, the streams should be ordered from north to south rather than the apparent random order that currently exists in the table.	Appendix E has been edited to include a column for the milepost associated with stream crossing locations.

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L29	167	ADF&G	Appendix H, Applicant Proposed Mitigation Measures	Section 10.0 Fisheries Resources		A mitigation measure should be developed to stabilize impacted stream banks using bioengineering techniques such as root wads, brush layering, or other acceptable techniques in fish bearing streams.	Section 5.23 now only includes AGDC applicant proposed mitigation. Mitigation measure #8 states that AGDC will maintain to the maximum extent practicable existing stream hydrologic regimes and temperature regimes at fish stream crossings throughout the corridor.
L29	168	ADF&G	Appendix I, Biological Assessment	Appendix B, Plan of Development, Rev 1		This appendix includes AGDC Plan of Development, Revision 1, May 2011. However, AGDC previously issued their Plan of Development, Revision 1 in March 2011.	May 2011 reflects the revision date of the Biological Assessment. March 2011 is the correct date for the Plan of Development. The Plan of Development was removed from the Biological Assessment, Appendix I. The Plan of Development (Revision 1, March 2011) can be viewed on the project website at www.asapeis.com.
L29	169	Alaska Department of Public Safety, Division of Fire and Life Safety	General			Please add the Alaska Department of Public Safety (AKDPS) to the list of acronyms provided on the acronym pages.	AKDPS has been added as an acronym under the Table of Contents.
L29	170	Alaska Department of Public Safety, Division of Fire and Life Safety	General			All fuel systems being developed to support port and airport operations during construction and future operational use of the pipeline must be reviewed and conform to the requirements in the 2009 International Fire Code (IFC).	AGDC will comply with all applicable local, state and federal laws and regulations pertaining to the design, construction and operation of the pipeline. This information will be gathered during the USACE 404 permitting process.
L29	171	Alaska Department of Public Safety, Division of Fire and Life Safety	2.0	Corrosion Protection and Detection Systems 2.2.5		The installation of block valves every 20 miles were mentioned in numerous places in the proposed draft document but I found no mention or discussion of the use of crack arrester rings or the fact they were not required in the design basis.	Analysis of pipeline ductility and potential ductile failure has not been completed. Crack arrestors may be included in the design basis if the pipe body toughness available from leading suppliers will be insufficient to guarantee a high enough probability of crack arrest within an acceptable segment length. This information will be gathered during the USACE 404 permitting process.
L29	172	Alaska Department of Public Safety, Division of Fire and Life Safety	2.0	Corrosion Protection and Detection Systems 2.2.5		Are the block valves to operate manually or by motorized valves?	Operational information on automatic block valves is not available at this stage of the project. That information will be developed during detailed design. This information will be gathered during the USACE 404 permitting process.

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L29	173	Alaska Department of Public Safety, Division of Fire and Life Safety	General			Is explosive blasting required? If so, the storage magazine type, location and any barricade requirements must meet the IFC requirements and proper Federal Alcohol, Tobacco and Firearms licensing permits will be required.	Blasting may be necessary along parts of the pipeline route. AGDC will comply with all applicable local, state and federal laws and regulations pertaining to the design, construction and operation of the pipeline. As per Section 5.23.5 a blasting control plan will be developed in consultation with ADFG and other agencies as appropriate. This information will be gathered during the USACE 404 permitting process.
L29	174	Alaska Department of Public Safety, Division of Fire and Life Safety	2.0	Construction Procedures for Aboveground Facilities 2.2.4		There was little mention or discussion of emergency power requirements, additional information is required.	In section 2.1.4 - Aboveground Facilities, the following text has been added: "Emergency backup diesel generators are currently specified to provide electrical power in the event of a shutdown that stops gas flow. AGDC has completed preliminary sizing of the backup generators to meet the power requirements of critical life-support and facility-support equipment; however, this sizing is subject to change as the design progresses. Currently, the North Slope Facilities would require two 3.1 Megawatt (MW) generators. Each compressor station would require one generator capable of providing a maximum of 0.1 MW. The Fairbanks Straddle and Off take Facility would require a generator providing a minimum of 0.1 MW. The Cook Inlet NGLEP would require 0.15 MW of emergency power. AGDC expects to store diesel for emergency generators in on-site tank farms. Each diesel tank is expected to have a storage capacity less than 10,000 gallons. AGDC would meet all ADEC requirements in 18 AAC 75 for spill prevention and contingency planning and would have EPA-required Spill Prevention and Control and Countermeasure (SPCC) Plans for each storage facility with a capacity to store in excess of 1,320 gallons of fuel."
L29	175	Alaska Department of Public Safety, Division of Fire and Life Safety	2.0	Construction Procedures for Aboveground Facilities 2.2.4		Blow down operations alluded to exhausting directly to the atmosphere. Is the intent to blow down to a flair system first?	Information regarding flares has been incorporated into the text. The blowdown systems will vent to a flare for the GCF, compressor stations, and straddle and off take facility and the Cook Inlet NGL extraction plant. The MLV blowdown system will not incorporate flaring. Figures depicting facility layouts have been added to the document. Information regarding flares has been

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							incorporated into the text in Section 2.1.2.
L29	176	Alaska Department of Public Safety, Division of Fire and Life Safety	2.0	Operation, Maintenance, and Safety Controls 2.3		There was little to no information about how the pipeline communications system would be operated to ensure the safety of the ongoing pipeline operations. Is there to be a SCADA, microwave or fiber optic system in place?	Section 2.3.1 - Normal Operation and Routine Maintenance states: AGDC would comply with Stipulation 3.5.3 of the State Right-of-Way Lease for the Alaska Stand Alone Gas Pipeline/ASAP, ADL 418997, contained in Appendix M. This stipulation requires "a reliable voice and data communication system and backup that shall provide information to a control center and be fully usable for an incident command system" and states that part of the communication system "shall be a fully functioning and reliable Supervisory Control and Data Acquisition (SCADA) system.
L29	177	Alaska Department of Public Safety, Division of Fire and Life Safety	1.0	Permits, Approvals, Compliance with Executive Orders and Regulatory Requirements 1.5;	Table 1.5-1; Table 2.1.2; and, Table 2.2.4	The regulatory requirements located in Table 1.5- 1, Table 2.1.2 and Table 2.2.4 did not reference any construction permitting requirements for any of the facilities to be used in support of construction or as permanent. Please reference the requirements in AS 18.70.10 and 13 AAC 50-55 for the permit and construction codes in effect.	Table 1.6-1, Authorities Applying to the Proposed Action, has been updated to include AS 18.70.10 and 13 AAC 50-55 and a description of the authority and regulatory intent.
L29	178	Alaska Department of Public Safety, Division of Fire and Life Safety	General			There was no mention of classification of electrical equipment in relation to hazardous areas that service the pipeline gas. This should be addressed.	All ASAP electrical equipment will meet applicable code and regulatory requirements for operation in areas where natural gas and NGLs are handled. This information will be gathered during the USACE 404 permitting process.
L29	179	Alaska Department of Public Safety, Division of Fire and Life Safety	General			There was no mention of any use of fire alarm detection or suppression systems in support of any of the compressor or processing facilities.	Information has been added to section 2.3.1 to state that fire alarm detection or suppression systems will be installed at facilities in accordance with all applicable codes and regulations, in particular, 49 CFR 192.163, Compressor Stations: Design and Construction, which requires that "Electrical equipment and wiring installed in compressor stations must conform to the National Electrical Code, ANSI/NFPA 70, so far as that code is applicable" [subparagraph 2(e)]. In addition, 49 CFR 192.171, Compressor Stations: Additional Safety Equipment, requires that compressor stations must have

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							adequate fire protection facilities [subparagraph (a)].
L29	180	Alaska Department of Public Safety, Division of Fire and Life Safety	ES			The Department of Public Safety (DPS) is curious about how the temporary and permanent project camp fire response and prevention plan is determined and what level of protection will be enacted. The DPS office is available to consult and provide support upon request.	Information regarding project camp fire response and prevention plans has been added to Section 2.1.3.3, subheading Construction Camps, Pipe Storage Yards, Air Facilities, Rail Yards, and Ports.
L29	181	ADNR, SPCO	5.9			The Statement that SPCO "manages development on its lands on which the proposed pipeline ROW would be located." is incorrect. The SPCO specifically manages the Right-of-Way and the lands encompassed by the right-of-way in accordance with the lease for the purposes of construction, operation, maintenance and termination of a pipeline and all pipeline associated actions.	The text in Sections 1.2.5.2 and 5.9 have been revised for accuracy.
L29	182	ADNR, SPCO	5.9			The SPCO issues a Right-of-Way Lease, not a permit. The Lease for this right-of-way has already been issued.	The text in Sections 1.2.5.2 and 5.9 have been revised for accuracy.
L29	183	ADNR, SPCO	5.9			Clarify what is meant by the third sentence under the heading "State": "The proposed Project would utilize portions of state ROW". This statement is unclear.	The sentence has been revised for clarification: "The proposed Project would utilize portions of state lands."
L29	184	ADNR, SPCO	5.9			Regarding the University: The header should read "University of Alaska" not "University of Alaska Fairbanks". It is the UA that owns and manages the trust lands.	The text has been revised for accuracy.
L29	185	ADNR, SPCO	5.10	5.10.1		Alaska Administrative Code, Part 6. Lands. (11AAC 51 - 11AAC 98) should also be listed as part of this regulatory environment.	The sentence has been revised with text added to the regulatory environment to reflect these regulations.
L29	186	ADNR, SPCO	5.10	5.10.1.1		Regarding RS-2477: The statement "R.S. 2477 trails have been created on ROW intended for the construction of roads, trails, or highways over public lands, which have not been reserved for public uses." This is an incorrect statement in two ways and should be clarified. 1.) Please explain what is meant by "....created on ROW..."	The text has been revised in Section 5.10.1.1 to read as follows: "R.S. 2477 trails have been established within ROW associated with the construction of roads, trails, or highways over public lands, which have not been reserved for public uses."

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						2.)RS 2477's are always on existing or past routes. They are not "intended" as they do not identify future routes. They are established by use or construction.	
L29	187	ADNR, SPCO	5.10	5.10.1.1		The second paragraph regarding Section 17(b) easements. It is incorrect to say that private property was transferred to Native Corporations. Federal lands were transferred to Native Corporations thereby making the land private.	The text has been revised to reflect this clarification on Section 17(b) easements.
L29	188	ADNR, SPCO	5.10	5.10.1.1		RS 2477 and 17(b) easements preserve "access" to both private and public lands for a variety of purposes and are not solely for the purposes of recreation.	The text has been revised to reflect this clarification on RS 2477 trails and Section 17(b) easements.
L29	189	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	ES	Connected Actions	ES-2	Suggest "Recreational Areas" and "Refuge" shading have more contrast and perhaps different colors to make figure more clear.	Figure has been updated for clarity.
L29	190	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	ES	No Action Alternative		Define short- and long-term.	This comment was made on the Executive Summary. These terms are defined in Section 5.0 of the FEIS.
L29	191	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	ES	Pipeline Route Alternative s	ES-3	Lime green text is very difficult to read.	Figure has been updated for clarity.

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L29	192	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	ES	Pipeline Route Alternatives	ES-3	Figure shows proposed route going near Anderson and through the Radar site. Is this the correct route placement here?	This comment is regarding the Executive Summary. The proposed route in the vicinity of Anderson is generally co-located with the Alaska Railroad corridor. Maps showing greater detail of the route are presented in Appendix C of the FEIS.
L29	193	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	ES	Soils and Geology		Stream processes (erosion/scour) are an important geomorphic process that is present in the proposed project area.	This comment is regarding the Executive Summary. Fluvial Processes are discussed in detail in Section 5.1.1.2 of the FEIS
L29	194	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	ES	Seismic Zones and Fault Considerations		The Ray Mountains are north of the Yukon River, not south of the river as stated here.	The text has been clarified as suggested in the Executive Summary - Seismic Zones and Fault Considerations to say Ray Mountains Ecoregion.
L29	195	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	ES	Seismic Zones and Fault Considerations		It should be stated that the proposed project crosses the projection of the Kaltag and Tintina fault systems, but that the location of these faults at the alignment crossing is unknown. Major geologic structures in the Alaska Range are not mentioned, including the Northern Foothills fold and thrust-fault belt and the Denali fault. The Castle Mountain fault crosses the alignment in the lower Susitna Basin. All of these structures should be mentioned in the EIS.	The text has been modified as suggested in the Executive Summary - Seismic Zones and Fault Considerations. The descriptions of faults from Section 5.1.1.2 has been added.
L29	196	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology	ES	Seismic Zones and Fault considerations		Include a reference/citation for the statement about 23 earthquakes.	This comment is regarding the Executive Summary. Seismicity is discussed in detail in Section 5.1.1.2 of the FEIS. The discussion includes a reference/citation for the statement about 23 earthquakes. A complete reference list for the citations in Section 5.1 is located at the end of the section.

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		Section					
L29	197	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	ES	Surface Water		"Streambed scour is not expected to occur" - the proposed pipeline routes cross streams where glacial outburst floods can and do occur. Extreme channel scour is associated with these events and should be considered.	The complete sentence in the DEIS is: "Streambed scour is not expected to occur due to burial of the pipeline five feet below the surface of streambeds." In the FEIS the sentence has been revised to state: "Streambed scour is not expected to affect the pipeline due to burial of the pipeline five feet below the surface of streambeds."
L29	198	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	ES	Vegetation resources		Add reference/citation for the source that describes/defines the ecoregions.	This comment is regarding the Executive Summary. Section 5.3.1.1 includes a discussion of ecoregions including citations. The complete references for Section 5.3 are located at the end of the section.
L29	199	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	general comment		Description of thaw bulbs is inconsistent throughout various sections.	Changed the use of "thaw bulbs" in the operation section so as not to confuse with thaw bulbs that occur under water bodies.
L29	200	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Beaufort Sea Coastal Plain Ecoregion		Capitalize "Quaternary"	Quarternary is now capitalized in section 5.1.1.1.
L29	201	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Beaufort Sea Coastal Plain Ecoregion		Stating that the project does not cross any faults may be misleading; suggest rephrase to indicate that the project does not cross any known active faults in the ecoregion.	The text has been modified to state "known active faults" in the discussion of the Brooks Foothills, Yukon Tanana Uplands ecoregion, and Tanana-Kuskokwim Lowlands in section 5.1.1.1.

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L29	202	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Beaufort Sea Coastal Plain Ecoregion		Text implies that solifluction occurs only on east facing slopes. Suggest rephrasing this, as solifluction processes can be active on slopes of any aspect.	Modified as suggested.
L29	203	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Beaufort Sea Coastal Plain Ecoregion		"Sheet ice" (aufeis) persists well into the summer in many areas.	Modified as suggested.
L29	204	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Brooks Foothills Ecoregion		Stating that the project does not cross any faults may be misleading; suggest rephrase to indicate that the project does not cross any known active faults in the ecoregion.	The text has been modified to state "known active faults" in the discussion of the Brooks Foothills, Yukon Tanana Uplands ecoregion, and Tanana-Kuskokwim Lowlands in section 5.1.1.1.
L29	205	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Brooks Foothills Ecoregion		It is important to distinguish between seasonally frozen ground and permafrost, which have very different engineering characteristics and challenges. Suggest defining both terms.	The text in section 5.1.1.1 regarding the Brooks Foothills Ecoregion has been modified to state: "In the floodplain of the Sagavanirktok River, continuous permafrost is present adjacent to the active channel."
L29	206	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Brooks Range Ecoregion		Some of the colluvial, glacial and glaciofluvial sediments are younger than Pleistocene. See mapping by Hamilton and others in the Slope Mountain region.	Modified as suggested.

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L29	207	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Brooks Range Ecoregion		Stating that the project does not cross any faults may be misleading; suggest rephrase to indicate that the project does not cross any known active faults in the ecoregion.	Modified as suggested.
L29	208	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Brooks Range Ecoregion		Suggest including reference/citation for the permafrost temperatures cited here.	Modified as suggested.
L29	209	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Kobuk Ridges and Valleys Ecoregion		Misplaced citation. Wahrhaftig (1965) should be associated with the Kobuk Ridges and Valleys Ecoregion sentence, not the Koyukuk River sentence.	Modified as suggested.
L29	210	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Kobuk Ridges and Valleys Ecoregion		A better description of "nearly dormant" should be provided for the Kobuk fault. Very little is known about this structure or its seismic potential, and this should be mentioned.	The phrase "nearly dormant" has been removed from section 5.1.1.1 in reference to the Kobuk Ridges and Valleys Ecoregion.
L29	211	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Kobuk Ridges and Valleys Ecoregion		Stating that the project does not cross any faults may be misleading; suggest rephrase to indicate that the project does not cross any known active faults in the ecoregion.	Modified as suggested.

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L29	212	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Ray Mountains Ecoregion		The EIS states that the Project would not cross any faults in the Ray Mountains Ecoregion. Similar to a previous comment (Executive Summary, page ES10), the Kaltag and Tintina faults project through the region. Their locations are not known, and their kinematic connection to each other is poorly defined. However, both faults are thought to be Quaternary active and earthquakes along these faults could generate strong ground motions at the pipeline alignment. These two faults should be mentioned. The 3/09/1985 M=6.1 earthquake along the Dall City seismic zones east of the proposed alignment should also be discussed. Even though the proposed alignment does not cross this structure, strong ground motions could be an issue.	The text has been modified as suggested and includes a description of the Dall City seismic zone in sections 5.1.1.1,Ray Mountains Ecoregion and 5.1.1.2, Seismicity.
L29	213	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Ray Mountains Ecoregion		The Rampart Trough area is known to be seismically active. The Rampart seismic zone generated an M=7.1 earthquake on 10/29/1968. Although this earthquake did not rupture the surface, the seismic zone should be mentioned as a potential seismic source.	A description of the Rampart seismic zone has been included as suggested in sections 5.1.1.1, Ray Mountains Ecoregion and 5.1.1.2, Seismicity.
L29	214	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Ray Mountains Ecoregion		"These two rivers transport silt that is deposited on the top of the hills by eolian processes in the region." - Suggest replace "deposited" with "redeposited".	Modified as suggested.
L29	215	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology	5.1	Yukon-Tanana Uplands Ecoregion		The project crosses the Minto Flats seismic zone and this should be discussed.	The text in section 5.1.1.1, Kuskokwim Lowlands Ecoregion has been changed to say that the project would cross the Minto Flats seismic zone and includes a description referencing Ruppert et al. 2008. This description is also included in Section 5.1.1.2, Seismicity.

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L29	216	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Yukon-Tanana Uplands Ecoregion		"However, as a stream channel migrates away from an area, permafrost can degrade because the ground refreezes in the absence of the influence of the heat of water in the channel." - Replace "degrade" with "aggrade", "regrow", "reform" or "redevelop"; permafrost degrades in the presence of water due to heat, then can redevelop when the heat source (e.g., water, stream) is removed to allow temperatures to once again be low enough to support the development of perennially-frozen ground (permafrost).	Modified as suggested.
L29	217	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Alaska Range Ecoregion		"Permafrost is absent on south-facing slopes… "This statement is generalized and overly simplified. There are factors other than solar gain that come into play in the distribution of permafrost, including vegetation, substrate grain size, and moisture content/drainage. Permafrost can be present on some south-facing slopes.	In section 5.1.1.1 in Alaska Range Ecoregion section, modified sentence to read: "Permafrost is generally absent of south facing slopes." as suggested.
L29	218	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	5.1.1.1	5.1-2	This figure is misleading as it does not adequately show seismicity associated with the Minto Flats, Fairbanks, Rampart or Dall City seismic zones. See Ruppert et al., 2008, In: Active Tectonics and Seismic Potential of Alaska, AGU, Geophysical Monograph 179. The reason the seismicity data used here does not show the above-mentioned seismic zones is that it only includes earthquakes of magnitude 5 and above. Suggest showing earthquakes of magnitude 3 and above to more accurately delineate the seismic zones.	Descriptions of the Dall City, Minto Flats, Rampart, and Fairbanks seismic zones have been added to Section 5.1.1.2 - Geomorphic Processes, Seismicity. Figure 5.1-2 shows all earthquakes of magnitude 5 and above, and has been modified by addition of the Dall Mountain Fault.
L29	219	ADNR, Department of Geological and Geophysical Surveys , Engineering	5.1	Cook Inlet Basin Ecoregion		Describing the western Castle Mountain fault as seismically quiet is misleading. It is a major active fault and capable of large surface-rupturing earthquakes. To be more clear, the EIS should just state that the western part of the	Modified as suggested.

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		Geology Section				fault has not had a large earthquake since seismic monitoring began in the early 1900s. Both the east and west sections are seismically active.	
L29	220	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Mass Wasting	5.1-3	Locations of mass wasting features should be described in greater detail, and illustrated on a map.	Comment is unclear as for the request, the table currently provides the location by mile post and length and a map is provided with miles posts.
L29	221	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Mass Wasting	5.1-3	This table might be more appropriately labeled "Approximate Locations of Significant Mass Wasting Features". The text lists solifluction in the description of mass wasting, but this table presumably does not include such features (which are ubiquitous on most slopes of moderate to high elevation from interior Alaska northward). It would be useful to mention in the text what kinds of mass wasting features are specifically being included in the table.	The Plan of Development describes this table as approximate locations for cut and fill for temporary extra workspace and is not appropriate to show locations of mass wasting features. This table has been removed as AGDC has not defined mass wasting locations for the project yet.
L29	222	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Permafrost and Soil Processes		Suggest the permafrost section begin with the definition of permafrost.	The definition is provided for not at the beginning of the section.
L29	223	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Permafrost and Soil Processes		The route segments where permafrost is discontinuous, absent and continuous are described in the text. Include the source of this information (e.g., subsurface data collected by the project, published literature, etc.).	Modified as suggested.

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L29	224	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Seismicity		The Minto Flats and Fairbanks seismic zones do not trend northeast in the Ray Mountains. These fault zones are both located south of the Ray Mountains.	Modified text in section 5.1.1.2 in the Seismicity Section to say: "the proposed Project would cross two seismic zones that trend northeast through the Ray Mountains"
L29	225	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Seismicity		The Healy Creek fault is part of the Northern Foothills fold and thrust belt. See Bemis, 2012, Geosphere, for a full description of the thrust belt and the associated faults contained within it. All of these faults should be mentioned. Also, the Castle Mountain fault should not be referred to as a "smaller fault" - it might be shorter than the Denali fault, but is still capable of large earthquakes.	Modified as suggested.
L29	226	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Seismicity		The discussion of earthquakes is generally weak and not adequately supported by literature citations. For the purposes of an EIS this may be adequate, however, the western Castle Mountain fault should not be described as seismically quiet.	The text has been modified in section 5.1.1.1, Cook Inlet Ecoregion to say: "Both the 62-mile long eastern and 39-mile long western parts of the fault are seismically active." Two significant earthquakes were also mentioned. This text was also added to Section 5.1.1.2, Seismicity.
L29	227	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Seismicity		The timing of the most recent prehistoric earthquake on the Castle Mountain fault should be referenced to Hauessler et al., 2002, GSA Bulletin.	Modified as suggested.
L29	228	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Glacial Processes		Suggest section be expanded to include distal effects of glacial processes that could impact the pipeline, e.g. outburst floods and surging behavior.	Expanded and modified as suggested.

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L29	229	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Geomorphic Processes		While fluvial processes are addressed, coastal processes are not. Due to the moderate-high rates of erosion and bank retreat in the Prudhoe Bay area (see http://pubs.usgs.gov/circ/c1075/prudhoe.html) the topic of coastal retreat at the northern pipeline terminus should be addressed.	Modified as suggested.
L29	230	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Environmental Consequences		There should be some effort to consider the impacts of projected climate change on the geomorphic processes and how these changes might impact the pipeline for each of the proposed routes.	This comment will require additional work that will take place prior to the FEIS.
L29	231	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Environmental Consequences - Construction		The AGDC proposes to identify measures that would mitigate long-term impacts to local drainage patterns during engineering design. Including one or more examples of such proposed measures would be useful.	Modified as suggested.
L29	232	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.1	Permafrost and Soil Considerations		Is there a strategy in place to prevent or reduce the likelihood of heave by the VSMs?	Text has been added to section 2.2.3.1 addressing strategies to reduce the likelihood of heave by VSMs.
L29	233	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.20	Wetlands		"… Expected that permanent access roads would be designed and located to avoid and minimize negative effects to wetlands." Include a brief description or example of how this might be done.	Under direction by the USACE, this comment will be addressed before the FEIS

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L29	234	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.20	Wetlands		Regarding the unknowns about the extent of wetland impacts for certain parts of the Projects, what types of work would be required to quantify these impacts and at what stage in the project would this occur?	Under direction by the USACE, this comment will be addressed before the FEIS
L29	235	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.2	general comment		Define long-and short-term.	The text cites the Executive Order 11988, which includes the terms short term and long term in the content. The Executive Order does not specifically define short term versus long term.
L29	236	ADNR, Department of Geological and Geophysical Surveys , Engineering Geology Section	5.2	Floodplain s		There should be some effort to consider the impacts of projected climate change on surface water and flood plains and how these changes might impact the pipeline for each of the proposed routes during the life of this infrastructure.	Addressed in the Air chapter of the PFEIS
L29	237	ADNR, Division of Agriculture	General			The terms Non-native and invasive need to be clarified in this document. Non-native species are not the same as invasive species, and, in terms of the AK State Seed Regulations, neither are regulated in the terms outlined here. The current Alaska Seed Regulations (11 AAC 34) includes the regulation of noxious weeds seed as prohibited or restricted in transport or sale within the State of Alaska. A Noxious Weed is defined in the regulations as any species of plants, either annual, biennial, or perennial, reproduced by seed, root, underground stem, or bulblet, which when established is or may become destructive and difficult to control by ordinary means of cultivation or other farm practices; or seed of such weeds that is	The text has been revised to define nonnative and invasive species and noxious weeds under the regulations and added citation.

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						considered commercially inseparable from agricultural or vegetable seed.	
L29	238	ADNR, Division of Agriculture	General			There is no definition or mention of "native seed" as a regulated item within 11 AAC 34. The Division of Agriculture is moving to make the regulations more applicable to all invasive weeds and agricultural pests, but will not be broadly regulating the spread of non-native plants, as a whole.	The text has been revised to clarify that non-native plant spread is not regulated by the state and native seed is not regulated.
L29	239	ADNR, Division of Agriculture	General			The term non-native has no bearing on this discussion unless the USACE is attempting to require that seeding and revegetation be accomplished exclusively with native species. However, 11AAC 34 does not regulate the use of non invasive introduce species or non-native plants in general unless specifically listed in 11AAC 34.020. Even 11AAC 34.020 specifically states that varying amounts of restricted noxious weeds are allowable in seed lots sold in Alaska.	The text has been revised to remove the word native, since restricted noxious weeds are allowed under the regulations.
L29	240	ADNR, Division of Agriculture	2.0	Cleanup and Restoratio n 2.2.2.7		The AGDC would consult with the BLM and follow ADNR"s Plant Materials Center Revegetation Manual for Alaska. The Stabilization, Rehabilitation, and Restoration Plan would stipulate native seed mixes for different geographic areas, seed application methods, and application rates for fertilizers. Additional information on restoration and revegetation procedures in upland and wetland areas is provided in Sections 5.3 (Vegetation) and 5.4 (Wetlands), respectively.	Comment acknowledged.

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L29	241	ADNR, Division of Agriculture	2.0	Cleanup and Restoration 2.2.2.7		The publication-- A Revegetation Manual for Alaska (Wright, 2008) will be retired in the spring of 2012. The 2008 manual is being replaced by two new publications. First the Alaska Coastal Revegetation and Erosion Control Guide (Wright & Czapla, 2010; 2nd printing Aug. 2011; Low, editor & designer) covers the Alaska land areas encompassed by the quads associated with the Coastal Zone Management Program. The second publication is-- Interior Alaska Revegetation& Erosion Control Guide (Czapla & Wright, in press; Low, editor and designer) for the interior Alaska land area not covered by the Coastal Guide. The Interior publication will be available in the spring of 2012.	The text has been revised to cite the two documents for rehabilitation of vegetation for project impacts.
L29	242	ADNR, Division of Agriculture	2.0	Cleanup and Restoration 2.2.2.7		With the Denali National Park Route Variation in the discussion it may be of benefit to include the following publication as a potential source of guidance: Native Plant Revegetation Manual for Denali National Park and Preserve, Densmore et al, 2000.	The text has been revised to add this document to the list of sources for the rehabilitation plan.
L29	243	ADNR, Division of Agriculture	2.0	Cleanup and Restoration 2.2.2.7		Promoting the use of native species is a primary mission of the Alaska Plant Materials Center (PMC). However, the PMC recognizes the use of annual ryegrass or another non native species that may be needed for temporary slope stabilization, erosion control or as a cover crop.	The text has been revised for accuracy to state that non-native species will be used for erosion control
L29	244	ADNR, Division of Agriculture	2.0	Cleanup and Restoration 2.2.2.7		It is also important that the issue of the production origin of seed be addressed early in the process. Native species can be produced outside of Alaska. That, in some regard, can be problematic. It is more important to stress that tested, adapted and/or Alaska developed native or non-native species be used in revegetation efforts. If Alaska developed cultivars or equivalent are produce outside of Alaska that is not as problematic. This project will require a significant amount of seed. Alaska seed	The rehabilitation section has been revised to include that they have adapted and tested plant seed.

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						producers will need adequate time to meet the projected demand. AGDC will also need assurances that the required types and amounts seed will be available from Alaska; or if not, from some other seed producing region.	
L29	245	ADNR, Division of Agriculture	5.3	Non-native and Invasive Plants 5.3.1.3		The Alaska Natural Heritage Program (ANHP), in cooperation with both state and federal agencies, currently tracks the distribution of 326 species of non-native plants in Alaska. The State of Alaska regulates the spread of invasive and nonnative weed species (11 AAC 34.020). Nine species are listed as restricted and 14 species are prohibited. The distinguishing factor between the two types is that restricted non-native weeds can be controlled by ordinary agricultural means, while prohibited non-native weeds cannot. Executive Order 13112 was issued to prevent the introduction of invasive species to provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause. ANHP does track 326 (number used in this report) non-native plant species in Alaska. These are all ranked for potential invasiveness on a scale of seriousness. That does not mean all 326 are invasive or in any manner a problem in a seed mix or on a site.	The text has been revised that the list of 326 non-native plants are not invasives.
L29	246	ADNR, Division of Agriculture	5.3	Non-native and Invasive Plants 5.3.1.3		The state of Alaska does not use the term non-native in its designation of weeds. That term should be dropped in this context. Also 11 ACC 34.020 is only the list of Prohibited and Noxious Weed in Alaska. The State of Alaska regulates weeds, invasive species, along with quality of seed sold in Alaska with all of 11 AAC 34; also known as the Alaska Seed Regulations. The state seed regulations do not address the issue of a species' nativity nor are there any reasons to so under that regulation. The text needs to	The text has been revised as regulation states noxious weeds, not non-native terminology. Regulations have been included in the text to clarify.

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						have the Executive Order separated from the statements regarding AK regulations and should be denoted as a federal action.	
L29	247	ADNR, Division of Agriculture	5.3	Non-native and Invasive Plants 5.3.1.3		Invasive plants thrive and establish quickly on recently disturbed soils. They are aggressive in growth and reproduction, are generalists, and are tolerant to many environmental conditions. Thus, they outcompete and displace native plants once exposure allows establishment. This causes a reduction in biological diversity and community composition. Changes in the composition of vegetation can in turn affect wildlife that inhabits these areas (Section 5.5 Wildlife). This paragraph is accurate but, as stated, only applies to invasive plants. This should not serve as a definition for non-native for the entirety of this document.	The text has been revised to include a definition for invasive plants, citing ANHP.
L29	248	ADNR, Division of Agriculture	5.3	Environmental Consequences: Non-native and Invasive Plants 5.3.2		Project construction would likely propagate invasive and non-native plants through several pathways: • Transport and use of construction equipment and personnel from the continental United States where invasive and non-native plants are common. This bullet point does not take into account the transport of invasive plant material from within the state. There are many regions of AK that could provide invasive plant material to the project area that were not previously there.	The text has been revised for accuracy to include spread of NIP from within the state

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L29	249	ADNR, Division of Agriculture	5.3	Environmental Consequences: Non-native and Invasive Plants 5.3.2		• Spread of invasive and non-native plants already associated with existing ROWs (ARRC, TAPS, and Highways) from construction equipment and personnel; •Some types of "Native" seed mixtures used to revegetate exposed soils could incidentally contain invasive and non-native seeds. This bullet point; "Some types of 'Native' seed mixtures…." seems to be implying something. It makes no sense and seems to be a personal view about a certain type of seed mix. Seed certification standards have been established in all states and adhere to the Federal Seed Act. Certification establishes methods to maintain variety/cultivar integrity and places maximum limits on allowable weed seed, plant parts and foreign material in a unit of seed. These standards establish how "thoroughly clean" seed is defined. All seed sold in Alaska must be labeled with germination and purity information, including the percentage of weeds and contaminants. All labels can then be traced to the specific official test document that lists total results analyzed in the original seed lot.	The text has been revised for accuracy to clarify.
L29	250	ADNR, Division of Agriculture	5.3	Environmental Consequences: Non-native and Invasive Plants 5.3.2		Invasive and non-native plants are documented along much of the Dalton Highway and the George Parks Highway (ANHP 2011). In areas along the proposed ROW that are associated with existing ROWs (ARRC, TAPS, Highways), this would create further invasion of non-native plants. The majority of the proposed Project would parallel these transportation corridors, and the spread of invasive and non-native plants could occur throughout the Project's construction workspace. A robust Non-native Invasive Plant (NIP) Prevention Plan would be required to prevent further spread of invasive and non-native plants. This paragraph needs to be	The text has been revised to clarify the regulations of weed seed.

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						edited for consistency of the terms invasive and non-native. The term non-native has no bearing on this discussion unless the USACE is attempting to require that seeding and revegetation be accomplished exclusively with native species. Yes, all invasive plant species are by definition non-native or introduced, but not all non-native species are invasive. That is fine in itself. However, 11 AAC 34 does not regulate the use of non invasive introduce species or non-native plants in general unless specifically listed in 11AAC 34.020. Even 11 AAC 34.020 specifically states that varying amounts of prohibited weeds are allowable in seed lots sold in Alaska.	
L29	251	ADNR, Division of Agriculture	5.3	Trenching 5.3-22		Access road development can act as a dispersal mechanism, where untouched land becomes exposed to non-native and invasive plant species. Spread can occur from vehicles, equipment, hand tools, boots and clothing. Non-native and invasive plants establish quickly on exposed soils, and impacts could be long term from continued exposure of NIP species along roadways. An agency approved NIP Plan that includes regular monitoring and assessment would be required to prevent invasion of non-native plant species along access roads. This plan would require updates over the long term throughout Project operations to maintain the integrity of the native flora. The use of the term non-native in conjunction with invasive has been addressed previously. The same comments will apply to this section and all other instances where they are used together in this draft EIS. A Non-native Invasive Plant (NIP) plan should also in clued equipment cleaning protocol for any equipment arriving on the project site or	The text has been revised for accuracy of non-native and invasive species.

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						equipment that has traveled through or work in an infested site.	
L29	252	ADNR, Division of Agriculture	5.3	Mitigation 5.3.3		As described throughout this section, the AGDC would implement the following mitigation measures to minimize Project-related impacts to vegetation resources: •Develop and implement a Stabilization, Rehabilitation, and Restoration (SRR) Plan following ADNR's Plant Materials Center Revegetation Manual for Alaska (Wright 2009) in consultation with the BLM; •Implement BMPs during construction to reduce fugitive dust, which would minimize dust deposition on vegetation adjacent to construction work areas; •Develop a SWPPP that outlines erosion control measures, including the temporary stabilization and reseeding of construction work areas during and after construction; and •Develop a NIP Prevention Plan to limit the establishment and spread of invasive and non-native species. Both highlighted items were discussed previously and the comments apply to these. However, now the final bullet seems to make "invasive and non-native species" as an all inclusive statement thereby committing AGDC to limit the establishment and spread of non-native species. This needs to be addressed. As previously stated the use of non-native species plant species is not state regulated unless the species is listed as being noxious, prohibited or invasive. If the USACE or other federal agency wants to apply an agency policy or Executive Order; they should do so. However, 11 AAC 34 does not address non native species and must not be used as a regulation to control simple undefined non-native plant species.	The text has been revised for accuracy to make non-native and invasive species clarification.

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L29	253	ADNR, Division of Agriculture	5.4			The same issues regarding the term non-native species (also referred to as non-native wetland plants in this section), ADNR PMC's Revegetation Manual for Alaska, and questioning seed cleaning programs, are found in this section.	The text has been revised for accuracy and refers to the manual
L29	254	ADNR, Division of Agriculture	5.4	Rehabilitat ion 5.4-19		Last sentence: An agency approved NIP Prevention Plan would be enforced and maintained as a mitigation measure to prevent the invasion of non-native species. This statement is not consistent in terminology with the rest of the document. The intent now seems to be all out prevention of non-native species use.	The text has been revised for accuracy and clarity about non-native species
L29	255	ADNR, Water Resource Section	General			In general terms the ASAP DEIS describes possible pipeline construction related water uses including hydrostatic testing, camp use, trench dewatering, ice roads and pads, stream crossing related water diversion/impoundment/pumping and HDD drill use, etc. To the extent that any of these or other water uses will exceed (from each separate requested water source) the limits set forth in Alaska Administrative Code Section 11 AAC 93.035, then the applicant will need to submit an Application for Temporary Use of Water to the appropriate permitting authority and be issued the corresponding temporary water use authorization before beginning the requested water use, withdrawal, impoundment, or diversion.	AGDC will apply for the required permits needed for water withdrawal. This specific text addressing 11AAC 93.035 was added into the document for clarity in section 5.2.1.4. "The AGDC would be required to submit an application for Temporary Use of Water to the appropriate permitting authority and be issued the temporary water use authorization before beginning the requested water use, withdrawal, impoundment, or diversion."
L29	256	ADNR, Realty Service Section	2.0	2.1.3.3		The proposed 13 pipe and equipment offloading and storage locations along the Alaska Railroad Corporation (ARRC) systems not identified.	Section 2.1.3.2 Construction Camps, Pipe Storage Yards, and Air Facilities, Rail Yards, and Ports states: The location of the proposed construction camps, pipe storage yards, air facilities, rail yards, and ports are depicted in Figure 2.1-9 and the land requirements for these facilities are described further in Section 5.9.

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L29	257	ADNR, Realty Service Section	2.0	2.1.3.3		Material Sites is ADOT&PF on board with the use of these sites? Have these sites been permitted?	Potential existing material sites have only been identified, AGDC has not committed to utilizing any material sites yet. During final design, AGDC will consult with ADOT&PF as well as any private material site owners to develop a comprehensive list of all material sites that will in fact be utilized during construction. This information will be gathered during the USACE 404 permitting process.
L29	258	ADNR, Realty Service Section	2.0			Access roads has construction of these roads been permitted? What about reclamation once the project is completed? Who will maintain these roads?	No access roads have been permitted to date. All road permitting will be completed following final design of the project. Many access roads will remain following construction so as to provide access to the pipeline for inspection and maintenance. This information has been added to Section 2.1.3.3 - Access Roads.
L29	259	ADNR, Realty Service Section	5.9	5.9		LWCF Funds Has the NPS been notified this project will affect the funds used for Denali SP and is there approval? Approx. 114 acres construction & 45 permanent have replacement lands been identified?	Table 5.9-13 Summary of Applicable Land Use Plans and Documents addresses in more detail mileposts 608.6 to 645.7 under the Denali State Park Management Plan (2006). Section 5.9.2.2 Proposed Action Section under subsection Section 6(f) of the Land and Water Conservation Fund states: The proposed MP 555 to End segment of the proposed Project would cross Denali State Park, which is Section 6(f) parkland, between MP 608.6 and MP 645.8. While a portion of the pipeline would remain within the ADOT ROW when crossing Denali SP, the construction ROW would affect approximately 114 acres and the permanent ROW would affect approximately 45 acres outside of the ADOT ROW. The proposed Project would therefore trigger a 6(f) conversion and would require approval from the NPS for the conversion of lands. In addition, a ROW permit would be required from the ADNR Division of Parks and Outdoor Recreation. The NPS would consider conversion of public outdoor recreation areas to another use if the following conditions are met: Practicable alternatives to the conversion have been evaluated and rejected on a sound basis; The property proposed for substitution is of at least fair

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							market value as that of the property to be converted; and The property proposed for replacement is of reasonably equivalent usefulness and location for recreational purposes as that being converted.
L29	261	ADNR, Realty Service Section	5.10	5.10		Has a mitigation plan been identified to offset the adverse affects of the construction crews/activities?	Mitigation measures proposed by AGDC are described and analyzed in Section 5.23 of the FEIS. Additional mitigation measures will be considered by the USACE in the permitting process.
L29	262	ADNR, Realty Service Section	5.10	5.10		Is there a reclamation plan to return the lands used to house the construction crews back to how they were prior to construction? What about damage/wear & tear on existing roads are there funds available to repair offset these costs?	Section 2.1.3.3 states that all mobile and stationary construction camps would be located within previously cleared and disturbed areas. The ASAP project would use areas that were used for TAPS construction. It is unlikely that these existing disturbed areas used for TAPS would be reclaimed to original conditions from ~40 years ago prior to TAPS. State roads are normally maintained by the DOT. According to AGDC, they will develop a maintenance plan that will cover access roads built by AGDC and pre-existing roads used for access. AGDC will be responsible for maintenance of access roads purpose-built for the project, while agreements with owners of existing roads will specify maintenance responsibilities. Ownership of access roads for the project will be more precisely determined at the time of final right-of-way acquisition.
L29	263	ADNR, Realty Service Section	5.10	5.10		Have scheduling conflicts been worked out with cruise line ships for docking in Seward?	The following statement has been added to Section 5.10.3.2: "AGDC will take into account all port activity when scheduling docking in Seward."

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L29	264	ADNR, Realty Service Section	5.10	5.10		"There would be no conveyances of Section 6(f) properties under the LWCF since the pipeline would be buried" has this been verified with NPS?	The source of the referenced statement is: LeClair, C. 2011. E-mail communication between Claire LeClair, Chief of Field Operations/Deputy Director, Alaska Department of Natural Resources, Division of Parks and Outdoor Recreation, and Jeff Bruno and Jason Walsh, on March 15, 2011. Section 1.2.4.2, National Park Service identifies that " The NPS has oversight responsibility for certain state and local recreational resources pursuant to section 6(f)(3) of the Land and Water Conservation Fund (LWCF) Act (Public Law 88-198) and its implementing regulations at 36 CFR Part 59. Section 6(f) (3) would apply to segments of the pipeline constructed within Denali State Park. Section 6(f)(3) prohibits the conversion of property acquired or developed with LWCF grants to a non-recreational purpose without the approval of the NPS and replacement lands of equal value, location and usefulness. In Alaska the section 6(f) (3) program is administered by the Alaska Division of Parks and Outdoor Recreation (ADPOR)." The status of communications between NPS and ADNR are not documented or reported in the FEIS.
L29	265	ADNR, Realty Service Section	5.10	5.10		Yukon River Crossing has a preferred option been identified?	Section 2.2.3.2, Waterbody Crossings, Yukon River Crossing Options, states: "The AGDC has proposed three options for crossing the Yukon River with construction of a new aerial suspension bridge across the Yukon River the preferred option (the Applicant's Preferred Option)."
L29	266	ADNR, Realty Service Section	5.10	5.10		Who would be responsible for maintenance of the new access roads created?	A footnote has been added to section 5.10.3.2, Aboveground facilities: "AGDC will develop a maintenance plan that will cover access roads built by AGDC and pre-existing roads used for access. AGDC will be responsible for maintenance of access roads purpose-built for the project, while agreements with owners of existing roads will specify maintenance responsibilities. Ownership of access roads for the project will be more precisely determined at the time of final right-of-way acquisition."

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L29	267	ADNR, Realty Service Section	5.10	5.10		Who would be responsible for maintenance of the new access roads created?	A footnote has been added to section 5.10.3.2, Aboveground facilities: "AGDC will develop a maintenance plan that will cover access roads built by AGDC and pre-existing roads used for access. AGDC will be responsible for maintenance of access roads purpose-built for the project, while agreements with owners of existing roads will specify maintenance responsibilities. Ownership of access roads for the project will be more precisely determined at the time of final right-of-way acquisition." Section 2.1.3.3 has been updated to state that "AGDC will provide ongoing maintenance of all access roads" so that it does not conflict with the discussion of the maintenance of access roads in section 5.10.3.2.
L29	268	ADNR, Realty Service Section	5.10	5.10		States Appendix C is Construction Mitigation & Reclamation Plans; however when I look at Appendix C is it actually Meeting Materials?	Construction Mitigation & Reclamation Plans is the correct appendix; however, the appendix letter has been corrected to Appendix "H" in sections 5.10.2.2 and 5.10.2.3, Construction.
L29	269	ADNR, Realty Service Section	5.11	5.11		Shouldn't this say see Table 5.11-1 on page 5.11-6 instead of see Table 5.11.1 above?	Page numbers for all Tables and Figures are listed in the Table of Contents. Page numbers referenced within the text are not a reliable locator as page numbers change throughout the DEIS and FEIS revision process.
L29	270	ADNR, Realty Service Section	5.12	5.12		Shouldn't this say in the table on page 5.12-9 instead of in the table below?	Page numbers for all Tables and Figures are listed in the Table of Contents. Page numbers referenced within the text are not a reliable locator as page numbers change throughout the DEIS and FEIS revision process.
L29	271	ADNR, Mining Land and Water	2.0	2.1.3.3		TEMPORARY EXTRA WORK SPACES (TEWS) outside of the ROW will need to be assessed once identified for possible third party impact or other permitting requirements depending on areas impacted	All impacts associated with TEWS will be addressed during design and construction. TEWs have now been identified and included in the EIS. This information will be gathered during the USACE 404 permitting process.

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L29	272	ADNR, Mining Land and Water	5.9	5.9.3 Mitigation		Section 5.9.3.2 addresses R.S. 2477 Trails and 17(b) Easements. This section should also address Section Line Easements (see general description at the top of this summary) and indicate that for all categories, the appropriate Federal, State, or Local Government Entity will be consulted and where permitting is required, securing the appropriate permits or other authorization will be part of the expected mitigation.	The following language has been added to Section 5.9.1.5: "The proposed Project would intersect section-line easements, which are public ROW 33, 50, 66, 83 or 100 feet wide that are located along a section line of the rectangular survey system. Some section-line easements are also R.S. 2477 ROW." In addition, the following language has been added to Section 5.9.2.2: "In addition, the proposed Project would intersect section-line easements (some section-line easements are also R.S. 2477 ROW). The proposed Project would not infringe upon the existing rights attributable to the R.S. 2477 ROW, 17(b) easements, and section-line easements that it would cross. As described in the ROW permit granted to the applicant by the State (Appendix M), the Project may not obstruct a public access easement or otherwise render it incapable of reasonable use for the purposes for which it was reserved. The proposed Project would therefore not interfere with the use of section-line easements, R.S. 2477, and 17(b) easements. The ROW permit also specifies that before any particular activity requiring any federal, State, or municipal permits or authorizations occurs under the Lease, all required permits and other authorizations for that particular activity must be obtained by the applicant. The applicant would therefore be required to obtain the necessary permits or authorizations prior to constructing any Project features that would intersect with section-line easements, R.S. 2477, and 17(b) easements."

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L29	273	ADNR, Mining Land and Water	5.10	5.10.1.1; 5.10.4		This section addresses R.S. 2477 Trails and 17(b) Easements and the mitigation methods that will be employed. Both sections should also address Section Line Easements (see general description at the top of this summary) and indicate that for all categories, the appropriate Federal, State, or Local Government Entity will be consulted and where permitting is required, securing the appropriate permits or other authorization will be part of the expected mitigation.	Section-line easements are now discussed under the "Section-Line Easements, Revised Statute 2477 Rights-of-Way, and Section 17(b) Easements" subheading within Section 5.10.1.1. In addition, section-line easements are now considered under the Environmental Consequences discussion (Section 5.10.2.2) as follows: "In addition, there could be direct effects from Project construction that may affect recreation, such as: open cut of roads and streams that can result in temporary closure of some roads and trails (including section-line easements, RS 2477 trails, and Section 17(b) easements); restricted access to recreation areas, including navigable rivers, interpretive sites and waysides along the Dalton Highway, and designated trails; or potential adverse effects on fish and wildlife resources that provide the basis for much of the recreation in Alaska (for more information, refer to Section 5.5, Wildlife and Section 5.6, Fish)."
L29	274	ADNR, Mining Land and Water	General			The document incorrectly states the management responsibility of the Iditarod National Historic Trail (INHT). BLM is the administrator of the trail, not the manager. DNR manages the INHT on state land, which includes the crossing of the INHT at Milepost 733 (not BLM). Please correct the entries on Page 5.10-3 and 5.10-16, as well as any other that incorrectly assert who the manager is.	The text has been revised to reflect that the Iditarod Trail is administered by BLM and managed by ADNR in the Project area.

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L29	275	ADNR, Mining Land and Water	General			Developed or undeveloped, if determined to have attached by operation of law, they represent a dominant usage right that can be compatible with this type of secondary associated usage, however, placement of improvements within the limits of the section line would be subject to review and approval by the specific managing entity and/or DNR SCRO in addition to the affected landowner (private, municipal, state).	This comment is an extension of comment 29-272. In response, the following language has been added to Section 5.9.2.2: "In addition, the proposed Project would intersect section-line easements. The proposed Project would not infringe upon the existing rights attributable to the R.S. 2477 ROW, 17(b) easements, and section-line easements that it would cross. As described in the ROW permit granted to the applicant by the State (Appendix M), the Project may not obstruct a public access easement or otherwise render it incapable of reasonable use for the purposes for which it was reserved. The proposed Project would therefore not interfere with the use of section-line easements, R.S. 2477, and 17(b) easements. The ROW permit also specifies that before any particular activity requiring any federal, State, or municipal permits or authorizations occurs under the Lease, all required permits and other authorizations for that particular activity must be obtained by the applicant. The applicant would therefore be required to obtain the necessary permits or authorizations prior to constructing any Project features that would intersect with section-line easements, R.S. 2477, and 17(b) easements."
L30	1	EPA	4.0			We believe the avoidance of impacts to the Minto Flats wetland complex should be considered by evaluating other reasonable alternatives in the EIS, such as the Richardson Highway Alternative and the Fairbanks Route Variation. We recommend that the EIS evaluate these alternatives to identify the Least Environmentally Damaging Practicable Alternative consistent with the Clean Water Act Section 404(b) (1) Guidelines. The Minto Flats wetland complex is considered to be one of the highest quality habitats in Alaska for nesting, rearing, and staging of migratory waterfowl, trumpeter swans, and sandhill cranes. It is also an important area for subsistence, hunting,	Comment acknowledged. The environmental resources of the Minto Flats area are described and the potential project impacts are analyzed in Section 5 of the FEIS. Measures that would mitigate impacts are described in Section 5.23 of the FEIS. The Council on Environmental Quality (CEQ) - Regulations for Implementing the National Environmental Policy Act (NEPA), 40 CFR Part 1502.14, Alternatives Including the Proposed Action, states: "...In this section agencies shall; (a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated...". The identification and analysis of the Fairbanks Route Variation in FEIS Section 4.4.2.1 and for the

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						fishing, and recreation.	Richardson Highway Route in Section 4.4.1.1 are considered by the U.S Army Corps of Engineers to be in compliance with 40 CFR Part 1502.14. The 404(b) (1) analyses has not been conducted by the Corps and the LEDPA has not been identified. The Corps will utilize information from the FEIS and the Section 404 Permit Application process to identify the LEDPA. This information will be gathered during the USACE 404 permitting process.
L30	2	EPA	General			We encourage the Corps to evaluate the 404 permit application concurrently with this EIS process, rather than sequentially. Integrating the NEPA process with those for 404 permitting and Section 106 consultation under NHPA would result in streamlined and consistent agency decision-making, enhanced public disclosure, and better predictability for the applicant. We recommend that the EIS include a public notice for the §404 permit application and a draft 404(b) (1) analysis.	The Section 404 permitting process is being conducted by the U.S. Army Corps of Engineers (Corps) independent of the EIS process. The 404(b) (1) analyses has not been conducted by the Corps and the LEDPA has not been identified. It is not expected that there will be sufficient information to file a complete § 404 permit application until later this year after completion of the 2012 summer field study season. This information will be gathered during the USACE 404 permitting process.
L30	3	EPA	5.23			We believe the Draft EIS does not provide sufficient information to fully assess the environmental impacts to Goldstream Creek which is listed as impaired under the Clean Water Act §303(d) for not meeting water quality standards for turbidity. Construction of the Fairbanks Lateral could result in additional sediment loading to the creek and contribute to violations of water quality standards. We recommend considering co-location of the Fairbanks Lateral along the Parks Highway as a reasonable alternative to avoid impacts to Goldstream Creek.	The following information regarding water quality in Goldstream Creek has been added to Section 5.2.1.6: "ADEC is currently developing a Total Maximum Daily Load (TMDL) for Goldtream Creek. Goldstream Creek is impaired for turbidity. The TMDL would allocate sources so that the stream meets the water quality standard. In AK, the standard is set to 5 NTU above background natural conditions. The TMDL is scheduled to be completed in 2013." In addition, the following text has been added to Section 5.2.2.2, Project Segments: "Construction activities for the Fairbanks Lateral would be required to meet the requirements of the Goldstream Creek TMDL for turbidity that is scheduled to be completed in 2013."

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L30	4	EPA	4.0			Portions of Fairbanks North Star Borough are included in a designated non-attainment area for fine particulate matter (PM2.5) and a maintenance area for carbon monoxide (CO). The Draft EIS does not provide sufficient information to evaluate the positive and/or negative direct, indirect, and cumulative impacts from this project in meeting air quality standards for PM2.5 and CO. If potential impacts would be adverse, we recommend evaluating alternatives that could avoid and/or minimize routing through the designated non-attainment area in Fairbanks.	The proposed Fairbanks Lateral would avoid the non-attainment area and would provide natural gas for Fairbanks. In the cumulative context, with the realization of a Fairbanks distribution system to provide natural gas as a replacement fuel for wood, fuel oil and coal, PM2.5 and CO levels would improve in the non-attainment area. The Fairbanks Route Variation would require construction and operations including a straddle and off-take facility within the non-attainment area as described in Section 4.4.2.1 of the FEIS. Locating the straddle and off-take facility west of the non-attainment area would require an additional lateral pipeline that would be a minimum of 5 miles in length provided that a suitable site could be found in the Goldstream Creek drainage area. Locating the straddle and off-take facility north of the non-attainment area would require an additional lateral pipeline that would be a minimum of 10 miles in length provided that a suitable site could be found along the Elliot Highway. Section 5.16 has been revised to address location of the straddle and off-take facility outside of the non-attainment area and provides further details regarding the Fairbanks air quality non-attainment area. Please also see response to EPA comment 30-23.
L30	5	EPA	5.15			We also recommend that the EIS consider the positive air quality impacts from a transition from wood stoves and coal generators to natural gas for heat and electricity in the Fairbanks North Star Borough area.	Air quality benefits were discussed in the DEIS in Section 5.15, Public Health, in Subsection 5.15.4.2 Proposed Action, as well as in Section 5.20, Cumulative Effects, in Subsection 5.20.6.3, Tourism, Recreation, and Wilderness Resources, Air Quality, Greenhouse Gases, and Global Climate Change. As noted in Table 6.0-1 of the DEIS, Air Quality, 'In concert with a Fairbanks natural gas distribution system, natural gas made available by the ASAP would replace wood and fuel oil currently used for heating and power generation and could result in improvements to air quality in the Fairbanks area.'

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L30	6	EPA	2.0			Additionally, to fully assess the environmental impacts, we believe that the EIS needs to provide a more detailed project description for the aboveground facilities, and other ancillary facilities, such as temporary extra work areas, material source sites, access roads, and water withdrawal areas.	Section 2.1.2 includes detailed information regarding aboveground facilities, including typical layouts of a GCF Facility (Figure 2.1-1b), a Stand-Alone Compressor Station (Figure 2.1-2c), the Straddle and Off-Take Facility (Figure 2.1-3b), and the Cook Inlet NGLEP Facility (Figure 2.1-4b), as well as diagrams of a typical block valve (Figure 2.1-5) and typical pig launcher and receiver profiles (Figure 2.1-6). Information regarding temporary extra workspaces (TEWs) is located in section 2.1.3.3 under the heading Temporary Extra Workspaces and a typical TEW are depicted in Figure 2.1-8. Potential material sites are identified in Appendix P. Access Road information is located in Section 2.1.3.3 under the heading Access Roads and in Section 5.9 Land Use, as well as in Appendix C and Appendix D. In addition, Figure 2.1-11 depicts a Typical Access Road Plan. Section 5.2 details impacts to water resources. However, AGDC has not yet identified waterbodies which may be potentially used as water withdrawal areas. AGDC will obtain the necessary permits and authorizations prior to any water withdrawals taking place.
L30	7	EPA	Appendix G			We also recommend that the EIS include an analysis of source water protection areas along the project corridor.	Comment acknowledged. The text has been revised in Appendix G. Drinking water protection areas have been added to Appendix G.
L30	8	EPA	General			We recommend that the EIS consider an adaptive management approach to mitigation and monitoring measures which would help ensure that impacts to resources are minimized and that corrective actions are taken as necessary.	The applicant will prepare monitoring plans to assess impacts of the project and the effectiveness of project mitigation measures, including those required under the 404 permit. These plans are not yet available. This information will be gathered during the USACE 404 permitting process.
L30	9	EPA	General			The EIS should provide a map identifying the location and types of jurisdictional wetlands impacted by the proposed ASAP project.	The wetlands impact analysis in the FEIS was conducted by GIS analysis of very large data sets. Maps at a legible scale that would depict wetlands and wetland impact areas would be voluminous. Maps would not significantly enhance the presentation of findings regarding wetland impacts. CEQ guidance states that NEPA analysis should be brief and concise {40 CFR

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							Part 1502.2(c)}. This information will be gathered during the USACE 404 permitting process.
L30	10	EPA	5.4			We recommend that the EIS quantify the direct, indirect, and cumulative wetland impacts associated with each construction site, the pipeline route, major aboveground facilities, mainline valves, temporary extra work spaces (TEWS), permanent and temporary access roads, camp and pipeline/contractor storage areas, etc.	The recommended information is presented in Section 5.4 and 5.20 of the FEIS. Section 5.4 of the FEIS has been supplemented with additional information regarding TEWS and temporary access road wetland impacts.
L30	11	EPA	5.23			We recommend that the EIS discuss the appropriate and practicable steps that will be taken by the project proponent to avoid and minimize adverse impacts to wetlands and other aquatic resources. Mitigation measures should be identified in the EIS to minimize those unavoidable wetland impacts. Compensatory mitigation for unavoidable adverse impacts to wetlands should be discussed in order to meet the goal of "no net loss" of wetlands function and acreage.	Wetland mitigation measures are discussed in Section 5.4.4 and 5.23 of the FEIS. Specific mitigation plans to compensate for unavoidable impacts to wetlands have not been developed. Compensatory wetland mitigation would be addressed in the CWA Section 404 Permitting Process. This information will be gathered during the USACE 404 permitting process.
L30	12	EPA	General			We recommend that the EIS include an assessment of wetland functions and conditions in the project area to determine the relative importance of each wetland type that could be adversely impacted by the ASAP Project.	A wetland functional assessment for the project has not yet been completed. This information will be gathered during the USACE 404 permitting process.
L30	13	EPA	5.23			We recommend that the EIS present a functional assessment for all wetlands within the 300-ft wide pipeline corridor sufficient for making permitting decisions, including evaluating the extent of compensatory mitigation required for unavoidable losses of wetlands and aquatic resources.	A wetland functional assessment has not yet been completed for project. Wetland mitigation measures are discussed in Section 5.4.4 and 5.23 of the FEIS. Specific mitigation plans to compensate for unavoidable impacts to wetlands have not been developed. Compensatory wetland mitigation would be addressed in the CWA Section 404 Permitting Process. This information will be gathered during the USACE 404 permitting process.

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L30	14	EPA	5.23			The *Compensatory Mitigation for Losses of Aquatic Resources; Final Rule,* establishes performance standards and criteria for the use of mitigation banks, in-lieu fee mitigation programs, and permittee responsible mitigation (e.g., restoration, enhancement, establishment, and preservation) to improve the quality and success of compensatory mitigation projects for activities authorized by 404 permits. We recommend that the EIS describe the project's proposed compliance with the Compensatory Mitigation Final Rule and the type of compensatory mitigation that would be utilized. In addition, we recommend that a Compensatory Mitigation Plan that evaluates the appropriate level of compensation, based on the functional and condition assessment of unavoidable wetland impacts, be included in the EIS.	A mitigation chapter has been added to the FEIS. Please see Section 5.23. This information will be gathered during the USACE 404 permitting process.
L30	15	EPA	General			Due to the local and national importance of the Minto Flats wetlands complex, we recommend that the EIS analyze in detail the direct, indirect and cumulative impacts to these resources resulting from the construction of the ASAP project. Of particular concern are impacts associated with development of new permanent gravel access roads and new material sources.	Information regarding new permanent and temporary construction access roads, and material site locations in the Minto Flats complex (MP 405 – MP 458) is incorporated within the analysis of the MP 0 – MP 540 segment in the body of the FEIS. The Minto Flats section of the proposed alignment is not being comparatively evaluated against another route option and is therefore not presented separately. Detailed information, however, is available in the appendices. Appendix D contains tables identifying the specific new permanent access roads by specific pipeline mile post and their areas of disturbance. Appendix P contains tables identifying specific existing material sites by mile post and the volume of material available under current permits. ASAP intends to use gravel from existing sources and no new material sites are contemplated in the Minto Flats complex. All wetlands information will be made available during the Corps 404 permitting process with the publication of a public notice.

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L30	16	EPA	5.23			The Draft EIS does not provide sufficient information regarding potential environmental impacts on Goldstream Creek. The proposed Fairbanks Lateral would follow the Goldstream Creek drainage for approximately 34 miles. The EPA has concerns that construction of the Fairbanks Lateral may exacerbate violations of turbidity standards in Goldstream Creek.	Text has been updated in 5.2.1.6 Surface water, Surface Water Quality, Tolovana River Watershed. The ADEC is currently developing a Total Maximum Daily Load (TMDL) for Goldtream Creek. Goldstream Creek is impaired for turbidity. The TMDL would allocate sources so that the stream meets the water quality standard. In Alaska, the standard is set to 5 NTU above background natural conditions. The TMDL is scheduled to be completed in 2013 (USEPA, 2012). The text has also been updated in section 5.2.2.2, Fairbanks Lateral. Construction of the Fairbanks Lateral would be required to meet the requirements of the Goldstream Creek TMDL for turbidity that is scheduled to be completed in 2013. Definition of TMDL has been added to section 5.2.1.4 - Federal, State, and Local Regulations and Rules. Text was added on to section 5.2.2.2 - Proposed Action, Project Segments, Fairbanks Lateral stating that Fairbanks Lateral construction would be required to follow the Goldstream Creek TMDL.
L30	17	EPA	General			We recommend that the EIS evaluate the direct, indirect, and cumulative impacts to Goldstream Creek resulting from activities related to the construction of the Fairbanks Lateral such as erosion, storm water runoff, and sedimentation.	Text has been updated in 5.2.1.6 Surface water, Surface Water Quality, Tolovana River Watershed. The ADEC is currently developing a Total Maximum Daily Load (TMDL) for Goldtream Creek. Goldstream Creek is impaired for turbidity. The TMDL would allocate sources so that the stream meets the water quality standard. In Alaska, the standard is set to 5 NTU above background natural conditions. The TMDL is scheduled to be completed in 2013 (USEPA, 2012). The text has also been updated in section 5.2.2.2, Fairbanks Lateral. Construction of the Fairbanks Lateral would be required to meet the requirements of the Goldstream Creek TMDL for turbidity that is scheduled to be completed in 2013. Definition of TMDL has been added to section 5.2.1.4 - Federal, State, and Local Regulations and Rules. Text was added on to section 5.2.2.2 - Proposed Action, Project Segments, Fairbanks Lateral stating that Fairbanks Lateral construction would be required to follow the Goldstream Creek TMDL.

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L30	18	EPA	General			We recommend that the EIS discuss enhancement efforts, such as how the project would coordinate with ongoing protection efforts, and any mitigation measures and monitoring programs that would be implemented to avoid further degradation of Goldstream Creek.	Specific mitigation plans and success criteria have not yet been developed. These will be developed during the detailed design and permitting process. Text has been updated in 5.2.1.6 Surface Water, Surface Water Quality, Tolovana River Watershed. The ADEC is currently developing a Total Maximum Daily Load (TMDL) for Goldtream Creek. Goldstream Creek is impaired for turbidity. The TMDL would allocate sources so that the stream meets the water quality standard. In Alaska, the standard is set to 5 NTU above background natural conditions. The TMDL is scheduled to be completed in 2013 (USEPA, 2012). Text in 5.2.2.2 has been revised as suggested. Definition of TMDL has been added to section 5.2.1.4 - Federal, State, and Local Regulations and Rules. Text was added to section 5.2.2.2 - Proposed Action, Project Segments, Fairbanks Lateral stating that Fairbanks Lateral construction would be required to follow the Goldstream Creek TMDL.
L30	19	EPA	Appendix G			The Draft EIS does not provide sufficient information to assess the environmental effects of the project on source water protection areas. The proposed ASAP project may impact public drinking water supplies and/or their source areas through activities related to construction such as trenching, excavation, or water withdrawal. We recommend that the EIS identify and map source water protection areas for surface and ground waters, recharge zones, natural springs, etc. along the proposed pipeline corridor. We also recommend that locations of water supply wells along the project route be identified.	According to AGDC, they will apply for all necessary permits that address maintaining water quality in any waterbody or water source that could be potentially affected by construction. In addition, AGDC-proposed mitigation measures for water resources will also help protect source water protection areas. In planning site-specific construction activities, AGDC will consult the Alaska Department of Environmental Conservation map of source water protection areas (http://dec.alaska.gov/eh/dw/dwp/protection_areas_map.html). This website lists different buffer requirement information that AGDC will be required to adhere to during construction and operation of the pipeline.

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L30	20	EPA	General			The Alaska Department of Natural Resource (ADNR) maintains a well log tracking system (WELTS) database that provides information on reported sources of drinking water. The EIS should describe potential direct, indirect and cumulative impacts to source water protection areas associated with the ASAP project, including potential sources of contamination.	The specific surface water locations for water withdrawal have not been determined to date. Once determined, data from drinking water sources can be assessed for impacts in the permitting process. AGDC will apply for all necessary permits that address maintaining water quality in any waterbody or water source that could be potentially affected by construction. In addition, AGDC-proposed mitigation measures for water resources will also help protect source water protection areas. In planning site-specific construction activities, AGDC will consult the Alaska Department of Environmental Conservation map of source water protection areas (http://dec.alaska.gov/eh/dw/dwp/protection_areas_map.html).
L30	21	EPA	General			The EIS should identify mitigation and monitoring measures to protect source water protection areas.	Specific mitigation plans and success criteria have not yet been developed. These will be developed during the detailed design and permitting process. AGDC will apply for all necessary permits that address maintaining water quality in any waterbody or water source that could be potentially affected by construction. In addition, AGDC-proposed mitigation measures for water resources will also help protect source water protection areas. In planning site-specific construction activities, AGDC will consult the Alaska Department of Environmental Conservation map of source water protection areas (http://dec.alaska.gov/eh/dw/dwp/protection_areas_map.html).
L30	22	EPA	5.15			The Draft EIS does not provide sufficient information to evaluate the air quality impacts from the ASAP project, particularly in the Fairbanks non-attainment area. In addition to the negative impacts, we recommend the EIS discuss the positive effects of the ASAP project in the Fairbanks North Star Borough (FNSB) area. Phased in over time, natural gas would replace the use of wood stoves and existing coal	Please see response to EPA comment 30-5.

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						powered generators for heat and energy. In the long term, after a natural gas distribution system becomes operational, there would likely be positive indirect benefits, including air quality improvements. Natural gas is expected to reduce the FNSB fine particulate pollution by as much as 93 percent.	
L30	23	EPA				Portions of the Fairbanks North Star Borough, including the City of Fairbanks, and the City of North Pole, are in a designated, Federal non-attainment area for exceeding the National Ambient Air Quality Standards (NAAQS) for PM25 (particulate matter size less than 2.5 microns) and a maintenance area for carbon monoxide (CO). Local sources, such as wood stoves, distillate oil, industrial operations and mobile emissions contribute to PM25 standard violations during stable weather events associated with extremely strong temperature inversions. Air quality impacts within the non attainment area need to be analyzed, including direct emissions (pipeline construction and activity within the non attainment area) and indirect emissions (increase in population and activities due to staging within the non attainment area) and how such emissions may worsen the existing air quality within the non attainment area or hinder efforts to making progress in improving the air quality. If either of these conditions is present, mitigation should be identified to make the air quality effects neutral or beneficial before proceeding. Further analysis of the necessary general conformity provisions of the CAA is required to make that identification.	Analysis of the portion of the pipeline located within the FNSB was included in Subsection 5.16.2.2 of the DEIS, Proposed Action, Fairbanks Lateral. Mitigation measures for the Project were included in Subsection 5.16.4 of the DEIS, Mitigation, and have been moved to Section 5.23 of the FEIS. A discussion of General Conformity was included in Section 5.16.3. Although many pipeline related EISs provide a preliminary General Conformity analysis that analyzes direct and indirect emissions based on applicant supplied emission estimates, the detailed information needed to complete such a General Conformity Analysis has not been provided for this proposed Project. Information required would include transportation equipment lists, construction schedules, and other similar details necessary for calculation of construction and operation emissions estimates for the nonattainment portion of the Fairbanks Lateral. Based on the current status of the design process, this General Conformity analysis may occur after the publication of the FEIS, but would occur within the permitting process. Section 5.16.3, General Conformity, of the FEIS has been updated to reflect this clarification.

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L30	24	EPA				Since the Fairbanks North Star Borough area is a designated non attainment area for 24-hour PM2.5 NAAQS, transportation conformity and general conformity need to be carefully assessed. As such, emissions from pipeline construction activities (e.g., heavy equipment and machinery) and air quality impacts from PM2.5 and its precursors, need to be consistent with the PM2.5 Attainment Plan being prepared by the Alaska Department of Conservation which is expected in December 2012.	Analysis of the portion of the pipeline located within the FNSB was included in Subsection 5.16.2.2 of the DEIS, Proposed Action, Fairbanks Lateral. Mitigation measures for the Project were included in Subsection 5.16.4 of the DEIS, Mitigation, and have been moved to Section 5.23 of the FEIS. A discussion of General Conformity was included in Section 5.16.3. Although many pipeline related EISs provide a preliminary General Conformity analysis that analyzes direct and indirect emissions based on applicant supplied emission estimates, the detailed information needed to complete such a General Conformity Analysis has not been provided for this proposed Project. Information required would include transportation equipment lists, construction schedules, and other similar details necessary for calculation of construction and operation emissions estimates for the nonattainment portion of the Fairbanks Lateral. Based on the current status of the design process, this General Conformity analysis may occur after the publication of the FEIS, but would occur within the permitting process. Section 5.16.3, General Conformity, of the FEIS has been updated to reflect this clarification. Transportation conformity applies to transportation plans, transportation improvement programs, and projects funded or approved by the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA) in nonattainment areas, and would not be required for the Project.

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L30	25	EPA				The Draft EIS should include a framework for comparing the baseline air quality to air quality during the construction and operation of the proposed ASAP project. Winter and summer conditions should also be evaluated in the assessment. The description should provide the following information for purposes of the air impact assessment: 1. Physical, climatological and meteorological characteristics important to an understanding of air pollution and transport, including a. The representative climate data in the vicinity of the project, including mixing height information. b. A discussion on whether the data is representative enough to characterize movement of the air mass in the area of interest c. A discussion of variables that affect air pollution and the fate and transport of pollutants, including air dispersion patterns, complex terrain interactions, extreme temperature affects, seasonal variations, and presence of other atmospheric phenomena.	Subsection 5.16.1.5 of the DEIS provided information on the baseline air quality in the Project area. Subsection 5.161.1 of the DEIS provided climate information for the Project area. Worst case analyses were used to calculate the emissions provided in the construction emissions tables in Section 5.16 of the DEIS, including emissions in winter months where winter construction is anticipated. Additionally, operational emissions are consistent during fall, winter, spring and summer months. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during both the summer and winter seasons. Detailed geography and climate data associated with air quality for the Fairbanks area was included in Section 5.15 (Public Health) of the DEIS, Subsection 5.15.4.2 (Proposed Action, Fairbanks Geography and Climate) of the DEIS. This information is provided in the same sections of the FEIS.

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L30	26	EPA				The Draft EIS should include a framework for comparing the baseline air quality to air quality during the construction and operation of the proposed ASAP project. Winter and summer conditions should also be evaluated in the assessment. The description should provide the following information for purposes of the air impact assessment: 2. Existing (baseline) air quality, including: a. Ambient air quality data obtained from the Prudhoe Bay Ambient Air Monitoring Program, 3000 E. 16th Street, Anchorage, Harrison Court (Matanuska-Susitna Borough), 675 7th Avenue (Fairbanks North Star Borough, and Denali National Park (Yukon Koyukuk Census Area), including information about the location, purpose of monitoring, data collection period with start and end date, frequency of monitoring, monitoring methodology (i.e., federal reference or equivalent methods), and data quality assurance and quality control. b. For the pollutants measured, the maximum and minimum concentrations, average concentrations, averaging times, time and date stamps, and specific location information in universal transverse Mercator or latitude/longitude coordinates as well as all other pertinent information required to make valid observations for the specific type of monitor. c. Any monitoring data that indicates a violation of a NAAQS, along with the date the violation occurred.	Table 5.16-4 of the DEIS provided background air quality data, as necessary for the analysis, from all four monitoring stations listed in this comment, in addition to the Prudhoe Bay Central Compressor Plant monitoring station. Subsection 5.16.1.5 of the DEIS provided information on the baseline air quality in the Project area. Subsection 5.16.1.1 of the DEIS provided climate information for the Project area. Worst case analyses were used to calculate the emissions provided in the construction emissions tables in Section 5.16 of the DEIS, including emissions in winter months where winter construction is anticipated. Additionally, operational emissions are consistent during fall, winter, spring and summer months. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during both the summer and winter seasons. Detailed geography and climate data associated with air quality for the Fairbanks area was included in Section 5.15 (Public Health) of the DEIS, Subsection 5.15.4.2 (Proposed Action, Fairbanks Geography and Climate). This information is provided in the same sections of the FEIS.

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L30	27	EPA				The Draft EIS should include a framework for comparing the baseline air quality to air quality during the construction and operation of the proposed ASAP project. Winter and summer conditions should also be evaluated in the assessment. The description should provide the following information for purposes of the air impact assessment: 3. Natural resources, ecosystems and human communities that may be adversely affected by any additional air emissions, including: a. Identification, quantification, and mapping of the following: critical habitat areas or Habitats of Particular Concern; biologically sensitive areas; most environmentally sensitive areas; wildlife refuges or sanctuaries; wetlands; sensitive water bodies; endangered species; threatened species or species of special concern; water resources; or archaeological, historical, or cultural resources.	The air quality analysis in Section 5.16-5 of the DEIS included discussion of potential impacts to ambient air conditions as well as sensitive human receptors. Impacts to other resources, as listed in this comment, were analyzed elsewhere in Chapter 5 of the DEIS. For a discussion of winter and summer emissions evaluations, please refer to response to EPA comment 30- 25.
L30	28	EPA				The Draft EIS should include a framework for comparing the baseline air quality to air quality during the construction and operation of the proposed ASAP project. Winter and summer conditions should also be evaluated in the assessment. The description should provide the following information for purposes of the air impact assessment: 4. Identification of the air pollution of concern that will be the focus of the analysis: a. In addition to identifying criteria pollutants and greenhouse gases (OHO), the EIS should identify hazardous air pollutants and include a list of project specific pollutants emitted. If some pollutants are not considered for the impact analysis, there should be a justification for their omission. The EIS should explain why omitted pollutants are not expected to contribute to reasonable significant impacts.	The air quality analysis in Section 5.16-5 of the DEIS included discussion of potential impacts from priority pollutants and GHGs, as well as HAP emissions from both construction and operation. Subsection 5.16.1.5 of the DEIS provided information on the baseline air quality in the Project area. Subsection 5.16.1.1 of the DEIS provided climate information for the Project area. Worst case analyses were used to calculate the emissions provided in the construction emissions tables in Section 5.16 of the DEIS, including emissions in winter months where winter construction is anticipated. Additionally, operational emissions are consistent during fall, winter, spring and summer months. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during both the summer and winter seasons. Detailed geography and climate data associated with air quality for the Fairbanks area was included in Section 5.15 (Public Health) of the DEIS, Section 5.15.4.2 (Proposed Action, Fairbanks

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							Geography and Climate). This information is provided in the same sections of the FEIS.
L30	29	EPA				The Draft EIS should include a framework for comparing the baseline air quality to air quality during the construction and operation of the proposed ASAP project. Winter and summer conditions should also be evaluated in the assessment. The description should provide the following information for purposes of the air impact assessment: Development of an emission inventory to provide an accounting of the sources of emissions and the total quantity of air pollutants emitted: a. A key element of an impact assessment of air emissions is a comprehensive accounting of the sources and quantities of emissions from all aspects of a proposed project and alternatives. Emission sources considered should include support activities such as site preparation, project construction and start-up, as well as operational activities. b. An emission inventory should cover all potential pollutant releases and cover a specific geographical area for a specific period of time. The inventory should include scaled schematics and process flow diagrams that identify product flow and emission-generating activities and points. Fugitive emission points, emission leaks and ancillary activities that have the potential to generate air emissions should be included for discussion.	The air quality analysis in Section 5.16-6 of the DEIS included discussion of predicted quantities of construction and operational emissions for all portions of the proposed Project, based on currently available information. A more detailed emissions inventory is not currently available, and would be prepared during the permitting phase of the proposed Project. Subsection 5.16.1.5 of the DEIS provided information on the baseline air quality in the Project area. Subsection 5.161.1 of the DEIS provided climate information for the Project area. Worst case analyses were used to calculate the emissions provided in the construction emissions tables in Section 5.16 of the DEIS, including emissions in winter months where winter construction is anticipated. Additionally, operational emissions are consistent during fall, winter, spring and summer months. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during both the summer and winter seasons. Detailed geography and climate data associated with air quality for the Fairbanks area was included in Section 5.15 (Public Health) of the DEIS, Subsection 5.15.4.2 (Proposed Action, Fairbanks Geography and Climate) of the DEIS. This information is provided in the same sections of the FEIS.

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L30	30	EPA				The Draft EIS should include a framework for comparing the baseline air quality to air quality during the construction and operation of the proposed ASAP project. Winter and summer conditions should also be evaluated in the assessment. The description should provide the following information for purposes of the air impact assessment: Modeled or otherwise predicted concentrations of air pollutants: a. The purpose of air quality modeling is to determine whether or not emissions from the proposed project activities will cause adverse environmental impacts. b. Models are selected for their ability to predict changes in ambient air quality and any significant pollutant deposition associated with the preferred action and alternatives being considered. Identify what kind of model is necessary to consider air quality impacts (conceptual, simple statistical or numerical dispersion).	Project impacts were analyzed based on potential emissions calculated on a ton per year basis. Ambient air quality modeling (i.e., dispersion modeling) would be required in the permitting process to support the ADEC Title I Air Permit application for each required stationary source. AGDC would be required to follow guidance, regulations, and modeling software as directed by the ADEC.
L30	31	EPA				The Draft EIS should include a framework for comparing the baseline air quality to air quality during the construction and operation of the proposed ASAP project. Winter and summer conditions should also be evaluated in the assessment. The description should provide the following information for purposes of the air impact assessment: An analysis of potential impacts on other aspects of the environment besides air, such as natural resources. For example, acidic deposition is one possible effect associated with emissions of sulfur oxides and nitrogen oxides. These emissions contribute to acidic precipitation, and, in the absence of sufficient buffering capacity, cause the acidification of lakes and severe ecosystem impacts: a. Consider various pathways of exposure (direct contact and inhalation of	The air quality analysis in Section 5.16-5 of the DEIS included a discussion of the potential impacts to ambient air conditions as well as sensitive human receptors. Impacts to other resources, as listed in the comment, were analyzed elsewhere in Chapter 5 of the DEIS. For a discussion of winter and summer emissions evaluations, please refer to response to EPA comment 30- 25.

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						particles or gaseous pollutants) and potential impacts to receptors as a result of pathway exposure. b. Develop a conceptual model for any potentially significant direct or indirect pathway of exposure for natural resources.	
L30	32	EPA				The Draft EIS should include a framework for comparing the baseline air quality to air quality during the construction and operation of the proposed ASAP project. Winter and summer conditions should also be evaluated in the assessment. The description should provide the following information for purposes of the air impact assessment: Contribution to GHG emissions: a. Develop a GHG emission inventory that includes baseline emissions, projected related emissions, and emissions from reasonably foreseeable activities	Greenhouse gas (GHG) emissions were discussed in Section 5.16.2 of the DEIS and included construction and operational emissions. GHG emissions were provided for each portion of the proposed Project (e.g., Mainline Construction, Fairbanks Lateral, Gas Conditioning Facility, Compressor Station, Straddle and Off take Facility, NGL Extraction Plant, Construction Camp, and Denali National Park Route Variation). Table 5.16-2 of the DEIS provided greenhouse gas inventories for both Alaska and the United States.
L30	33	EPA				The Draft EIS states that the cumulative effect on air quality will be developed during the permit process. However, the CEQ regulations require that an EIS consider cumulative impacts along with the direct and indirect impacts of a proposed project and alternatives. We recommend that the following components be used in an air cumulative impacts analysis: • Identification of emissions from the project and other sources in the resource area; • Receptors such as people living in the area of impact; • A conceptual model linking emissions and impacts, such as a narrative description, cause-effect diagrams, or emission receptor-impact matrices; • Modeling to analyze the impact in a cumulative analysis context (e.g., air quality modeling or deposition modeling). Produce an estimate change from baseline condition to determine whether or not the change is significant.	To the extent possible based on available data for the Projects, cumulative effects are analyzed in Subsection 5.20.6.3 Tourism, Recreation, and Wilderness Resources. Statements from the analysis include, 'There may be potential interactions between the emissions from Project compressor stations and compressor stations for APP, depending on proximity of the APP stations to Project Stations. Emissions from the straddle/take-off facility would not interact with other existing or reasonably foreseen projects.' and 'Because of the expected general size and horsepower of a new LNG facility and associated facilities in the same general area, no appreciable adverse cumulative air quality emissions are expected as long as air quality standards are met. Any modification of the existing GCF to accommodate the production of natural gas to meet the requirements for APP system are subject to detailed permitting. Neither the Project nor the new LNG facilities on the North Slope are expected to have an adverse impact on the ability of the APP to meet required air quality standards. Point Thomson is not

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							expected to require additional facilities or development in the Prudhoe Bay area. As such, there would be no cumulative air quality impacts associated with that project.' and 'There would be long-term positive improvement of air quality to the extent natural gas is substituted for wood or fuel oil as a source of heating. Likewise, the air quality would be further improved to the extent GVEA electrical generation and the Flint Hills Refinery could be economically converted from naphtha, diesel and coal to natural gas. The Connected Action of operating a conceptual fractionating facility, tank farm and marine terminal at Nikiski would have cumulative effect on air quality. The extent and components of the cumulative air emissions would depend primarily on the site specific equipment and emission controls at the fractionation facility.' Again, potential cumulative impacts have been analyzed to the extent possible based on available information.
L30	34	EPA				The EIS should describe the flaring system that would be required at the aboveground facilities, such as the gas conditioning facility, compressor stations, straddle and off-take facility, natural gas liquids extraction plant, and other areas along the pipeline corridor. A flaring system would be required for facility startup, de-pressuring during maintenance activities, and to protect the facility from overpressure. We recommend that the air impact assessment in the EIS include gas flaring emissions information.	Based on information received from AGDC after publication of the DEIS, Section 2.1.2 (Aboveground Facilities) of the FEIS has been revised to include a description of flaring at aboveground facilities. Additionally, Section 5.16.2 of the FEIS has been revised to include emissions estimates associated with flaring. These emissions estimates are included in the calculations contained in Appendix O of the FEIS. The emissions estimates are also included in the revised Tables 5.16-9, 11, 13, and 15 of the FEIS. Details regarding flaring emissions are footnoted in the overall emissions tables in Appendix O. Details on flaring from Section 2.1.2, Aboveground Facilities, of the FEIS have been added to Section 5.16-2 of the FEIS.

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L30	35	EPA				Sources of fugitive dust from the ASAP may include unpaved gravel roads and facility pads, clearing and construction sites, and gravel mine sites. Effects of fugitive dust to the natural environment may include visibility reductions and haze, surface water impacts, impacts to wetlands, thermokarsting of permafrost, and reduction in plant growth. Fugitive dust may pose a human health risk due to chronic exposure in areas with vulnerable populations, such as infants and the elderly. The EIS should evaluate the magnitude and significance of fugitive dust emissions resulting from this project and potential impacts on human health. We recommend that the EIS include provisions for monitoring fugitive dust during construction and operations, and measures to reduce fugitive dust emissions, such as wetting the source material, installing barriers to prevent dust from leaving the source area, and halting operations during high wind events.	Fugitive dust emissions were provided in Tables 5.16-6, 7, and 17 of the DEIS and these tables have been updated in the FEIS where appropriate based on information received after publication of the DEIS. Fugitive dust impacts to ambient air quality are discussed in Section 5.16.2 of the FEIS. Mitigation measures for the proposed Project were included in Subsection 5.16.4 of the DEIS, Mitigation, and have been moved to Section 5.23, Mitigation, of the FEIS. Fugitive dust is also discussed in Section 5.15, Public Health, Subsection 5.15.4.2, Proposed Action, Exposure to Hazardous Materials. Additionally, particulate matter emissions have been updated in Table 5.16-6 and 5.16-7 of the FEIS. As noted in the tables, total PM fugitive dust is assumed equal to PM10 fugitive dust. PM2.5 fugitive dust is estimated at 10 percent of PM10, based on the study conducted by Midwest Research Institute in 2006 (Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors) for the Western Governors Association to better characterize the PM2.5/PM10 ratio in fugitive dust. This report has been accepted by the EPA as an approved adjustment to the emission factors in EPA AP-42, Section 13.2. Mitigation in Section 5.23 of the FEIS has been updated to reflect applicant proposed mitigation and includes the implementation of Best Management Practices (BMPs) during construction activities to mitigate fugitive dust and reduce particulate matter emissions. The BMPs for dust control are based on the EPA's National Menu of BMPs, Construction Site Stormwater Runoff Control, Erosion Control and include minimizing the time disturbed ground is exposed; using water to prevent windborne dust from leaving construction sites and gravel roads; limiting speed of construction equipment to minimize dust creation; and sweeping paved public roads of dirt left by construction vehicles.

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L30	36	EPA				We encourage the Corps to evaluate the 404 permit application concurrently with this EIS process, rather than sequentially. Integrating the NEPA process with those for 404 permitting and Section 106 consultation under NHPA would result in streamlined and consistent agency decision- making, enhanced public disclosure, and better predictability for the applicant. We recommend that the EIS include a public notice for the §404 permit application and a draft 404(b) (I) analysis.	The Section 404 permitting process is being conducted by the U.S. Army Corps of Engineers independent of the EIS process. The 404(b) (1) analyses have not been conducted by the Corps and the LEDPA has not been identified. The Corps will utilize information from the FEIS and the Section 404 Permit Application process to identify the LEDPA. Section 106 coordination and compliance activities will be conducted by the USACE prior to development of the LEDPA and a Record of Decision. This information will be gathered during the USACE 404 permitting process.
L30	37	EPA				The Draft EIS does not provide sufficient information to determine whether the proposed action is the Least Environmentally Damaging Practicable Alternative (LEDPA) under the Clean Water Act §404(b) (I) Guidelines. We recommend that the EIS analyze a broad range of reasonable alternatives capable of meeting the project's purpose and need. We are concerned that eliminating reasonable project alternatives from detailed analysis in the EIS may result in a limited analysis of the potential environmental impacts and inappropriately limit the range of reasonable alternatives.	The Section 404 permitting process is being conducted by the U.S. Army Corps of Engineers (Corps) independent of the EIS process. Given the current state of the proposed Project design process, the 404(b) (1) analysis has not yet been conducted by the Corps and the LEDPA has not yet been identified. Section 4.6 of the DEIS presented a summary of potential alternatives considered and identified reasonable alternatives that meet the purpose and need of the proposed Project, are technically feasible and have potential environmental advantages over the proposed Project. Reasonable alternatives that are technically feasible and have potential environmental advantages over the proposed Project were identified and carried forward for more detailed analysis as potential action alternatives in Section 5 of the DEIS. The information provided in the DEIS has been updated in the FEIS as appropriate based on information that was not available at the time of publication of the DEIS. The Corps will utilize information from the FEIS and the Section 404 Permit Application process to identify the LEDPA. This information will be gathered during the USACE 404 permitting process.

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L30	38	EPA				We note that the Alaska Legislature in House Bill (HB) 369, set guidelines regarding the analysis of possible routes for the ASAP project. According to the guidelines, the selected route should: • Be economically feasible, • Make natural gas available to residents at the lowest possible price, • Allow for connecting lines to serve industrial, residential, and utility customers along the entire route, and in other regions of the state that can be served at commercially feasible rates, • Use state land and existing state highway and railroad rights-of-way to the maximum extent feasible, and • Use existing highway and railroad bridges, gravel sources, equipment yards, maintenance facilities, and other existing facilities and resources to the maximum extent feasible. The Draft EIS does not provide sufficient information to determine whether these guidelines have been met. We recommend that the HB 369 guidelines be included as screening criteria to determine a range of reasonable alternatives to be analyzed in detail in the EIS. We recommend that the Richardson Highway Route, the Fairbanks Route Variation, and the Port MacKenzie Rail Route Variation be included as reasonable alternatives to be analyzed in further detail in the EIS to determine which represents the LEDPA.	The primary purpose of the proposed Project as stated in Alaska State House Bill 369 is to provide a long-term, stable supply of up to 500 MMscfd of natural gas and NGLs from existing reserves within North Slope gas fields to markets in the Fairbanks and Cook Inlet areas by the most direct and shortest route possible with production starting in 2019. Sections 4.4.1 and 4.4.2 of the DEIS provided a sufficient level of information to determine whether proposed alternatives met the proposed Project purpose and need, whether the proposed alternatives were reasonable, and whether the proposed alternatives provided an identifiable environmental advantage over the proposed Project. Those alternatives which passed this level of screening were further analyzed in Section 5 of the DEIS. Information in the FEIS has been updated as appropriate with any information that was unavailable at the time of publication of the DEIS. This information will be gathered during the USACE 404 permitting process.

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L30	39	EPA				According to the Draft EIS, approximately 82 percent of the proposed project route would be co-located with existing transportation and utility rights-of-way (ROWs) along the Dalton Highway and Parks Highway, the Alaska Railroad, and the Trans-Alaska Pipeline System (TAPS). Portions of the proposed pipeline corridor that would *not* be co-located within existing infrastructure ROWs include the sections through the Minto Flats wetlands complex (Mile Post (MP) 410-460), and along the Susitna River drainage south of Trapper Creek to its terminus in the Matanuska-Susitna Borough (MP 710 to MP 736). Co-location is desirable as a means of concentrating development within established and approved corridors, minimizing adverse environmental impacts on undisturbed areas. Co-locating the pipeline within existing infrastructure ROWs would provide better access for pipeline construction, maintenance, and operations, and would avoid the need for additional access roads and material source sites. We recommend that the greatest possible length of the ASAP project be co-located within existing infrastructure ROWs, and make use of existing Federal and State designated corridors on public land. This would reduce impacts to undeveloped areas, maximize use of previously established infrastructure (e.g., access roads, storage yards, construction camps, material sites, etc.), and avoid potential adverse impacts to wetlands and other aquatic resources.	As described in the DEIS, the proposed Project route parallels existing transportation and utility ROWs to the degree practicable and consistent with the proposed Project purpose and need. This information will be gathered during the USACE 404 permitting process.

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L30	40	EPA				The Richardson Highway Route alternative would follow the Dalton Highway ROW as the proposed ASAP project until Livengood (MP 410), at which point it would be co-located with the existing TAPS and Richardson Highway ROWs to Fairbanks, Delta Junction, and Glendale. At Glennallen, it would follow the Glenn Highway ROW to its terminus in south central Alaska. The Richardson Highway Route alternative would avoid adverse impacts to the Minto Flats and the Susitna River Flats Wetlands. This alternative could provide natural gas at offtake points to Fairbanks, North Pole, and existing military bases - Fort Wainwright, Eielson Airforce Base, and Fort Greeley. The Richardson Highway Route Alternative could support a future option for a pipeline to a liquefied natural gas facility in Valdez. If the future Alaska Pipeline Project from Prudhoe Bay to Canada is constructed, a take off point at Delta Junction could provide gas to South Central and Valdez via this alternative route along the Richardson Highway.	Please see response to EPA comment 30-38. This information will be gathered during the USACE 404 permitting process.
L30	41	EPA				A Fairbanks Route Variation would follow the existing TAPS corridor between Livengood and the Fairbanks area. In Fairbanks, the route could connect with the Parks Highway until the terminus. The Fairbanks Route Variation would avoid potential adverse direct, indirect, and cumulative impacts to the Minto Flats Wetlands Complex. There is limited infrastructure near the Minto Flats area. This would require additional impacts for new material sites and additional permanent gravel access roads, resulting in greater cumulative impacts to wetlands.	Please see response to EPA comment 30-38. This information will be gathered during the USACE 404 permitting process.

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L30	42	EPA				The Port MacKenzie Rail Route Variation would avoid potential adverse direct, indirect, and cumulative impacts to Nancy Lake State Recreation Area and the northeastern comer of the Susitna Flats State Game Refuge, Little Susitna State Recreation River and the Iditarod National Historic Trail. This route variation would avoid residential neighborhoods and drinking water wells by co-locating with the existing infrastructure ROWs. For additional information regarding the Port MacKenzie Rail Route, refer to the project website: http://portmacrail.com/.	The Council on Environmental Quality (CEQ) - Regulations for Implementing the National Environmental Policy Act (NEPA), 40 CFR Part 1502.14, Alternatives Including the Proposed Action, states: "...In this section agencies shall; (a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated...". The identification and analysis of the Port MacKenzie Route Variation presented in Section 4.4.2.4 of the FEIS is considered by the U.S Army Corps of Engineers to be in compliance with 40 CFR Part 1502.14. The Port Mackenzie Rail Extension is not an "existing infrastructure ROW" at this time. However, the conclusions stated in Section 4.4.2.4 do not rely on consideration of future absence or presence of the rail extension.
L30	43	EPA				We recommend that the EIS evaluate an alternative route to the Fairbanks Lateral Alternative, which could include an alignment along the Park Highway ROW and the Richardson Highway Route Alternative to avoid further potential degradation of water quality in Goldstream Creek.	The Fairbanks Route Variation alternative is identified and analyzed in Section 4.4.2.1 of the FEIS. The proposed Fairbanks lateral would be co-located with the Alaska Railroad corridor in the Goldstream Creek area. The Alaska Railroad corridor would be between the pipeline and Goldstream Creek. Water quality impacts and potential mitigation measures are identified and described in Section 5.10 of the FEIS. An alignment along the Parks Highway would be 4.7 miles longer than the proposed route that is co-located with the Alaska Railroad corridor. The following information regarding water quality in Goldstream Creek has been added to Section 5.2.1.6: "ADEC is currently developing a Total Maximum Daily Load (TMDL) for Goldtream Creek. Goldstream Creek is impaired for turbidity. The TMDL would allocate sources so that the stream meets the water quality standard. In AK, the standard is set to 5 NTU above background natural conditions. The TMDL is scheduled to be completed in 2013." The following text has been added to Section 5.2.2.2, Project Segments: "Construction of the Fairbanks Lateral would

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							be required to meet the requirements of the Goldstream Creek TMDL for turbidity that is scheduled to be completed in 2013."
L30	44	EPA				The ASAP project would require additional aboveground facilities to support the processing and transportation of natural gas, such as the gas conditioning facility (GCF) on the North Slope, a straddle and off-take facility at Dunbar, compressor stations, a natural gas liquids extraction plant (NGLEP), mainline valves (ML V), and other support facilities. The Draft EIS does not identify or analyze in detail any alternative site locations for these aboveground facilities to determine which locations would best meet site criteria. We recommend that the EIS include analyses of aboveground facility site alternatives to determine which would be the LEDP A. This could be accomplished by identifying additional sites for each aboveground facility, and explaining why the siting criteria support a preferred site over other sites identified and analyzed in the EIS.	Section 4.5.2 of the DEIS addressed aboveground facility site alternatives. The general locations of these facilities are constrained by proximity, technical and logistical issues related to proposed Project construction and operation. Considering these constraints, the AGDC selected proposed aboveground facility sites that would limit impacts to topography, surface waters, wetlands and habitats, visual resources, cultural resources, and human use. Mitigation measures that would further reduce impacts to environmental resources during aboveground facility construction and operation were provided throughout Section 5 of the DEIS and for ease of reference have been relocated to Section 5.23 of the FEIS. This information will be gathered during the USACE 404 permitting process.
L30	45	EPA				To integrate the procedural requirements of NEPA and the requirements of the CW A, we recommend that general cost estimates be developed for each alternative evaluated in the EIS. This information could then be used in the evaluation of choices among the action alternatives. As you are aware, the CW A §404(b) (1) Guidelines require the consideration of cost in order to determine the practicability of the alternatives when determining whether a proposed alternative is considered to be the LEDPA. In addition, HB 369 requires consideration of economic feasibility in identifying the proposed pipeline route. The ASAP Plan of Development, Revision I (POD) stated that the cost of construction would be	Given the current state of the design process for the proposed Project, the U.S Army Corps of Engineers (Corps) did not utilize cost information as a quantitative factor in screening reasonable alternatives to the proposed action in the DEIS, since the cost estimate provided in Table 2.3-1 of the POD is preliminary and subject to change. Additionally, there are no cost estimates available for the alternatives considered. Section 4 of the FEIS has been amended to clarify that cost is not a quantitative alternative screening criterion. Please also see response to EPA comment 30-37. This information will be gathered during the USACE 404 permitting process.

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						$8.4 billion and the cost of annual operation and maintenance would be $70 million. We recommend that cost of service estimates for 2012 be developed for each alternative analyzed in the EIS.	
L30	46	EPA				The description of the project in the Draft EIS should include all of the relevant components so that the analysis of potential environmental impacts will be full and complete. Additional details regarding the proposed aboveground facilities and ancillary facilities, such as the temporary extra work spaces (TEWS), material sites, water sources, and access roads is necessary to evaluate the direct, indirect, and cumulative environmental consequences of the proposed action. As required under the CW A §404(b) (I) Guidelines, this information is necessary to determine whether appropriate and practicable steps have been taken to avoid and/or minimize adverse impacts to wetlands.	Please see response to EPA comment 30-6. This information will be gathered during the USACE 404 permitting process.
L30	47	EPA				In March 20 II, the project proponent prepared a Plan of Development (POD), Revision I, for the Alaska Stand Alone Gas Pipeline project. The POD included data and information that we believe is relevant and valuable in a full evaluation of potential environmental impacts. We recommend incorporating the following information from the POD into the EIS: • Construction Spread by Season and Location (Table 2.2-1; page 9); • Cost of Proposal (Table 2.3-1; page 10); • Pipeline wall thicknesses (Table 4.1-1; page 15); • Temporary Land Use Overview (Table 7.2-1; page 35); • Project Airports and Airstrips (Table 7.2-3; page 41); • Construction Timeline for Major Facilities (Table 7.3-1; page 42); • Approximate Locations of Cut and Fill Grading (Table 7.4-1; page 49); • Material Availability and Need by Construction	AGDC provided information that the estimates given in Table 2.3-1 of the AGDC March 2011 Plan of Development, Revision 1, were used in the PFEIS and are appropriate for the level of accuracy of AGDC cost estimates at this time (in the range of ±30%). ·The construction timeline for the project can be found in Tables 2.2-1 and 2.2-3 of the FEIS. ·Existing land ownership is addressed in Chapter 5.9.1.2. ·Construction Spread by Season and Location can be found in Table 2.2-1 of the FEIS. ·Pipeline wall thickness can be found in Table 5.19-1 of the FEIS. ·All airports or airstrips to be utilized for the project are in existence today and are either currently in use or have been historically used along the ROW corridor. ·The approximate locations of the cut and fill grading have not been included at this time. ·Material availability and need by construction spread can be found in Table 5.1-3 of the FEIS ·Standard Details and Typical Drawings of

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						Spread (Table 7.4-3; page 50); •Standard Details and Typical Drawings (Attachment I) •Land Ownership (Attachment 2); and • Existing Material Sites (Attachment 6)	the proposed project can be found in Figures 2.1-1a, 2.1-1b, 2.1-2a, 2.1-2b, 2.1-2c, 2.1-3a, 2.1-3b, 2.1-4a, 2.1-4b, 2.1-5, 2.1-6, 2.1-7, 2.1-8, 2.1-10, 2.1-11, 2.2-1, 2.2-2, 2.2-3, 2.2-4, 2.2-7, 2.2-8, 2.2-9, and 2.2-10· Existing material sites can be found in the table in Appendix P.
L30	48	EPA				We recommend that descriptions of the following project facility components be incorporated into the EIS, including size, location of the various modules, and layouts of the components, some of which were provided in the POD: • Gas Conditioning Facility • Compressor Stations • Straddle and Off-Take Facility • Cook Inlet NGL Extraction Plant Facility • Mainline Valves • Cathodic Corrosion Protection	Typical layouts of key aboveground facilities presented in the POD have been added to Section 2.1.2 of the FEIS.
L30	49	EPA				As proposed in the Draft EIS, the ASAP project would require the construction and operation of four aboveground pipelines (raw gas supply, miscible injectant supply, CO2 return line, and ethane return line) that would connect the Prudhoe Bay Central Gas Facility (CGF) to the Gas Conditioning Facility (GCF). These pipelines are not included as part of the project but are considered connected actions in the Draft EIS. We consider the four pipelines connecting the CGF and GCF and the ASAP project as one complete project. We believe these projects do not have independent utility and would not stand alone as separate projects as the ASAP project would not be a viable project without the raw gas feed line connecting the CGF to the GCF. We recommend including the four pipelines as part of the ASAP project and analyses in the EIS.	Since AGDC is not proposing to permit and construct the four aboveground pipelines addressed in this comment, USACE has determined that they should be analyzed in the DEIS as “connected actions”. The potential impacts of these four aboveground pipelines are addressed in Section 3.0 of the DEIS and potential cumulative effects in Section 5.20 of the DEIS. This information will be gathered during the USACE 404 permitting process.

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L30	50	EPA				Additional construction areas, or temporary work spaces (TEWS) would be required for construction at road crossings, railroad crossings, crossings of existing pipelines and utilities, stringing truck turnaround areas, wetland crossings, and waterbody crossings. These TEWS would be located adjacent to the construction ROW and could be used for such things as spoil storage, staging, equipment movement, material stockpiles, and pull string assembly associated with horizontal directional drilling (HDD) installation. According to the Draft EIS, the size of the TEWS would vary depending on site-specific conditions and the proposed use of the TEWS. We recommend that the EIS identify the location and size (acres) of all proposed TEWS for this project, preferably in a table and on a map. The cumulative impacts of the TEWS may be significant depending on where they are located in the project area. We recommend that the EIS establish siting criteria for the TEWS, such as maintaining a 50-ft "no disturbance" buffer from wetlands and waterbodies, and a 100-ft buffer from waterbodies that support anadromous fish.	Please see response to EPA comments 30-89 and 30-90. This information will be gathered during the USACE 404 permitting process.
L30	51	EPA				The Draft EIS indicates that approximately 13.1 million cubic yards of material may be required for project construction. Approximately 546 existing material sites have been identified using the Alaska Department of Transportation & Public Facility (ADOT&PF) material site information sources. We recommend the EIS identify the location of existing and proposed new material sites on a map. It would also be helpful to have the information regarding the material source sites included on a table with the milepost location, the surface area impacts, quantity of material available, quantity of	Appendix P (Exiting Material Sites), which contains most of the information requested including specific milepost locations, has been added to the FEIS. A digital web-viewer has been provided to agencies depicting this information (access roads, material sites, camp laydown locations, etc.). Additional information will be available during the permitting process.

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						material needed for the project, land ownership, permit status, etc. The POD (Attachment 6) provides a list of existing material sites.	
L30	52	EPA				The Draft EIS indicates that approximately 1,088.02 million gallons of surface water would be required for construction of ice work pads, ice access roads, ice armouring of snow roads, earthwork (dust control and compaction), and hydrostatic testing of the pipeline and for horizontal directional drilling operations. The Draft EIS describes the results of lake studies conducted for the proposed route from Prudhoe Bay to Galbraith Lake. Additional water resources have not been identified for areas of the pipeline south of the Brooks Range. We recommend the results of the lake studies for all proposed water withdrawal areas along the pipeline corridor are included in the EIS, including lake surface areas, maximum depths, volume of water, volume of proposed withdrawal, and presence/absence of resident and/or anadromous fish species.	Additional lake studies have not been conducted along the entire route therefore additional data is not available at this time. Water sources for all aspects of project construction will be identified during final design. All appropriate regulatory permits will be obtained for water withdrawal and discharge. This information will be gathered during the USACE 404 permitting process.
L30	53	EPA				We recommend including mitigation measures, such as establishing water withdrawal rates, timing of water withdrawal and screening to avoid impacts to fish, and monitoring to ensure that fisheries resources are protected.	Addressed by stating in Section 5.23 of the FEIS: This will be a requirement for each permitted lake, which will be determined during the permitting process. This information will be gathered during the USACE 404 permitting process.

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L30	54	EPA				The proposed mainline would require the use of 90 permanent gravel roads, 60 of which would be new roads developed to transport material, equipment and personnel, and to access water sources, material sites and camps. The majority of new permanent access roads would be in areas where there are no existing infrastructure ROWs, such as in the Minto Flats area and areas south of Trapper Creek. Approximately 300 acres of additional wetlands would be lost through final placement of permanent roads in the Minto Flats area. We recommend that a map identifying the location of all proposed access roads - permanent and temporary gravel roads, and ice and snow roads - be included in the EIS. A typical access road section drawing should also be included in the EIS. Please refer to the POD (Attachment I). The type and size of culverts should be specified to ensure adequate cross drainage. We recommend avoiding and minimizing impacts to wetlands by reducing the number of temporary and permanent gravel access roads by maximizing construction activities in the winter season.	Section 2.1.3.2 now contains a typical access road drawing (Figure 2.1-10). Additional access road information, including the type of access road and the volume of material to be used for construction, is available in Appendix D. A digital web-viewer has been provided to agencies depicting this information (access roads, material sites, camp laydown locations, etc.). Culverts will be designed and installed to ensure adequate cross-drainage and to facilitate surface water flow under access roads. AGDC will develop construction schedules that take into account minimization of impacts to wetlands through winter construction. Additional information will be available during the permitting process.
L30	55	EPA				Certain discharges associated with the ASAP can be covered by the North Slope GP. Activities within the North Slope Borough, such as the GCF, and portions of the pipeline north of the Brooks Range can be authorized under the North Slope OP. Authorization for coverage under the North Slope OP and other discharges associated with this project should be coordinated with the EPA and ADEC.	Comment acknowledged.

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L30	56	EPA				We are concerned about potential releases of drilling mud, cuttings, and additives into waterbodies that support resident and/or anadromous fish. We recommend that the EIS discuss how this waste material would be managed, stored, transported, and properly disposed. We recommend that a Drilling Mud Plan be prepared and included in the EIS, describing potential impacts, monitoring, and mitigation procedures and contingency plans with inadvertent fluid releases that may occur during HDD activities	According to AGDC, they will commit to a drilling mud plan for HDD activities. This plan has not yet been developed and will not be part of another plan. It will be developed during the permitting process.
L30	57	EPA				We recommend that a site specific plan be developed for each proposed HDD waterbody crossing. Each plan should account for the physical conditions of the site, including substrate composition and variability, and any terrain constraints that may affect drill success.	Comment acknowledged. The text in FEIS Section 5.23 Mitigation, has been revised to include the suggested action as a mitigation measure. This information will be gathered during the USACE 404 permitting process.
L30	58	EPA				Hydrostatic testing of the pipelines would be required to ensure integrity during construction. The Draft EIS does not provide sufficient information to evaluate the direct, indirect, and cumulative environmental impacts associated with the discharge of hydrostatic test water. We recommend that the EIS identify the location of water sources and withdrawal rates that would be required for hydrotesting. In addition, we recommend that the discharge locations to land and/or surface waters, and discharge methods be specified in the EIS. Of particular concern is hydrotesting in the winter season when other additives, such as freeze depressants, may be mixed with the test water. Also, untreated, heated water (36°F to 38°F) may be used for hydrotesting. We recommend that the EIS identify the types of chemical additives that may be required for winter hydrostatic testing and how these chemicals would be treated and	Water withdrawal will be from permitted lakes with the capacity to supply the desired volumes. Surface water withdrawal locations have not been determined. Discharge locations have not been determined. Additional mitigation measures addressing hydrostatic testing have been added to Section 5.23 of the FEIS. This information will be gathered during the USACE 404 permitting process.

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						properly disposed, as well as any potential thermal impacts. Any discharge of hydrostatic test water should be to surface waters that do not support fisheries resources. We recommend that the EIS describe the mitigation measures and control devices that would be implemented to minimize environmental impacts associated with discharging hydrostatic test water.	
L30	59	EPA				During project construction, blasting may be required in certain areas along the pipeline route corridor and adjacent facilities, resulting in increased noise and related effects to local residents, and disruption and displacement of birds and wildlife. We recommend that the EIS identify the location of required blasting in the project area, describe the blasting methods that would be used, and specify how blasting effects would be controlled and mitigated. A table with this summary information and a map identifying the blasting locations should be provided. Noise levels in the project area should be quantified and the effects of blasting to humans, birds, and wildlife should also be evaluated. We recommend that a Blasting Management Plan be developed and included in the EIS.	At the current stage of the design process, AGDC is unable to determine where blasting would be required along the proposed ROW. However, as stated in the DEIS, AGDC is committed to providing a blasting control plan later in the design process and prior to construction. The plan would comply with Alaska Department of Fish and Game blasting standards. This information will be gathered during the USACE 404 permitting process.
L30	60	EPA				The proposed project would impact lands managed under a number of Federal. State. and Local jurisdictions. These lands are managed under Federal Resource Management Plans and Conservation Plans. State Management Plans. Borough Comprehensive Plans, and Local Community Council Plans. The Draft EIS does not provide sufficient information to determine whether the ASAP project is consistent with the management directives of these plans. We recommend that the EIS describe how the proposed pipeline and aboveground facilities would comply with these land management	Section 5.9 includes an analysis of land use and compatibility along the pipeline route and at above ground facilities. Table 5.9-13 provides a summary of each land use plan and its authority, and acreage impacted by milepost and a summary of the relationship between the plan the proposed action. The chapter further describes potential impacts on land use. Chapter 6 summaries these impacts and also provides a ranking of impacts. As stated in Section 5.9.1.10 The Minto Flats State Game Refuge Management Plan contains policies related to transportation/utility corridors through the

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						plans. including the requirements of the Minto Flats State Game Refuge Management Plan. implemented by the Alaska Department of Fish and Game.	refuge (ADF&G 1992). The relevant policies under the plan are discussed in Table 5.9-13.
L30	61	EPA				The Minto Flats State Game Refuge (MFSGR) was established in 1988 to (I) ensure the protection and enhancement of habitat. (2) ensure the conservation of fish and wildlife, and (3) guarantee the continuation of hunting. fishing, trapping. and other compatible public uses within the Minto Flats area. The Minto Flats State Game Refuge Management Plan (March 1992) provides policies to guide decisions on management activities, including pipeline corridors on refuge lands if they are determined to be compatible with the purposes for which the refuge was established. Additionally, MFSGR corridor proposals must demonstrate the following: • There is a significant public need for the corridor that cannot be reasonably met off-refuge, • The use of refuge lands and impacts to refuge resources are avoided or minimized to the maximum extent feasible. • Public access to the refuge is maintained, and • All impacts to refuge resources are fully mitigated. We recommend that the EIS provide a determination of how the ASAP project would be consistent with directives of the MFSGR Management Plan. This information should be provided for public disclosure in the EIS.	The state of Alaska has issued a ROW for the proposed route which would go through the Minto Flats State Game refuge where this determination should have likely been made by the state for issuing the ROW. This information will be gathered during the USACE 404 permitting process.
L30	62	EPA				In the event that the pipeline corridor would intersect with one or more CERCLA sites, a more in-depth plan would be needed and site-specific arrangements would need to be made with the EPA. We recommend that the ASAP project be routed to avoid known contaminated areas to minimize potential liability and to avoid negatively impacting the remedy that is in place	AGDC will not develop a general “Soil Handling Plan”. Cleanup of unexpected soil contamination encountered during construction will be in accordance with a site-specific plan approved by the Alaska Department of Environmental Conservation at the time of the incident (18 ACC 75, Article 3, “Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances”).

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						for the CERCLA sites.	
L30	63	EPA				Both State and Federal agencies will require development of a Soil Handling Plan by to address unexpected contamination encountered during pipeline construction. This plan must be approved by ADEC and EPA. A Soil Handling Plan should include, but not be limited to, the following components: (I) a notification list in the event suspected contamination is encountered, (2) a sampling protocol following an encounter, (3) a protocol for contaminated soil handling and disposal, and (4) a written procedure to address any areas of contamination that extend beyond the boundaries of the ROW. We recommend that the Soil Handling Plan be included in the EIS.	AGDC has not yet drafted a Soils Handling Plan for construction. During detailed design, AGDC will prepare a general plan for handling contamination discovered during construction. However, cleanup of unexpected contamination encountered during construction must be in accordance with a site-specific plan approved by the Alaska Department of Environmental Conservation at the time of the incident (18 ACC 75, Article 3, "Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances").
L30	64	EPA				We recommend including information from the Fairbanks North Star Borough Gas System Distribution Analysis Preliminary Executive Summary Report (February 14, 2012) in the cumulative effects analysis in the EIS. The final report is expected in May 2012. This information should be used to consider refinements to the proposed alternatives and route alignments.	Information from the Fairbanks North Star Borough Gas System Distribution Analysis Report, prepared by Northern Economics and dated June 29, 2012 has been incorporated into the FEIS in Section 5.20.5.5 and in Section 5.20.6.3 under the subheadings of Socioeconomics and Air Quality.
L30	65	EPA				The Draft EIS does not provide sufficient information to fully assess the cumulative effects of the ASAP project. We recommend that the EIS clearly identify resources potentially affected by multiple actions or stressors in addition to this project, the time frame over which impacts are likely to occur, and the geographic area applicable to the affected resource. The focus should be on resources of concern - those resources that are at risk and/or are significantly impacted by the proposed project before mitigation. For each resource analyzed, we recommend that the EIS: • Identify the current condition of the resource as a measure of past	Section 5.20.6 discusses potential cumulative effects for individual resource categories as defined in prior sections of Chapter 5.0. The geographical and temporal scope of the analyses is discussed in Section 5.20.5.1. Chapter 6.0 discusses the relative impacts of the project on resources and provides a ranking of impacts per resource. The current condition of each resource or resource category is defined in subsections of Chapter 5.0 that are relative to each resource under the Affected Environment subheading. In most cases specifics regarding parentage of habitat lost to date etc is not available so the cumulative analysis is qualitative. There is insufficient information available regarding minimization of cumulative impacts and is outside the

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						impacts. For example, the percentage of habitat lost to date; • Identify the trend in the condition of the resource as a measure of present impacts. For example, the health of the resource is improving, declining, or in stasis; • Identify the future condition of the resource based on an analysis of the cumulative impacts of reasonably foreseeable projects or actions added to existing conditions and current trends. For example, what will the future condition of the watershed be? • Assess the cumulative impacts contribution of the proposed alternatives to the long-term health of the resource, and provide a specific measure for the projected impact from the proposed alternatives; • Identify potential parties that would be responsible for minimizing, and mitigating those adverse impacts; and • Identify opportunities to avoid and minimize impacts, including working with other entities.	scope of this analysis. This information will be gathered during the USACE 404 permitting process.
L30	66	EPA				Additionally, we recommend that the Corps consider including federal actions identified in the following documents in the cumulative impacts analysis: • Department of Interior, US Fish and Wildlife Service (USFWS) - *Comprehensive Conservation Plan (CCP) and EIS for the Arctic National Wildlife Refuge (ANWR)* • Department of Interior, Bureau of Land Management (BLM) o *National Petroleum Reserve-Alaska (NPR-A) Integrated Activity Plan and EIS (IAPIEIS)* o *Trans-Alaska Pipeline System (TAPS) Renewal EIS (2002)* o *Trans-Alaska Gas System (TAGS) EIS* (1988) • Surface Transportation Board (STB) o *EIS on the Alaska Railroad Corporation Construction and Operation of a Rail Line Extension to Port MacKenzie, Alaska (2011).*	Table 5.20-1 and the text of section 5.20 located in the FEIS indicate that federal and state oil and gas lease sales, the operation of TAPS, Alaska Railroad Expansion, and Port Mackenzie operations have all been taken into account when addressing cumulative impacts. The CCP and EIS for the ANWR and the NPR-A Integrated Activity Plan and EIS were not utilized in the cumulative effects analysis due to the fact that the proposed project will not be located in either ANWR or NPR-A. Further the activities contemplated by the proposed project will not create cumulative impacts to the administration and activities associated with either ANWR or NPR-A as contemplated in these documents.

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L30	67	EPA				We recommend that the EIS include a discussion and analysis of proposed mitigation measures and compensatory mitigation under CW A §404. The EIS should identify the type of activities which would require mitigation measures either during construction, operation, and maintenance phases of this project. To the extent possible, mitigation goals and measureable performance standards should be identified in the EIS to reduce impacts to a particular level or to achieve an environmentally preferable outcome. Mitigation measures could include best management practices and options for avoiding and minimizing impacts to important aquatic habitats and to compensate for unavoidable impacts. Compensatory mitigation options could include mitigation banks, in-lieu fee, preservation, applicant proposed mitigation, and should be consistent with the *Compensatory Mitigation/or Losses 0/ Aquatic Resources; Filial Rule* (33 CFR Parts 325 and 332 and 40 CFR Part 230). A mitigation plan should be developed in compliance with 40 CFR Part 230 Subpart J 230.94, and should be included in the EIS.	A mitigation chapter has been added to the FEIS. Please see Section 5.23. This information will be gathered during the USACE 404 permitting process.
L30	68	EPA				An environmental monitoring program should be designed to assess both impacts from the project and the effectiveness of mitigation measures being implemented. The EIS should identify clear monitoring goals and objectives, such as what parameters are to be monitored, where and when monitoring will take place, who will be responsible, how the information will be evaluated, what actions (contingencies, triggers, adaptive management, corrective actions, etc.) will be taken based on the information.	A mitigation chapter has been added to the FEIS. Please see Section 5.23. The success of mitigation measures will be addressed by site-specific permit requirements developed by the regulatory agencies.

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L30	69	EPA				The EIS should discuss public participation, and how the public can get information on mitigation effectiveness and monitoring results.	AGDC has no general plan for notifying the public about mitigation monitoring. This issue will be addressed by the agencies in specific permits, and AGDC will follow the permit requirements. During the 404 permitting process the applicant will provide information on mitigation. During the public review process the public can send additional comments on mitigation. This information will be gathered during the USACE 404 permitting process.
L30	70	EPA	Executive Summary			Please reinsert the inset map of the Denali National Park Route Variation as it was the action alternative analyzed in detail in the EIS.	Figure ES-2 of the DEIS provided a depiction of the proposed Project route. The only inset map within Figure ES-2 is provided to show the design options for the pipeline crossing of the Yukon River. These design options are not considered route deviations or alternatives. Inclusion of the Denali Park Route Variation would confuse the reader since it is not a component of the proposed Project action alternative.
L30	71	EPA	Executive Summary			On page ES-12, it says, "The proposed Project would affect approximately 5,387 acres of wetlands throughout its length." On page ES-21, it says, "Approximately 4,575 acres of wetlands would be impacted by the proposed ASAP Project between the North Slope and the Cook Inlet area." There is a difference here of over 800 acres of wetland impacts cited. Please determine and use the correct number of acres of wetland impacts.	Wetland impact acreages presented in the FEIS have been updated to assure accuracy and consistency.
L30	72	EPA	Executive Summary			On page ES-12, it says, "The potential for non-native and invasive plant species to establish could occur; however, this would be mitigated through a robust Non-native Invasive Plant Control Plan developed in collaboration with appropriate state and federal agencies." How will this Plan be paid for? Is there an expectation that state and federal agencies will have the budgetary support to take on this additional responsibility?	This will be determined between applicant and relevant agencies.

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L30	73	EPA	5.0	5.12.2		EJ – This section of the Executive Summary states that minority and low-income communities would be positively affected by the project through the creation of jobs, as well as income and tax effects, and that any adverse quality of life effects during the construction phase are expected to be minor, temporary, and not concentrated in low income or minority areas. It could be argued that the positive effects mentioned are also minor, temporary, and won't affect low income or minority areas either. As mentioned above, another option to consider is developing renewable energy forms instead, ensuring sustainable long term benefits.	As provided in Section 5.12.3-3, the proposed Project would increase employment during construction, leading to increased discretionary income for some area residents, this effect would be temporary and would cease after the construction period. During the operations phase, area residents (50 -75 employees) could be employed for upwards of 50 years. As proposed Project infrastructure depreciates over the 50-year period, property taxes would decrease. As provided in Section 4.6, multiple renewable energy alternatives were considered, but were not carried forward for detailed analysis because they do not meet the objectives of the proposed Projects purpose and need.
L30	74	EPA	1.0	1.1		Natural gas liquids (NGLs) – provide what they are, e.g., propane, butane, pentane, etc.	Section 1.2 of the FEIS has been revised to include a description of the components of NGL. Additionally, the Glossary contains the definition of NGL.
L30	75	EPA	1.0	1.1		…and would require a separate NEPA analysis.	FEIS Section 3.0 Connected Actions, identifies NGL processing and distribution as a connected action to the ASAP project. Section 3.3 indicates that further analysis under the NEPA could also be required, depending on specific construction and operation plans.
L30	76	EPA	1.0	1.1	1.1-1	Please reinsert the inset map of the Denali National Park Route Variation as it was the action alternative analyzed in detail in the EIS.	Figure 1.0-1 of the DEIS provided a depiction of the proposed Project route. The only inset map within Figure 1.0-1 is provided to show the design options for the pipeline crossing of the Yukon River. These design options are not considered route deviations or alternatives. Inclusion of the Denali Park Route Variation would confuse the reader since it is not a component of the proposed Project action alternative.
L30	77	EPA	1.0	1.2		In supporting the statement of purpose and need, the EIS should discuss the proposed project in the context of the Alaska energy market, including identification of existing gas providers and sources, public and private demands, existing and proposed natural gas transmission systems, and clearly describe how	Please see response to EPA comment 30-38. This information will be gathered during the USACE 404 permitting process.

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						the need for the proposed action has been determined. We recommend including information that discusses the proposed project in the context of the national and global energy markets.	
L30	78	EPA	1.0	1.2.2	1st bullet	The project need indicates the near future shortfall of Cook Inlet natural gas is 2013 – 2015. If the project's first gas delivery is not scheduled until 2019, then how would this need have been met?	Please see response to EPA comment 30-38. This information will be gathered during the USACE 404 permitting process.
L30	79	EPA	1.0	1.2.4.2	1st bullet	The authority for permitting related to oil and gas discharges (Phase 4) will transfer to the Alaska Department of Environmental Conservation (ADEC) in October 31, 2012. The EPA recently reissued the North Slope General Permit for facilities related to oil and gas extraction (AKG-33-1000). ADEC has expressed a desire to prepare a pipeline specific general permit (GP) with the intent of soliciting public comment on the permit soon after transition of Phase 4. Certain discharges associated with the Alaska Stand Alone Pipeline can be covered by the North Slope GP. Activities within the North Slope Borough, such Gas Conditioning Facility and portions of the pipeline north of the Brooks Range can be authorized. Authorization for coverage under the North Slope GP and other discharges associated with ASAP should be coordinated with EPA and ADEC.	Comment acknowledged.
L30	80	EPA	1.0	1.3		I believe this word should be "consultation" instead of coordination, however many of the Agencies now are using the words "consultation and coordination" – including EPA, although I think in this sentence you might be referring to the need for "consultation."	This change will be incorporated into the FEIS.

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L30	81	EPA	1.0	1.5		It says in the first EPA line that the 309 review is entirely about oversight of the air program which is not true. The review is covered in the last EPA section: Executive Order 11514 – Protection and Enhancement of Environmental Quality (same as on PDEIS)	This change will be incorporated into the FEIS.
L30	82	EPA	1.0	1.5	T- 1.5-1	AKG-33-0000 has been reissued. It will be an EPA permit until the transition later in 2012.	Table 1.6.1 has been revised to state that AKG-33-0000 is currently a valid permit.
L30	83	EPA	2.0	2.1.2		GCF – include a drawing of the typical facility. Straddle and off-take facility – include a drawing of the typical facility. Compressor stations – include a drawing of the typical facility. NGL Extraction Facility – include a drawing of the typical facility. Cathodic Protection – include drawings of the typical facility Access Roads – include typical access road plan For each of these facilities, include the typical drawing from the Plan of Development, Attachment 1 into the EIS. Not certain why this was not included for the Draft EIS?	Please see response to EPA comment 30-48.
L30	84	EPA	2.0	2.1.2		Barges – we recommend include a description of the barges, including the class of vessel, deep or shallow drafts, length, maximum weight capacity, etc. In Section 5.7 of the DEIS, it was indicated that the barges were Small Handy Class cargo ships and could accommodate 10,000 tons. Is this correct? Please include the barge information in the project description. The barge lift is expected to require 9 barges to transport the modules. What is the weight of the modules for the GCF? Does this calculate to a total of 90,000 tons of material to be barged to West Dock for the GCF during the open water season? The open water season on the North Slope is approximately 45 days. Will the 9 barges be sealifted in 1 or more open water seasons? Please provide this information in the EIS and modify the construction schedule as	Module delivery by sealift will be made by typical sealift barges in use for North Slope deliveries to West Dock. These barges typically have a deck area of 400 feet by 100 feet and are 25 feet deep. AGDC sealift estimates are based on maintaining a barge draft of less than 5.5 feet to allow for access to West Dock. AGDC used module square footage for the sealift estimate of nine barges. It was assumed that each GCF module would weigh less than 4,000 tons. The requested detailed information on the GCF modules is not available at this time. As discussed on page 43 of the March 2011 POD, additional details regarding the size/weight and assembly/construction of the GCF modules will be developed as the project progresses. The nine-barge lift will be conducted in one open-water season. Updated information regarding barge specifications and the barge lift have been inserted into Section 2.1.2.

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						appropriate.	
L30	85	EPA	2.0	2.1.2		According to the DEIS, "West Dock infrastructure would not require modification to accommodate the barge lift." Please be advised that if future requirements for modifications to West Dock, including dredging and transportation of dredged material for the purpose of dumping it into ocean waters, this activity is regulated under the Marine Protection, Research and Sanctuaries Act (MPRSA), aka Ocean Dumping Act. The EPA designates dredged material disposal sites and develops site management plans pursuant to Section 102 of the MPRSA and 40 CFR Part 228. The Department of the Army, U.S. Army Corps of Engineers (Corps) may issue dredged material permits and select alternative disposal sites with the concurrence of the EPA pursuant to Section 103 of the MPRSA and 40 CFR Parts 225, 227 and 228. A subsequent NEPA analysis will be required.	AGDC will apply for and maintain all required permits and regulatory approvals that they have responsibility for throughout the project. This information will be gathered during the USACE 404 permitting process.
L30	86	EPA	2.0	2.1.2		According to the DEIS, "Module design, construction, transport and assembly details would be developed later in the Project." We recommend this information be included in the EIS in order to accurately evaluate the environmental impacts associated with this aspect of the overall project.	AGDC is proposing a project at an earlier stage of design, financing and project development than is typical for projects of similar size and scope. As a result, the requested information on modules is not available at this time and cannot be included in the FEIS. This information will be gathered during the USACE 404 permitting process.
L30	87	EPA	2.0	2.1.2		37 – Mainline block valves (MLVs) – include on an aerial photo where these facilities will be located at 20 mile intervals adjacent to the mainline and Fairbanks lateral.	Based on the current level of proposed Project design the specific locations of the MLVs is not available. This information will be gathered during the USACE 404 permitting process.
L30	88	EPA	2.0	2.1.3		"All TEWS will be constructed outside of wetland areas." Is this really a correct statement? How would you know if the TEWS have not been identified? Alaska has a lot of wetlands. It would be challenging to avoid working in	Information regarding TEWS has been added to all appropriate sections of the FEIS including Section 5.4. As indicated in revised FEIS Section 5.4, TEWS would result in wetland impacts. A description of TEWS has been added to the project description in various parts of

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						wetlands areas.	Section 2 of the FEIS.
L30	89	EPA	2.0	2.1.3		TEWS for HDD crossing over Nenana, Yukon, and Tanana Rivers have been identified. We recommend including the dimensions of the TEWS on a map	Typical dimensions of TEWS along the proposed pipeline corridor are depicted and described in Section 2.1.3.3 of the FEIS based on information received from AGDC after the publication of the DEIS.
L30	90	EPA	2.0	2.1.3.3		TEWS would be required for construction of road crossings, railroad crossings, crossings of existing pipelines and utilities, stringing truck turnaround areas, wetland crossings, points of inflection and waterbody crossings, TEWS would be used for spoil storage, staging, equipment movement, material stockpiles, and pull string assembly (HDD). We have concerns that the EIS does not identify the location of TEWS and does not include the total estimates for wetland impacts. The only TEWS determined are for the HDD crossings at the Yukon, Nenana, and Tanana Rivers, which are 2 acres each for a total of 6 acres. We recommend including the location (by MP), size (acres), and estimates of TEWS impacts to wetlands and other resources. Include this information on a table and an aerial photo. Without this information, the total project impacts to the environment would be underestimated. We recommend including the quantity of fill material (cubic yards) that would be required to construct the TEWS. Do the estimates of fill required for project include the TEWS? Or is it not reflected in the estimates? We recommend that site criteria for TEWS be developed, e.g., 50-ft set backs from waterbodies and wetlands, and 100-ft set back from anadromous streams. We recommend a discussion on how these TEWS would be restored and enhanced after project completion.	Where feasible, TEWS would be constructed outside of saturated/soft wetlands that cannot support equipment. The TEWS would range in size from less than one half acre to 9 acres, most would be occupy less than 1 acre. A total of 1902 TEWS are proposed (*Table 2.1-X*). The total area occupied by all proposed TEWS would be approximately 982 acres. This information will be gathered during the USACE 404 permitting process.

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L30	91	EPA	2.0	2.1.3.3		Construction Camps, Pipe Storage Yards, Air Facilities, Rail Yards, and Ports – looked in Section 5.9 but could not find the acreage estimates for these facilities. We recommend including a table that summarizes the size (acres), MP location, fill material estimates, etc. for these facilities. Figure 2.1-7 does only provide the size and fill material information – hard to see. The EIS identifies the Port of Seward as the primary port of entry. Based on public comments, we recommend the EIS evaluate the use of Port MacKenzie as a port of entry as well for pipeline construction and logistics.	While the fill quantities for these facilities are not available at this point in the design process, AGDC anticipates these existing facilities would require little additional fill for improvements required by the proposed Project. Any fill required in wetlands would be included in the final 404 permit application; however, it should be noted that these sites are typically on uplands. As discussed in Section 5.7.2.2 of the DEIS, AGDC selected the Port of Seward as the port of entry for AGDC pipe because of access to the railroad, storage, and year-round accessibility of the port. AGDC does not expect to use Port MacKenzie. This information will be gathered during the USACE 404 permitting process.
L30	92	EPA	2.0	2.1.3.3		Material Sites – "The AGCD has estimated approximately 13.1 Million cy of material required for Project construction" Does this estimate include those facilities where the location and size of the pad are not yet known, such as for the TEWS, Construction Camps, Pipe Storage Yards, Air Facilities, Rail Yards, and Ports (if applicable)? We recommend the EIS provide estimates for material needs that include all of these facilities. "AGDC has identified 546 existing material sites" We recommend including information regarding the location, ownership, estimated material, etc. of each of these material sites in a table to be included as an appendix. A map identifying their location should also be included in the EIS. The Plan of Development, Attachment 6, includes this list. Not certain why this information is not included in the DEIS appendix.	AGDC's estimate of 13.1 million cy of material for project construction does include TEWS pads, construction camps, pipe storage yards, etc. Appendix P (Exiting Material Sites), which contains most of the information requested including specific milepost locations, has been added to the FEIS. A digital web-viewer has been provided to agencies depicting this information (access roads, material sites, camp laydown locations, etc.). Additional information will be available during the permitting process.
L30	93	EPA	2.0	2.2.1		Please specify the rating for the steel to be used based on the American Petroleum Institute's rating system for the mainline and the Fairbanks Lateral. Please specify the wall thickness for the mainline and the Fairbanks Lateral. Refer to the	AGDC plans to use API X70 steel for the mainline pipe and API X65 steel for the Fairbanks Lateral. Proposed pipeline wall thickness based on location class has been added to Table 5.19-1 of the FEIS.

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						POD, page 15 and Table 4.1-1. Specify a range for the pipeline wall thickness.	
L30	94	EPA	2.0	2.1.3.3		Access Roads – We recommend including a map identifying the location of all temporary and permanent gravel access roads, and ice and snow roads be included in the EIS. "18 inches diameter culverts" We recommend the EIS indicate that larger culverts and/or culvert batteries may be required for certain crossings, such as for anadromous waterbodies, and wetland areas. We recommend including a typical access road drawing. Refer to the drawings in the POD, Attachment 1. Not certain why this information was not included in the DEIS.	The USACE and cooperating agencies were provided with digital mapping depicting access roads. Additional access road information including the type of access road and the material to be used for construction is available in Appendix D of the DEIS. Providing large scale maps of the entire route showing access roads is not practical in the document. Additional information will be available during the permitting process. Culverts will be designed and installed to ensure adequate cross-drainage and to facilitate surface water flow under access roads.
L30	95	EPA	2.0	2.1.3.3		Pipe Design and Wall Thickness – identify the grade of steel to be used based on American Petroleum Institute rating for the mainline and Fairbanks lateral pipelines. Identify the pipeline wall thickness for the mainline and Fairbanks Lateral.	Please see response to EPA comment 30-93.
L30	96	EPA	2.0	2.2.2.6		Hydrostatic Testing - We recommend the EIS identify the water sources and withdrawal rates that would be required for hydrotesting. In addition, we recommend the discharge locations to land and/or surface waters, and discharge methods be specified in the EIS. Of particular concern is hydrotesting in the winter season when other additives, such as freeze depressants, may be mixed with the test water. We recommend the EIS identify the types of chemical additives that may be required for winter hydrostatic testing and how these chemicals would be treated and properly disposed. Any discharge of hydrostatic test water should not be to surface waters that support fisheries resources. We recommend the EIS describe the mitigation measures and	Water sources for all aspects of project construction will be identified during final design. All appropriate regulatory permits will be obtained for water withdrawal and discharge. Additionally industry accepted BMPs will be employed throughout the project. This information will be gathered during the USACE 404 permitting process.

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						control devices that would be implemented to minimize environmental impacts associated with discharging hydrostatic test water. These BMPs could include: screen intake hose to prevent entrapment of fish, regulating discharge rates, using energy dissipation devices, installing sediment barriers to minimize erosion, stream scour, suspension of sediments, and excessive stream flows.	
L30	97	EPA	2.0	2.2.2.7		We recommend the EIS identify all temporary facilities, such as TEWS, Construction Camps, Pipe Storage Yards, access roads, etc. would be restored to pre-construction conditions, and the gravel removed and the area revegetated.	Table 2.1-3 in the DEIS has been updated in the PFEIS with revised acreage estimates for the mainline ROW and newly available acreage estimates for the TEWS. Access road acreages have been received as well and will be incorporated into Table 2.1-3 prior to FEIS publication.
L30	98	EPA	2.0	2.2.2.7	Fig 2.2-2	Include “24-inch diameter” Pipeline in the figure.	"24-inch diameter" has been added to Figure 2.2-2.
L30	99	EPA	2.0	2.2.5		Corrosion Protection and Detection System – We recommend including a typical corrosion protection and detection system drawing. Refer to the drawings in the POD, Attachment 1. Not certain why this was not included in the DEIS.	The cathodic protection figures (Figures 2.2-11 through 2.2-13) from the POD have been inserted into Section 2.2.5 of the FEIS.
L30	100	EPA	2.0	2.2.5		“As specified by USDOT regulations, aboveground cathodic protection system test stations would be located at less than 1 mile intervals along the proposed route. We recommend identifying the impacts associated with these facilities in the EIS. Will a gravel pad be required to support this system? How much fill material is needed and what is the footprint for each station?	Section 2.2.5 of the FEIS has been revised to better describe the aboveground cathodic protection system test stations impacts.
L30	101	EPA	2.0	2.2.3.1		Include on the figure the depth of the VSMs.	The VSM drawing is a conceptual drawing based on typical VSM design. Actual design VSM lengths are unavailable at this time. Specific dimensions for the VSMs will be determined during final design. During construction, the VSM borings will be approximately 20 to 35 feet deep and will be conducted from an ice pad during the winter construction season.

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							This language has been added to section 2.2.3.1.
L30	102	EPA	2.0	2.2.3.2		The project would cross 593 wetland areas. We recommend including a map that depicts the locations of these wetland crossings and include the type of wetland and acreages.	The wetlands impact analysis in the FEIS was conducted by GIS analysis of very large data sets. Maps at a legible scale that would depict wetlands and wetland impact areas would be voluminous. Maps would not significantly enhance the presentation of findings regarding wetland impacts. CEQ guidance states that NEPA analysis should be brief and concise {40 CFR Part 1502.2(c)}. This information will be gathered during the USACE 404 permitting process.
L30	103	EPA	2.0	2.2.4		"The module sections of the GCF would be transported to the facility site via 9 barges to West Dock…" How many seasons would this take? 1 or more open water seasons? The length of the open water season is about 45 days.	The text in Section 2.1.2 has been revised to state "The nine-barge lift will be conducted in one open-water season and would meet necessary scheduling, regulatory and safety standards associated with a large-scale barge lift."
L30	104	EPA	2.0	2.2.6		When would the GCF be constructed? Before or after the mainline construction? We recommend including a construction spread for the GCF. This may be required before Spread 1 can begin. Refer to the POD Table 7.3-1 (page 42) Construction Timeline for Major Facilities. This level of information should be included in the EIS. Also, how many open water seasons would be required for the barging of modules to West Dock?	Construction of the GCF will occur during mainline pipeline construction. The GCF is not part of pipeline Spread 1. It is anticipated that one open-water season will be required for barging modules to West Dock. POD Table 7.3-1 has been revised based on more recent information and included in Section 2.2.6 of the FEIS as Table 2.2-X.
L30	105	EPA	2.0	2.2.6		Construction Spread – We recommend including the Construction Spread by Season and Location (Table 2.2-1) of the POD, page 9. The information in the POD provided more detailed information for each spread, by section, MP locations, length of miles, and construction	Section 2.2.6 of the FEIS has been revised to include Table 2.2-1 of the POD. The table number in the FEIS is also 2.2-1.

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						season. We are not certain why this information is not included in the DEIS.	
L30	106	EPA	2.0	2.2.7		Water Sources – We recommend the EIS identify the location of surface water resources, estimated quantities, depth of surface water, and presence/absence of resident and/or anadromous fish species. A map and a table should be provided in the EIS. Information is only available for the North Slope. We recommend additional lake studies for the Interior and Southcentral areas as well.	Water sources for all aspects of project construction will be identified during final design. All appropriate regulatory permits will be obtained for water withdrawal and discharge. This information will be gathered during the USACE 404 permitting process.
L30	107	EPA	2.0	2.2.7		Waste disposal – does AGDC plan to install an underground injection control (UIC) Class I well? A Class I well is regulated under Part C of the Safe Drinking Water Act (SDWA) and can accept industrial (hazardous and non-hazardous) wastes and municipal (non-hazardous) wastewater. EPA issues permits for Class I wells and Class VI wells for geological sequestration. If a Class I well would be required for this project, we recommend the EIS include information regarding the number and approximate location of the proposed UIC wells, and description of the well design and construction, and the approximate depths of the injection horizon. The sub-surface geology and hydrology should be characterized in the EIS, as well as identification of any underground sources of drinking water (USDW). In addition, the EIS should describe the composition and volumes of the waste stream and plans for the waste injection by developing a Waste Analysis Plan, which should be included as an appendix to the EIS.	AGDC does not plan to install a UIC Class I well per the Section 2 Project Description. This information will be gathered during the USACE 404 permitting process.

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L30	108	EPA	2.0	2.3		The EIS should describe the gas flaring system that would be required for the GCF and at other facilities. A flaring system would be required for facility startup, depressuring during maintenance activities, and burn off gas during upsets, and to protect the facility from overpressure.	Section 2.1.2 of the FEIS has been revised based on new information received from AGDC to provide descriptions of the gas flaring systems at the GCF, compressor stations, straddle and off-take facility, and Cook Inlet NGL extraction facility. Emissions from flaring have been added to the calculations contained in new Appendix O added to the FEIS for emissions and also to Tables 5.16-9, 11, 13, and 15. Details regarding emissions are footnoted in the emissions tables in the air quality appendix. Details regarding flaring emissions are footnoted in the overall emissions tables in Appendix O. Details on flaring from Section 2.1.2, Aboveground Facilities, of the FEIS have been added to Section 5.16-2 of the FEIS.
L30	109	EPA	3.0			"Construction and operation of four aboveground pipelines that would connect the Prudhoe Bay Central Gas Facility to the gas conditioning facility (GCF) for supply of natural gas and natural gas liquids (NGLs), and return bi-products" has been identified as a connected action to the ASAP project. We recommend this be included as part of the overall project description since the ASAP pipeline is interdependent upon the 4 pipelines connecting the CGF to the GCF to provide the source of natural gas. Without the pipelines from the CFG to the GCF, there would not be a source of natural gas and therefore, no project. The ASAP project is only a viable project when gas is provided by the pipelines from the CGF. Both actions do not have independent utility. We recommend the 4 aboveground pipelines connecting the PB CGF to the GCF be evaluate in the EIS as part of the ASAP project.	Please see response to EPA comment 30-49. This information will be gathered during the USACE 404 permitting process.

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L30	110	EPA	4.0			In determining the range of reasonable alternatives to evaluate in the EIS, we recommend that alternatives not be eliminated from detailed consideration based on a determination that an alternative would not present a significant environmental advantage over the proposed ASAP project. We are concerned that eliminating project alternatives under this approach would necessarily rely on a limited analysis of the potential environmental impacts and may inappropriately limit the range of reasonable alternatives in the EIS. We encourage the Corps to consider a broad range of reasonable alternatives in the EIS that are capable of meeting the project purpose and need.	The Council on Environmental Quality (CEQ) - Regulations for Implementing the National Environmental Policy Act (NEPA), 40 CFR Part 1502.14, Alternatives Including the Proposed Action, states: "...In this section agencies shall; (a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated...". The identification and analysis of alternatives presented in Section 4 and the analysis of the proposed action and alternatives presented in Section 5 of the DEIS were considered by the U.S Army Corps of Engineers (the Corps) to be in compliance with 40 CFR Part 1502.14. Sections 4 and 5 of the FEIS have been updated as appropriate based on information not available at the time of publication of the DEIS. This information will be gathered during the USACE 404 permitting process.
L30	111	EPA	4.0			"Potential alternatives are identified and evaluated for…Technical and logistical feasibility and reasonableness." The Corps will determine the preferred alternative if it is the least environmentally damaging practicable alternative (LEDPA) based on the Clean Water Act Section 404(b) (1) Guidelines. "Practicability" includes consideration of costs, existing technology, and logistics in light of the overall project purpose. We recommend including "cost" to the evaluation criteria, in addition to technical and logistical feasibility and reasonableness. To integrate the procedural requirements of NEPA and the requirements of the CWA, we recommend that general cost estimates be developed for each alternative evaluated in the EIS. This information could then be used in the evaluation of choices among the action alternatives. We recommend that these cost estimates be developed and	The U.S Army Corps of Engineers (Corps) has not utilized cost information as a factor in identifying reasonable alternatives to the proposed action for consideration in the FEIS. Section 4 of the FEIS has been amended to clarify that cost is not a quantitative alternative screening criterion. The Section 404 permitting process is being conducted by the U.S. Army Corps of Engineers independent of the EIS process. The 404(b) (1) analysis has not been conducted by the Corps and the LEDPA has not been identified. The Corps will utilize information from the FEIS and the Section 404 Permit Application process to identify the LEDPA.

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						incorporated into the EIS. The Plan of Development included the Cost of Proposal (Table 2.3-1; page 10) for construction, operation, and maintenance dated July 2010. An updated cost proposal should be provided for each alternative analyzed in the EIS.	
L30	112	EPA	4.0		footnote 1	CEQ does not define "reasonable" alternatives. Please clarify that this is not a definition in the CEQ NEPA regulations, but was provided in CEQ's 40 Most Asked Questions to address alternatives.	This change will be incorporated into the FEIS.
L30	113	EPA	4.0	4.3.6		Aboveground Pipeline Alternative – In addition to considering a smaller diameter pipeline alternative, we recommend the EIS consider an aboveground mainline pipeline alternative for the entire 737 mile length of the pipeline and the Fairbanks Lateral. The aboveground pipeline should consider being co-located with existing rights-of-way. On the North Slope, the proposed mainline pipeline would be constructed aboveground on vertical support members (VSMs) for the first six miles. The remaining portion would be buried belowground, except at fault crossing and other areas. The Arctic Coastal Plain provides important wetland habitat underlain by continuous permafrost. The short growing season and other environmental factors in the arctic make wetland restoration and enhancement challenging. In order to avoid and minimize potential adverse impacts to wetlands and permafrost on the Arctic Coastal Plain, we recommend the EIS analyze in detail an aboveground pipeline from Prudhoe Bay to the Brooks Range (MP 0 to 150) following the TAPS corridor. The aboveground pipeline would be supported by Vertical Support Members (VSMs). The footprint and direct impacts to the Arctic Coastal Plain associated with VSMs would be	The design decision to construct a buried high pressure gas transmission pipeline is based on significant safety, arctic and subarctic engineering, and environmental considerations. The natural gas that would be transported by the proposed Project would be chilled prior to transport to provide minimal impact on continuous and discontinuous permafrost along the proposed Project corridor. The decision to construct the proposed Project aboveground at active fault crossings is also a safety related decision that eliminates the potential for the pipeline to be placed in direct shear in the event of ground rupture during an earthquake. The first 6 miles of the ASAP pipeline that is planned as an elevated pipeline would be within a secured and operational oil field where pipeline security is enhanced. Burial of pipelines helps protect them from sabotage, collision or other accidental damage, reduces visual impacts, reduces potential impacts on large mammal migration (e.g. caribou), and reduces impacts on surrounding land uses. Pipeline construction techniques that would minimize impacts to land cover are discussed in Section 2.2.2 of the DEIS. Restoration of vegetation is discussed in Section 2.2.2.7 of the DEIS. Additional information on restoration and revegetation procedures in upland and wetland areas is provided in Sections 5.3 (Vegetation) and 5.4 (Wetlands) of the DEIS respectively. These sections of the FEIS have been

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						less than the footprint associated with a buried pipeline. We recommend the EIS analyze an aboveground pipeline variation to determine whether it represents the LEDPA in compliance with the Section 404(b) (1) Guidelines.	updated as appropriate based on information received after publication of the DEIS. This information will be gathered during the USACE 404 permitting process.
L30	114	EPA	4.0	4.4.1.1		Richardson Highway Route Alternative – We recommend the Richardson Highway Route Alternative not be eliminated from detailed analysis in the EIS. The Richardson Highway Route Alternative is a reasonable alternative to the proposed ASAP route because it would completely avoid potential adverse direct, indirect, and cumulative impacts to the Minto Flats Wetlands Complex and the Susitna River Flats and Wetlands drainage area, and would be co-located with existing infrastructure rights-of-way. Avoiding these important resource areas would maintain subsistence, hunting, fishing and trapping, and support habitat for wildlife, bird staging, nesting, and feeding areas. The Richardson Highway Route Alternative would represent a balance comparison with the ASAP project. The Richardson Highway Route is a major route alternative to the proposed project that should be evaluated for further detailed analysis in the EIS. The Richardson Highway Route alternative would follow the same route as the proposed action until Livengood (MP 410). This alternative would follow the existing Richardson Highway and TAPS ROWs until Glennallen, then along the Glenn Highway ROW to its terminus in south-central Alaska. The Richardson Highway Route alternative would provide natural gas off take to existing military bases – Fort Wainwright, Eielson Airforce Base, and Fort Greeley. The Richardson Highway Route Alternative could also support a future option for a pipeline to a liquefied natural gas	The Richardson Highway Route Alternative was eliminated by the U.S Army Corps of Engineers (the Corps) due to its potential for higher impacts to waters of the U. S. than the proposed Project, including: impact to wetlands (e.g. there are more stream crossings and higher acres of wetland impacts on the Richardson Highway Route Alternative); the difficulty and additional time of construction through these stream and wetland areas; and the potential cost of the additional miles of construction that would be required along this alternative. The identification and analysis of alternatives presented in Section 4 and the analysis of the proposed action and alternatives presented in Section 5 of the DEIS are considered by the Corps to be in compliance with 40 CFR Part 1502.14. The analysis and conclusions for the Richardson Highway Route are presented in Section 4.4.1.1. These sections of the FEIS have been updated as appropriate with information received after the publication of the DEIS. This information will be gathered during the USACE 404 permitting process.

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						(LNG) facility in Valdez. We recommend cost estimates be provided for the ASAP and the Richardson Highway Route Alternative to determine their practicability under the Guidelines. We encourage the Corps to analyze this major route alternative in further detail in the EIS to determine whether it represents the LEDPA in compliance with the Section 404(b)(1) Guidelines	
L30	115	EPA	4.0	4.4.2.1		Fairbanks Route Variation – We recommend the Fairbanks Route Variation not be eliminated from detailed analysis in the EIS. The Fairbanks Route Variation is a reasonable alternative to the proposed ASAP route because it would completely avoid potential adverse direct, indirect, and cumulative impacts to the Minto Flats Wetlands Complex and would be co-located with existing infrastructure rights-of-way. A Fairbanks Route Variation would follow the existing TAPS corridor between Livengood and the Fairbanks area. In Fairbanks, the route could connect with either (1) the Alaska Railroad corridor to Dunbar, which is similar to the Fairbanks Lateral or (2) the Parks Highway to Nenana. This route variation would also straddle the Elliott Highway to Fairbanks. The Fairbanks Route Variation can be routed to avoid or minimize entering the designated non attainment area for Fairbanks. We recommend cost estimates be provided for the ASAP and the Fairbanks Route Variation to determine their practicability under the Guidelines. We encourage the Corps to analyze the Fairbanks Route Variation in further detail in the EIS to determine whether it represents the Least Environmentally Damaging Practicable Alternative (LEDPA) in compliance with the CWA Section 404(b) (1) Guidelines.	Please see response to EPA comments 30-43 and 30-45. This information will be gathered during the USACE 404 permitting process.

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L30	116	EPA	4.0	4.4.2.1		"Figure 4.4-1 illustrates the differences in the ruggedness of the Fairbanks Route Variation compared to the corresponding Minto Route Segment." This is not the correct figure. Figure 4.4-1 is "Major Route Alternatives and Minor Route Variations. Please strike that sentence from the text.	The text in Section 4.4.2.1 has been revised to read "Figure 4.4-2..."
L30	117	EPA	4.0	4.4.2.4		Port MacKenzie Rail Route Variation - We recommend the Port MacKenzie Rail Route Variation not be eliminated from detailed analysis in the EIS. The Fairbanks Route Variation is a reasonable alternative to the proposed ASAP route because it would completely avoid potential adverse direct, indirect, and cumulative impacts to the Susitna River and Flats Wetlands Complex and would be co-located with the existing Parks Highway and the future Point MacKenzie Rail Route infrastructure rights-of-way. This route variation would also avoid impacts to residential neighborhoods, private/public drinking water wells, and recreational areas. We recommend cost estimates be provided for the ASAP and the Port MacKenzie Route Variation to determine their practicability under the Guidelines. We encourage the Corps to analyze the Fairbanks Route Variation in further detail in the EIS to determine whether it represents the Least Environmentally Damaging Practicable Alternative (LEDPA) in compliance with the CWA Section 404(b) (1) Guidelines.	Please see response to EPA comments 30-38, 30-42, 30-43, and 30-45. This information will be gathered during the USACE 404 permitting process.

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L30	118	EPA	4.0	4.5		The ASAP project would required additional aboveground facilities to support the processing and transportation of natural gas, such as the gas conditioning facility (GCF) on the North Slope, a Fairbanks gas straddle and off-take facility, compressor stations, a natural gas liquids extraction plant (NGLEP), 37 mainline valves every 20 miles, cathodic protection facilities every 1 mile, TEWS, construction camps, and other support facilities. The Draft EIS does not identify or analyze in detail any alternative site locations for these aboveground facilities to determine whether it meets the siting criteria, as compared to any other site. We recommend the EIS include a detailed analysis of aboveground facility site alternatives. This could be accomplished by identifying additional sites for each aboveground facility, and then explaining why the siting criteria supported a preferred site over other sites identified and analyzed in the EIS.	Please see response to EPA comment 30-45. This information will be gathered during the USACE 404 permitting process.
L30	119	EPA	5.1	5.1.1.1		Ecoregions – for each area, describe the mineralization potential. On a table, identify any active/inactive mining claims in the area and the land owner. This is important to ensure that impacts to these claims are minimized. Acid Rock Drainage (ARD) - Acid generating rock could possibly be exposed by construction activities, such as transportation corridor work for pipelines, aboveground facilities, and other ground disturbance activities. We recommend the EIS evaluate bedrock and surficial geology that may be crossed by the pipeline corridor and facilities to determine whether the project area has geologic conditions that could potentially create metal leaching/ARD conditions. This information should be included in the EIS.	Text was added to section 5.1.2.2, sub-heading Construction, to further describe acid rock drainage. Active/inactive mining claims and land owners are provided in Appendix P of the FEIS. Known areas of acid rock drainage are over 500 miles from the project site. Mining activities for obtaining borrow material for the project will come from sites identified in Appendix P - Existing Material Sites of the FEIS.

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L30	120	EPA	5.1	5.1.3.1		Terrain mapping is a systematic method for identifying, classifying, and mapping soil, rock, and geomorphologic features using observations using stereoscopic analysis of aerial photographs. It provides a continuous interpretation of surface and implied subsurface conditions along the mapped pipeline corridor. Terrain mapping provides a qualitative characterization of conditions along the Alaska Mainline that provides for a high level evaluation of soil resources. Combined with other data information, terrain mapping could provide information regarding the pipeline route such as soil properties, permafrost conditions, topography, and related potential hazards such as erosion, slope instability, ground freezing, and thawing of permafrost. Include a table which inventories and identifies at each MP of the mainline pipeline and Fairbanks lateral the geomorphic, permafrost and soil, glacial, and fluvial processes that would be encounter during construction of the pipeline, the GCF, compressor stations, straddle/off take facility, NGLEP facility, MLVs, TEWs, etc.	Field surveys identifying geomorphic, permafrost and soil, glacial, and fluvial processes that would be encountered during construction of the pipeline and above-ground facilities will be completed during final design of the project. This information will be gathered during the USACE 404 permitting process.
L30	121	EPA	5.1	5.1.2.2	Table 5.1-4	We recommend including on a map the location of the material sites, ownership, and quantity of material available per site. Refer to the POD, Attachment 6 for this information.	Reference has been incorporated; Appendix 6 will become an attachment to the FEIS.
L30	122	EPA	5.1	5.1.3.1		Identify the location of the proposed blasting areas on a map for the EIS and describe whether these locations would be subject to mass wasting, permafrost and soil processes, seismicity, glacial and fluvial processes, etc as part of the environmental consequences analysis for the EIS.	Blasting areas will be defined during the design process AGDC has committed to developing a blasting control plan. This information will be gathered during the USACE 404 permitting process.

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L30	123	EPA	5.2	5.2.1.1		EPA's Significant Non-Complier (SNC) is a list developed for permit violations. While a permit violation may imply that surface water quality is being affected, given the protective nature of limitations, the use of the SNC list is not a direct path to the quality of surface water.	Comment acknowledged. The text has been revised for accuracy to state that water quality data is sparse therefore this list was included in Section 5.2.5.
L30	124	EPA	5.2	5.2.1.1		Should there be a "." after systems? If ADEC is not responsible for private wells, is anyone else? If so, then say who and if not, say that nobody is.	Comment acknowledged. The text has been revised for accuracy. A period was added.
L30	125	EPA	5.2	5.2.1.1		What do violations at a drinking water system have to do with surface water quality? If a Drinking water system is on the SNC for a numeric violation, it is because the water it provides to its final consumers doesn't meet the standards. This could imply that the withdrawn water doesn't meet standards but there is no way of telling from the violations what the quality of the surface water was to start with.	The SNC list is among the best available information for surface water quality in Alaska. The text has been revised for accuracy to state that water quality data is sparse therefore this list was included in Section 5.2.1.1
L30	126	EPA	5.2	5.2.1.1		PWS was short cited earlier on the page	PWS has been defined in 5.2.1.1. - Surface Water Quality.
L30	127	EPA	5.2	5.2.1.2		ADNR WELTS – We recommend including a map that identifies the public/private water supply wells along the project route. This is important to avoid and minimize impacts to drinking water supplies from project construction activities. Groundwater supply wells within 150-ft of facility construction areas may be susceptible to impacts. We recommend avoiding any construction activities within 150-ft of known groundwater wells.	Section 5.2.1.2 has been revised to state that: The pipeline route will be designed to avoid all private and public well site locations to avoid impact to water systems. This information will be gathered during the USACE 404 permitting process.

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L30	128	EPA	5.2	5.2.1.2		EPA has regulatory authority over hazardous contaminated sites which may be listed on the National Priority List (NPL) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), aka Superfund, or sites identified under the Resources Conservation and Recovery Act (RCRA), and the Toxic Substances Control Act (TSCA). The Alaska Department of Environmental Conservation (ADEC) has the lead for all other contaminated sites within the State. In the event the ASAP project corridor would be located in CERCLA site(s), which fall under EPA jurisdiction, a more in-depth plan would be needed and site specific arrangements would need to be made with EPA. The fence lines of Fort Wainwright, Eielson AFB, and Fort Greely, have been identified as CERCLA sites. If the ASAP pipeline is to cross these property boundaries, coordination with the environmental offices at Eielson and Wainwright and ADEC is required. We recommend routing to avoid known contaminated areas to minimize potential liability and to avoid negatively impacting the remedy that is in place for the CERCLA sites.	The proposed Project corridor would not cross the fence lines of Fort Wainwright, Eielson AFB, or Fort Greely. The ASAP Project also does not cross any Clear Air Force Station property. The text of the FEIS has been revised to indicate that AGDC would avoid crossing contaminated sites along the proposed Project to the extent practicable. According to AGDC, they will not develop a general "Soil Handling Plan". Cleanup of unexpected soil contamination encountered during construction will be in accordance with a site-specific plan approved by the Alaska Department of Environmental Conservation at the time of the incident (18 ACC 75, Article 3, "Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances"). The site specific plan would take place during the permitting process.
L30	129	EPA	5.2	5.2.1.4	T – 5.2-3	Since the part of CWA § 402 permitting says that EPA still has authority then the CWA § 401 section on page 5.2-16 should say that ADEC has to certify those EPA permits.	Comment acknowledged. The text has been revised for accuracy in Table 5.2.3 of the FEIS.
L30	130	EPA	5.2	5.2.1.4		Should explain why strontium was chosen.	Strontium was selected as an example of a standard from the Alaska Water Quality Manual for Toxic and Other Deleterious Organic and Inorganic Substances. This is stated in section 5.2.1.4 - Federal, State and Local Regulations and Rules.
L30	131	EPA	5.2	5.2.1.5	F – 5.2-4	The source of the data by census area is not readily named. In an area where the mines are mainly gravel pits, it seems inconceivable that 64% of the surface water is USED in mining. It	USGS data has been double checked and estimates for 2005 are correct. Possible reason is due to low populations for Arctic region and surface water used primarily for mining.

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						would make more sense if the data showed that surface water rights had been allocated for these uses (but perhaps not utilized fully).	
L30	132	EPA	5.2	5.2.1.6	Fs – 5.2-6 & 7	These figures also seem to have a disproportionately high value for mining given the small mines present in the area. Once again, it makes sense only if the data showed that surface water rights had been allocated for these uses (but perhaps are not utilized fully).	USGS data has been double checked and estimates for 2005 are correct. Possible reason is due to low population for Arctic region and surface water is used primarily for mining.
L30	133	EPA	5.2	5.2.1.6		Goldstream Creek in the Tolovana River Watershed is listed as Category 5 impaired waterbody by ADEC for not meeting turbidity standards. The area of concern is 70 miles, in Fairbanks. The Fairbanks Lateral would follow Goldstream Creek drainage from Dunbar to Fairbanks. ADEC is completing a TMDL for Goldstream Creek and is expected to be completed by Summer 2012. The EIS should include information regarding the TMDL. The EIS should describe how the construction of the Fairbanks Lateral would not further degrade the impaired water body and would coordinate with protection efforts to ensure that the waterbody will attain water quality standards, and meet the TMDL. The EIS should describe any mitigation measures that will be implemented to avoid further degradation of this impaired waterbody.	Section 5.23 Mitigation has been revised to state that specific mitigation measures will be developed to avoid further degradation of Goldstream Creek water quality. Details have not been determined to date. Text has been updated in section 5.2.1.6 Surface water, Surface Water Quality, Tulovana River Watershed. "The ADEC is currently developing a Total Maximum Daily Load (TMDL) for Goldtream Creek. Goldstream Creek is impaired for turbidity. The TMDL would allocate sources so that the stream meets the water quality standard. In Alaska, the standard is set to 5 NTU above background natural conditions. The TMDL is scheduled to be completed in 2013 (USEPA, 2012)."
L30	134	EPA	5.2	5.2.1.7	F – 5.2-12	See comment for Figures 5.2-6 and 5.2-7. "These figures also seem to have a disproportionately high value for mining given the small mines present in the area. Once again, it makes sense only if the data showed that surface water rights had been allocated for these uses (but perhaps are not utilized fully)."	USGS data has been double checked and estimates for 2005 are correct.

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L30	135	EPA	5.2	5.2.2.2		Water Requirements – identify location of all water resources that would be required to support the 1,007 million gallons of water to support construction activities for the project. The location should be included on a map. A table for the water resources should be developed to include the location, size, volume of water, surface area, depth, and presence/absence of resident and anadromous fish species.	Final locations have not been yet been identified by AGDC, and will be determined in the detailed design process. This information will be gathered during the USACE 404 permitting process.
L30	136	EPA	5.2	5.2.2.2		The EIS should indicate that the Fairbanks Lateral would parallel Goldstream Creek, a category 5 impaired water body for exceeding the water quality standards for turbidity for placer mining activities. The EIS should describe how construction of the Fairbanks Lateral would impact Goldstream Creek. We have concerns that construction activities would further result in exceedance of the turbidity standard. Construction of the Fairbanks Lateral could increase sediment loading to Goldstream Creek due to erosion and result in higher turbidity levels. ADEC is completing a TMDL for Goldstream Creek and is expected to be completed by Summer 2012. The EIS should include information regarding the TMDL and how this project would meet the requirements of the TMDL. The EIS should describe how the construction of the Fairbanks Lateral would not further degrade the impaired water body and would coordinate with protection efforts to ensure that the waterbody will attain water quality standards, and meet the TMDL. The EIS should describe any mitigation measures that will be implemented to avoid further degradation of this impaired waterbody.	Text has been updated in 5.2.1.6 Surface water, Surface Water Quality, Tulovana River Watershed to state: "The ADEC is currently developing a Total Maximum Daily Load (TMDL) for Goldtream Creek. Goldstream Creek is impaired for turbidity. The TMDL would allocate sources so that the stream meets the water quality standard. In Alaska, the standard is set to 5 NTU above background natural conditions. The TMDL is scheduled to be completed in 2013 (USEPA, 2012)."

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L30	137	EPA	5.2	5.2.2.2		Contaminated Sites - In the event that unknown contamination is discovered, the EPA should be notified of the location and the nature of the contamination. If unknown contamination is encountered during pipeline construction, both State and Federal agencies would require development of a Soil Handling Plan by the project proponent. This plan would require State and Federal approval. A Soil Handling Plan should include, but not be limited to, the following components: (1) a notification list in the event suspected contamination is encountered; (2) a sampling protocol following an encounter; (3) a protocol for contaminated soil handling and disposal; (4) a written procedure to transition any areas of contamination that extend beyond the boundaries of the ROW, so that a comprehensive scoping, delineation, and clean up of contamination can be completed. We recommend that a draft Soil Handling Plan be included as an appendix to the EIS.	AGDC has not yet drafted a Soils Handling Plan for construction. According to AGDC, they will not develop a general "Soil Handling Plan". Cleanup of unexpected soil contamination encountered during construction will be in accordance with a site-specific plan approved by the Alaska Department of Environmental Conservation at the time of the incident (18 ACC 75, Article 3, "Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances"). This response was revised based on information provided by AGDC. The site specific plan would take place during the permitting process.
L30	138	EPA	5.4			It states: "Jurisdictional wetlands regulated by the U.S. Army Corps of Engineers (USACE) under Section 404 must exhibit a positive wetland indicator from all three characteristics – vegetation, soils and hydrology – to make a wetland jurisdictional determination, except in limited instances identified in the manual;1987 Corps of Engineers Wetlands Delineation Manual (USACE 1987)." This is not a complete thought. Although a wetland may meet the three wetland indicators – vegetation, soils and hydrology – jurisdiction is additionally determined by location of that wetland. An isolated wetland would not be jurisdictional. Please refer to: http://water.epa.gov/lawsregs/guidance/wetlands	Comment acknowledged. The text in FEIS Section 5.4-1 has been revised and the EPA document has been cited. This information will be gathered during the USACE 404 permitting process.

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						/upload/2008_12_3_wetlands_CWA_Jurisdiction _Following_Rapanos120208.pdf For more information on jurisdictional wetlands.	
L30	139	EPA	5.4	5.4.1		Under Analysis Methodology, it states: "A multiyear preliminary jurisdictional determination (PJD) was conducted along the proposed 737-mile Project within the 2,000-foot planning corridor in support of USACE permitting (AES 2011)." The EPA (Gayle Martin) reviewed the PJD dated March 2011 (referred to in this section of the DEIS as "AES 2011"), and supplied comments to the Corps on May 26, 2011. The Corps (Ben Soiseth) subsequently wrote a letter to AGDC (David Norton) dated June 10, 2011, incorporating EPA's comments, and asking that consideration be taken to identify any missing or conflicting data in the March 2011 PJD to ensure that 2011 field work will provide any necessary information. The Corps (Mary Romero) wrote another letter to AGDC (David Norton), undated but distributed on January 6, 2012, requesting a detailed list of additional information, including "2011 wetland analysis with supplemental information gathered in 2011". No update to the March 2011 PJD is supplied in the DEIS, implying that the incomplete PJD is being relied upon to inform the EIS, including the extent of jurisdictional waters of the U.S. that would be affected by the Project. As it stands now, the March 2011 PJD does not contain enough data to support a CWA Section 404 permit application. We recommend that the PJD be completed, and incorporate all of the information requested by the Corps in its June 2011 and January 2012 letters before the Final EIS is published.	Wetland data that is currently available is presented in the Section 5.4 of the FEIS. This information will be gathered during the USACE 404 permitting process.

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L30	140	EPA	5.4	5.4.1		It states: "Two classification systems were used to characterize the wetlands within the proposed Project area: The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) by Cowardin et al. (1979) Classification of Wetlands and Deepwater Habitats, and the Brinson (1993) hydrogeomorphic (HGM) classification." The only document showing wetland classification for the Project area is the PJD dated March 2011. That PJD did not rely on Brinson (1993), but rather on Magee and Hollands (1998), A Rapid Procedure for Assessing Wetland Functional Capacity Based on Hydrogeomorphic (HGM) Classification.	Comment acknowledged. The text in Section 5.4.1 of the FEIS has been revised for accuracy to include Magee and Hollands.
L30	141	EPA	5.4	5.4.2		It states: "The proposed Project corridor crosses a wide variety of wetland classes as it proceeds from the Beaufort Sea Coastal Plain southbound to the Cook Inlet Basin (Section 5.1.1.1 and Figure 5.1-1)." No map of the extent of affected wetlands is included in the DEIS. Figure 5.1-1 does not depict wetlands or wetland classes. Section 5.1.1.1 discusses ecoregions, not wetlands. If it is intended that the PJD dated March 2011 comprise the map of affected wetlands, then this PJD should be included as an appendix to the EIS, and should be referenced in the text in this section. The EPA's copy of this PJD (four binders, each 3 inches thick) is stamped "CONFIDENTIAL" in big red letters, implying that it is not accessible to the public for this DEIS review. Even so, the March 2011 PJD depicts individual "field target" sites, and does not map the entire extent of wetlands along the Project corridor. Clearly, information on the extent of affected wetlands is available somewhere; otherwise calculation of the wetland acres presented in tables in the remainder of this chapter would not be possible. We recommend	The wetlands impact analysis in the FEIS was conducted by GIS analysis of very large PJD data sets. Maps at a legible scale that would depict wetlands and wetland impact areas would be voluminous. Maps would not significantly enhance the presentation of findings regarding wetland impacts. CEQ guidance states that NEPA analysis should be brief and concise {40 CFR Part 1502.2(c)}. This information will be gathered during the USACE 404 permitting process.

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						that a complete map set showing the extent of waters of the U.S., including wetlands, that will be located within the Project corridor be included in the Final EIS.	
L30	142	EPA	5.4	5.4.2.1		It states: "The Wetland compositions relative to the aboveground facilities locations are presented in Figures 5.4-1 through 5.4-5." These four figures show only the large infrastructures associated with the Project at five locations, and do not depict the locations and classifications of wetlands along the pipeline corridor. There is no wetland map of the Project provided in this DEIS, including in the appendices; this is a deficiency in the information needed by a reviewer to assess impacts on the environment.	Figures 5.4-1 to 5.4-5 depict aboveground facilities sites as titled. The wetlands impact analysis in the FEIS was conducted by GIS analysis of very large data sets. Maps at a legible scale that would depict wetlands and wetland impact areas along the pipeline route would be voluminous. Maps would not significantly enhance the presentation of findings regarding wetland impacts. CEQ guidance states that NEPA analysis should be brief and concise {40 CFR Part 1502.2(c)}. This information will be gathered during the USACE 404 permitting process.
L30	143	EPA	5.4	5.4.2.1	Figures 5.4-1 through 5.4-5	There appears to be a map registration error in these figures. For example, the olive-green colored depiction of wetland type "PUBH" on Figure 5.4-1does not exactly overlay the open-water wetland it is meant to depict on the underlying base map, but is offset approximately 125 feet to the northeast. On Figure 5.4-5, a "PEM1B" wetland (palustrine emergent) is shown in a lake (in the upper center of the figure). We question whether the graphic error resulting from erroneous map registration may have also caused errors in calculation of wetland acreage.	Wetland acreage calculations were generated by GIS analysis of wetland data sets and did not utilize the imagery background presented in the figure Wetland impact acreages presented in the FEIS have been reviewed to assure accuracy and consistency. This information will be gathered during the USACE 404 permitting process.
L30	144	EPA	5.4	5.4.2.3	Figure 5.4-11	Typo: "Minerla" in the table.	This change will be incorporated into the FEIS.

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L30	145	EPA	5.4	5.4.3.2		It states: "The AGDC has not identified the site specific locations of the TEWS; therefore, these areas have not been included in the Project impact calculations and assessment. TEWS would be typically located to reduce impacts to wetlands, and calculations of potential impacts to wetlands would be included prior to the permit application." In our comments on the Preliminary Draft EIS, we noted that no quantification of wetland impacts for TEWS had been provided, that this information was needed to establish the extent of impacts, and we asked for an approximation. Those comments have not been addressed; there is no additional information provided in the DEIS as to the extent of impacts on wetlands due to the TEWS. Temporary impacts are still impacts.	Information regarding TEWS has been added to all appropriate sections of the FEIS including Section 5.4. A description of TEWS has been added to the project description in Section 2 of the FEIS. This information will be gathered during the USACE 404 permitting process.
L30	146	EPA	5.4	5.4.3.2	Tables 5.4-2 and 5.4-3	Please spell out, or explain in a footnote, what "% Comp" means.	Foot note has been added to explain "% comp" (percent composition) in Tables 5.4-2., 5.4-3, 5.4-4, and 5.4-8 in Section 5.4 (Wetlands).
L30	147	EPA	5.4	5.4.3.2		It states: "During the post-construction phase, the construction ROW area would likely revert to a wetland type and function similar to what had existed prior to Project implementation." This statement is inconsistent with statements made elsewhere in the document, which explain that the ROW will be kept clear of forested vegetation, resulting in a permanent change in wetland types and functions; see, for example, on p. 5.4-23, "Regular maintenance of the permanent ROW would include mowing surface wetland vegetation to a non-forested vegetative cover type. This would allow visual inspections of the pipeline during aerial patrols in order to identify areas of concern. Forested wetlands within the permanent ROW would be permanently removed and converted to a scrub/shrub, emergent or other wetland type.	Comment acknowledged. The text has been revised for accuracy in Section 5.4.3.2 of the FEIS to state that function would change based upon the wetland type that would exist in the maintained ROW.

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						Approximately 136 acres (Table 5.4-4) of forested wetlands along the mainline ROW would be permanently lost; however, these areas would function as a different wetland class."	
L30	148	EPA	5.4	5.4.3.2		It states: "The linear nature of the proposed Project has the potential to divide wetland systems, disrupting or altering vegetation, subsoil and hydrology. Fragmentation in wetlands would be expected to occur temporarily during the construction phase of the Project and for a short time thereafter. During post-construction, it would be expected that once soils subside over the buried pipeline, surface hydrology would resume quickly and disturbed vegetation would recover." Upon what scientific precedent does ADGC base this assertion, that once soils settle, wetland hydrology will re-establish?	Comment acknowledged. The text in Section 5.4.3.2 of the FEIS has been revised for accuracy.
L30	149	EPA	5.4	5.4.3.2		The underlined heading "Route Variations and Options" may need to be assigned a new section number, 5.4.3.3, for clarity.	The Denali National Park Route Variation is now listed in the TOC as subheading 5.4.3.3.
L30	150	EPA	5.4	5.4.3.2		The fourth paragraph under the heading "Denali National Park Route Variation" seems to address the entire pipeline corridor, not just the Denali National Park route variation part of the Project. This is confusing, because there is no new heading which would indicate a change in subject to the reader.	There is now a new heading: 5.4.3.3 Denali National Park Route Variation. Text was revised to just describe the wetland characterization of the Denali National Park and Mainline route (MP 540-MP 555)
L30	151	EPA	5.4	5.4.3.2		It states: "A straddle and off-take facility would be located at the Fairbanks Lateral tie-in at approximately MP 458 near Dunbar. This facility would be collocated with a mainline compressor station, if this facility is built, and a gas metering station. These facilities would be built on a 4.7-acre gravel pad and would require a permanent gravel access road." On Figure 5.4-4, there is	Under direction by the USACE, access roads issues will be addressed for the FEIS. This information will be gathered during the USACE 404 permitting process.

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						no permanent gravel access road depicted. Where will any and all gravel access roads be located for the Project?	
L30	152	EPA	5.4	5.4.3.2		It states: "The Cook Inlet NGLEP Facility would be constructed near MP 736 at the terminus of the pipeline. This facility would be built on a permanent 5.2-acre gravel pad and accessed by a permanent gravel road. The size and location of these structures would be determined during facility design optimization. The location of this facility would not affect wetlands because it would be located in an upland vegetated area, but roads leading to the facility could cross or be adjacent to wetlands (Table 5.4-6)." There is no depiction of any gravel access roads on Figure 5.4-5, which shows the location for the NGLEP. Also, Table 5.4-6 shows zero wetland impacts for the NGLEP, indicating that roads leading to the facility that could cross wetlands are not included in the data presented in this table.	Access road acreages and details regarding impacts to wetlands have been added to Section 5.4 of the FEIS. This information will be gathered during the USACE 404 permitting process.
L30	153	EPA	5.4	5.4.3.2	Table 5.4-6	Please clarify if the numbers of acres of wetlands impacts given in this table include any gravel access roads to the aboveground facilities.	The text has been revised for accuracy in Section 5.4.3.2 of the FEIS to state gravel access road acreages are presented separately from aboveground facilities acreages. Table 5.4-7, NWI Wetland Classes (Acres) Impacted by Access Roads, has been added in the TOC.
L30	154	EPA	5.4	5.4.3.2		Access Roads - we recommend further analysis of the direct and indirect impacts to wetlands of the Minto Flats Wetlands Complex. In addition to the pipeline, impacts from permanent gravel access roads would be significant. We recommend quantifying the wetlands impact to the Minto Flats Wetlands. It is our understanding that construction in wetlands would be conducted in winter. So, we are not certain of the need for permanent gravel access roads in the Minto Flats. We recommend	Access road acreages and details regarding impacts to wetlands have been added to Section 5.4 of the FEIS. This information will be gathered during the USACE 404 permitting process.

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						including a map depicting the location of the permanent and temporary gravel access roads in the Minto Flats Wetlands Complex	
L30	155	EPA	5.4	5.4.3.2		It states: "Approximately 21 acres of wetlands would be impacted by development of temporary and permanent access roads associated with construction of the mainline and Fairbanks Lateral ROW"s (Section 4.9.1.4)." There is no section 4.9.1.4.	This sentence has been changed in the PFEIS to "Approximately 2 acres of wetlands would be impacted by temporary and 170 acres by permanent access roads for the proposed Project."
L30	156	EPA	5.4	5.4.3.2		The Access Roads section discusses the roads that will be needed, both for construction and permanently. In Section 5.9 (Land Use), tables are presented for acreage of access roads. Some 90 permanent gravel access roads will result from the Project, comprising 524 acres in the construction phase and 542 acres in the operational phase. This is a substantial amount of gravel fill. There are, however, no maps in the DEIS that show where access roads will be located vis-à-vis the pipeline and aboveground facilities. We recommend that detailed route maps – one for the construction phase, and one for the permanent ROW -- be included which would show not only the pipeline route, pipeline ROW and likely locations of aboveground facilities, but also the locations of access roads, and wetlands delineated and identified as to type, and at a large enough scale so as to make interpretation of wetland impacts possible. This would make it more graphically apparent to the reader what the wetland impacts of all project components are likely to be.	A digital web-viewer has been provided to agencies depicting this information (wetlands, access roads, material sites, camp laydown locations, etc.). Providing large scale maps of the entire route showing such detail is not practical in the document. Additional information will be available during the permitting process. This information will be gathered during the USACE 404 permitting process.
L30	157	EPA	5.4	5.4.3.2		This Access Roads section states, "acreage for access road use was classified under the NLCD system, not NWI or HGM systems". Maps showing the NLCD classification for the pipeline route are given at Figure 5.3-1. The National Land Cover Dataset may not give an accurate	Access road acreages and details regarding impacts to wetlands have been added to Section 5.4 of the FEIS. This information will be gathered during the USACE 404 permitting process.

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						representation of the extent of wetlands (as wetlands are defined in the Clean Water Act context). This Access Roads section states, "Approximately 30 acres of wetlands would be impacted from permanent placement of access roads (Section 5.9.1.4)." We believe that this may be an underestimate of the extent of wetlands for access roads in the operational phase of the project, because some of the land cover types identified in the NLCD as non-wetlands (e.g. sedge herbaceous) may, on the North Slope of Alaska, and under the definition of wetlands as used in the Clean Water Act, actually be wetlands. Upon study of Map 1 of Figure 5.3-1, the predominant land cover type shown between MP 0 and MP 50 is sedge herbaceous – identified in the NLCD system as not a wetland type, but known to anyone who has been there (this commenter included) to be saturated wetlands. If, indeed, the NLCD system does not accurately classify wetlands for Alaska (especially north of the Brooks Range), then a more accurate classification system should be used for characterizing the extent of impacts to wetlands caused by the gravel access roads. Why did the project proponent choose to use a different wetland classification for the access roads than for the other components of the project?	

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L30	158	EPA	5.4	5.4.3.2		It states: "Thermokarst development could occur at impoundments in areas where permafrost is present. In thermokarst areas, soil temperatures rise with thaw depth, and primary productivity can shift the species composition from changes in soil characteristics. Culvert placement and frequency would be a very important variable to allow natural drainage of wetlands to occur, especially in highly saturated wetlands. This would apply to all areas including facility pads where dust could be deposited on wetlands from vehicle use." This language is not clear. It implies that culverts will be placed under facility pads. We are not aware that placing culverts under gravel pads is standard practice on the North Slope, an area of nearly continuous permafrost. The GCF is described as covering 70 acres of flat emergent scrub/shrub wetlands (p. 5.4-26), in a part of the pipeline ROW that is likely the wettest of the entire route. No mitigation measures for maintaining hydrology under the GCF that include installation of culverts are proposed in Section 5.4.4 of the DEIS.	Comment acknowledged. The text in Section 5.4.3.2 has been revised for accuracy.
L30	159	EPA	5.4	5.4.3.2		It states: "calculations of Project impacts from TEWS have not been included". The EIS is not complete without sufficient information to determine the impacts that TEWS have on the environment.	Information regarding TEWS has been added to all appropriate sections of the FEIS including Section 5.4. A description of TEWS has been added to the project description in Section 2 of the FEIS. Table 5.4-8 has been added in Section 5.4.3.2.
L30	160	EPA	5.4	5.4.4.1		It states, "Mitigation measures proposed by the AGDC are included in Appendix C." Appendix C contains Project Maps, and it has no information on the subject of Mitigation. Mitigation is addressed in Appendix H.	Section 5.23, describing mitigation measures, has been added to the FEIS. All AGDC proposed mitigation measures have been analyzed for effectiveness. The reference in the text to Appendix C has been removed.

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L30	161	EPA	5.4.4; Also, Appendix H, Section 9.0	5.4.4; Also, Appendix H, Section 9.0		We have reviewed both the Mitigation section of the DEIS (5.4.4, 5.4.4.1, 5.4.4.2 and 5.4.4.3) and the section of Appendix H on mitigation measures for Vegetation and Wetlands. We agree, in a general sense, with the proposed measures. Specific mitigation requirements will necessarily need to be addressed when more is known about the project impacts to wetlands, when the project proponent applies for a Section 404 permit from the US Army Corps of Engineers, and when any 404(b)(1) Guidelines Analysis that the project proponent submits can be reviewed by the agencies. At the current time, it is our understanding that no 404 permit application has yet been made to the Corps for this project.	Comment acknowledged. No change to document required.
L30	162	EPA	5.4	5.4.4.2		Third line, typo, “than” not “then”.	The text containing this typo was in the Mitigation portion of section 5.4, which was removed and added to a new, rewritten mitigation chapter.
L30	163	EPA	5.4	5.4.4.2		It states: “Traditional mitigation methods are included in Section 2 with associated construction methods and procedures.” What “Section 2” is being referred to? What does “traditional mitigation” mean?	Section 2 of the FEIS is the Project Description. In the FEIS, Section 5.23 has been added to consolidate all proposed and identified mitigation measures for wetlands and other resources.
L30	164	EPA	5.4	5.4.4.3		Next to last line, is “adversely impacted” meant instead of “adversely impacting”?	The text containing this typo was in the Mitigation portion of section 5.4, which was removed and added to a new, rewritten mitigation chapter.
L30	165	EPA	5.4	5.4.4.3		First line, typo, “compensatory” not “compensatory”	The text containing this typo was in the Mitigation portion of section 5.4, which was removed and added to a new, rewritten mitigation chapter.
L30	166	EPA	5.6	5.6.1		Figure 5.6-1 is not a map of the project area… It is the Lake Study Area on the North Slope. Please make this correction. We recommend the Lake Study Area also include information for water use that includes the Interior Alaska and Southcentral Alaska.	Comment acknowledged. The text in Figure 5.6-1 has been revised for accuracy. This information will be gathered during the USACE 404 permitting process.

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L30	167	EPA	5.6	5.6.2.2		Water Withdrawals - Construction Spread 1, from GCF to the Chandalar Shelf would require 43504 million gallons for ice roads, etc on the North Slope. We recommend that the water use for the additional Construction Spreads be included in the EIS. The water withdrawal estimates should also be provided for the other sections of the project that crossed the interior and southcentral Alaska.	No additional water use data is available beyond what has been provided. This information will be gathered during the USACE 404 permitting process.
L30	168	EPA	5.6	5.6.2.2	Table 5.6-5	We recommend that a similar table be included that provides the water withdrawal rates from Galbraith Lake to the project terminus in Southcentral Alaska.	No additional water use data is available beyond what has been provided. This information will be gathered during the USACE 404 permitting process.
L30	169	EPA	5.6	5.6.2.2		The Blasting Plan for streamside blasting should specify that no blasting is allowed during critical lifecycles of resident and anadromous fish species in that particular reach of the stream. A schedule identifying "no blasting work" for all proposed blasting in streams should be included in the Blasting Plan.	The text has been revised and information from ADFG blasting standards has been added. The text was obtained from an ADFG document found on the ADFG website.
L30	170	EPA	5.6	5.6.2.2		HDD – We have concerns regarding the drilling muds and other chemicals, and fluids inadvertently released into surface waters where fish are present and could affect the entire lifecycle of fish resources. We recommend developing a site specific plan for each proposed HDD waterbody crossing that accounts for the physical conditions of the site, include substrate composition and variability, and any terrain constraints that may affect drill success. Develop a Drilling Mud Plan that describes potential impacts, monitoring, and mitigation procedures and contingency plans for inadvertent fluid releases that may occur during HDD activities. This plan should be included as an appendix to the EIS.	According to AGDC, they will prepare and implement a drilling mud plan for HDD activities. This plan has not yet been developed and will not be part of another plan. Mitigation measures expected to be incorporated in the plan include: • Current plans call for use of a standard bentonite (naturally occurring clay) mud; no synthetic additives are currently planned for the project. Final selection of drilling fluid/mud will depend on numerous site-specific factors, such as soil properties, site conditions, drilling application, and drill equipment. • Proper drilling procedures should contain the mud and prevent inadvertent mud releases. A 50-foot setback between the bore and the waterbody will reduce the risk of mud leaking into stream. Based on the required geometry of the HDD for a 24-inch pipeline (2400-foot radius), the setback from most streams will exceed 200 feet.

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							• HDD activities will be constantly monitored by the contractor, construction inspector, environmental inspector, or any combination of the three. Monitoring procedures will include: o Electronic monitoring of mud volumes. o Continuous examination of drilling mud pressure gauges and return flows to the surface pits. o Monitoring of drill status information regarding drilling conditions and alignments of the drilling profile during the course of drilling activities. • Contingency plans for HDD operations always address frac-out. These plans will be developed with an HDD contractor during final design. The engineering goal is to have adequate geotechnical information to predetermine the suitability of a site for the HDD method. If a site is determined to be not suitable whether from repeated HDD failure or engineering analysis, an alternate method will be evaluated and developed on a case-by-case basis. • A mud pond will be located at HDD drill entry and exit areas to contain excess drilling mud and cuttings. This material will be pumped into a truck and disposed of at an approved/permitted upland location. • The drilling pads are normally located well outside the stream banks, and lined berms will be used to keep waste drilling mud and spoils inside the drilling area.
L30	171	EPA	5.6	5.6.2.2		Hydrostatic Testing - The hydrostatic testing of pipelines would be required to ensure its integrity. We recommend the EIS identify the water sources and withdrawal rates that would be required for hydrotesting. In addition, we recommend the discharge locations to land and/or surface waters, and discharge methods be specified in the EIS. Of particular concern is hydrotesting in the winter season when other additives, such as freeze depressants, may be mixed with the test water. Also, untreated, heated water (36°F to 38°F) may be used for	The details of the hydrostatic testing are unknown at present, but will be determined prior to Project implementation through the permitting process. This information will be gathered during the USACE 404 permitting process.

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						hydrotesting. We recommend the EIS identify the types of chemical additives that may be required for winter hydrostatic testing and how these chemicals would be treated and properly disposed. Any discharge of hydrostatic test water should be to surface waters that do not support fisheries resources. We recommend the EIS describe the mitigation measures and control devices that would be implemented to minimize environmental impacts associated with discharging hydrostatic test water to fisheries resources.	
L30	172	EPA	5.7	5.7.1	Table 5.7-1	We recommend including on the table and analyzing in the EIS the use of Port MacKenzie as a port of entry for this project.	Port MacKenzie will not be a port of entry for the proposed Project. USACE and the cooperating agencies carefully considered and then screened out the Port MacKenzie Rail Route Variation from detailed analysis. The basis for this agency decision is summarized in Section 4.4.2.4 of the DEIS. Port of Anchorage species presence and potential impacts would be the same for the Port of Mackenzie because these ports are 1-2 mile across from each other in the upper Cook Inlet. This information will be gathered during the USACE 404 permitting process.
L30	173	EPA	5.7	5.7.2.2		Small Handy Class cargo ships – specify the length and draft of the vessel class in the EIS. Will this type of cargo ship be used at all ports of call – POS, POA, and West Dock?	As discussed on page 40 of the POD, it is anticipated that pipe will be shipped to Seward using Small Handy Class cargo ships. Seward is the only port of call planned for such ships. In Section 5.7.2.2 under Vessel Activity it states: "Small Handy Class cargo ships are approximately 380 feet in length with loaded drafts approximately from 25 feet.
L30	174	EPA	5.9	5.9		We recommend this section to describe how this project would meet or be consistent with the Federal, State, local land use and resource management plans identified in the DEIS. There are management directives, policies, conditions, and guidances in these plans that should be met	The relevant management directives, policies, conditions, and guidances in these plans are discussed in Table 5.9-13. This information will be gathered during the USACE 404 permitting process.

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						prior to the project moving forward.	
L30	175	EPA	5.9	5.9.1.9		Minto Flats State Game Refuge (MFSGR) – we recommend additional information be included regarding requirements in the MFSGR management plan for a gas pipeline. Identify the goals and policies under the management plan and describe how this project would be consistent with the MFSGR management plan.	As stated in Section 5.9.1.10 The Minto Flats State Game Refuge Management Plan contains policies related to transportation/utility corridors through the refuge (ADF&G 1992). The relevant policies under the plan are discussed in Table 5.9-13. This information will be gathered during the USACE 404 permitting process.
L30	176	EPA	5.11	5.11.1.2		The description of affected environment should provide the following information for purposes of the air impact assessment: Natural resources, ecosystems and human communities that may be adversely affected by any additional air emissions Identify, quantify, and map the occurrence of the following: critical habitat areas or Habitats of Particular Concern; biologically sensitive areas; most environmentally sensitive areas; wildlife refuges or sanctuaries; wetlands; sensitive water bodies; endangered species; threatened species or species of special concern; water resources; or archaeological, historical, or cultural resources	No changes were made to the FEIS in response to this comment. The air quality analysis in 5.16-5 provides for potential impacts to ambient air conditions as well as sensitive human receptors. Impacts to other resources, as listed in the comment, are analyzed in separate sections of the EIS. All construction emissions tables in Section 5.16 are preceded by a discussion of winter and summer equipment use. Operational emissions would be year round and therefore seasonal information is not provided.
L30	177	EPA	5.12	5.12.1		Socioeconomics – This section states that tax revenue, consumer spending, and employment opportunities would increase and that housing availability and property values would not be affected. The benefits, however, are short term and temporary. Although the DEIS notes that alternative energy sources will be developed separately from the gas pipeline, it would be good to look at developing these energy sources (including solar, which is usually overlooked in Alaska) instead of the gas pipeline. The associated jobs would be truly long term and permanent, and would not involve creating carbon.	Additional information about the duration of operation and maintenance employment has been added to Section 5.12.2.2 of the FEIS. Construction impacts are considered to be short-term, while O&M employment is considered to be long-term. Section 4.2.7 (Alternative Energy Sources) examined renewable sources as potential alternatives to the proposed ASAP project. A number of projects that would generate electric power from renewable resources have been identified and are in various stages of planning or implementation. These projects, which could reduce, but not replace because of their limited sizes, the existing and future need for natural gas that would be provided by the proposed Project are listed in Table 4.2-1. The listed projects are those that were identified in the Alaska Railbelt Regional Integrated Resource Plan (RIRP) Study Final Report.

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L30	178	EPA	5.12	5.12.2		EJ – This section of the Executive Summary states that minority and low-income communities would be positively affected by the project through the creation of jobs, as well as income and tax effects, and that any adverse quality of life effects during the construction phase are expected to be minor, temporary, and not concentrated in low income or minority areas. It could be argued that the positive effects mentioned are also minor, temporary, and won't affect low income or minority areas either. As mentioned above, another option to consider is developing renewable energy forms instead, ensuring sustainable long term benefits.	Section 5.12.2.3 'Summary of Socioeconomic Consequences of Proposed Action' contains a summary of the impacts related to Environmental Justice. Both negative and positive impacts are discussed. In general, it is expected that minority and low-income communities would be positively affected by the proposed Project through the creation of both temporary and permanent jobs, as well as income- and tax-effects. Negative effects are expected to be minor to moderate and confined to temporary increases in traffic, noise, and possible effects to subsistence. With regard to considering renewable energy: Sections 4.2.7 and 4.2.8 describe renewable energy sources and energy conservation programs. Section 4.2.9 discusses why none of the identified alternative energy sources would meet all objectives of the proposed Project.
L30	179	EPA	5.12	5.12.2		Socioeconomics/EJ -The DEIS notes that two Census Tracts traversed by the proposed route have minority populations in excess of or near 50 percent: North Slope CT 200 and YKCA CT 200 have a high concentration of AIAN population, 86.5 percent, and 48.8 percent respectively. It also notes that poverty rates in the YKCA and the North Slope are much higher when compared to the state, with 23.8 and 14.4 percent of the population impoverished respectively. A question that comes up: pipeline construction and O&M offer only short term and temporary employment opportunities when looking at the big picture and long term. 5.12.3.3, Pages 40 & 41 state that only 50 – 75 permanent jobs will be created for the entire project, from Prudhoe Bay to Cook Inlet. And "permanent" only means until this nonrenewable resource runs out (a few decades?), so does the short term potential economic benefit justify the carbon creation/climate change effects and potential degradation to subsistence resources?	The short-term and long-term employment benefits for the proposed Project are summarized in Table 5.12-15. Section 5.14 of the DEIS identifies that the majority of impacts to subsistence resources would be during construction and that possible long term effects would occur in the undeveloped areas around a proposed compressor station near Minto Flats. Stream-crossings and water quality are considered in both the Water section (5.2) and Subsistence section (5.14) and the impacts associated with the proposed Project are expected to be minor to moderate and short-term because effects are associated with the construction phase. For summary information see the tables in Section 6.1 Ranking of Potential Effects/Impact Tables. With regard to the cumulative impacts noted in the comment (greenhouse gas emissions and climate change), greenhouse gas emissions are discussed in a subsection of the Cumulative Effects section. It is probable that construction and operation of the ASAP pipeline would result in a relative net decrease in greenhouse gas emissions over the life of the proposed Project. The primary reason is that the natural gas from

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						P. 10 of the Executive Summary notes that the project ROW would cross approximately 495 waterways and drainages, and would involve clearing vegetation, grading over the centerline, and excavating a trench for pipeline installation across streams. It seems that changes and negative impacts to water quality and dependent animal species would be inevitable in at least some of these ecosystems.	this project would displace other fuels currently in use, such as oil, coal, and wood, which emit more greenhouse gases than does natural gas. Fewer greenhouse gas emissions over the life of the proposed Project would impact climate change in a positive way . This is discussed in detail in Section 5.20.6.3.
L30	180	EPA	5.12	5.12.3.2.6		A map showing the census tracts that this section refers to would be helpful.	The Census Tracts traversed by the proposed Project and the Denali National Park Route Variation are provided in Figure 5.12-4. Additional text has been provided in Section 5.12.3.3 (the environmental justice section), referring the reader to Figure 5.12-4.
L30	181	EPA	5.12	5.12.3.2.6		Government-to-Government consultation is separate from environmental justice. I would encourage you to include the various meaningful involvement opportunities that have been provided to the EJ communities of concern.	As suggested, we have revised the community involvement section within Environmental Justice to remove focus on the Government to Government consultation and Mitigation measures. We have augmented the information on opportunities for public comment outreach. The revised paragraph now reads: "As provided in Sections 1.4 and 1.5, there have been multiple opportunities for public involvement for the communities of concern. Scoping meeting advertisements and instructions on how to obtain additional project information were sent by the USACE to affected parties and community leaders (see Section 1.4.1.1). Announcements for public scoping meetings were advertised through a variety of media such as local and state-wide newspapers, online news resources, and radio stations. Informational meetings were held to introduce the proposed Project and solicit public comment from the affected communities. Initial meetings were held in Glennallen, Delta Junction, Nenana, Fairbanks, McKinley Village, Anchorage, Wasilla, and Barrow (see Table 1.4-1). Each meeting included an open house, a brief formal presentation, and a public question and comment period. After publication of the Draft EIS, the process to advertise the public

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							comment period was repeated and informational meetings were held in Kenai, Anaktuvuk Pass, Fairbanks, Nenana, Cantwell, Trapper Creek, Willow, Anchorage, Barrow, Wiseman/Coldfoot, and Minto (see section 1.5.2). As a result of public input during the scoping and review phases, various mitigation measures have been proposed by the AGDC for local residents (see Section 5.23.2.12). These mitigation measures include the development of an Economic Opportunity Plan, coordination with local training centers, and the use of local businesses to support the proposed Project. Coordination and consultation with local groups is discussed in detail in Section 1.4."
L30	182	EPA	5.12	5.12.3	Figure 5.13-1; Table 5.13-2	Notes that quality of life in the proposed project area may be negatively impacted by changes in traffic density and changes in natural resources or environmental quality including air quality, water quality/quantity, or habitat, and that quality of life could be affected by access restrictions, alteration to visual resources, and recreational activities due to the proposed project. Subsistence resources in some areas could be affected through increased hunter efforts, costs and risks. The DEIS states, however, that these types of impacts would be mostly during the temporary construction phase due to increased traffic, dust, noise, and construction delays, and are expected to be of minor to moderate magnitude. Long-term effects on these components of quality of life are expected to be negligible to minor. With the size of this project, however, some of these quality of life changes may be permanent. For example, the pipeline ROW would encounter 37 Alaska Heritage Resource Survey sites and 705 sites are within 1 mile of the ROW. There are 178 previously reported AHRS sites located within 1 mile of the Project area in the North Slope region; a total of	The completion of cultural, archeological, and historical surveys would increase the ability to assess impacts prior to Project initiation. However, a PA is being developed for this Project and the EIS includes the following language regarding the surveying for cultural resources: This information will be gathered during the USACE 404 permitting process. The PA will lay out a phased completion process for continuing surveying and identifying previously unknown cultural resources, as well as the process for monitoring and the discovery of previously unknown cultural resources, including human remains, during construction, as well as the process for mitigating potential adverse effects, which have not yet been identified.

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						nine AHRS sites are located within the construction ROW (Figure 5.13-1; Table 5.13-2). It would be challenging to ensure that all of these culturally significant sites are adequately protected.	
L30	183	EPA	5.12	5.12.2.3		EIS focuses on economic and housing effects, a few mentions of noise, traffic, dust. What about other types of effects, for example during construction – crossing water bodies, potential effects on subsistence. What about the other community members of different origin, the EIS is focused on the AIAN populations, mentions the other populations, but does not describe how they were meaningfully engaged in the process. Outline the public participation plan... In addressing potential adverse impacts, measures for avoidance or minimization of those impacts should be considered before resorting to mitigation measures. Where avoidance or minimization is not possible, propose appropriate mitigation measures. These should be developed with input from the affected population in a consensus-based process. Include in the EIS a summary conclusion, sometimes referred to as an 'environmental justice determination', which concisely expresses whether impacts have been appropriately avoided, minimized or mitigated.	1.) Additional information/discussion on construction and waterbody crossing effects on subsistence has been included in Section 5.12.2.3 (Quality of Life). 2.) Additional discussion on public involvement has been incorporated into Section 5.12.2.3 (Environmental Justice). 3.) Additional information on avoidance or minimization has been included in Section 5.12.2.3 (Environmental Justice). 4.) Additional text was added to the Environmental Justice summary within Section 5.12.2.3 (Summary of Socioeconomic Consequences of Proposed Action).

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L30	184	EPA	5.13			The DEIS indicates that not all areas of the proposed ROW and APE have been surveyed. We recommend the EIS include a complete cultural, archeological, and historical survey be completed for the entire project ROW and areas of proposed aboveground facilities.	Comment acknowledged. The completion of cultural, archeological, and historical surveys would increase the ability to assess impacts prior to Project initiation. However, a PA is being developed for this Project and the EIS includes the following language regarding the surveying for cultural resources: "The PA will lay out a phased completion process for continuing surveying and identifying previously unknown cultural resources, as well as the process for monitoring and the discovery of previously unknown cultural resources, including human remains, during construction, as well as the process for mitigating potential adverse effects, which have not yet been identified." This information will be gathered during the USACE 404 permitting process.
L30	185	EPA	5.13	5.13.1		There is no mention here of the federally recognized tribal governments and their role in the PA; or how the Lead Agency reached out to the communities along the APE that might have cultural resources or want to be engaged in the mitigation of effects on those resources. This is a separate consultation process, specifically for the NHPA 106 and Traditional Cultural Properties process. The North Slope Borough has specific ordinances that address cultural resources; I would encourage you to reach out to them if you haven't already, as well as the tribal governments and tribal organizations.	The North Slope Borough provided TLUI site data and these were incorporated into the EIS impact analysis. Section 1.4 of the FEIS discusses activities undertaken by USACE for tribal consultation and coordination. The outreach began in Oct of 2009. During the permitting process the Section 106 consultation will be completed prior to the permit decision being made.
L30	186	EPA	5.13	5.13.3		This section does a great job outlining the requirements under NHPA for the Lead Agency to consult with a variety of stakeholders. I would encourage you to discuss your outreach efforts to help identify potential resources that may not be listed and also how the Lead Agency worked with the stakeholders to identify, evaluate and consider effects of historic properties.	Section 106 coordination and compliance activities will be conducted by the USACE prior to development of the LEDPA and a Record of Decision. This information will be gathered during the USACE 404 permitting process.
L30	187	EPA	5.13	5.13.4		This section addresses the Preliminary DEIS comment on putting together a Programmatic	Section 106 coordination and compliance activities will be conducted by the USACE prior to development of the

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						Agreement, perhaps in the Final EIS there will be additional information on the consultation process under NHPA.	LEDPA and a Record of Decision. This information will be gathered during the USACE 404 permitting process.
L30	188	EPA	5.13			The risks to cultural resources are many during construction and such sites often can't be returned to their original states. (Examples of direct effect: placement of gravel for work pads and spoil and subsequent demobilization of gravel pads and replacement of spoil could disturb or dislocate buried artifacts, features, and possibly human remains. Operation of heavy equipment over wet tundra, water saturated soils or incompletely frozen wet tundra, even with tundra mats, could cause displacement of buried archaeological deposits. Example of indirect effect: Open cut crossings on streams may cause changes in stream banks resulting in bank cutting or channel infill, potentially exposing, eroding, or flooding cultural resource sites.) Do the regulations of the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA) adequately protect sensitive cultural sites? Tribal consultation is critical in this category.	Requirements for compliance with the National Historic Preservation Act are described in TABLE 1.5-1 Authorities Applying to the Proposed Action and Section 5.13.3. Section 106 coordination and compliance activities will be conducted by the USACE prior to development of the LEDPA and a Record of Decision. Regarding the NSB cultural resource regulations, the NSB was contacted and TLUI site data was obtained that were incorporated into the cultural resources impact analysis in Section 5.13 of the FEIS.
L30	189	EPA	5.14	5.14.12 5.14.5		Subsistence – State Regulations: To begin with, this is a very tricky and controversial issue in Alaska, especially for Tribes. While the Alaska Federation of Natives (AFN) not only views subsistence as the traditional hunting, fishing, and gathering of wild resources, but also recognizes the spiritual and cultural importance of subsistence in forming Native peoples worldview and maintaining ties to their ancient cultures (Alaska Federation of Natives 2005), under Alaska law, when there is sufficient harvestable surplus to provide for all subsistence and other uses, all residents qualify as eligible subsistence users. This topic is further	Subsistence regulations are a complex and controversial issue, especially for Tribes. The EIS notes the various interpretations of subsistence and provides discussions of them based upon the available data.

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						complicated since the State distinguishes subsistence harvests from personal use, sport, or commercial harvests based on where the harvest occurs, not where the harvester resides (as is the case under federal law). Finding ways to address different interpretations of subsistence as well as solutions for the 3 subsistence issues that BLM raised (The effect of use, occupancy, or disposition on subsistence uses and needs; The availability of other lands for the purpose sought to be achieved; and Other alternatives that would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes), is important.	
L30	190	EPA	5.14			Marine mammals such as seal, walrus, etc. see SBRA TK 2010	In subsection 5.14.2.2 Community Subsistence Patterns, under Community Descriptions, Barrow subheading, "walrus and seal" were added to the sentence "A main subsistence focus has been marine mammal (e.g., walrus and seal) hunting and whaling in particular." The last sentence in the paragraph referencing other harvested resources do not include marine mammals such as walrus and turtle as these were discussed in the previous sentence.
L30	191	EPA	5.14			Add birds	Subsection 5.14.2.2 Community Subsistence Patterns, Community Descriptions, Kaktovik subheading now reads "The community relies primarily on marine mammals, caribou, fish, and birds."
L30	192	EPA	5.14			Add birds	Subsection 5.14.2.2 Community Subsistence Patterns, Community Descriptions, Nuiqsut subheading now reads "Nuiqsut residents primarily harvest fish, caribou, marine mammals, and birds."
L30	193	EPA	5.14			Map colors shadow coastline, hard to see the overlap	Changes have been made to Figure 5.14-5 in Section 5.14 to show the coastline.

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L30	194	EPA	5.14			Most important is a value statement, although there is a clarification that this is based on number of pounds I would encourage a different way of stating this.	Section 5.14.2.2 Community Subsistence Patterns, sub-section Subsistence Harvest Patterns has been revised to state: "The average of all North Slope study communities shows that marine mammals and land mammals comprise over 80 percent of total harvested pounds for the region".
L30	195	EPA	5.14			Subsistence lifestyle should be subsistence way of life.	Text has been edited on page 5.14-2 to say "subsistence way of life."
L30	196	EPA	5.14			General comment – the federally recognized tribal government of Chickaloon is mentioned, however most of the other communities do not mention the federally recognized tribal government. I understand that this is probably related to the fact that this paragraph is discussing the school that the tribal government operates. I would encourage the recognition of the federally recognized tribal governments in the other communities that are summarized in this section.	Text has been changed throughout the entire chapter to identify federally recognized tribes. Additionally, Table 5.14-1 lists each federally recognized tribe by region.
L30	197	EPA	5.14			FYI – there is still an “error note” on this reference.	The error note located in chapter 5.14 was caught in the revisions of the chapter. Error note no longer exists.
L30	198	EPA	5.14	5.14.2.2.1		The direct effects is a general summary, given the potential to impact subsistence resources, both terrestrial and marine it would seem that a greater discussion would be required to adequately describe the specific impacts and how those will be mitigated. The loss of one moose for a family could be quite significant, even if it is for only one season. In addition, if there were impacts to a fish resource the 30 mile marker that was used to determine which communities might be affected may not apply. The analysis should at least consider upstream/downstream effects to fish resources used for subsistence. If the 30 mile marker still applies than a discussion as to why upstream or downstream communities were not included in	Subsistence resources including fish and moose are included in the AGDC proposed mitigation section 5.23.2.6 fish, 5.23.2.5 wildlife and 5.23.2.14 subsistence. Due to the large scale of the project, specific discussion of impacts to the level of individual household consumption of an individual resource is not feasible. A sentence has been added regarding effects to subsistence uses of upstream and downstream communities related to fish resources.

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						the impacts discussion would be appropriate.	
L30	199	EPA	5.14			Fencing – might expand a bit on this, otherwise it may sound like a fence along the entire ROW? This would clearly be an issue for wildlife.	The text has been revised to state "fencing near entry points."
L30	200	EPA				Birds – issue with Prudhoe Bay and pipelines – the predator birds are moving in, unintentional effect due to the beams that hold up the pipeline, which indirectly effects threatened and endangered species – has this been addressed in the project design? Or alternatives for project design?	Comment acknowledged. Additional text added, addresses the potential impact of predatory birds, which would be included in site specific mitigation plans.
L30	201	EPA	5.15		Table 5	The table includes percent population of white and Alaska Native people; however there is no information here about other minorities? While the communities discussed in this section are chosen because of their proximity to construction camp locations, it would be helpful to include why the nearby villages are not included, especially since there is discussion in other parts of the document about their subsistence use areas, environmental justice, and socioeconomics.	These data can be found in Table 5.12-11. We have edited the Public Health Section to change the reference from Table 5.12-13 to 5.12-11. The text has also been edited to reflect this change. We have also verified references to tables in other sections. Additional information can be found at http://censusviewer.com/cities/AK.
L30	202	EPA	5.15			Water withdrawal – there is reference to the AGDC needing to obtain and comply with necessary permits, thereby minimizing any potential adverse effects to potable water supplies. Wouldn't it be reasonable to request that the permit that covers this activity be reviewed and discussed more in depth here, or referenced, so that the public will know how any potential adverse effect would be minimized? Where there is reference to complying with permits, it would be nice to have a discussion of how that permit mitigates any adverse effect. This comes up several times in the public health section.	This comment refers to discussion within the 'Water and Sanitation' subsection of Section 5.15.4.2 - Proposed Action. As an example of the specific regulations that need to be addressed prior to permitting for work camps under this section: "The AGDC would need to obtain the necessary permits and comply with relevant regulations (e.g. 40 CFR 122; 18 AAC 31.020; 18 AAC 72.010, 200, and 215; AAC 80.200; 18 AAC 60 and others, see POD pp. 22-30), and would manage waste according to the CWMP."

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L30	203	EPA	5.15			The communities of Nenana and Minto are discussed in this section but I would recommend discussing why the other subsistence communities who have use areas that overlap the pipeline corridor (or ROW) are not included.	Identification of the PACs is provided in section 5.15.3.1.
L30	204	EPA	5.15			Each subsection has a scoring paragraph, the table on 5.15-4 is very easy to see the scoring system visually, and it would make it easier on the public who is reading this document to see this approach handled for each subsection, if that is possible. Then it would be easy to see where there is reason for greater concern and hence the need for more attention to be paid to mitigation.	A summary table ranking impacts is provided in Section 6 - Conclusions. In addition, the USACE has identified three final Alternatives (The Proposed Action, The No-Action Alternative, and The Denali Route Variation) and an option within the Proposed Alternative (three possibilities for crossing the Yukon River). Summaries and rankings of the impacts associated with these alternatives have been added to Section 6.
L30	205	EPA	5.15		Bullet 6	While this shows the number of households that use natural gas, it doesn't say anything about what it would require for the other homes to start using the natural gas. Is there any data that shows out of the total number of households in Fairbanks, the number of households that would require some type of conversion to natural gas for heating their homes? The scoring as a result of reducing respiratory illness is "positive and very likely"; therefore it seems that in order to make this determination that there would need to be some additional effort to demonstrate how Fairbanks would reach this goal. For example, a woodstove change out program?	Northern Economics published on this subject in June 2012. We have edited the text in Section 5.15.4.2 - Proposed Action, Cumulative Effects, and Potential Health Effect Benefits to Fairbanks to add the number of structures in the region that currently could be converted to Natural gas by stating: "Northern Economics (2012) notes that there are approximately 23,465 residential and 1,794 commercial structures in the Fairbanks region that are candidates for conversion." We have also edited Section 5.15.4.2 - Proposed Action, Cumulative Effects, Fuel Cost Issues to include the Northern Economics assessment of the overall cost savings on fuel for the region associated with conversion and added information on the expected improvement in air quality if the distribution system is built.

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L30	206	EPA	5.15			This section states that operation of the proposed Project (assuming a distribution system were constructed) would enable Fairbanks residents to switch fuels to natural gas from wood, coal, and oil and reduce PM 2.5 emissions and probably (depending upon Project transmission charges and local distribution charges) save money as well. While this is generally true, there are non-petroleum, renewable energy sources available. And wood burning, if done correctly, can be a clean, renewable energy resource (biomass). All that's needed is a properly used, EPA rated woodstove and a sustainable biomass source (which a number of regions in Alaska, including the Interior, have). If more time and money were invested in developing these cleaner forms of renewable energy, both the environment and human health would benefit in the long term. George Ahmaogak, former Mayor of the North Slope Borough noted: The benefits of oil development are clear — I don't deny that for a moment. The negative impacts are more subtle. They're also more widespread and more costly than most people realize. We know the human impacts of development are significant and long-term. So far, we've been left to deal with them on our own. They show up in our health statistics, alcohol treatment programs, emergency service needs, police responses – you name it.	The comment that there are wood burning heating systems with lower environmental impacts is accurate (see e.g.,http://www.epa.gov/burnwise/bestburn.html or http://www.epa.gov/oaqps001/community/details/woodstoves.html). That said, EPA guidance lists 'consider cleaner heating fuels' as the first among several options. From a policy perspective, it would be necessary to provide some incentives or introduce regulations to get consumers who now use less efficient wood burning systems to switch. For a useful discussion of present programs, see: http://www.epa.gov/burnwise/workshop2011/Fairbanks-AirQuality-DeHaven.pdf. See also Fye et al. (2009) for additional discussion of various options.
L30	207	EPA	5.15	5.15 5.15-7		The first table lists potential human health concerns, ranging from water and sanitation to social determinants of health. Table 5.15-7 lists 18 potentially affected communities. Using the Alaska Health Impact Assessment Toolkit, the rating that was done concluded that nearly all the potential health impacts would be low. Given	A summary of the ratings is included in Table 5.15-37, titled "Summary of Impact Rankings for Effects on Public Health Associated with the Proposed Project." A description of the process used to rank the impacts within the Health Effects Categories (HECs) is provided under the heading "Impact Evaluation Criteria" within Section 5.15.2.1 - Framework. Also, after each analysis

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						the size and nature of the project, this seems too good to be true.	of an HEC for either the Construction phase or the Operations and Maintenance phase, we explain/justify our rankings in bulleted text.
L30	208	EPA	5.15	5.15.20.1		The list of Key Assumptions of the Cumulative Effects Analysis is a list of best guesses. There is certainly no guarantee for all of these assumptions, such as a market for liquid natural gas and propane; that authorizations to construct and operate the Trans Alaska Pipeline System (TAPS) and its recent 30-year ROW renewal are effective in avoiding and minimizing adverse cumulative impacts from that project; that a compliance based monitoring system will be adequate; that wind farms will provide a viable, long-term contribution to electrical generation for the Railbelt area and for some remote Alaska communities; that electricity will not be an economical energy source for home and business heating; that construction of a large hydroelectric project in combination with smaller hydroelectric projects will provide a source of electricity that is now dependent upon natural gas from Cook Inlet as the primary energy source; etc. What will the cumulative effects be if some or all of these assumptions don't occur (which seems pretty likely)?	The cumulative effects analysis considered reasonably foreseeable actions and the assumptions and methodology as approved By USACE is provided in Section 5.20.
L30	209	EPA	5.16	5.16.1.1	Table 5.16-1	The description of affected environment should provide the following information for purposes of the air impact assessment: Physical, climatological and meteorological characteristics that are important to an understanding of air pollution and transport. The representative climate data in the vicinity of the project should include mixing height information. Include a discussion on whether the data is representative enough to characterize movement of the air mass in the area of interest Include a discussion on variables that affect air pollution and the fate	Subsection 5.16.1.5 of the DEIS provided information on the baseline air quality in the Project area. Subsection 5.16.1.1 of the DEIS provided climate information for the Project area. Worst case analyses were used to calculate the emissions provided in the construction emissions tables in Section 5.16 of the DEIS, including emissions in winter months where winter construction is anticipated. Additionally, operational emissions are consistent during fall, winter, spring and summer months. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during both the summer and winter seasons. Detailed

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						and transport of pollutants: the air dispersion patterns, complex terrain interactions, extreme temperature affects, seasonal variations, and presence of other atmospheric phenomena.	geography and climate data associated with air quality for the Fairbanks area was included in Section 5.15 (Public Health) of the DEIS, Subsection 5.15.4.2 (Proposed Action, Fairbanks Geography and Climate). This information is provided in the same sections of the FEIS.
L30	210	EPA	5.16	5.16.1.2 to 5.16.1.3		The Air Quality section should include an air emission impact assessment that identifies the following: Identify the air pollution of concern that will be the focus of the analysis In addition to identifying criteria pollutants and GHG, the DEIS should identify HAPs and include a list of project specific pollutants emitted. If some pollutants are not considered for the impact analysis, there should be a justification for their omission. The DEIS should explain why they are not expected to contribute to reasonable significant impacts.	The air quality analysis in Section 5.16-5 of the DEIS included discussion of potential impacts from priority pollutants and GHGs, as well as HAP emissions from both construction and operation. Subsection 5.16.1.5 of the DEIS provided information on the baseline air quality in the Project area. Subsection 5.161.1 of the DEIS provided climate information for the Project area. Worst case analyses were used to calculate the emissions provided in the construction emissions tables in Section 5.16 of the DEIS, including emissions in winter months where winter construction is anticipated. Additionally, operational emissions are consistent during fall, winter, spring and summer months. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during both the summer and winter seasons. Detailed geography and climate data associated with air quality for the Fairbanks area was included in Section 5.15 (Public Health) of the DEIS, Subsection 5.15.4.2 (Proposed Action, Fairbanks Geography and Climate) of the DEIS. This information is provided in the same sections of the FEIS.

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L30	211	EPA	5.16	5.16.1.5		The description of affected environment should provide the following information for purposes of the air impact assessment: Existing(baseline) air quality Ambient air quality data obtained from the Prudhoe Bay Ambient Air Monitoring Program, 3000 E. 16th Street, Anchorage, Harrison Court (Matanuska-Susitna Borough), 675 7th Avenue (Fairbanks North Star Borough, and Denali national Park (Yukon-Koyukuk Census Area) should include information about the location, purpose of monitoring, data collection period with start and end dated, frequency of monitoring, monitoring methodology (i.e., federal reference or equivalent methods), and data quality assurance and quality control. For the Pollutants measured, provide the maximum and minimum concentrations, average concentrations, averaging times, time and date stamps, and specific location information in universal transverse Mercator or latitude/longitude coordinates as well as all other pertinent information required to make valid observations for the specific type of monitor. Please note if any monitoring data indicated a violation of a NAAQS, along with the date the violation occurred.	Table 5.16-4 of the DEIS provided background air quality data, as necessary for the analysis, from all four monitoring stations listed in this comment, in addition to the Prudhoe Bay Central Compressor Plant monitoring station. Subsection 5.16.1.5 of the DEIS provided information on the baseline air quality in the Project area. Subsection 5.16.1.1 of the DEIS provided climate information for the Project area. Worst case analyses were used to calculate the emissions provided in the construction emissions tables in Section 5.16 of the DEIS, including emissions in winter months where winter construction is anticipated. Additionally, operational emissions are consistent during fall, winter, spring and summer months. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during both the summer and winter seasons. Detailed geography and climate data associated with air quality for the Fairbanks area was included in Section 5.15 (Public Health) of the DEIS, Subsection 5.15.4.2 (Proposed Action, Fairbanks Geography and Climate). This information is provided in the same sections of the FEIS.
L30	212	EPA	5.16	5.16.1.5	Entire Section Table 5.16-4	Only data from 2008 is being utilized for determining whether the NAAQS are being met. For many of the NAAQS (daily PM2.5, 1-hour SO2, 1-hour NO2, and 8-hour O3), at least 3 years of data is needed to determine compliance. We recommend the EIS, at a minimum, use data from 2008-2010 for performing the NAAQS compliance review. As well as most of these standards have minimum data completeness requirements (e.g., 75% per quarter and year) which should be part of this	Public air quality data from monitoring sites in Alaska is limited, but what is available was included in Table 5.16-4 of the DEIS. The ADEC determines compliance with the NAAQS. Some permitting activities must ensure compliance with NAAQS by conducting ambient air quality monitoring as well as additional monitoring (if applicable by regulation – such as for PSD permitting and some minor permitting) which would be required in the AGDC air quality permitting application. While an EIS typically assesses the potential impacts of a proposed Project, more detailed site specific analyses

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						review? If the completeness requirement is not met, then the EIS should pull in additional quarters or years of data until there is a continuous 3-year period.	typically occur during the air quality permitting process and given the current state of the design process of the proposed Project, this may occur after the publication of the FEIS.
L30	213	EPA	5.16	5.16.1.5	Table 5.16-4	The number of air quality monitoring stations is not sufficient to cover the entire project corridor and to provide good background concentrations. The data depicted in the table for 5 stations are not complete and are missing concentrations for certain NAAQS. Additional monitoring stations should be installed and identified on a map. The results of the data should be included in the EIS.	As stated previously in response to EPA comment 30-26, data in Table 5.16-4 of the DEIS provided background air quality data from all four monitoring stations listed in that comment, in addition to the Prudhoe Bay Central Compressor Plant monitoring station. Therefore, all available data has been provided. The need for additional monitoring stations, if any, would be determined by ADEC during the air quality permitting process. As stated previously, the air quality permitting process may occur after publication of the FEIS.
L30	214	EPA	5.16	5.16.1.6		The reference in the "Title I New Source Review (NSR) // Prevention of Significant Deterioration (PSD) Permits" sentence 4 should end with "best available control technology" not "best available pollution control".	This change will be addressed in the FEIS.
L30	215	EPA	5.16	5.16.1.6		Human health concerns have been associated with projects that result in air toxics emissions and particulate matter from mobile sources, particularly diesel exhaust. The National Air Toxics Assessment (http://www.epa.gov/ttn/atw/nata) asserts that a large number of human epidemiology studies show increased lung cancer associated with diesel exhaust and significant potential for non cancer health effects. Also, the Control of Emissions of Hazardous Air Pollutants from Mobile Sources Final Rule (66 FR 17230, March 29, 2001) lists 21 compounds emitted from motor vehicles that are known or suspect to cause cancer or other serious health effects. The EPA recommends the EIS disclose whether vehicular air toxics emissions would result from project construction and operations, discuss the cancer and non cancer health effects associated	The commenter is correct that diesel exhaust has potentially adverse impacts. From a proposed Project perspective it is planned to use best management practices for fugitive dust control and ultra-low sulfur diesel fuel.

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						with air toxics and diesel particulate matter, and identify sensitive receptor populations and individuals that are likely to be exposed to these emissions. For each alternative, the EPA recommends: Disclosure of all locations at which emissions would increase near sensitive receptors traffic, increased loads on engines (higher speeds, climbs, etc.); An assessment or accounting (qualitative or modeled depending on the severity of existing and projected conditions) of all the factors that could influence the degree of adverse impact on the population because of the activities listed above (e.g., distances to human activity centers and sensitive receptor locations, particularly parks, schools, hospitals, day care centers, outdoor recreation facilities, etc; amount, duration, and location of emissions from construction, diesel, and other vehicles, etc.); For receptor locations, we recommend that hotspot analysis be conducted for air toxics and particulate matter, and that construction mitigation measures be included.	
L30	216	EPA	5.16	5.16.1.6		We recommend including a section on Non-Attainment for Fairbanks PM2.5 in the EIS: Portions of the Fairbanks North Star Borough, including the City of Fairbanks, and the City of North Pole, are designated as a Federal non-attainment area for exceeding the NAAQS for PM2.5 (particulate matter size less than 2.5 microns) and a maintenance area for carbon monoxide (CO). Local heating emission sources, such as wood stoves, distillate oil, industrial sources and mobile emissions contribute to primary and secondarily formed PM2.5 that violate the standard during stable weather events associated with extremely strong temperature inversions. Air quality impacts	Analysis of the portion of the pipeline located within the FNSB was included in Subsection 5.16.2.2 of the DEIS, Proposed Action, Fairbanks Lateral. Mitigation measures for the Project were included in Subsection 5.16.4 of the DEIS, Mitigation, and have been moved to Section 5.23 of the FEIS. A discussion of General Conformity is included in Section 5.16.3. Although many pipeline related EISs provide a preliminary General Conformity analysis that analyzes direct and indirect emissions based on applicant supplied emission estimates, the detailed information needed to complete such a General Conformity Analysis has not been provided for this proposed Project. Information required would include transportation equipment lists, construction schedules, and other similar details

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						within the non attainment area will have to be analyzed. This analysis will include direct emissions (pipeline construction and activity within the non attainment area) and indirect emissions (increase in population and activities due to staging within the non attainment area) and how such emissions may worsen the existing air quality within the non attainment area or hinder its efforts to making progress in improving the air quality. If either of these conditions is present, mitigation would be required to make the air quality effects neutral or beneficial before proceeding. Further analysis of the necessary general conformity provisions of the CAA is required.	necessary for calculation of construction and operation emissions estimates for the nonattainment portion of the Fairbanks Lateral. Based on the current status of the design process, this General Conformity analysis may occur after the publication of the FEIS, but would occur within the permitting process. Section 5.16.3, General Conformity, of the FEIS has been updated to reflect this clarification. Fugitive dust emissions for construction of the Fairbanks Lateral were provided in Table 5.16-7 of the DEIS (note the table provides emissions for the entire Fairbanks Lateral, not just the nonattainment portion). The table has been updated in the FEIS where appropriate based on information received after publication of the DEIS (including adding projected open burning emission and refining PM-2.5 emissions). As noted by AGDC, no open burning would be conducted within the nonattainment area. Total PM fugitive dust is assumed equal to PM-10 fugitive dust. However, PM-2.5 fugitive dust is estimated at 10 percent of PM-10, based on the study conducted by Midwest Research Institute in 2006 (Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors) for the Western Governors Association to better characterize the PM2.5/PM10 ratio in fugitive dust. This report has been accepted by the EPA as an approved adjustment to the emission factors in EPA AP-42, Section 13.2. It is also projected that four material sites and one construction camp and pipeline yard will be located within the nonattainment portion of the Fairbanks Lateral. Emissions for the construction camp and pipeline yard were provided in Table 5.16-16 of the DEIS. Emissions from material sites are included within construction of the Fairbanks Lateral. Again, these emissions are for the entire Fairbanks Lateral and not just the nonattainment portion. When the General Conformity is completed, it will provide emissions for the nonattainment portion only, and compare that to the

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							General Conformity thresholds. Fugitive dust impacts to ambient air quality are discussed in Section 5.16.2 of the FEIS. Fugitive dust is also discussed in Section 5.15, Public Health, Subsection 5.15.4.2, Proposed Action, and Exposure to Hazardous Materials.
L30	217	EPA	5.16	5.16.2.2		Additional emissions sources include mobile barges transporting the GCF modules and supplies to West Dock, Port of Seward and Anchorage: Vessel/Barge Emissions - As part of the air quality analysis, the EIS should include emissions from marine vessels/barges. The use of marine vessels/barges during dredging operations for the navigational channel and turning basin, and transportation of equipment and pipeline supplies should be evaluated in the EIS. The number of vessels/barges arriving at the ports of entry in Alaska may result in direct, indirect, and cumulative impacts to air quality. The opacity of smoke from marine vessel emissions is regulated by the State of Alaska within the three-miles of the coastline. We recommend that the air quality analysis in the EIS incorporate information from studies being conducted by the National Park Service (NPS) and ADEC. The NPS is conducting opacity studies on cruise ships in Glacier Bay National Park. ADEC is conducting studies on gaseous and particulate pollutants from cruise ships in Juneau, Alaska. Nine barges are proposed for West Dock, and 35 barges are proposed for POS. Black Carbon - We also recommend that the EIS contain a discussion of the potential emissions of black carbon, a form of particulate matter, from sources like ships and diesel engines associated with the proposed project. Because of its location in the Arctic and the fact that increased amounts of black carbon could	The state of Alaska has specific state standards that are identified in 18 AAC 055 (visible emission, particulate matter, and sulfur compound emission standards for industrial processes and fuel burning equipment excluding nonfood engines) and 18 AAC 50.070 (visible emission standards for marine vessels). Additional regulations that may apply to the project are 18 AAC 50.110 (air pollution prohibited), 18 AAC 50.235 (unavoidable emergencies and malfunctions), and 18 AAC 50.240 (excess emissions). The DEIS did not outline applicability to all of the state of Alaska regulations, however, such provisions would be included in Title I and Title V air quality permitting for all stationary sources as identified in Section 5.16.2. Furthermore, emissions from ports of entry, air strips, and helipads were considered very minor in nature with regards to the overall project emissions, and thus, were not included in the emission totals. In addition, these mobile sources are not subject to the requirements to obtain an air permit as specified by 18 AAC 50.100. However, regardless of inclusion to an air permit, compliance with the state of Alaska regulations is required. Although we recognize that the state of Alaska and National Park Service are conducting inspections to ensure marine vessels comply with the state marine vessel visible emission standard, this is not a formal study or analysis that would be necessary in the EIS. Black carbon is a solid particle emitted during incomplete combustion (i.e., the solid fraction of PM-2.5 that strongly absorbs light and converts that energy to heat). Currently, there are no black carbon regulations. However, EPA's implementation of New Source

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						increase snow or ice melting in the nearby areas, it would be important for the EIS to provide information on black carbon emissions and alternative types of fuels that could be considered.	Performance Standards is estimated to reduce PM and black carbon emissions. The proposed Project will comply will all applicable New Source Performance Standards as identified in Section 5.16. In addition, emissions of black carbon are estimated by emissions of total PM-2.5, which are identified within the DEIS.
L30	218	EPA	5.16	5.16.2.2	Table 5.16-5	For each emission source identified for the Construction Equipment per Spread, we recommend also including the estimated emissions levels for each source in tons per day and tons per year basis. Clarify whether these estimates factor in winter and summer construction? Identify for each emission source the fuel type: natural gas and/or diesel. We anticipate that diesel powered generators will be required as a backup for all aboveground facilities in the event natural gas is shut off.	Table 5.16-5 of the DEIS provided a list of construction equipment proposed for use on the proposed Project. Estimated emission levels for construction were provided in Tables 5.16-6, 5.16-7, and 5.16-17 of the DEIS on a tons per year basis. Subsection 5.16.1.5 of the DEIS provided information on the baseline air quality in the Project area. Subsection 5.16.1.1 of the DEIS provided climate information for the Project area. Worst case analyses were used to calculate the emissions provided in the construction emissions tables in Section 5.16 of the DEIS, including emissions in winter months where winter construction is anticipated. Additionally, operational emissions are consistent during fall, winter, spring and summer months. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during both the summer and winter seasons. Detailed geography and climate data associated with air quality for the Fairbanks area was included in Section 5.15 (Public Health) of the DEIS, Subsection 5.15.4.2 (Proposed Action, Fairbanks Geography and Climate). This information is provided in the same sections of the FEIS. All information on fuel type provided by AGDC was incorporated into the calculations in the tables listed above. As presented in the Project Description, Section 2 of the DEIS, backup electrically powered generators at the GCF and compressor station are proposed.

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L30	219	EPA	5.16	5.16.2.2		Fugitive dust is small airborne particles called particulate matter which have the potential to adversely affect human health and the environment. EPA defines fugitive dust as "particulate matter that is generated or emitted from open air operations (emissions that do not pass through a stack or a vent)". The most common forms of particulate matter (PM) are known as PM10 and PM2.5 (particulate matter size less than 10 and 2.5 microns, respectively). _Sources of fugitive dust from this project may include unpaved gravel roads and facility pads, clearing and construction sites, and gravel mine sites. Effects of fugitive dust to the natural environment may include visibility reduction and haze, surface water impacts, and reduction in plant growth – impacts to wetlands. Fugitive dust may pose a human health risk due to chronic exposure in areas with vulnerable populations, such as infants and the elderly. The EIS should evaluate the magnitude and significance of fugitive dust emissions resulting from this project and its potential impacts on human health. We recommend a Dust Control Plan be developed and included as an appendix to the EIS. This plan should include provisions for monitoring fugitive dust during construction and operations, and implementing measures to reduce fugitive dust emissions, such as wetting the source material, installing barriers to prevent dust from leaving the source area, halting operations during high wind events, etc. We recommend the EIS identify mitigation measures to avoid and minimize potential adverse impacts to the natural and human environment.	Fugitive dust emissions were provided in Tables 5.16-6, 7, and 17 of the DEIS and these tables have been updated in the FEIS where appropriate based on information received after publication of the DEIS. Fugitive dust impacts to ambient air quality are discussed in Section 5.16.2 of the FEIS. Mitigation measures for the proposed Project were included in Subsection 5.16.4 of the DEIS, Mitigation, and have been moved to Section 5.23 of the FEIS. Fugitive dust is also discussed in Section 5.15, Public Health, Subsection 5.15.4.2, Proposed Action, Exposure to Hazardous Materials. Additionally, particulate matter emissions have been updated in Table 5.16-6 and 5.16-7 of the FEIS. As noted in the tables, total PM fugitive dust is assumed equal to PM10 fugitive dust. PM2.5 fugitive dust is estimated at 10 percent of PM10, based on the study conducted by Midwest Research Institute in 2006 (Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors) for the Western Governors Association to better characterize the PM2.5/PM10 ratio in fugitive dust. This report has been accepted by the EPA as an approved adjustment to the emission factors in EPA AP-42, Section 13.2.

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L30	220	EPA	5.16	5.16.2.2		The EIS should describe the flaring system that would be required for the GCF, NGLEP, and any other aboveground facility. A flaring system would be required for facility startup, depressuring during maintenance activities, and to protect the facility from overpressure. Include gas flaring in the emissions calculations for the construction and operations of these facilities.	Based on information received from AGDC after publication of the DEIS, Section 2.1.2 (Aboveground Facilities) of the FEIS has been revised to include a description of flaring at aboveground facilities. Additionally, Section 5.16.2 of the FEIS has been revised to include emissions estimates associated with flaring. These emissions estimates are included in the calculations contained in Appendix O of the FEIS. The emissions estimates are also included in the revised Tables 5.16-9, 11, 13, and 15 of the FEIS. Details regarding flaring emissions are footnoted in the overall emissions tables in Appendix O.
L30	221	EPA	5.16	5.16.2.2		The DEIS says that Best Management Practices will be used to control fugitive dust during construction. It would be helpful to identify which specific practices are expected to be used.	Mitigation measures designed to reduce fugitive dust emissions were listed in Section 5.16.4 (Mitigation) of the DEIS and have been moved to Section 5.23 of the FEIS. They include: 1) Use dust abatement techniques such as applying water or dust retardant chemicals as needed during construction to control fugitive dust emissions; 2) Reduce the amount of the disturbed land area where possible to control fugitive dust emissions; and 3) Cover or maintain at least two feet of freeboard for all trucks hauling dirt, sand, soil, or other loose materials to control fugitive dust emissions.

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L30	222	EPA	5.16	5.16.2.2	Table 5.16-6	This table should include emission levels in tons per day (TDY) as well as tons per year (TPY). We recommend the information and data used to calculate the Mainline Construction Emissions be included in an appendix to the EIS. This information should provide an itemized breakdown of the mobile and non-mobile emissions sources and their emission levels. Clarify whether these estimates factor in winter and summer construction?	Table 5.16-6 of the DEIS provided emissions information for mobile and non-mobile sources. Appendix O of the FEIS includes information used to calculate emissions estimates. Subsection 5.16.1.5 of the DEIS provided information on the baseline air quality in the Project area. Subsection 5.16.1.1 of the DEIS provided climate information for the Project area. Worst case analyses were used to calculate the emissions provided in the construction emissions tables in Section 5.16 of the DEIS, including emissions in winter months where winter construction is anticipated. Additionally, operational emissions are consistent during fall, winter, spring and summer months. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during both the summer and winter seasons. Detailed geography and climate data associated with air quality for the Fairbanks area was included in Section 5.15 (Public Health) of the DEIS, Subsection 5.15.4.2 (Proposed Action, Fairbanks Geography and Climate) of the DEIS. This information is provided in the same sections of the FEIS. Table 5.16-5 of the DEIS provided a list of construction equipment proposed for use on the proposed Project. Estimated emission levels for construction were provided in Tables 5.16-6, 5.16-7, and 5.16-17 of the DEIS on a tons per year basis. All information on fuel type provided by AGDC was incorporated into the calculations in the tables listed above. Calculations were not provided in tons per day, as this level of detail is currently unavailable (i.e. what construction and operations equipment is operating on a daily basis). As presented in the Project Description, Section 2 of the DEIS, backup generators at the Gas Conditioning Facility and Compressor Stations are proposed. These generators will be powered electrically, where available, or by fuel in areas where electricity is not available.

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L30	223	EPA	5.16	5.16.2.2		It appears that Option 2, using the existing would have the least air quality impact during construction. If this option is not used, a clear reason why would be needed.	As discussed in Section 2 (Project Description), Subsection 2.2.3.2 (Waterbody Crossings, Yukon River Crossing Options) of the DEIS, 'The HDD crossing (Option 3) would require a 1 acre work area at each end of the crossing. The work area would be within the pipeline TCE. The feasibility of an HDD crossing is unknown at this time due to limited soil information. If the soils are similar to those found during the geotechnical exploration of the E.L. Patton Yukon River Bridge 0.6 mile upstream, then the HDD method may not be feasible due to the presence of gravel and fractured bedrock. Further study is required to investigate and evaluate the in-situ soils, analyze scour limitations, and to address seismic concerns.' While HDD may have the least impact to air, it has the greatest impact to noise, as HDD operations run 24 hours. As part of the final design process, impacts to all resources, as well as crossing method feasibility would be reviewed to determine the selected crossing method.

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L30	224	EPA	5.16	5.16.2.2		Transportation conformity and general conformity needs to be carefully assessed since the Fairbanks area is a non attainment area for 24-hour PM2.5 NAAQS. As such, construction emissions and air quality impacts (from PM2.5 and its precursors) need to be consistent with the PM2.5 Attainment Plan being prepared by ADEC that is due in December 2012.	Analysis of the portion of the pipeline located within the FNSB was included in Subsection 5.16.2.2 of the DEIS, Proposed Action, Fairbanks Lateral. Mitigation measures for the Project were included in Subsection 5.16.4 of the DEIS, Mitigation, and have been moved to Section 5.23 of the FEIS. A discussion of General Conformity is included in Section 5.16.3. While in many pipeline related EISs, a preliminary General Conformity Analysis is provided based on applicant supplied emission estimates for those emissions that are subject to the General Conformity Rule, the detailed information needed to complete such a General Conformity Analysis has not been provided for this proposed Project. Information required would include transportation equipment lists, construction schedules, and other similar details in order to calculate emissions estimates for the Fairbanks lateral construction and operation as well as for the use of the four proposed material sites and one proposed construction camp and pipeline yard. Since the proposed Project would require several federal decisions to allow it to proceed, USACE as the lead federal agency will conduct a General Conformity Analysis when the required information is received from AGDC. Given the current state of the design process, this analysis may occur independent of the publication of the FEIS, but would occur prior to any federal decision. Transportation conformity applies to transportation plans, transportation improvement programs, and projects funded or approved by the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA) in nonattainment areas, and would not be required for the Project.
L30	225	EPA	5.16	5.16.2.2		Additional emissions calculations should be conducted for construction and operations of a number of aboveground facilities that have not been included in the DEIS. Emissions calculations should be conducted for the proposed 37 Mainline Valves, meter stations, pig	Section 5.16.2.2 (Proposed Action, Aboveground Facilities) of the DEIS states, 'Construction of aboveground facilities would normally be conducted with pipeline facilities construction (see above Pipeline Facilities section). Therefore, the mainline construction emissions shown in Table 5.16-6 include emissions from

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						launcher/receiver facilities, gas flaring, ports of entry, air strips, helipads, cathodic protection facilities, pipe connector facilities, construction of access roads and TEWS, etc. The EIS should explain why the emissions inventory and emission estimates have not been calculated for these aboveground facilities.	all other aboveground facilities construction activities (as specified under this section: Gas Conditioning Facility, Compressor Stations, Straddle and Off-Take Facility, Cook Inlet Natural Gas Liquids (NGL) Extraction Plant Facility, Mainline Valves and Pig Launcher/Receivers, Operations and Maintenance Buildings, Construction Camps and Pipeline Yards, and Material Sites) except for the fugitive dusts (PM, PM-10, and PM-2.5) emissions which are specified in each of the corresponding aboveground facility sections below.' Operational emissions from these sources would result in fugitive emissions, which are also addressed in the Air Quality section, '...while there may be fugitive emissions from pipeline connections (e.g., valves) such emissions are generally very minor in nature and typically are not subject to the requirement to obtain a permit. Fugitive emissions for the mainline valves are specifically included in the air quality calculations in the appendix that will be included in the Final EIS. Likewise, emissions from ports of entry, air strips, and helipads were considered, "very minor in nature and typically are not subject to the requirement to obtain a permit". TEWS were not included in Table 2.1-3 and as discussed in the text before the table, 'Note that additional lands would be required during construction for temporary extra workspaces (TEWS)...With the exception of the HDD crossings at the Yukon, Nenana, and Tanana Rivers the locations of these workspaces are not available and have, therefore, not been included in the total land requirements. It is estimated that the TEWS associated with these HDD crossings would require approximately 2 acres of uplands each for a total land use of 6 acres.' Fugitives from construction of access roads are included with the fugitive dust provided in Tables 5.16-6 and 5.16-7 (see footnote e).

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L30	226	EPA	5.16	5.16.2.2	Table 5.16-7	This table should include emission levels in tons per day (TDY) as well as tons per year (TPY). We recommend the information and data used to calculate the Fairbanks Lateral Construction Emissions is included in an appendix to the EIS. This information should provide an itemized breakdown of the mobile and non-mobile emissions sources and their emission levels. Clarify whether these estimates factor in winter and summer construction?	Table 5.16-7 of the DEIS provided emissions information for mobile and non-mobile sources. Appendix O of the FEIS includes information used to calculate emissions estimates. Please also see response to EPA comments 30-25 and 30-218.
L30	227	EPA	5.16	5.16.2.2	Table 5.16-8	For each emission source identified for the Operations and Maintenance Equipment per Spread, we recommend also including the estimated emissions levels for each source in tons per day and tons per year basis. Clarify whether these estimates factor in winter and summer construction? Identify for each emission source the fuel type: natural gas and/or diesel. We anticipate that diesel powered generators will be required as a backup for all aboveground facilities in the event natural gas is shut off.	Table 5.16-8 of the DEIS included a list of equipment proposed for the operation of the Gas Conditioning Facility, and emissions were included in Table 5.16-8 of the DEIS. Appendix O of the FEIS includes information used to calculate emissions estimates. Subsection 5.16.1.5 of the DEIS provided information on the baseline air quality in the Project area. Subsection 5.16.1.1 of the DEIS provided climate information for the Project area. Worst case analyses were used to calculate the emissions provided in the construction emissions tables in Section 5.16 of the DEIS, including emissions in winter months where winter construction is anticipated. Additionally, operational emissions are consistent during fall, winter, spring and summer months. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during both the summer and winter seasons. Detailed geography and climate data associated with air quality for the Fairbanks area was included in Section 5.15 (Public Health) of the DEIS, Subsection 5.15.4.2 (Proposed Action, Fairbanks Geography and Climate). This information is provided in the same sections of the FEIS. Table 5.16-5 of the DEIS provided a list of construction equipment proposed for use on the proposed Project. Estimated emission levels for construction were provided in Tables 5.16-6, 5.16-7, and 5.16-17 of the DEIS on a tons per year basis. All information on fuel type provided by AGDC was

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							incorporated into the calculations in the tables listed above. Calculations were not provided in tons per day, as this level of detail is currently unavailable (i.e. what construction and operations equipment is operating on a daily basis). As presented in the Project Description, Section 2 of the DEIS, backup generators at the Gas Conditioning Facility and Compressor Stations are proposed. These generators will be powered electrically, where available, or by fuel in areas where electricity is not available.
L30	228	EPA	5.16	5.16.2.2	Table 5.16-9	This table should include emission levels in tons per day (TDY) as well as tons per year (TPY). Clarify whether these estimates factor in winter and summer construction? We recommend the information and data used to calculate the Gas Conditioning Facility Operations Emissions be included in an appendix to the EIS.	Tables 5.16-8, 5.16-10, 5.16-12, and 5.16-14 of the DEIS included a list of equipment proposed for the operation of the Gas Conditioning Facility, Compressor Stations, Straddle and Off-Take Facility and NGL Extraction Plant. Appendix O of the FEIS includes information used to calculate emissions estimates, such as equipment rating, emission factors, fuel type, and expected operational hours. Worst case analyses were used to calculate the operational emissions provided in Tables 5.16-9, 5.16-11, 5.16-13, and 5.16-15. The DEIS presented emissions in tons per year in order to compare total emissions to regulatory permitting thresholds. All available information on equipment rating, emission factors, fuel type, and expected operational hours were incorporated into the emission calculations. Calculations were not provided in tons per day, as this level of detail is currently unavailable (i.e. what construction and operations equipment is operating on a daily basis). It was assumed that all equipment would operate 8760 hours per year (all day, all year), with the exception of the flares. In conclusion, operational emissions are assumed be consistent during fall, winter, spring and summer months – providing a most conservative (worst-case) impact analysis. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during all seasons. As presented in the Project Description, Section 2 of the DEIS, backup generators at the Gas

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							Conditioning Facility and Compressor Stations are proposed. These generators will be powered electrically, where available, or by fuel in areas where electricity is not available.
L30	229	EPA	6.16	6.16.2.2	Table 5.16-10	For each emission source identified for the Compressor Station Emission Unit Inventory, we recommend also including the estimated emissions levels for each source in tons per day and tons per year basis. Clarify whether these estimates factor in winter and summer construction? Identify for each emission source the fuel type: natural gas and/or diesel. We anticipate that diesel powered generators will be required as a backup for all aboveground facilities in the event natural gas is shut off.	Table 5.16-10 of the DEIS included a list of equipment proposed for the operation of the compressor station. Appendix O of the FEIS includes information used to calculate emissions estimates. Subsection 5.16.1.5 of the DEIS provided information on the baseline air quality in the Project area. Subsection 5.16.1.1 of the DEIS provided climate information for the Project area. Worst case analyses were used to calculate the emissions provided in the construction emissions tables in Section 5.16 of the DEIS, including emissions in winter months where winter construction is anticipated. Additionally, operational emissions are consistent during fall, winter, spring and summer months. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during both the summer and winter seasons. Detailed geography and climate data associated with air quality for the Fairbanks area was included in Section 5.15 (Public Health) of the DEIS, Subsection 5.15.4.2 (Proposed Action, Fairbanks Geography and Climate). This information is provided in the same sections of the FEIS. Table 5.16-5 of the DEIS provided a list of construction equipment proposed for use on the proposed Project. Estimated emission levels for construction were provided in Tables 5.16-6, 5.16-7, and 5.16-17 of the DEIS on a tons per year basis. All information on fuel type provided by AGDC was incorporated into the calculations in the tables listed above. Calculations were not provided in tons per day, as this level of detail is currently unavailable (i.e. what construction and operations equipment is operating on a daily basis). As presented in the Project Description, Section 2 of the DEIS, backup generators at the Gas Conditioning Facility and Compressor Stations are proposed. These generators will be powered electrically,

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							where available, or by fuel in areas where electricity is not available.
L30	230	EPA	5.16	5.16.2.2	Table 5.16-11	This table should include emission levels in tons per day (TDY) as well as tons per year (TPY). Clarify whether these estimates factor in winter and summer construction? We recommend the information and data used to calculate the Compressor Station Operations Emissions be included in an appendix to the EIS.	Table 5.16-9 of the DEIS provided emissions information for the operation of the Gas Conditioning Facility. Appendix O of the FEIS includes information used to calculate emissions estimates. Worst case analyses were used to calculate the operational emissions provided in Tables 5.16-9, 5.16-11, 5.16-13, and 5.16-15. The DEIS presented emissions in tons per year in order to compare total emissions to regulatory permitting thresholds. All available information on equipment rating, emission factors, fuel type, and expected operational hours were incorporated into the emission calculations. Calculations were not provided in tons per day, as this level of detail is currently unavailable (i.e. what construction and operations equipment is operating on a daily basis). It was assumed that all equipment would operate 8760 hours per year (all day, all year), with the exception of the flares. In conclusion, operational emissions are assumed be consistent during fall, winter, spring and summer months – providing a most conservative (worst-case) impact analysis. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during all seasons. As presented in the Project Description, Section 2 of the DEIS, backup generators at the Gas Conditioning Facility and Compressor Stations are proposed. These generators will be powered electrically, where available, or by fuel in areas where electricity is not available.
L30	231	EPA	6.16	6.16.2.2	Table 5.16-12	Correct the title of Table. Change from "Compressor Station Emission Unit Inventory" to "Straddle and Off-Take Facility Operations Emissions." For each emission source identified for the Straddle and Off-Take Facility Operations Unit Inventory, we recommend also including the estimated emissions levels for each source in tons per day and tons per year basis. Identify for	The title of Table 5.16-12 has been corrected in the FEIS to read, 'Straddle and Off-Take Facility Emission Unit Inventory'.

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						each emission source the fuel type: natural gas and/or diesel. We anticipate that diesel powered generators will be required as a backup for all aboveground facilities in the event natural gas is shut off.	
L30	232	EPA	6.16	6.16.2.2	Table 5.16-13	This table should include emission levels in tons per day (TDY) as well as tons per year (TPY). Clarify whether these estimates factor in winter and summer construction? We recommend the information and data used to calculate the Straddle and Off-Take Facility Operations Emissions be included in an appendix to the EIS.	Table 5.16-13 of the DEIS provided emissions information for the operation of the Straddle and Off-Take Facility. Appendix O of the FEIS includes information used to calculate emissions estimates. Subsection 5.16.1.5 of the DEIS provided information on the baseline air quality in the Project area. Subsection 5.161.1 of the DEIS provided climate information for the Project area. Worst case analyses were used to calculate the emissions provided in the construction emissions tables in Section 5.16 of the DEIS, including emissions in winter months where winter construction is anticipated. Additionally, operational emissions are consistent during fall, winter, spring and summer months. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during both the summer and winter seasons. Detailed geography and climate data associated with air quality for the Fairbanks area was included in Section 5.15 (Public Health) of the DEIS, Subsection 5.15.4.2 (Proposed Action, Fairbanks Geography and Climate) of the DEIS. This information is provided in the same sections of the FEIS. Table 5.16-5 of the DEIS provided a list of construction equipment proposed for use on the proposed Project. Estimated emission levels for construction were provided in Tables 5.16-6, 5.16-7, and 5.16-17 of the DEIS on a tons per year basis. All information on fuel type provided by AGDC was incorporated into the calculations in the tables listed above. Calculations were not provided in tons per day, as this level of detail is currently unavailable (i.e. what construction and operations equipment is operating on a daily basis). As presented in the Project Description, Section 2 of the DEIS, backup generators at the Gas

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							Conditioning Facility and Compressor Stations are proposed. These generators will be powered electrically, where available, or by fuel in areas where electricity is not available.
L30	233	EPA	5.16	5.16.2.2	Table 5.16-14	For each emission source identified for the Compressor Station Emission Unit Inventory, we recommend also including the estimated emissions levels for each source in tons per day and tons per year basis. Clarify whether these estimates factor in winter and summer construction? Identify for each emission source the fuel type: natural gas and/or diesel. We anticipate that diesel powered generators will be required as a backup for all aboveground facilities in the event natural gas is shut off.	Tables 5.16-8, 5.16-10, 5.16-12, and 5.16-14 of the DEIS included a list of equipment proposed for the operation of the Gas Conditioning Facility, Compressor Stations, Straddle and Off-Take Facility and NGL Extraction Plant. Appendix O of the FEIS includes information used to calculate emissions estimates, such as equipment rating, emission factors, fuel type, and expected operational hours. Worst case analyses were used to calculate the operational emissions provided in Tables 5.16-9, 5.16-11, 5.16-13, and 5.16-15. The DEIS presented emissions in tons per year in order to compare total emissions to regulatory permitting thresholds. All available information on equipment rating, emission factors, fuel type, and expected operational hours were incorporated into the emission calculations. Calculations were not provided in tons per day, as this level of detail is currently unavailable (i.e. what construction and operations equipment is operating on a daily basis). It was assumed that all equipment would operate 8760 hours per year (all day, all year), with the exception of the flares. In conclusion, operational emissions are assumed be consistent during fall, winter, spring and summer months – providing a most conservative (worst-case) impact analysis. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during all seasons. As presented in the Project Description, Section 2 of the DEIS, backup generators at the Gas Conditioning Facility and Compressor Stations are proposed. These generators will be powered electrically, where available, or by fuel in areas where electricity is not available.

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L30	234	EPA	5.16	5.16.2.2	Table 5.16-15	Correct the title of Table. Change from "Compressor Station Emission Unit Inventory" to "NGL Extraction Plant Facility Operations Emissions." This table should include emission levels in tons per day (TDY) as well as tons per year (TPY). Clarify whether these estimates factor in winter and summer construction? We recommend the information and data used to calculate the NGL Extraction Plant Facility Operations Emissions be included in an appendix to the EIS.	The heading to table 5.16-15 has been corrected as requested. Estimated emissions for construction and operation were provided in Section 5.16.2 of the DEIS. Appendix O of the FEIS includes information used to calculate emissions estimates, such as equipment rating, emission factors, fuel type, and expected operational hours. The DEIS presented emissions in tons per year in order to compare total emissions to regulatory permitting thresholds. All available information on fuel type and expected operations, as provided by AGDC, was incorporated into the emission calculations. Calculations were not provided in tons per day, as this level of detail is currently unavailable (i.e. what construction and operations equipment is operating on a daily basis). Worst case analyses were used to calculate the construction emissions provided in the tables in Section 5.16.2 of the DEIS, including emissions in winter months where winter construction is anticipated. Additionally, operational emissions are consistent during fall, winter, spring and summer months. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during both the summer and winter seasons.
L30	235	EPA	5.16	5.16.2.2	Table 5.16-16	This table should include emission levels in tons per day (TDY) as well as tons per year (TPY). Clarify whether these estimates factor in winter and summer construction? We recommend the information and data used to calculate the Potential Camp Operations Emissions be included in an appendix to the EIS.	Table 5.16-16 of the DEIS provided emissions information for the construction camps. Appendix O of the FEIS includes information used to calculate emissions estimates. Subsection 5.16.1.5 of the DEIS provided information on the baseline air quality in the Project area. Subsection 5.16.1.1 of the DEIS provided climate information for the Project area. Worst case analyses were used to calculate the operational emissions provided in Tables 5.16-9, 5.16-11, 5.16-13, and 5.16-15. The DEIS presented emissions in tons per year in order to compare total emissions to regulatory permitting thresholds. All available information on equipment rating, emission

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							factors, fuel type, and expected operational hours were incorporated into the emission calculations. Calculations were not provided in tons per day, as this level of detail is currently unavailable (i.e. what construction and operations equipment is operating on a daily basis). It was assumed that all equipment would operate 8760 hours per year (all day, all year), with the exception of the flares. Operational emissions are assumed be consistent during fall, winter, spring and summer months – providing a most conservative (worst-case) impact analysis. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during all seasons. Detailed geography and climate data associated with air quality for the Fairbanks area was included in Section 5.15 (Public Health) of the DEIS, Subsection 5.15.4.2 (Proposed Action, Fairbanks Geography and Climate) of the DEIS. This information is provided in the same sections of the FEIS. Table 5.16-5 of the DEIS provided a list of construction equipment proposed for use on the proposed Project. Estimated emission levels for construction were provided in Tables 5.16-6, 5.16-7, and 5.16-17 of the DEIS on a tons per year basis. All information on fuel type provided by AGDC was incorporated into the calculations in the tables listed above.

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L30	236	EPA	5.16	5.16.2.2	Table 5.16-17	This table should include emission levels in tons per day (TDY) as well as tons per year (TPY). Clarify whether these estimates factor in winter and summer construction? We recommend the information and data used to calculate the Denali National Park Route Variation Construction Emissions be included in an appendix to the EIS.	Estimated emissions for construction and operation were provided in Section 5.16.2 of the DEIS. The DEIS presented emissions in tons per year in order to compare total emissions to regulatory permitting thresholds. All available information on fuel type and expected operations, as provided by AGDC, was incorporated into the emission calculations. Calculations were not provided in tons per day, as this level of detail is currently unavailable (i.e. what construction and operations equipment is operating on a daily basis). Worst case analyses were used to calculate the construction emissions provided in the tables in Section 5.16.2 of the DEIS, including emissions in winter months where winter construction is anticipated. Additionally, operational emissions are consistent during fall, winter, spring and summer months. Therefore, sufficient emissions information was provided to assess the impacts of these emissions during both the summer and winter seasons. Table 5.16-17 of the DEIS provided emissions information for the Denali National Park Route Variation. Appendix O of the FEIS includes information used to calculate these emissions estimates.
L30	237	EPA	5.16			The Air Quality section should include an air emission impact assessment that identifies the following: Develop an emission Inventory to provide an accounting of the sources of emissions and the total quantity of air pollutants emitted A key element of an impact assessment of air emissions is a comprehensive accounting of the sources and quantities of emissions from all aspects of a proposed project and alternatives. Emission sources include support activities such as site preparation, project construction and start-up, as well as operational activities. An emission inventory should cover all potential pollutant releases and cover a specific	The air quality analysis in Section 5.16-5 of the DEIS included discussion of predicted quantities of construction and operational emissions for all portions of the proposed Project, based on currently available information. The emissions calculations were based on a preliminary inventory of fuel burning equipment for construction and operation, as well as expected fugitive emissions from ground disturbances and open burning. While there may be fugitive emissions from pipeline connections (e.g., valves), such emissions are generally very minor and typically are not subject to the requirement to obtain a permit. Consequently, these emissions are not tabulated in the DEIS as explained within the document. Based on the current status of the

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						geographical area for a specific period of time. The inventory should include scaled schematics and process flow diagrams that identify product flow and emission-generating activities and points. Fugitive emission points, emission leaks and ancillary activities that have the potential to generate air emissions should be included for discussion.	design process for the proposed Project, the information necessary to prepare a more detailed emissions inventory, scaled schematics, or process flow diagrams are not currently available.
L30	238	EPA	5.16			The Air Quality section should include an air emission impact assessment that identifies the following: Modeled or otherwise predicted concentrations of air pollutants The purpose of air quality modeling is to determine whether or not emissions from the proposed project activities will cause adverse environmental impacts. Models are selected for their ability to predict changes in ambient air quality and any significant pollutant deposition associated with the preferred action and alternatives being considered. Identify what kind of model is necessary to consider air quality impacts (conceptual, simple statistical model, numerical dispersion model).	Project impacts were analyzed based on potential emissions calculated on a ton per year basis. Ambient air quality modeling (i.e., dispersion modeling) would be required in the permitting process to support the ADEC Title I Air Permit application for each required stationary source. AGDC would be required to follow guidance, regulations, and modeling software as directed by the ADEC.
L30	239	EPA	5.16			The Air Quality section should include an air emission impact assessment that identifies the following: An analysis of potential impacts on other aspects of the environment besides air, such as natural resources. For example, acidic deposition in one possible effect associated with emissions of sulfur oxides and nitrogen oxides. In this example, a mechanism for indirect adverse effects is the deposition sulfur oxides and nitrogen oxides which can contribute to acidic precipitation, and in the absence of sufficient buffering capacity, can cause the acidification of lakes and severe ecosystem impacts. Consider various pathways of exposure (direct contact and inhalation of particles or	Please see response to EPA comment 30-31.

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						gaseous pollutants) and potential impacts to receptors as a result of pathway exposure. Develop a conceptual model for any potentially significant direct or indirect pathway of exposure for natural resources.	
L30	240	EPA	5.16			The Air Quality section should include an air emission impact assessment that identifies the following: Contribution to GHG emissions Develop a GHG emission inventory that includes baseline emissions, projected related emissions, and emissions from reasonably foreseeable activities.	Please see response to EPA comment 30-32.
L30	241	EPA	5.20	5.20.2		Key Assumptions of the Cumulative Effects – we are not certain why there is a need for this section. Key assumptions include - there will be purchasers of the gas and for the NGL. In Section 1.0 Purpose and Need, the DEIS establishes the need for this project and would assume that purchasers/users are available based on the established need for this project.	This subsection includes more information than is provided in Section 1.0 and discusses why projects, for example, such as TAPs and existing north slope natural gas reserves are considered. We believe it provides additional information relative to the cumulative effects analysis.
L30	242	EPA	5.20	5.20.5.1		Geographic Scope – we recommend including a map that depicts the Cumulative Effects geographic scope for this project.	Figures 5.20-2 and 5.20-3 provide maps of the geographic scope of the projects analyzed for the cumulative effects analysis.
L30	243	EPA	5.20	5.20.2		Temporal Scope – keep it as 30 years rather than 60 years, change from (2011 to 2071) to (2012 to 2042). There will be additional supplemental NEPA documents prepared before the ASAP project could be constructed. BLM will have to do a supplemental EIS to grant the additional 30 year ROW renewal.	Discussions with BLM and Usage determined the temporal scope of the cumulative effects of analysis. BLM requested the 60 year period based on its time frame for the BLM ROW. USACE and cooperating agencies agreed. This information will be gathered during the USACE 404 permitting process.

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L30	244	EPA	5.20	5.20.5.3	1st bullet	Four pipelines connecting PB CGF to GCF. As mentioned in Section 3.0, we recommend including this into the proposed ASAP project as this does not have independent utility from the proposed pipeline, but is a mandatory component in order to transfer the gas through the pipeline to Fairbanks and Southcentral. Therefore, these four pipelines should also be evaluated in the Environmental Consequences section of the EIS.	The 4 aboveground pipelines that would connect the PB CGF to the GCF are not a part of the ASAP project proposed by the AGDC. They would be designed and constructed by others. The necessity of the 4 aboveground pipelines for the ASAP project to operate as described in the FEIS is recognized, and is the basis for their inclusion in the FEIS as a connected action. Section 3.0 of the FEIS states: "The proposed Project could not operate as planned without these connected actions in place, if an action would be unrealistic to exclude, it would be considered a connected action. Furthermore, these connected actions would not occur if the proposed Project is not constructed and operated as planned. Therefore, these actions would be connected to the proposed Project even though they would be planned and undertaken by others, and specific details are unknown at this time." The connected actions are described and analyzed based upon the best available information in Section 3.0 of the FEIS. FEIS Section 5.20.6.2, Cumulative Effects of the Proposed and Connected Actions, has been revised to clarify that the connected actions are considered in the analysis of cumulative effects to be connected to the proposed Project as opposed to reasonably foreseeable actions that are speculative and less certain.
L30	245	EPA	5.20	5.20.5.4	Table 5.20-1	Include a separate category for “Mining” and include Donlin, Chuitna, Usibelli, etc.	A separate category in the table and an additional paragraph of text was added to address mining.
L30	246	EPA	5.20	5.20.5.4		It states, “For a detailed discussion of the relationship of TAPS to the Project, APP and Dalton/Elliott Highways see Section 5.20.5.4.” This statement is made within the section that it says to go see. Is there some other part of the text that the reader is supposed to be referred to?	FEIS Section 5.20.5.4, subheading TransAlaska Pipeline System, has been revised to direct the reader to the correct Section, 5.20.6.5.

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L30	247	EPA	5.20	5.20.5.4		The Alaska Pipeline Project – Another component of their project is a Point Thomson Gas Transmission Pipeline, consisting of approximately 58.4 miles of a buried 32-inch diameter pipeline from the Point Thomson Unit to an APP proposed GTP and associated facilities near Prudhoe Bay.	The final EIS describes in section 5.20.5.4 under the subheading Point Thomson Gas Pipeline information: "In July, 2012, the USACE completed a FEIS for a proposed exploration, production and pipeline system at Point Thomson on the North Slope. The proposed Point Thompson facility would include a central gravel pad for wells and facilities, two satellite gravel pads for wells, an airstrip, a service dock, a sealift facility and barge mooring dolphins (dredging of around 1500 cubic yards may be required), a gravel mine site, infield gravel roads, and infield gathering pipelines. A 23-mile-long export pipeline would also be constructed to transport hydrocarbon liquids from Point Thomson to existing common carrier pipelines at the Badami Development. The Point Thompson facility would also include infrastructure such as a waste injection well, communications towers and staging facilities at Badami, Prudhoe Bay, and/or Deadhorse (USACE 2011). The Point Thomson facilities would occur within or near the northern portion of the proposed ASAP Project."
L30	248	EPA	5.20	5.20.5.4		It states, "For a detailed discussion of the relationship of APP to the Project, TAPS and Dalton/Elliott Highways see Section 5.20.5.4." This statement is made within the section that it says to go see. Is there some other part of the text that the reader is supposed to be referred to?	The subject sentence in Section 5.20.5.4 has been corrected to state, "For a detailed discussion of the relationship of APP to the Project, TAPS and Dalton/Elliott Highways see Section 5.20.6.5."
L30	249	EPA	5.20	5.20.5.5		We recommend including information from the *Fairbanks North Star Borough Gas System Distribution Analysis Preliminary Executive Summary Report (February 14, 2012)* into the Cumulative Effects section. The final report is expected May 2012. This information should be used to consider refinements to the proposed alternatives and route alignments.	The final report - Fairbanks North Star Borough Gas Distribution System Analysis (June 29, 2012) has been cited in Section 5.20 of the FEIS. Findings from the report have been incorporated in to Section 5.20.5.5 of the FEIS. The findings of the report do not necessitate changes in ASAP alternatives and route alignments.

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L30	250	EPA	5.20	5.20.6.2		Borrow Materials – include analysis for areas such as Minto Flats and areas south of Willow where there are no known borrow sites. We recommend including the location of proposed new borrow sites in order to analyze the direct and cumulative impacts more accurately. Additional new permanent and temporary access roads would also be required to access these new borrow sites, thereby increasing the cumulative impacts, especially in more remote areas where access is limited now.	As stated in Section 2.1.3.3 of the FEIS, the AGDC has identified 546 existing material sites using the ADOT&PF material site information sources and expects that the use of these sites would be sufficient to meet the proposed Project's needs. Appendix P has been added to the FEIS and provides a listing of all existing material sites identified by AGDC. Table 5.1-4 notes that a total of 13,079,000 cubic yards will be needed for the mainline construction. The identified material sites have approximately 194,123,000 cy of material available. Further evaluation of material sites will be conducted during more detailed design phase of the project. Usage of particular sites will be determined during final design and issues related to access, public safety and human health will be taken into consideration along with construction requirements when choosing material site locations. This information will be gathered during the USACE 404 permitting process.
L30	251	EPA	5.20	5.20.6.2		Groundwater – evaluate impacts to drinking water wells, and underground sources of drinking water, aquifers, springs, and seeps on the overall cumulative effects.	Impacts to ground water and water quality are addressed in section 5.20.
L30	252	EPA	5.20	5.20.6.2		Water Quality – discuss cumulative effects associated with the Fairbanks Lateral and impacts to Goldstream Creek – a category 5 303(d) listed impaired waterbody for turbidity. We recommend additional discussion regarding the cumulative effects of construction on Goldstream Creek when considered with other past and present actions in the watershed.	Impacts to specific waterbodies have not been addressed at this time in part because the project is in an early design phase. Following final design, AGDC will apply for all waterbody crossing permits and at that time will evaluate and address impacts to specific water bodies. This information will be gathered during the USACE 404 permitting process.

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L30	253	EPA	5.20	5.20.6.2		It states, "The proposed Project would result in the temporary disturbance of an estimated total of 5,036 acres of wetlands during construction of the mainline pipeline system, and an estimated 1,808 acres of wetlands within the permanent ROW." 1. These numbers do not include the Fairbanks Lateral, the Denali National Park Route Variation, or any permanent access roads; and are therefore misleadingly small. 2. The sentence, as written, implies that the 1,808 acres of wetlands within the permanent ROW would be temporarily (not permanently) disturbed.	FEIS Section 5.20.6.2, Wetlands, has been revised to accurately identify temporary and permanent wetland impacts for all segments and variations of the proposed ASAP project. Within the Denali National Park route variation, there would be a total of 4.4 acres of construction impacts and 0.9 acres of permanent impacts. The wetlands impacts that would occur from the Denali National Park Route Variation would occur in place of the impacts from the corresponding Mainline segment (MP 540 to MP 555). In addition, permanent impacts to wetlands resulting from the new permanent access roads are now discussed as follows: "The final locations of the new permanent access roads are unknown; however, it is estimated that new permanent access roads would permanently affect 164 acres of wetlands (Table 5.4-7)."
L30	254	EPA	5.20	5.20.6.2		It states, "Final location of the approximately 545 acres of vegetation that would be impacted by the permanent roads is unknown. However, the bulk of the area set aside for permanent roads would be located within the Minto Flats State Game Refuge where there is little opportunity to avoid wetlands. Therefore, there could be 300 acres of wetlands lost through the final placement of permanent roads." This is the only place that this reviewer was able to find in the DEIS that estimated the extent of wetland impacts due to permanent roads. The acreage of wetlands disturbed in the permanent ROW for the mainline pipeline system alone (not including the Fairbanks Lateral) is stated to be 1,808 acres. An additional 300 acres for permanent roads is an increase of more than 16%. The locations of permanent roads are apparently known by the project proponent; Appendix D lists locations and lengths of all access roads. Why then, is there no firm number of acres of wetlands associated with those roads presented	Access road acreages and details regarding impacts to wetlands have been added to Section 5.4 of the FEIS.

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						in this DEIS? And why is there no map showing the locations of those roads vis-à-vis wetland types?	
L30	255	EPA	5.20	5.20.6.2		We recommend including a map that identifies all the proposed temporary and permanent gravel access roads. This map should be overlain on wetlands aerial maps. We recommend more robust cumulative effects analysis on wetlands in the Minto Flats Wetlands Complex resulting from construction of the pipeline, permanent gravel access roads, and future borrow sites in the area. Additional access roads would increase impacts to wetland resources.	Information regarding new permanent and temporary construction access roads, and material site locations in the Minto Flats complex (MP 405 – MP 458) is incorporated within the analysis of the MP 0 – MP 540 segment in the body of the FEIS. The Minto Flats section of the proposed alignment is not being comparatively evaluated against another route alternative and is therefore not presented separately. Detailed information, however, is available in the appendices. Appendix D contains tables identifying the specific new permanent access roads by specific pipeline mile post and their areas of disturbance. A digital web-viewer was provided to agencies depicting Access Roads. Appendix P contains tables identifying specific existing material sites by mile post and the volume of material available under current permits. ASAP intends to use gravel from existing sources and no new material sites are contemplated in the Minto Flats complex. Additional information will be available during the permitting process.
L30	256	EPA	5.20	5.20.6.2		It states, “Overall, the Project could result in the loss of an estimated 400 acres associated with permanent facilities and potential long-term gradation of the 5,390 acres of wetlands in the footprint cleared for construction as well as wetlands in the permanent right-of-way.” Is “degradation” meant instead of “gradation”?	Comment acknowledged.
L30	257	EPA	5.20	5.20.6.2		Change APP GCF to GTP – Gas Treatment Plant. The total area for the GTP is 235 acres and not 70 acres.	This change will be addressed in the FEIS.
L30	258	EPA	5.20	5.20.6.2		Footnote 8 should have a period, and not a comma, at the end.	This change will be addressed in the FEIS.

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L30	259	EPA	5.20	5.20.6.2		We recommend including a map that identifies all the proposed temporary and permanent gravel access roads. We recommend more robust cumulative effects analysis on floodplains in the Minto Flats Wetlands Complex resulting from construction of the pipeline, permanent gravel access roads, and future borrow sites in the area. Additional access roads would increase impacts to floodplain resources from hunting, trapping, etc.	A more robust cumulative effects analysis regarding the effect of the project on wetlands within the Minto Flats State Game Refuge was added to both Section 5.4 (Wetlands) and Section 5.20 (Cumulative). The estimates of acres of wetlands affected by the various project features have changed since the first draft of the EIS based on additional information provided by AGDC. Appendix D contains tables identifying the specific new permanent access roads by specific pipeline mile post and their areas of disturbance. A digital web-viewer was provided to agencies depicting Access Roads. Appendix P contains tables identifying specific existing material sites by mile post and the volume of material available under current permits. ASAP intends to use gravel from existing sources and no new material sites are contemplated in the Minto Flats complex. Additional information will be available during the permitting process.
L30	260	EPA	5.20	5.20.6.2		We recommend a more robust cumulative effects analysis on the wildlife impact in the Minto Flats area resulting from the construction of the pipeline, permanent gravel access roads, and future borrow sites in the area. Additional access roads would increase impacts to wildlife resources.	A full quantitative and qualitative analysis of the impacts will be completed following final design and will be incorporated into any permit applications or NEPA documents that are generated at that time. This information will be gathered during the USACE 404 permitting process.
L30	261	EPA	5.20	5.20.6.2		The location and assessment of the freshwater lakes for water withdrawal along the project corridor has not been completed. Therefore, we are not certain how the cumulative effects can be fully known and disclosed. We recommend providing information regarding water withdrawal and the assessment of freshwater lakes for this EIS to be completed.	The locations for and the volume of water withdrawal from freshwater lakes and/or streams will not be available until more extensive design and field work have been completed. This information will be gathered during the USACE 404 permitting process.

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L30	262	EPA	5.20	5.20.6.2		Cultural and Historic Resources – further evaluate cumulative impacts in the Minto Flats Wetlands Complex resulting from further access to the area from new permanent access roads, borrow sites, etc. The Minto Flats are a cultural and historical area for the athabascan tribes.	Information regarding new permanent and temporary construction access roads, and material site locations in the Minto Flats complex (MP 405 – MP 458) is incorporated within the analysis of the MP 0 – MP 540 segment in the body of the FEIS. The Minto Flats section of the proposed alignment is not being comparatively evaluated against another route alternative and is therefore not presented separately. Detailed information, however, is available in the appendices. Appendix D contains tables identifying the specific new permanent access roads by specific pipeline mile post and their areas of disturbance. A digital web-viewer was provided to agencies depicting Access Roads. Appendix P contains tables identifying specific existing material sites by mile post and the volume of material available under current permits. ASAP intends to use gravel from existing sources and no new material sites are contemplated in the Minto Flats complex. Additional information will be available during the permitting process.
L30	263	EPA	5.20	5.20.6.2		Subsistence Resources - further evaluate cumulative impacts in the Minto Flats Wetlands Complex resulting from further access to the area from new permanent access roads, borrow sites, etc. The Minto Flats are a subsistence resource area for the athabascan tribes.	Information regarding new permanent and temporary construction access roads, and material site locations in the Minto Flats complex (MP 405 – MP 458) is incorporated within the analysis of the MP 0 – MP 540 segment in the body of the FEIS. The Minto Flats section of the proposed alignment is not being comparatively evaluated against another route alternative and is therefore not presented separately. Detailed information, however, is available in the appendices. Appendix D contains tables identifying the specific new permanent access roads by specific pipeline mile post and their areas of disturbance. A digital web-viewer was provided to agencies depicting Access Roads. Appendix P contains tables identifying specific existing material sites by mile post and the volume of material available under current permits. ASAP intends to use gravel from existing sources and

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							no new material sites are contemplated in the Minto Flats complex. Additional information will be available during the permitting process.
L30	264	EPA	5.20	5.20.6.2		The DEIS states that the cumulative effect on air quality will be developed during the permit process. However, the CEQ regulations require that an EIS consider cumulative impacts along with the direct and indirect impacts of a proposed project and alternatives. The Air Quality section should include an air emission impact assessment that identifies the following: Cumulative Impact Emissions from the project and other sources included in the cumulative impact section should be identified Receptors and ecosystems such as people living in the area of impact Develop a conceptual model linking emissions and impacts, such as a narrative description, cause-effect diagrams, and emission receptor-impact matrices. Use the model to guide the impact in the cumulative analysis context Use the analysis to estimate effects in the cumulative context (e.g., air quality modeling or deposition modeling). Produce an estimate change from baseline condition to determine whether or not the change is significant.	To the extent possible based on available data for the projects, cumulative effects were analyzed in Subsection 5.20.6.3 (Tourism, Recreation, and Wilderness Resources) of the DEIS. Statements from the analysis included: • 'There may be potential interactions between the emissions from Project compressor stations and compressor stations for APP, depending on proximity of the APP stations to Project Stations. Emissions from the straddle/take-off facility would not interact with other existing or reasonably foreseen projects.' • 'Because of the expected general size and horsepower of a new LNG facility and associated facilities in the same general area, no appreciable adverse cumulative air quality emissions are expected as long as air quality standards are met. Any modification of the existing GCF to accommodate the production of natural gas to meet the requirements for APP system are subject to detailed permitting. Neither the Project nor the new LNG facilities on the North Slope are expected to have an adverse impact on the ability of the APP to meet required air quality standards. Point Thomson is not expected to require additional facilities or development in the Prudhoe Bay area. As such, there would be no cumulative air quality impacts associated with that project.' • 'There would be long-term positive improvement of air quality to the extent natural gas is substituted for wood or fuel oil as a source of heating. Likewise, the air quality would be further improved to the extent GVEA electrical generation and the Flint Hills Refinery could be economically converted from naphtha, diesel and coal to natural gas.' • 'The Connected Action of operating a conceptual

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							fractionating facility, tank farm and marine terminal at Nikiski would have cumulative effect on air quality. The extent and components of the cumulative air emissions would depend primarily on the site specific equipment and emission controls at the fractionation facility.'
L30	265	EPA	5.20	5.20.6.3		Greenhouse gases and climate change: The DEIS notes that from 1990 to 2005, Alaska's gross GHG emissions increased by 30 percent, while national emissions rose by 16 percent, and that on a per capita basis, Alaskans emitted about 79 metric tons of CO2-e in 2005, higher than the national average of 24 metric tons of CO2-e in 2005 and higher than any other state. It goes on to note that because GHGs affect global warming, the area of potential impact is the entire planet. Certain activities directly necessary for the project have the potential to generate GHG emissions, primarily from fuel combustion. These activities include construction activities at and adjacent to the project area; transportation of goods, materials, and workers to the project area; and operation activities at the project area. Although this section covers potential cumulative effects, the DEIS specifically excludes "Life cycle" GHGs, which refers to the GHG emissions generated during the original manufacture of equipment, vehicles, or construction materials, noting that such life cycle emissions are not considered part of the project related GHGs and are beyond the scope of this analysis. In addition, analysis of greenhouse gas emissions from consumption of produced natural gas is not part of the discussion. Whether you want to include them or not, these emissions are part of the total cumulative effect and should be considered. This section also looks at the predicted increasing rate of climate change then	Greenhouse gas emissions resulting from the proposed Project, potential effects, regulatory controls, and mitigation measures were included in Section 5.16 (Air Quality) of the DEIS, as required by February 2010 CEQ Guidance. Climate change effects were discussed in Subsection 5.20.6.3 (Tourism, Recreation, and Wilderness Resources, under Air Quality, Greenhouse Gases, and Global Climate Change and under Greenhouse Gases and Climate Change) of the DEIS. The discussion included comparison of proposed Project greenhouse gas emissions with both the state and national inventory, and indicated, 'Even with mitigation, the proposed Project and its connected actions would generate GHG emissions and incrementally contribute to climate change. However, when proposed Project emissions are viewed in combination with global emissions levels that are contributing to the existing cumulative impact on global climate change, the incremental contribution of GHG emissions would be cumulatively minor.' Greenhouse gases and climate change were analyzed to the extent possible in the DEIS. Relative to life cycle GHG emissions, the current state of proposed Project planning does not allow specification of the source of the goods, materials and work forces that could be associated with proposed Project implementation to the extent necessary to provide a full life cycle GHG analysis. While the DEIS acknowledged the existence of life cycle GHG emissions, it appropriately defined the boundary of Project related GHG emissions to exclude detailed analysis of these equipment/supply/transportation manufacturing related GHG emissions. Relative to consumption of natural gas

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						concludes that "Even with mitigation, the proposed Project and its connected actions would generate GHG emissions and incrementally contribute to climate change. However, when proposed project emissions are viewed in combination with global emissions levels that are contributing to the existing cumulative impact on global climate change, the incremental contribution of GHG emissions would be cumulatively minor". Rather than thinking that the project's significant level of GHG emissions is OK when looking at total global emissions, it would be better to acknowledge that project emissions would be significant cumulatively with other sources and over time. Again, supporting alternative, renewable energy development instead of the proposed project should be considered.	that would be transported by the proposed Project, such consumption would likely decrease the level of GHG emissions associated with fuel sources currently utilized in the Fairbanks and Cook Inlet areas of Alaska. The use of alternative renewable energy sources is not considered an alternative to the proposed Project since it is not consistent with the proposed Project's primary Purpose and Need. The primary purpose of the proposed Project is driven by Alaska State House Bill 369, to provide a long-term, stable supply of up to 500 MMscfd of natural gas and NGLs from existing reserves within North Slope gas fields to markets in the Fairbanks and Cook Inlet areas by the most direct and shortest line possible with production starting in 2019.
L30	266	EPA	5.22	5.22.2.1-7		5.22 Irreversible And Irretrievable Commitment Of Resources: The irreversible and irretrievable commitment of resources and the resulting effects are significant and should be carefully considered before moving forward with this project: 1. Large amounts of construction materials from 546 existing material sites would be committed to the project. Sands, gravels, rip rap, and other materials from would be required at various locations for infrastructure, pad construction, and production and ancillary facilities along the proposed Project right-of-way (ROW).	Section 5.22.2.1 of the FEIS has been revised to describe the level of environmental review that would be required prior to borrow excavation to appropriately assess the impacts of the borrow removal process. Usage of particular sites would be determined during final design and issues related to access, public safety and human health would be taken into consideration along with construction requirements when choosing material site locations. The revisions also state that Table 5.1-3 identifies that approximately 194,123,000 cy of material is available to provide the total of 13,079,000 cubic yards that would be needed for the mainline construction.
L30	267	EPA	5.22	5.22.2.1-7		2. Human effort would be irretrievably committed during the project planning, construction, and operation phases. Irreversible impacts to the physical setting would be associated with maintenance of access in the ROW. Various landform changes including earthwork and rock formation alteration, pipeline markers, and new	Comment content is addressed in section 5.22

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						aboveground structures located along the route such as compressor stations, mainline valves, pig launchers/receivers, and a straddle and off-take facility.	
L30	268	EPA	5.22	5.22.2.1-7		3. Timber resources would not be restored within the permanent project footprint, so there would be a long-term conversion and irretrievable loss of approximately 1,340 acres of forested land that could contain timber in these areas. The project would require a total of 1,088.02 million gallons of surface water for construction of ice workpads, ice access road construction, ice armoring of snow roads, earthwork, and hydrostatic testing of the pipeline and for horizontal directional drilling operations. Additional water would be needed for cleanup of equipment at camps and material sites, and construction camp usage.	Comment acknowledged. The referenced information is presented in Section 5.22 of the FEIS.
L30	269	EPA	5.22	5.22.2.1-7		4. Vegetation and habitats in the permanent pipeline ROW would be altered due to the requirements of maintenance and inspection activities. The presence of aboveground facilities would alter vegetation and habitats, resulting in changes to use patterns for wildlife. Disturbance of areas for temporary construction activities could result in changes to habitats that would be irreversible over the long term.	Comment acknowledged. The referenced information is presented in Section 5.22 of the FEIS.
L30	270	EPA	5.22	5.22.2.1-7		5. Cultural resources (archaeological sites, historic trails, structures and sites, cultural landscapes, and traditional cultural properties) are nonrenewable resources, and any loss of such resources would be irreversible and irretrievable. ROW and aboveground permanent facilities would potentially directly impact 37 known cultural resources and potentially impact an additional 693 sites outside the ROW, but within 1 mile of the ROW centerline.	The information cited in the comment is presented in Section 5.22.2.5 of the FEIS.

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L30	271	EPA	5.22	5.22.2.1-7		6. Proposed pipeline construction and operation would require permanent commitment of land for the ROW, access roads, and associated aboveground facilities. Land owners in the study area include the federal, state, and municipal governments, private citizens, and Native Corporations.	The information cited in this comment is included in Section 5.22.2.6 of the FEIS. TABLE 5.22-1 Land Ownership Affected by the Construction ROW (Acres) has been revised to present current information.
L30	272	EPA	5.22	5.22.2.1-7		7. All Project construction activities would consume fuel, mostly in the form of diesel. This would be an irreversible use of nonrenewable fossil fuels.	Comment content is addressed in section 5.22
L30	273	EPA	6.0		T 6.0-1	CEQ regulations specify that the environmental impacts of the proposal and the alternatives be provided in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public. However, a number of reasonable alternatives have been eliminated from detailed study in the DEIS. Substantial treatment of the other reasonable alternatives is necessary so that reviewers may evaluate their comparative merits. The DEIS fails to provide reviewers with the opportunity to compare impacts of the proposed action against other reasonable alternatives and variations, such as the Richardson Highway Alternative, Fairbanks Route variation, Port MacKenzie Railroad variation, and aboveground pipeline variation, etc. A balanced alternatives analysis would include comparison of these reasonable alternatives to the proposed action and the no action alternative. This table should also include a column for the No Action Alternative to compare with the proposed action.	The USACE has identified three EIS Alternatives (The Proposed Action, The No-Action Alternative, and The Denali Route Variation). They have also identified three Yukon River crossing options. Summaries and rankings of the impacts associated with the three Alternatives and the option within the Proposed Action have been added to the latest version of Section 6 - Conclusions.

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L30	274	EPA	Volume 3			The Corps has determined AGDC's 404 permit application to be incomplete. Will AGDC be able to provide the additional information needed by the Corps to make the application complete and to be incorporated in to the Final EIS? We recommend that a Corps Public Notice of a complete application be included in the appendix along with a draft Clean Water Act Section 404(b) (1) analysis.	A complete application has not been provided to the U.S. Army Corps of Engineers (USACE). Once USACE has received the complete application, the permitting process will begin. Through the decision process the LEDPA will be identified.
L30	275	EPA	Volume 3			This appendix, "404 (b)(1) Guideline Checklist", is a generic list of topics that should be covered in an analysis, and gives no information specific to the project that would help a permitting or commenting agency to make a decision on a Clean Water Act Section 404 permit application. To the best of our knowledge, no CWA 404 permit application has yet been made to the Corps by the project proponent.	A complete application has not been provided. Public notice will be provided once it is received. The Section 404 permitting process is being conducted by the U.S. Army Corps of Engineers independent of the EIS process. The 404(b) (1) analyses has not been conducted by the Corps and the LEDPA has not been identified. The Corps will utilize information from the FEIS and the Section 404 Permit Application process to identify the LEDPA. This information will be gathered during the USACE 404 permitting process.
L30	276	EPA	Volume 3			We recommend including in the project maps the proposed pipeline project on aerial photographs.	At this stage in the project aerial photographs are not available. Aerial photos of the project will be provided during the Corps 404 permitting process and the public notice will provide links to view them.
L30	277	EPA	Volume 3			Access Roads – Include a list for all proposed temporary gravel access roads and temporary winter ice/snow roads. Also, we recommend including a map depicting the location of all permanent and temporary gravel access roads and temporary winter ice/snow roads.	Detailed information on access roads (milepost origin, type, disturbance area) is presented in Appendix D. A digital web-viewer has been provided to agencies depicting this information (wetlands, access roads, material sites, camp laydown locations, etc.). Providing large scale maps of the entire route showing such detail is not practical in the document. Locations of temporary winter ice/snow roads will be identified during the permitting process.
L30	278	EPA	Volume 3			Stream Crossings Tables – For the Cross Mode, we recommend changing "TT" back to "HDD"	Comment acknowledged. The text has been revised for accuracy. TT was replaced with HDD in Appendix E of the FEIS.

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L30	279	EPA				Mitigation Measures – we recommend including monitoring programs and adaptive management. On February 18, 2010, CEQ issued draft guidance on the Appropriate Use of Mitigation and Monitoring. This guidance seeks to enable agencies to create successful mitigation planning and implementation procedures with robust public involvement and monitoring programs [1]. We recommend that the EIS include a discussion and analysis of proposed mitigation measures and compensatory mitigation under CWA §404. The EIS should identify the type of activities which would require mitigation measures either during construction, operation, and maintenance phases of this project. To the extent possible, mitigation goals and measureable performance standards should be identified in the EIS to reduce impacts to a particular level or adopted to achieve an environmentally preferable outcome. Mitigation measures could include best management practices and options for avoiding and minimizing impacts to important aquatic habitats and to compensate for the unavoidable impacts. Compensatory mitigation options could include mitigation banks, in-lieu fee, preservation, applicant proposed mitigation, etc. and should be consistent with the Compensatory Mitigation for Losses of Aquatic Resources; Final Rule (33 CFR Parts 325 and 332 and 40 CFR Part 230). A mitigation plan should be developed in compliance with 40 CFR Part 230 Subpart J 230.94, and included in the EIS. An environmental monitoring program should be designed to assess both impacts from the project and that mitigation measures being implemented are effective. The EIS should identify clear monitoring goals and objectives, such as what parameters are to be monitored,	A mitigation chapter has been added to the FEIS. Please see Section 5.23. This information will be gathered during the USACE 404 permitting process.

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						where and when monitoring will take place, who will be responsible, how the information will be evaluated, what actions (contingencies, triggers, adaptive management, corrective actions, etc.) will be taken based on the information. Furthermore, the EIS should discuss public participation, and how the public can get information on mitigation effectiveness and monitoring results. [1] See http://ceq.hss.doe.gov/current_developments/new_ceq_nepa_guidance.html.	
L30	280	EPA	Volume 3			Additional Appendices Corps Public Notice and Draft 404(b)(1) Analysis Water withdrawal – table and map with location of lakes Material source site – table and map with locations of material sites TEWS – table and map with location of lakes.	This change will be addressed in the FEIS. This information will be gathered during the USACE 404 permitting process.
L31	1	NOAA	5.6	Fish		1) The modest fisheries effort used to date does not accurately confirm the presence or absence of anadromous species; and 2) does not support the justification of the type of stream crossing to be designed and constructed as an elevated bridge or culvert, based on fisheries resources.	The text has been revised to state that permitting requirements for each stream crossing will include additional fish resource data (see Section 5.6). Section 5.23.2.6 states: Additional seasonal life history and habitat use information would be required to determine the construction schedule for all proposed stream crossings in order to protect fish and their habitat. All stream crossings would require permit approval from ADFG and NMFS. Collaborations with these agencies will define applicable and appropriate site-specific construction techniques and other mitigation for Project implementation.

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L31	2	NOAA	FISH	general comment		As described in the DEIS the proposed project may adversely affect EFH. The enclosed information provides the rationale for our determination. NMFS offers the following EFH Conservation Recommendations pursuant to Section 305(b)(4)(A) of the MSA: 1) NMFS recommends a more aggressive sampling effort be conducted to identify potential seasonal presence or absence of all 5 species of Pacific salmon at various life stages, prior to making decisions regarding waterbody crossing methods. Conducting surveys at proposed pipeline transects during spring, summer and fall seasons would provide a more accurate and defensible determination of seasonal anadromy.	The text has been revised for accuracy to state that additional fish sampling will be required to determine anadromy at stream crossings (see Section 5.6). Section 5.23.2.6 states: Additional seasonal life history and habitat use information would be required to determine the construction schedule for all proposed stream crossings in order to protect fish and their habitat. All stream crossings would require permit approval from ADFG and NMFS. Collaborations with these agencies will define applicable and appropriate site-specific construction techniques and other mitigation for Project implementation. Section 5.6.1 - Affected Environment, Essential Fish Habitat states: Each stream crossing proposed would require an approved ADFG Fish Habitat Permit, which would include the necessary site specific fish resource data to comply with permit requirements. The permit application process would determine the appropriate site specific crossing methods (open cut, open-cut isolation, HDD, or bridge) for protection of EFH. The collection of additional fish and fish habitat data at stream crossings is also addressed in Section 5.23.2.6 - Fish Resources, Mitigation Measure #7.
L31	3	NOAA	Fish	general comment		As described in the DEIS the proposed project may adversely affect EFH. The enclosed information provides the rationale for our determination. NMFS offers the following EFH Conservation Recommendations pursuant to Section 305(b)(4)(A) of the MSA: 2) In waterbodies confirmed to support anadromous species, tributary crossings should be designed, constructed and installed according to the methods and recommendations referred to the Anadromous Salmonid Passage Facility Design (NMFS 2011). Using these methods in fish passage design and stream habitat simulation will avoid and minimize long term impacts, minimize subsequent loss of EFH and reduce	The text has been revised in Section 5.6 citing the 2 NMFS docs: EFH Conservation Recommendations pursuant to Section 305(b) (4) (A) of the MSA and the Anadromous Salmonid Passage Facility Design (NMFS 2011). Section 5.6.1 - Essential Fish Habitat states: The AGDC would be required to collaborate with NMFS through the Essential Fish Habitat Consultation Guidance of the MSA Section 305(b) (4) (A) (2004) and the Anadromous Salmonid Passage Facility Design (2011). Each stream crossing proposed would require an approved ADFG Fish Habitat Permit, which would include the necessary site specific fish resource data to comply with permit requirements.

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						the potential impacts to anadromous species.	
L31	4	NOAA	Fish	Fish presence		Identification of anadromous water is described as follows: "stream crossings were determined to support anadromous fish if they:1) are cataloged anadromous waters, and 2) if they are connected to a cataloged anadromous water; or 3) if stream sampling along the proposed Project during the summer of 2010 yielded anadromous fish. NMFS cautions against identifying a waterbody as not supporting anadromous species if the recent stream surveys were only conducted once in a specific summer field season. A number of water bodies previously not listed in the ADFG Anadromous waters catalog have been shown to have anadromous species present and have been nominated to the catalog based on additional surveys. Each species of pacific salmon known to inhabit Alaskan watersheds migrates through and populates various habitat types seasonally at different times depending on life history stage and watershed of origin (Hilborne 2003). Larger environmental influences and genetics may also play a role in specific stock run timing (Hodgson 2002 and 2006 Schindler 2010). Adult immigration and smolt emigration timing need to be considered when implementing a survey design. Surveys should be conducted to identify potential seasonal presence or absence of all 5 Pacific salmon species.	The text has been revised to add the quoted text. Section 5.6.1 - Affected Environment states: Anadromous fish may be found in streams not currently designated as anadromous fish streams in the catalog. Waterbodies in the catalog represents less than 50 percent of the streams, rivers and lakes actually used by anadromous species (ADF&G 2011a). Each species of Pacific salmon known to inhabit Alaskan watersheds migrates through and populates various habitat types seasonally at different times depending on life history stage and watershed of origin (Hilborne 2003).

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L31	5	NOAA	Fish	Stream crossings - PIPELINE		The proposed stream crossing method suggested to bury the pipeline is either Open Cut method or Open Cut Isolation methods. NMFS recommends using the Open cut Isolation method over the Open cut method to further avoid and minimize impacts to EFH and anadromous species and maintain downstream hydrologic function and instream flow.	The text has been revised (see Section 5.6). Final stream construction methods will be determined after agency consultation and through ADFG fish habitat permits. Section 5.6.1 - Affected Environment, Essential Fish Habitat states: The AGDC would be required to collaborate with NMFS through the Essential Fish Habitat Consultation Guidance of the MSA Section 305(b) (4) (A) (2004) and the Anadromous Salmonid Passage Facility Design (2011). Each stream crossing proposed would require an approved ADFG Fish Habitat Permit, which would include the necessary site specific fish resource data to comply with permit requirements. The permit application process would determine the appropriate site specific crossing methods (open cut, open-cut isolation, HDD, or bridge) for protection of EFH.
L31	6	NOAA	Fish	Bridge crossings		Currently bridge crossings are only proposed for four river crossings: the Yukon, the Chulitna, Coal Creek, and the Hurricane River. Bridge crossings should be designed to provide natural physical processes within the stream or river braid plain corridor, promote natural sediment transport, allow natural debris movement, and maintain functional longitudinal continuity and connectivity of the watershed braid plain system. Bridge crossings should support natural braid plain function and meander, providing long-term dynamic channel instability, retention of exosting spawning and incubation substrate, sustainable benthic invertebrate production and minimize risk of failure and restoration.	The bridge section has been revised to add text stating that no structures below the ordinary high water mark would be developed for the bridge construction. Section 5.6.2.2 - Proposed Action, Bridge Crossing Method states: Bridge crossings would be designed to provide natural hydro-geomorphic processes within the stream or river flood plain, promote natural sediment transport, allow natural debris movement, and maintain functional longitudinal continuity and connectivity of the watershed. No footings or piles would be placed below the ordinary high-water mark for bridge construction at any stream crossing. Bridge crossing is also addressed in Section 5.23.2.6 - Fish Resources, Mitigation Measure #16, which applies to the Yukon River, as it is the only bridge proposed for construction by AGDC. All other crossings using bridges will be placed aerially on hanger pipes.

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L31	7	NOAA	Fish	Accss roads and culvert design		To minimize long-term impacts during operations phases, the NMFS Anadromous Salmonid passage Facility Design Guidance (NMFS 2011). Should be followed in designing stream crossings that transect EFH and anadromous waters. Bridge and culvert design and stream simulation methods used should span the stream braid plain, provide long-term dynamic channel stability, and retain existing spawning areas. Recommended stream simulation designed typically result in open-bottom arches or boxes. These designs and structures provide sufficient substrate and channel complexity to provide rearing and passage conditions similar to that which exist in reaches above and below the culvert or bridge and include sufficient depth, velocity, and resting areas for migrating fish. Post-construction evaluation is important to ensure that the intended results of the culvert design are accomplished and assist in insuring that mistakes are not repeated elsewhere. All crossing designs should be based on site-specific information, such as anadromy, seasonal instream flows and peak discharge, and flood plain regime (50-year to 100-year events). This information should be included in the FEIS. Crossings that transect EFH and anadromous waters within wetlands should incorporate bridge or elevated tracks to provide long-term water supply.	Mitigation Section 5.23.2.6 - Fish Resources has been revised to state: Additional seasonal life history and habitat use information would be required to determine the construction schedule for all proposed stream crossings in order to protect fish and their habitat. All stream crossings would require permit approval from ADFG and NMFS. Collaborations with these agencies will define applicable and appropriate site-specific construction techniques and other mitigation for Project implementation. Section 5.6.1 - Affected Environment, Essential Fish Habitat states: The AGDC would be required to collaborate with NMFS through the Essential Fish Habitat Consultation Guidance of the MSA Section 305(b) (4) (A) (2004) and the Anadromous Salmonid Passage Facility Design (2011).
L32	1	USACE	Coversheet			Cooperating agencies should include the U.S. before BLM and NPS	The coversheet has been updated as requested to reference the U.S. Bureau of Land Management and the U.S. National Park Service.
L32	2	USACE	Coversheet			Should include the lateral line to Fairbanks	Coversheet has been updated to include the lateral line to Fairbanks

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L32	3	USACE	Coversheet			Information on a preliminary application would be September, by the FEIS we should have a complete application date (none yet). The FEIS will be used in conjunction with a USACE application for record of decision (a ROD cannot be completed without an application).	The abstract has been revised to reflect that the FEIS will be used in conjunction with a USACE application for record of decision
L32	4	USACE	General			Rather than just listing mitigation, the EIS must analyze mitigation in detail and explain the effectiveness of the measures in terms of the resulting impacts	Mitigation measures proposed by AGDC are described and analyzed for effectiveness in Section 5.23 of the FEIS. Additional mitigation measures will be considered by the USACE in the permitting process.
L32	5	USACE	General			CEQ "Section 1500.4(b) Preparing analytic rather than encyclopedic environmental impact statements." And from NEPA's Forty Most Asked Questions: 25a "The body of the EIS should be a succinct statement of all the information on environmental impacts and alternatives that the decision maker and the public need, in order to make the decision and to ascertain that every significant factor have been examined. The EIS must explain or summarize methodologies of research and modeling, and the results of research that may have been conducted to analyze impacts and alternatives." Accordingly please analyze the DEIS to determine areas that repeat information, consolidate information that is the same for different aspects of the analyses and leave out highly technical discussions (these should be in appendices) - reduce to clear understandable language for the general public and those not familiar with scientific terminology.	The USACE and cooperating agencies have been provided with digital mapping for verification of wetland data to replace the inclusion of 200 additional pages of project maps. Impact analysis and conclusions have been consolidated into ranking tables in Section 6.1. The Plan of Development was removed from the Biological Assessment (Appendix I) and referenced on the project website.
L32	6	USACE	General			Plan of Development should be included as an appendix	Under direction by the USACE, the Plan of Development has been removed from the Biological Assessment Appendix and referenced on the project website.
L32	7	USACE	General			Maps at 1:20,000 need to be linked to website	The USACE and cooperating agencies have been provided with digital mapping.

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L32	8	USACE	Purpose and Need 1.0	Sub sec 1-7		The last word "Overall should be on the next line with Project Purpose and be the heading for the following paragraph	Comment acknowledged.
L32	9	USACE	Purpose and Need 1.0	Sub sec 1-8		This paragraph should be aligned with the first paragraph under the Bureau of Land Management (BLM)	Formatting has been fixed in Section 1.2.5.2.
L32	10	USACE	Purpose and Need 1.0	Sub sec 1-13		There needs to be a comma after (USFWS),	Formatting has been fixed in Section 1.2.5.3.
L32	11	USACE	Purpose and Need 1.0	Sub sec 1-13		Second sentence should say, The USACE initially invited	Text has been revised in Section 1.3 as requested.
L32	12	USACE	Purpose and Need 1.0	Sub sec 1-14		Delete the two words "was given"	Text has been revised in Section 1.3 as requested.
L32	13	USACE	Purpose and Need 1.0	Sub sec 1-14		Add , "January 13, 2012, the Notice of Availability for the DEIS was sent out to all tribes", "On January 24, 2012 a letter was sent to the tribes inviting them to the telephonic public comment session for the DEIS", "On February 2, 2012 a teleconference was held for all Tribal entities to comment on the DEIS and ask questions." "February 22, 2012, an e-mail with the transcription of the teleconference was sent to the tribes." " March 7, 2012, notification of the extension of DEIS comment period was sent to the tribes", " On March 13, 2012 an e-mail was sent to the tribes notifying them of the extension and the meeting dates and venues for Minto and Wiseman meetings as well as the new teleconference date of May 9th to share concerns addressed by all tribes."	Comment acknowledged. The text has been added to Section 1.0 of the FEIS

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L32	14	USACE		Appendix D of Appendix B - Scoping		Needs to include Wiseman Scoping comments from 3Feb10	The Scoping Report is Appendix B of this EIS. The Scoping Report has multiple Appendices of its own; of these, Appendix D includes agency comments and Appendix E includes public comments. Therefore, the Wiseman public comments can be found in Scoping Report Appendices D and E within Appendix B of the FEIS. Public Scoping Comments can also be viewed on the ASAP EIS website at: http://www.asapeis.com/joomla/images/final%20appendix%20e%20-%20public%20comments.pdf.
L32	15	USACE		general comment		Need to coordinate with the Alaska Railroad where pipeline runs along the tracks to determine issues with erosion of river and creek banks, and realign if route is within those areas of high erosion	Final details of pipeline placement will be determined later in the process. Erosion of streambanks will be evaluated.
L32	16	USACE	Table 7.2-2			Police/State Troopers says “Bethel” – is this correct? Bethel is almost 500 miles away and Fairbanks is around 200, maybe it should be Bettles?	Under direction from the USACE, the Plan of Development has been removed from the Biological Assessment Appendix. "Bethel" has been corrected to "Bettles" in the Plan of Development which is available on the project website.
L32	17	USACE	1.0	1.2.4.3 sub sec 1-11		Comma needed after US Fish and Wildlife Service (USFWS),	Formatting has been fixed in Section 1.2.5.3.

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L32	18	USACE	1.0			Change second sentence of second paragraph to read, "The USACE initially invited 41 potentially affected federally recognized tribes to participate in the proposed Project EIS NEPA process through coordination and consultation. After the route elimination process the number of tribes within the project corridor was changed to 28 tribes who remain potentially affected by the proposed project that is being carried forward. Please remove the following tribes from the list: Chitna Traditional Indian Village Council, Village of Dot Lake, Native Village of Eagle, Native Village of Gakona, Gulkana Village, Healy Lake Village, Native Village of Kluti-Kaah, Mentasta Lake Tribal Council, Northway Village, Native Village of Tazlina, Native Village of Tetlin, Native Village of Venetie Tribal Government, and Venetie Village Council	The text in Section 1.3 was revised as suggested to remove the tribe names provided in the comment.
L33	1	Center for Biological Diversity	General			The DEIS impacts analysis lacks information about the Projects direct, indirect, and cumulative impacts to affected resources.	Impact rankings have been added to the EIS in chapter 6, Conclusions.
L33	2	Center for Biological Diversity				The DEIS fails to assess adequately the proposed projects impacts in the context of climate change in Alaska and the Alaskan Arctic. It is essential that the FEIS analyze the effects of gas development and production in regards to climate change and greenhouse gas emissions because Alaska is currently warming at twice the rate of the rest of the world, and climate change will continue to have serious impacts in Alaska over the coming decades	Greenhouse gas emissions resulting from the Project, potential effects, regulatory controls, and mitigation measures are included in Section 5.16 Air Quality per February 2010 CEQ Guidance. Climate change effects are discussed in Subsection 5.20.6.3 Tourism, Recreation, and Wilderness Resources, under Air Quality, Greenhouse Gases, and Global Climate Change and under Greenhouse Gases and Climate Change. Specific effects of climate change in Alaska are listed on page 5.20-66 of the Draft EIS. The discussion includes comparison of project greenhouse gas emissions with both the state and national

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							inventory, and indicates on page 5.20-67, 'Even with mitigation, the proposed Project and its connected actions would generate GHG emissions and incrementally contribute to climate change. However, when proposed Project emissions are viewed in combination with global emissions levels that are contributing to the existing cumulative impact on global climate change, the incremental contribution of GHG emissions would be cumulatively minor.' Greenhouse gases and climate change were analyzed to the extent possible in the EIS. Projects outside of the proposed Action are outside the scope of the EIS and are not included, with the exception where necessary for cumulative effects analysis. It is probable that construction of the ASAP pipeline would result in a net decrease in greenhouse gas emissions over its operating lifetime. The primary reason is that the natural gas from this project would displace other fuels, such as oil, coal, and wood, which emit more greenhouse gases than does natural gas. This is discussed in detail in section 5.20.6.3.
L33	3	Center for Biological Diversity	5.8			Among the most profound changes are loss of sea ice, melting of permafrost, and coastal erosion. As temperatures continue to rise and precipitation patterns change, species distributions will shift and many species will experience increased stress and decreased chance of reproduction and survival. Arctic species including polar bears, ice seals, and walruses are especially vulnerable to climate change due to their dependence on sea ice. Because of melting sea ice, polar bears are spending more time on land and less time on the sea ice where they hunt for seals. This increases the length of on-land fasting time for polar bears, resulting in increased mortality, cannibalism, and decreased reproductive success. As a result, scientists predict that two-thirds of the world's	The text was revised in Section 5.8.4.9 - Polar Bear, Affected environment to state: However, if predictions of the continued loss of Arctic sea ice due to climate change occur, it is expected that the number of polar bears denning on land in northern Alaska east of Barrow will continue to increase (Schliebe et al. 2008).

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						polar bear population could disappear by the middle of the century. Walruses also have a poor outlook for the future. Walruses are benthic feeders that use the ice as a platform from which to dive for food. Without sea ice, food will become much more difficult to access, leading to malnutrition and increased energy expenditures in searching for food.	
L33	4	Center for Biological Diversity				Other Alaskan species are also susceptible to climate change, melting sea ice, and temperature changes, including migratory birds, caribou, wolverine, lynx, and brown and black bears. The DEIS fails to analyze the cumulative impacts of the ASAP and greenhouse gas (GHG) emissions on climate change, and subsequent impacts to Alaskan species.	Greenhouse gas information has been added to section 5.20 Cumulative Effects. Also, impact rankings tables have been added to Chapter 6, Conclusions. It is probable that construction of the ASAP pipeline would result in a net decrease in greenhouse gas emissions over its operating lifetime. The primary reason is that the natural gas from this project would displace other fuels, such as oil, coal, and wood, which emit more greenhouse gases than does natural gas. This is discussed in detail in Section 5.20.6.3.
L33	5	Center for Biological Diversity				a. Greenhouse gas emissions and climate change The DEIS acknowledges that climate change is occurring due to GHG emissions. But the DEIS fails to analyze the effects of ASAP related natural gas development and production in the context of a changing and stressed environment.	Greenhouse gas emissions resulting from the Project, potential effects, regulatory controls, and mitigation measures are included in Section 5.16 Air Quality per February 2010 CEQ Guidance. Climate change effects are discussed in Subsection 5.20.6.3 Tourism, Recreation, and Wilderness Resources, under Air Quality, Greenhouse Gases, and Global Climate Change and under Greenhouse Gases and Climate Change. Specific effects of climate change in Alaska are listed on page 5.20-66 of the Draft EIS. The discussion includes comparison of project greenhouse gas emissions with both the state and national inventory, and indicates on page 5.20-67, 'Even with mitigation, the proposed Project and its connected actions would generate GHG emissions and incrementally contribute to climate change. However, when proposed Project emissions are viewed in combination with global emissions levels that are contributing to the existing cumulative impact on global climate change, the incremental contribution of GHG

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							emissions would be cumulatively minor.' Greenhouse gases and climate change were analyzed to the extent possible in the EIS. Projects outside of the proposed Action are outside the scope of the EIS and are not included, with the exception where necessary for cumulative effects analysis. The direct and indirect effects of the project to the extent information is available have been included in the analysis in Section 5.20. It is probable that construction of the ASAP pipeline would result in a net decrease in greenhouse gas emissions over its operating lifetime. The primary reason is that the natural gas from this project would displace other fuels, such as oil, coal, and wood, which emit more greenhouse gases than does natural gas. This is discussed in detail in section 5.20.6.3.
L33	6	Center for Biological Diversity				The DEIS's greenhouse gas analysis is incomplete and inaccurate The DEIS discussion of greenhouse gas emissions and potential impacts on climate change throughout the entire lifecycle of natural gas is incomplete. Even small leakages of natural gas to the atmosphere have very large consequences (Howarth and Santoro 2011). The DEIS also fails to analyze the dominant contributor of greenhouse gas emissions during the complete lifecycle of natural gas, which is that of CO from the power plant or boiler. The lifecycle of natural gas starts at production and ends at the combustion plant. According to the EPA, billions of cubic feet of climate changing greenhouse gases in natural gas seep from loose pipe valves or are vented intentionally from gas production facilities into the atmosphere each year. Recently revised EPA figures find that 2.5 percent of natural gas is lost in its production processing, transmission, and storage (Howarth et al. 2012). There is much uncertainty in regards to total leakage, which can vary widely and is estimated at from	As stated in Subsection 5.20.6.3 Tourism, Recreation, and Wilderness Resources, under Greenhouse Gases and Climate Change.,' "Life cycle" GHGs refer to the GHG emissions generated during the original manufacture of equipment, vehicles, or construction materials. Such life cycle emissions are not considered part of the Project-related GHGs and are beyond the scope of this analysis. In addition, analysis of greenhouse gas emissions from consumption of produced natural gas is not part of this discussion.' See response to comment 30-35 regarding fugitive emissions. It is probable that construction of the ASAP pipeline would result in a net decrease in greenhouse gas emissions over its operating lifetime. The primary reason is that the natural gas from this project would displace other fuels, such as oil, coal, and wood, which emit more greenhouse gases than does natural gas. This is discussed in detail in Section 5.20.6.3.

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						zero percent to 10 percent (Wigley 2011). 96 percent of the lost gas consists of methane. Even under a no-leakage scenario for methane, the climate would continue to warm (Wigley 2011).	
L33	7	Center for Biological Diversity				The EIS must analyze how the project will affect our nation's ability to reduce greenhouse gases. Every kilogram of gas burned produces 12/16 kgC of CO. Further, conventional gas extraction, such as that proposed under the DEIS, has a 2.5 percent leakage rate for methane (Wigley 2011). The DEIS states that "With respect to natural gas pipeline operations, a pipeline itself generally does not have any significant air emissions associated with its operation; while there may be fugitive emissions from pipeline connections (i.e., valves), such emissions are generally very minor in nature and typically are not subject to the requirement to obtain a permit." This is inaccurate. According to U.S. Greenhouse Gas Inventory data, pipeline leaks account for about eight Bcf—or about eight percent—of methane emissions from the transmission sector. Additionally, as stated above, total leakage from operations are estimated at between zero percent to 10 percent, with continued climate change even under a no-leakage scenario. Thus, the DEIS fails to analyze climate change impacts from pipeline operations post-construction.	See response to comment 30-35 regarding fugitive emissions. See response to comment 33-6 regarding consumption of natural gas. See response to comment 33-2 regarding greenhouse gas emissions for the Project as compared with state and national emissions as well as regarding specific project effects.

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L33	8	Center for Biological Diversity				The DEIS asserts that use of natural gas would lower GHG emission rates and have a reduced impact on climate change compared to other fuel sources. As demonstrated in Figure 1, below, this is a flawed conclusion. ASAP would result in both methane emissions during extraction, transmission and production, and CO emissions once it used in the market. This is because reduction of methane, a major component of natural gas, is critical to limiting long-term global temperature increases. This figure points out that measures to reduce all important forms of GHG emissions, including CO22, methane and black carbon are critical to limiting climate increase. Especially notable is that reductions in methane emissions has a more immediate impact on the climate, although all three important GHG must be reduced for long term limits to temperature increases. Compared to coal, natural gas has a similar, or even greater, impact on long-term climate impacts, with natural gas being worse for the climate over the short term due to its more potent quality as a GHG.	It is unclear from the comment where in the Draft EIS it states, '...use of natural gas would lower GHG emission rates and have a reduced impact on climate change compared to other fuel sources.' Subsection 5.20.6.3 Tourism, Recreation, and Wilderness Resources, under Air Quality, Greenhouse Gases, and Global Climate Change and under Greenhouse Gases does not include this statement, nor does Table 6.0-1. Greenhouse gas emissions from the proposed Project would be reduced with mitigation measures listed in Section 5.16 Air Quality and controlled to the extent regulations have been established. It is probable that construction of the ASAP pipeline would result in a net decrease in greenhouse gas emissions over its operating lifetime. The primary reason is that the natural gas from this project would displace other fuels, such as oil, coal, and wood, which emit more greenhouse gases than does natural gas. This is discussed in detail in Section 5.20.6.3.
L33	9	Center for Biological Diversity	AIR	SUB SEC 5.6-18		The DEIS states that under the no-action alternative there would be an increased rate of air pollution due to the general population's continuous use of other higher pollutant emitting fuel, compared to if natural gas were used instead (ASAP DEIS 5.16-18). This statement is flawed on a few levels. First, conservation of energy and higher efficiency is not considered. Second, the specific "conventional" forms of energy are not specified. As shown in Figure 1, a reduction in CO without a reduction in other greenhouse gases will not effectively slow long-term climate change, unless accompanied by a reduction in methane and black carbon	A new Table 5.20-10 has been inserted into Section 5.20 - Cumulative Effects of the FEIS, which provides emission factors for greenhouse gases for a variety of fuel sources, including natural gas, oil, coal, and wood, . The table demonstrates that natural gas has the lowest emission factors with the exception of biogas fuel (gas produced by the anaerobic digestion or fermentation of organic matter) and supports the assertion that greenhouse gases would decrease as a result of the ASAP pipeline compared to the no-action alternative. . Alternative energy sources that are reasonably foreseeable and could potentially generate lower greenhouse gas emissions were evaluated in Section 4. These alternative energy projects could supplement and

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						emissions. Most conventional energy sources produce large amounts of CO 2, but little methane. The DEIS must analyze the climate impact of the CO2 produced by conventional sources compared to the climate impact of methane and CO produced by the burning of natural gas in order to support this statement Finally, the DEIS fails to consider the future development of alternative energy sources including geothermal, tidal, or wind development, all of which could provide a substantial amount, or even all of the energy needed for Alaskan residents. Based on this data, natural gas is not the clean energy source it is purported to be in the DEIS, and contributes substantial amounts of GHGs to the climate. The no-action alternative should compare the additional emissions of GHGs from the pipeline to a true baseline, rather than to additional hypothetical emissions from conventional sources. Further, if the BLM wishes to compare natural gas with conventional fuels it must undergo a realistic analysis of the GHGs produced by, and the climate impacts of, conventional fuel sources compared to natural gas. Additionally, investing heavily in natural gas development rather than alternative energy does little to slow the impacts of climate change in Alaska and globally. Promoting natural gas as a clean energy in the DEIS is deceptive and inaccurate and not supported by the facts.	reduce, but could not replace the need for energy provided by natural gas from the proposed Project, and therefore were not considered to be reasonable alternatives.

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L33	10	Center for Biological Diversity	5.20	SUB SEC 5.20-6		b. Cumulative analysis is incomplete and inaccurate In the cumulative impacts section, the DEIS states that: Even with mitigation, the proposed Project and its connected actions would generate GHG emissions and incrementally contribute to climate change. However, when proposed Project emissions are viewed in combination with global emissions levels that are contributing to the existing cumulative impact on global climate change, the incremental contribution of GHG emissions would be cumulatively minor (ASAP DEIS 5.20-66). This is an inaccurate and incomplete assertion and fails to take into account the impact that the proposed project, gas extraction, and related project would have on climate change and GHG emissions. A cumulative impact is defined as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency…or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. 40 C.F.R. § 1508.7 (emphasis added). The cumulative impacts analysis requirement is designed precisely to prevent agencies from glossing over the harmful consequences of their actions the way this DEIS has by excusing the proposed actions as minor and not significant in the light of global contributions to climate change.	The statement quoted in the comment constitutes an assertion of potential cumulative effects of greenhouse gas emissions and subsequent climate change. It is probable that construction of the ASAP pipeline would result in a net decrease in greenhouse gas emissions over its operating lifetime. The primary reason is that the natural gas from this project would displace other fuels, such as oil, coal, and wood, which emit more greenhouse gases than does natural gas. This is discussed in detail in section 5.20.6.3.

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L33	11	Center for Biological Diversity				There can be no dispute that ASAP will contribute to global climate change by emitting CO2, methane, and other greenhouse gases into the atmosphere every year, for decades to come. Yet the DEIS does not evaluate the "incremental impact" that these emissions will have on the climate or on the environment more generally in light of other past, present, and reasonably foreseeable actions. The DEIS also does not discuss the actual environmental effects resulting from those emissions or place those emissions in context of other similar proposals. Indeed, the impact of ASAP's greenhouse gas emissions on climate change and its effects is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct.	See response to comment 33-2 regarding climate change analysis.
L33	12	Center for Biological Diversity				Specifically, the DEIS fails to analyze how the potential sale and use of natural gas to industrial users in Southcentral Alaska including the LNG plant in Nikiski, the Donlin Creek Mine Project, the proposed Cook Inlet natural gas to liquids project, and the proposed Accelergy/Tyonek Coal to Liquids (CTL) project would contribute to greenhouse gas emissions. The DEIS states that up to 200 MMscfd of natural gas from the ASAP project could be used by the proposed CTL Project. This would require an additional 320-mile-long pipeline from the end of the project pipeline to the Tyonek area, and a compressor station. Future users of natural gas from this pipeline include Donlin Creek Mine Project, which plans to use up to 25 MMscfd of natural gas and a proposed natural gas to liquids facility in the Cook Inlet area. The EIS must include analysis of the total contributions to greenhouse gases from these projects, as they would be powered by, and constructed in large	This project is identified along with the others mentioned in this comment under Section 5.20.5.5 within cumulative effects as 5.20.5.5 'Projects that are Foreseeable if the proposed ASAP Project is Built'. Data on GHG emissions for these projects are not available because the projects are still on the drawing board (like the Accelergy/Tyonek CTL plant) or are only proposals. In response to this comment, a footnote has been added to the Greenhouse Gas section within cumulative effects stating: "Increased demand could come from the projects noted in Section 5.20.5.5. One commenter suggested that because the proposed Project may partially fuel the projects noted in 5.20.5.5 (e.g. the Accelergy/Tyonek Coal to Liquids facility) they should be included in the cumulative analysis of GHG emissions and climate change. The projects noted in 5.20.5.5 are still in the proposal and planning phases so it is not possible to identify the emissions from these sources. However, the natural gas delivered by ASAP is cleaner (relative to other conventional industrial fuels [see Tables 5.20-7 through 5.20-9]) than the currently

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						part because of, ASAP. Analysis of GHG emissions from the additional length of pipeline and from these projects should be included in the FEIS. Additionally, regardless of additional GHG emissions resulting from the natural gas used to power these projects, these proposed projects on their own produce substantial greenhouse gas emissions and also have significant environmental impacts. The cumulative environmental impacts of these emissions, especially those to wildlife and air quality, must be added to the cumulative impacts section.	available alternatives (oil or coal). Choosing to fuel the foreseeable projects with natural gas would result in lower emissions than if oil or coal were used."
L33	13	Center for Biological Diversity				The DEIS also fails to analyze the impacts of the liquefied natural gas (LNG) facility in Nikiski on greenhouse gas emissions, and in regards to tankering of the LNG to other markets. GHG emissions from LNG are far higher than for nonliquefied gas (Amarillo et al. 2007). The use of LNG adds three additional lifecycle stages to the natural gas lifecycle, with additional GHG emissions for each stage. In the liquefication process, natural gas is cooled and pressurized. LNG is then transported, generally by ocean going tankers, to consumer markets. Upon arriving, LNG tankers offload their cargo and LNG is regasified.	See response to comment 33-2 regarding climate change analysis. Impacts of the LNG facility in Nikiski would be included in the required documentation for that project.
L33	14	Center for Biological Diversity				The impacts of the proposed LNG must be included in cumulative analysis as the plant, processing, transportation and regasification processes would contribute a significant amount of additional greenhouse gases, increasing the Project's overall impacts. When converted to LNG and then back to gas for use once it arrives at market, 8.8 percent of natural gas is used in the liquification plant, and three percent is used in the regassification plants. This does not include additional GHG emissions from the fuel	See response to comment 33-2 and comment 33-13.

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						used for transportation. This means that over 10 percent of gas is used just for conversion to and from LNG. The DEIS must analyze the impacts of LNG if it plans to include this plant as an incentive for the ASAP project.	
L33	15	Center for Biological Diversity				An analysis of the processing of gas at the Nikiski LNG plant and associated tankering is essential because these activities could have substantial effects on the environment. The infrastructure and activities associated with LNG transport could affect large areas of land and ocean, including ESA listed marine species. Activities on shore could disturb wildlife species, including threatened or endangered birds. LNG transport could significantly increase traffic in Cook Inlet. Increased noise from these vessels could harm ESA listed Cook Inlet beluga whales, pinnipeds, and other ESA listed marine mammals in Alaskan waters, at sea, and in waters at the final destination. Vessels transporting LNG to market could negatively affect the critically endangered North Pacific right whale, one of the most endangered whales in the world. It is essential that USACE and AGDC consider the possibility that boat strikes could result in mortality to right whales because the loss of any North Pacific right whale would be a significant effect.	LNG is not a component of this project. Comment acknowledged

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L33	16	Center for Biological Diversity				Additionally, LNG tankering could greatly increase sub-Arctic emissions of black carbon and contribute to Arctic warming. These effects should be analyzed.	Greenhouse gas emissions resulting from the Project, potential effects, regulatory controls, and mitigation measures are included in Section 5.16 Air Quality per February 2010 CEQ Guidance. Climate change effects are discussed in Subsection 5.20.6.3 Tourism, Recreation, and Wilderness Resources, under Air Quality, Greenhouse Gases, and Global Climate Change and under Greenhouse Gases and Climate Change. Specific effects of climate change in Alaska are listed on page 5.20-66 of the Draft EIS. The discussion includes comparison of project greenhouse gas emissions with both the state and national inventory, and indicates on page 5.20-67, 'Even with mitigation, the proposed Project and its connected actions would generate GHG emissions and incrementally contribute to climate change. However, when proposed Project emissions are viewed in combination with global emissions levels that are contributing to the existing cumulative impact on global climate change, the incremental contribution of GHG emissions would be cumulatively minor.' Greenhouse gases and climate change were analyzed to the extent possible in the EIS. Projects outside of the proposed Action are outside the scope of the EIS and are not included, with the exception where necessary for cumulative effects analysis. It is probable that construction of the ASAP pipeline would result in a net decrease in greenhouse gas emissions over its operating lifetime. The primary reason is that the natural gas from this project would displace other fuels, such as oil, coal, and wood, which emit more greenhouse gases than does natural gas. This is discussed in detail in section 5.20.6.3.
L33	17	Center for Biological Diversity				The FEIS must also consider the effects that the project and its associated facilities and activities could have in conjunction with oil production and development activities in the Arctic environment. Especially in regards to the lease sales for oil	Greenhouse gas emissions resulting from the Project, potential effects, regulatory controls, and mitigation measures are included in Section 5.16 Air Quality per February 2010 CEQ Guidance. Climate change effects are discussed in Subsection 5.20.6.3 Tourism,

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						and gas development in the Beaufort and Chukchi seas and pending offshore oil and gas development in these areas. Offshore impacts to wildlife must be considered, along with the impacts of climate change, melting sea ice and resulting changes to the Arctic ecosystem.	Recreation, and Wilderness Resources, under Air Quality, Greenhouse Gases, and Global Climate Change and under Greenhouse Gases and Climate Change. Specific effects of climate change in Alaska are listed on page 5.20-66 of the Draft EIS. The discussion includes comparison of project greenhouse gas emissions with both the state and national inventory, and indicates on page 5.20-67, 'Even with mitigation, the proposed Project and its connected actions would generate GHG emissions and incrementally contribute to climate change. However, when proposed Project emissions are viewed in combination with global emissions levels that are contributing to the existing cumulative impact on global climate change, the incremental contribution of GHG emissions would be cumulatively minor.' Greenhouse gases and climate change were analyzed to the extent possible in the EIS. Projects outside of the proposed Action are outside the scope of the EIS and are not included, with the exception where necessary for cumulative effects analysis. It is probable that construction of the ASAP pipeline would result in a net decrease in greenhouse gas emissions over its operating lifetime. The primary reason is that the natural gas from this project would displace other fuels, such as oil, coal, and wood, which emit more greenhouse gases than does natural gas. This is discussed in detail in Section 5.20.6.3.
L33	18	Center for Biological Diversity				c. Wildlife analysis is incomplete and insufficient Greenhouse gas emissions The DEIS lacks adequate analysis of the impacts of project-related greenhouse gas emissions and cumulative impacts to polar bears, ice seals, caribou, Cook Inlet beluga whales, and other wildlife. The DEIS does not analyze the impact to ice-dependent species such as polar bears and ice seals of the greenhouse gas emissions resulting from this project, and resulting	Added new GHG section to EIS in section 5.20, Cumulative Effects. It is probable that construction of the ASAP pipeline would result in a net decrease in greenhouse gas emissions over its operating lifetime. The primary reason is that the natural gas from this project would displace other fuels, such as oil, coal, and wood, which emit more greenhouse gases than does natural gas. This is discussed in detail in Section 5.20.6.3.

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						increased warming potential and ice melt in an already quickly changing environment.	
L33	19	Center for Biological Diversity				Cumulative analysis in the DEIS for air quality states that the incremental contribution of GHG emissions from the project would be cumulatively minor. However, potential impacts to wildlife in the context of other activities occurring in the Arctic and Alaska must be analyzed. The FEIS must account for the fact that the Arctic is already in the midst of rapid climate change, and that environmental conditions 20 and 50 years into ASAP operations will be drastically different than those analyzed in the DEIS. The FEIS analyses of the effects to Alaskan species, including marine mammals, terrestrial mammals, and birds, should account for factors such as diminished habitat, food resources, and/or population numbers, and increased competition from species moving north to expand their range. The DEIS is too quick to conclude that there would be no impacts on wildlife. GHG emissions and climate change will and are impacting all wildlife species in the Alaskan Arctic, while the impacts from construction and development of the pipeline, and associated gas drilling activities that will occur, will also have direct impacts on exposed wildlife.	It is probable that construction of the ASAP pipeline would result in a net decrease in greenhouse gas emissions over its operating lifetime. The primary reason is that the natural gas from this project would displace other fuels, such as oil, coal, and wood, which emit more greenhouse gases than does natural gas. This is discussed in detail in section 5.20.6.3. In response to this comment we have added the following paragraphs to the climate change section of the Cumulative Effects section: "With respect to biodiversity and impact on listed species and critical habitats, emissions from the proposed project are not expected to contribute in any discernable way to climate change, to climate change effects within Alaska, or to effects upon listed species or critical habitat. Construction and operation of project facilities, and transiting vessel traffic in support of the proposed activities, is expected to contribute an extremely small amount of the overall GHG emissions into the planet's atmosphere (AGDC 2011c). Although the proposed Project is not expected to materially contribute to climate change, Climate change can negatively impact wildlife, especially threatened and endangered species in Alaska. Section 5.8 (Threatened and Endangered Species) notes that some of these species are sensitive to climate change. Loss of Sea ice due to climate change is considered to be a current threat to the Pacific Walrus and Ringed Seal. Loss of sea ice will also likely increase the number of polar bears denning on land in Northern Alaska and potentially increase the number of interactions between polar bears and humans. Bowhead whales, Stellar sea lions and Yellow Billed loons are both negatively impacted by climate change that causes changes in preferred habitat or prey availability. Refer to Section 5.8 for more detail."

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L33	20	Center for Biological Diversity	5.5			Caribou The DEIS does not sufficiently analyze the potential effects of the project on caribou. The DEIS only states that the elevated pipeline won't prevent caribou movements, but the FEIS should provide a more detailed analysis of the potential for onshore gas-pipeline construction and operational activities to disturb caribou, including a review of the potential of ASAP to delay caribou movements and the effect that would have on caribou herds and individuals. The Bureau of Land Management has identified numerous potential adverse effects of less extensive pipelines and also indicates that onshore gas activities, especially roads, can displace caribou and reduces caribou densities for miles. Snow drifts under a pipeline can block or interrupt caribou movements. The FEIS should provide a more comprehensive review of relevant research on the effects of gas development on caribou.	Section 5.5.1.1 - Wildlife, Terrestrial Mammals, Caribou states "The proposed Project would construct the segments of the pipeline in the Arctic region during the winter period only, thus reducing impacts to the majority of the caribou herds because few caribou are present in the winter in relation to other times of the year. Construction would occur during one winter season and mitigation to reduce disturbance to a few caribou would be determined from collaborations with ADFG and AGDC. The pipeline would be buried except for the first 6 miles from the GCF. The pipeline would be placed on VSMs at the appropriate height for caribou to pass underneath the pipeline."
L33	21	Center for Biological Diversity	5.5			Other Arctic species The DEIS does not adequately analyze the effects of gas development and production operations on Arctic species. The review of effects of the project provides very little data or actual analysis to support the conclusions.	The text in Section 5.5 - Wildlife states: "The wildlife discussed in this chapter are common species that inhabit the area associated with the proposed Project at some point in their life history (breeding, migration, feeding, nesting, calving, rearing, molting and staging)." Section 5.5.1.1 - Wildlife Resources states: "Terrestrial mammals commonly found along the proposed Project ROW that are categorized as common terrestrial mammals include moose, caribou, and bears." The chapter does not discuss details on every Arctic species, but primarily focuses on the common species populations that could be impacted by the proposed Project.

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L33	22	Center for Biological Diversity	5.8	SUB SEC 5.8-16		The DEIS analysis for the polar bear fails to account for changes in the Arctic climate and ice extent. The GCF and first 6.7 miles of the pipeline would be within designated polar bear terrestrial denning critical habitat. The DEIS states that polar bears would not choose to den in the project area partly due to "previous human disturbance and ongoing oilfield activity." (ASAP DEIS 5.8-16). However, this fails to take into account the impact melting sea ice will have on polar bear movements and activities, which have and will force more polar bears to spend increasing time on land. Because gas facilities can draw hungry bears, gas development and production could increase bear disturbances and human-bear encounters. The DEIS also fails to sufficiently consider the cost of such disturbances to a bear. A human-bear encounter may result in killing of a bear to prevent human injury or death. The FEIS should provide a comprehensive analysis of this and other relevant potential effects to polar bears, and should consider such impacts in light of a changing Arctic climate and environment.	The text was revised in Section 5.8.4.9 - Polar Bear, Affected environment to state: However, if predictions of the continued loss of Arctic sea ice due to climate change occur, it is expected that the number of polar bears denning on land in northern Alaska east of Barrow will continue to increase (Schliebe et al. 2008). This is supported by the recent increase in the number of bears using the coastal areas during the summer and early fall in northern Alaska (Schliebe et al. 2008). Polar bears face increasing potential for conflicts with humans in a warming Arctic, as industrial activity expands (Arctic Climate Impact Assessment 2005), longer ice-free periods force polar bears to spend more time on land (Schliebe et al. 2008) and nutritional stress encourages polar bears to seek anthropogenic food sources (Regehr et al. 2007). Increased use of terrestrial environments by polar bears would likely increase bear/human interactions in the future.
L33	23	Center for Biological Diversity	5.8	WALRUS		The FEIS should also provide additional analyses of the effects to walruses. The DEIS states that the project would have no affect on the Pacific walrus, citing unlikely presence of Pacific walruses at the West Dock facility. The FEIS should include an analysis of potential for vehicle disturbances to walruses, especially to walruses hauled out in unusual areas, as has been occurring in recent years. Trampling death of stampeding walrus due to vessel or airplane disturbance can be a serious issue. The FEIS must remedy these deficiencies by providing a complete analysis of potential effects to walruses that includes a discussion of all	Section 5.8.4.8. - Pacific Walrus, Affected Environment states: "Low numbers of Pacific walrus occur in the Beaufort Sea and while some walruses have hauled-out onshore near Kaktovik (which indicates travel past the West Dock area), this is an infrequent event and walrus rarely occur in the Prudhoe Bay region (USFWS 2010). The potential for, but unlikely scenario, an oil spill could occur if a vessel went aground. See Figure 5.7-4 in the Marine Mammal Section (5.7) for Pacific walrus habitat." Section 5.8.4.8 - Pacific Walrus, Environmental Consequences states: "Few, if any, Pacific walruses would be expected near the dock, and the likelihood of vessel-related disturbance would be very low to none."

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						relevant impacts. It is likely that there will be increased vessel and air flight traffic associated with the project, and walruses could be significantly impacted, especially as their haul out spots and behavior shifts due to climate change.	
L33	24	Center for Biological Diversity	5.5			The DEIS also does not sufficiently analyze the effects of gas development, production, and pipeline operation on birds. The DEIS fails to consider how increased predation due to predator attraction to natural gas operations will affect bird species. The FEIS should analyze the potential effects of increased predation. The Alaskan Arctic is a major breeding ground for many species of birds. Loss of permafrost and increased predators may significantly impact these species.	The text in Section 5.5.2.2 - Proposed Action, Aboveground Facilities, Gas Conditioning Facility, Operations and Maintenance states: "Fox species and the common raven are opportunistic predators which feed on birds' eggs, and young birds; however, predator populations would not likely increase due to the development of the GCF. Mitigation measures would be developed between AGDC and ADFG to prevent denning or nesting opportunities of subsidized predators. This may include placing material (netting, enclosed material) under and above beams where ravens like to nest."
L33	25	Center for Biological Diversity				d. Black carbon emissions analysis must be included in the FEIS USACE and AGDC must also analyze the impact of natural gas development's contribution to black carbon emissions, for example from increased vessel traffic and development infrastructure. Black carbon is generally regarded as the second most important contributor to Arctic warming and sea ice melt after CO . It warms the environment by absorbing solar radiation and heating the atmosphere, and it darkens snow and ice after falling to earth, thus increasing absorption and reducing the reflection of sunlight and accelerating melting. Emissions of black carbon from sources in Alaska itself are particularly troubling, as emissions in the far north are far more likely to come in contact with and accelerate melt of Arctic snow and ice. The effect of black carbon emissions in the Arctic, related to project construction, including	Greenhouse gas emissions resulting from the Project, potential effects, regulatory controls, and mitigation measures are included in Section 5.16 Air Quality per February 2010 CEQ Guidance. Climate change effects are discussed in Subsection 5.20.6.3 Tourism, Recreation, and Wilderness Resources, under Air Quality, Greenhouse Gases, and Global Climate Change and under Greenhouse Gases and Climate Change. Specific effects of climate change in Alaska are listed on page 5.20-66 of the Draft EIS. The discussion includes comparison of project greenhouse gas emissions with both the state and national inventory, and indicates on page 5.20-67, 'Even with mitigation, the proposed Project and its connected actions would generate GHG emissions and incrementally contribute to climate change. However, when proposed Project emissions are viewed in combination with global emissions levels that are contributing to the existing cumulative impact on global climate change, the incremental contribution of GHG

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						increased shipping traffic, and project operations should be analyzed.	emissions would be cumulatively minor.' Greenhouse gases and climate change were analyzed to the extent possible in the EIS. Projects outside of the proposed Action are outside the scope of the EIS and are not included, with the exception where necessary for cumulative effects analysis. It is probable that construction of the ASAP pipeline would result in a net decrease in greenhouse gas emissions over its operating lifetime. The primary reason is that the natural gas from this project would displace other fuels, such as oil, coal, and wood, which emit more greenhouse gases than does natural gas. This is discussed in detail in Section 5.20.6.3.
L33	26	Center for Biological Diversity				e. The DEIS fails to analyze impacts to the marine environment. The North Pacific and Arctic oceans are already showing evidence of climate change. These oceans are becoming warmer more acidic, undersaturated in regards to calcium carbonate, fresher, and also experiencing changes in upwelling and water circulation patterns. The DEIS fails to include analysis of impacts to the marine environment from the ASAP contribution to GHG emissions and resulting climate change, or from the CO emissions resulting from burning of natural gas once at market.	See response to comment 33-2 regarding climate change analysis.
L33	27	Center for Biological Diversity				From one-third to one-half of global CO2 emissions are absorbed into the world's oceans. As a result, the oceans are becoming increasingly acidic, which can have devastating effects on marine species that use calcium carbonate including plankton, corals, and shellfish. Especially vulnerable are the planktonic species foraminifera and pteropods, which form calcium carbonate shells and have been found to be susceptible to increased ocean acidification, and the resulting undersaturation of the forms of calcium carbonate required to form	See response to comment 33-2 regarding climate change analysis.

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						their exoskeletons. These planktonic species are abundant in Alaskan waters and form the basis of the marine food chain. Reduction in production of planktonic species due to increased CO emissions and resulting ocean acidification processes could negatively impact salmon, other fish species, coral, whales, seals, walruses, polar bears, and other Alaska wildlife species. When burned for heat or fuel, natural gas is converted to CO. The DEIS must include analysis of impacts to ocean acidification from operations of ASAP.	
L33	28	Center for Biological Diversity				Additionally, increases in seawater temperatures and resulting sea ice melt, freshening, and changes in water circulation patterns that result from GHG emissions and climate change that occurs due to methane produced during natural gas processing, development, transmission, and use, must also be analyzed in the DEIS.	See response to comment 33-2 regarding climate change analysis.
L34	1	Bud J. Carlson				Commenter is concerned that while he lives close to the pipeline route he will have no way to connect to it. As such the project is of no benefit to him.	Comment acknowledged.
L35	1	Jack Reakoff				The compressor Station should be located at or near Coldfoot in the development node: 1) The Compressor location MP225 is an open area with interspersed timber patches. The location of the Compressor would be in the travel routes of local moose, and also caribou when the use the area. The way the river and the active Dalton Highway are configured the animals avoid the human activities. The site with 8-12 personnel, and a load station would be disruptive to the game and hunters who watch those areas. It would very disruptive to subsistence users to compete with the sound and the compressor crews' activities that would displace game	Section 2.1.2 Aboveground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6.Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final engineering, but for the purposes of this document, the analysis includes the locations of the compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed."

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						movements at a natural funnel point.	
L35	2	Jack Reakoff	Appendix L			ANILCA Title VIII section .810 requires an analysis of impacts to subsistence uses and the resources. If alternative lands are available to deflect impacts, those are to be seriously considered by the Federal agencies. The high human activity in the wide valley at Coldfoot would have a much lower impact on subsistence resources and the users. The impact to the adjacent native allotment would also be detrimental to the land and its value to the allot tee.	Appendix L of the FEIS is an ANILCA 810 Analysis of Subsistence Impacts completed by the BLM. Land use information regarding native allotments, as presented in Section 5.9.1.2 of the FEIS, indicates that native allotments in the vicinity of Coldfoot would not be impacted by the proposed project.
L35	3	Jack Reakoff				This is a State of Alaska project so facilities should be located to the highest degree on the State lands. The Hydraulic flow of the compressed gas would continue to drop approximately 250 feet in elevation from PM225 Nugget Creek's location to Coldfoot itself. There would be little if any real drop in pressure in that short distance with the gravitational flow advantage. From Coldfoot the terrain raises to the south, it is a good location to begin a compression stage to boost the pressure over the hills. The TAPS has a Drag Reducing Agent site in Coldfoot for exactly that same reason	AGDC will take the comment into consideration as project design progresses.
L35	4	Jack Reakoff				The compressor Station should be located at or near Coldfoot in the development node because Coldfoot is centrally located with a 4500-foot airfield, truck stop and cafe, lodging with 68 rooms, DOT maintenance camp, electrical power to be purchased and a post office. The Compressor crews could easily be rotated out by air. There would be a noise reduction of the Compressor Station without the need to produce electricity. The small Coldfoot community would be beneficial to the Compressor crews in the long dark winters. Those crews would be running down to Coldfoot If the site was at	Section 2.1.2 Aboveground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6.Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final engineering, but for the purposes of this document, the analysis includes the locations of the compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed."

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						Nugget Creek to check mail and get out of their camp. The ROW maps I have seen for the other gas line projects put it about .5 miles east of Coldfoot Camp, but behind a small ridge that would act as a sound shield. The Compressor would be out of hearing shot so to speak.	
L35	5	Jack Reakoff				My family and I would be concerned about construction activities during harvest periods. If at all possible construction should be slated during the mid-May to mid-August time frame within 50 miles of Wiseman/ Coldfoot. This would avoid the critical fall moose and sheep hunting seasons. Using this construction timing would also would avoid the caribou migrations and wintering in this valley also. Trapping also occurs in the wintertime. Subsistence trapping activities consistently use the valley floor of the Dietrich and Middle Fork Koyukuk Rivers.	Construction for that area is currently slated for Winter (per Table 2.2-1). However, AGDC will take the comment into consideration as it develops the construction schedule which will be finalized until much later in the design process.
L35	6	Jack Reakoff				Consideration is need for unimpeded subsistence use and access of the lands associated to the gas line ROW. The Trans-Alaska Oil Pipeline Act (P.L. 93-153) that set out the Utility Corridor specifically requires stipulations in all oil and gas pipeline right-of-way permits to protect the "interests of individuals living in the general area of the right-of-way permit who rely on fish, wildlife, and biotic resources of the area for subsistence purposes."	AGDC has developed mitigation measures, found in Section 5.23 of the FEIS that address potential impacts to access to subsistence resources. The ARMS have been removed from the mitigation chapter. AGDC proposed mitigation is stated and includes the analysis and effectiveness of each measure. Through this public review process and the formal permitting process for the project, AGDC anticipates that additional mitigation measures for subsistence will be developed.
L35	7	Jack Reakoff				Regarding Alternative B: the proposed action, Appendix L, Analysis of Section of Subsistence Impacts, there is a need to reflect the stated subsistence impacts in all a), b), c), and d) of the ANILCA sec. 810 analysis. The therefore mentioned concerns and mitigations must be reflected in the final EIS.	Potential impacts to subsistence resources are described in Section 5. 14 of the FEIS. Appendix L of the FEIS is an ANILCA 810 Analysis of Subsistence Impacts completed by the BLM.

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L35	8	Jack Reakoff				I personally feel this project will benefit Alaska and the Nation. The people here have coincided with the TAPS and Alyeska Service Company now for over 35 years. I feel we can work with any gasline project to reduce impacts to the resources and local rural residents that reside in the directly affected area.	Comment acknowledged.
L36	1	Jack Reakoff				I am very appreciative that the comment period for the DEIS-ASAP was extended to April 4, 2012, and that a public meeting in Wiseman transpired. Local people gave good input and questions regarding the ASAP project. I was happy also that the BLM was able to have an ANILCA sec. 810 hearing in conjunction. I do want to stress that the Federal lands here are also subject to The Trans-Alaska Oil Pipeline Act, protections of subsistence interests.	Comment acknowledged.
L36	2	Jack Reakoff				I have printed and marked out areas of fish and wildlife areas of environmental concern or sensitivity, which may be impacted by the ASPA project. (See PDF for maps)	Comment acknowledged.
L36	3	Jack Reakoff				Previous planning efforts through the BLM General Management Plan, and the Scenic By-Way to contain developments to nodes should be adhered to. These planning efforts accomplished after many local meeting were to reduce impacts to the fish and wildlife resources, subsistence, and wilderness characteristics of the Arctic Brooks Range. Gas transportation can be responsibly developed with reduced impact to the other valuable aspects of the area.	According to AGDC, they are aware of these plans and the preference to have development occur at existing development nodes along the Dalton Highway. Based on hydraulic flow analysis using the current design parameters for the project, the compressor station at MP 225.1 in the EIS cannot be at the Coldfoot development node. However, the hydraulic analysis will be refined as engineering progresses to pinpoint the location of that compressor station.

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L37	1	Kristin Reakoff				Construction should be started as early as possible in the summer within 50 miles of Wiseman and the aim should be to move well past Wiseman before the beginning of annual moose and sheep hunting. One of the comments made at the public meeting was that the construction will last approximately 2 seasons in any given area, and will likely be a "one season disturbance." I want to point out that a one season disturbance, which could mean a resident is not able to hunt successfully a moose or a sheep, really means that resident or household goes without meat for an entire year. The cost of shipping meat from Fairbanks is prohibitive, and in no way are most subsistence households in the area able to make up by buying meat, for the missed opportunity to hunt. Loud construction sounds, lots of activity and people can and do seriously change movement patterns for animals. Construction crews should not be allowed to be constructing pipeline during the very limited subsistence harvest of moose and sheep. All year long there is harvest of subsistence resources such as wood, birds, fish, berries, etc., but for many of those resources we can travel to many areas and can move to areas where construction is not occurring, but during moose and sheep harvest, there are limited places where animals go and we cannot just go to another area, we must hunt where the animals are.	AGDC proposed the following mitigation measures in the EIS: "The ADGC has proposed the following mitigation measures that can be implemented to address effects on subsistence activities: • Identifying locations and times when subsistence activities occur, and avoiding work during these times and in these areas to the maximum extent practicable; • Scheduling work (e.g., blasting) to avoid conflict with subsistence activities when possible;" According to AGDC, they will address the concerns of local residents by analyzing the concerns to see if project engineering can accommodate them and by following the regulatory process to develop the appropriate mitigation measures. It is not possible to address all specific concerns, but AGDC will work to minimize its impact on the public while providing the most benefit to the most people.

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L37	2	Kristin Reakoff				I am also concerned about the proposed compressor station about 11 miles north of Wiseman. I feel this is an unnecessary intrusion upon the land and resources when there is a "development node" not far south, set aside specifically for such developments, and is a location that would be just as appropriate for the compressor station without losing much or any pressure. All though the compressor station's sound is a concern, as it will affect wildlife, the biggest concern is the regular visits of people to the area...this can and does and will have the effect of keeping animals from being in the area, and will alter wildlife travel patterns.	According to AGDC, the compressor station locations are based on hydraulic flow analysis using the current design parameters for the project. Locations other than the three discussed in the POD and the EIS have not been considered at this time, but the hydraulic analysis will be refined as engineering progresses to pinpoint the location of the compressor station. Section 2.1.2 Above Ground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6.Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final engineering, but for the purposes of this document, the analysis includes the locations of the compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed."
L37	3	Kristin Reakoff				I think one of the biggest concerns I have as a local resident of Wiseman, is the general feeling that the local concerns are not truly being responded to. We are very thankful for the opportunity to share our comments, but we also feel like they may mean very little to those planning the pipeline.	According to AGDC, they will address the concerns of local residents by analyzing the concerns to see if project engineering can accommodate them and by following the regulatory process to develop the appropriate mitigation measures. It is not possible to address all specific concerns, but AGDC works to minimize its impact on the public while providing the most benefit to the most people.
L37	4	Kristin Reakoff				Wiseman is a rare and small subsistence village in the Brooks Range. There is no reason to not at least try to mitigate some of the concerns of locals and to try to not disturb the special way of life we have in Wiseman. If it means not putting a compressor station so close to the one community that lies so close to the pipeline, to help continue this way of life, it is not only needed, but law requires it.	According to AGDC, the compressor station locations are based on hydraulic flow analysis using the current design parameters for the project. Locations other than the three discussed in the POD and the EIS have not been considered at this time, but the hydraulic analysis will be refined as engineering progresses to pinpoint the location of the compressor station. AGDC has developed mitigation measures, found in Section 5.23 of the FEIS that address potential impacts to access to subsistence resources. Through this public review process and the formal permitting process for the

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							project, AGDC anticipates that additional mitigation measures for subsistence will be developed.
L37	5	Kristin Reakoff				Laws that protect subsistence also prevent such projects from impeding subsistence activities, so if construction does occur during sensitive moose and sheep hunting, I would implore the BLM permit process and Army Corp to plan for ways to mitigate these issues. If that means providing an access route around a construction area so subsistence hunters can continue to access lands for hunting, than that should be something carefully looked at and planned for.	AGDC has developed mitigation measures, found in Section 5.23 of the FEIS that address potential impacts to access to subsistence resources. Through this public review process and the formal permitting process for the project, AGDC anticipates that additional mitigation measures for subsistence will be developed. Section 5.23.2.12 -Mitigation, Social and Economic Resources, Mitigation Measure #1 includes mitigation for user access to subsistence resources.
L37	6	Kristin Reakoff				I also am concerned about pipe being laid in sensitive salmon spawning areas and would ask that those areas be carefully examined during the planning phase, and that hydro seeding is not done at any point in the restoration process.	Section 5.23.2.6, Mitigation Measure #6 states that "Additional characterization of temporal fish use at proposed stream crossings would be required. Mitigation measures would be required." In addition, all stream crossings will be permitted individually prior to Project commencement.
L37	7	Kristin Reakoff				Last summer the road from Coldfoot to Wiseman was paved and then hydro-seeded, which caused a huge spurt of green grass to shoot up just as the moose were starting to move around during the fall....and we had a huge number of moose mortalities, such a shame. We would ask that disturbed areas are left to re-seed with the natural process that occurs with native plants and no seeding is done.	Text was added to include potential wildlife mortality from hydroseeding along the ROW as a potential impact which should be mitigated in a mitigation plan,
L38	1	Merrick Peirce				Significant stakeholders throughout Alaska are OPPOSED to this pipeline project and its routing. Note that the Fairbanks North Star Borough Assembly, which represents approximately 100,000 Alaska citizens is opposed to the route of the ASAP line. Likewise, the City of Valdez and the City of North Pole are on record via resolution opposing this project/ routing.	Comment acknowledged.

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L38	2	Merrick Peirce				It is very, very clear, through multiple resolutions passed by local government, and the representatives of local government (AML) that these significant stakeholders do NOT support this pipeline project or its proposed route along the Parks Highway.	Comment acknowledged.
L39	1	Merrick Peirce				The ASAP stand alone pipeline proposes to convey natural gas from the North Slope of Alaska- at great, uneconomical cost- to the Cook Inlet Region of Alaska. Given the serious body of scientific data gathered by USGS, EIA, DOE, and industry, (See PDF) there is no rational, economic reason for Alaskans to desire to draw gas from the proposed pipeline given the vast Cook Inlet natural gas reserves. Escopeta discovered as much as 3.5 trillion cubic feet of gas within one well drilled last summer with a jack up rig in the Kitchen Lights Unit of Cook Inlet. Such a discovery, if fully confirmed, is enough gas, given existing railbelt usage within Alaska of 240 MCF/D, to last approximately 30 years. Other drilling, on-shore, (8 wells as of last summer) are also confirming gas deposits. NordAq (an on-shore Cook Inlet well driller) believes it can pull 50 MCF/D from a new well it is in the process of completing. Buccaneer Energy is optimistic about its estimates for Cook Inlet gas reserves. Its estimates for Natural gas reserves within Cook Inlet are comparable to those of USGS. Buccaneer Energy plans to bring its own jack up rig into Cook Inlet in 2012 to support its own drilling program.	As provided in Section 1.2.2 Purpose and Need, the existing Cook Inlet gas fields are currently supplying approximately 200 MMscfd of natural gas to the region for power generation and residential use. These existing fields cannot sustain the area's needs without some form of supply expansion. Major new supplies of Cook Inlet natural gas remain unproven. The projected drop in Cook Inlet natural gas production is illustrated in Figure 1.2-1.

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L39	2	Merrick Peirce				The air pollution generated by compressors to chill and compress the gas through the 737 mile pipeline would unnecessarily pollute the air.	As discussed in Subsection 5.16.2.2, Proposed Action, Compressor Stations, 'Emissions for the proposed Project from operation of each compressor station are provided in Table 5.16-11. These emissions were calculated to represent a worst-case (most conservative) scenario. The AGDC should refine the emissions calculations using vendor specific emission factors upon equipment selection. As indicated in the table, preliminary emission estimates trigger the requirement for a PSD permit for NOX. The PSD permit process would require the AGDC to perform an air quality impact analysis to ensure compliance with air quality standards and increments in 18 AAC 50.010 and 18 AAC 50.020. The permit would also require BACT on emission units to minimize air pollution. Preliminary emission estimates also indicate each compressor station would trigger the requirement for a Title V operating permit. Consequently, the proposed Project as permitted by the ADEC would not cause or contribute to a violation of any federal, state, or local air quality standards.' While compression is required for the pipeline, it will be controlled under both state and Federal requirements.
L40	1	Merrick Peirce				The proposed ASAP project has not credibly evaluated alternative gasline routes as required by law. In March 1988 the US Department of the Interior BLM-AK-PT-88-003-1792-910 approved the Final Environmental Impact statement for a Trans-Alaska Gas System project, the centerpiece of the project being a 36" diameter gasline routed from the North Slope to Valdez, following the Alaska- Richardson Highway. This exhaustive analysis, which looked at alternative routes including the Parks Highway, found that the best routing was down the Richardson Highway.	The purpose and need for the proposed ASAP project as described in Section 1.2 of the FEIS would not be met by a North Slope to Valdez pipeline project. Section 4.4.3 describes a Spur Pipeline from a North Slope-to-Lower 48 or Valdez Pipeline alternative. A North Slope-to-Lower 48 or Valdez Pipeline is in the planning process and is not currently scheduled to be completed and transporting natural gas by 2019. Furthermore, implementation of the APP is uncertain. Therefore, the Spur Pipeline from a North Slope-to-Lower 48 or Valdez Pipeline would not meet the purpose and need of the proposed Project and would not be a reasonable alternative.

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L40	2	Merrick Peirce				Further, the Federal Export License (ERA Docket No. 87-68-LNG) see attached, see Sec. D, 'Other Comments' noted that DOE determined that the Port Of Valdez was by far the environmentally preferable alternative for LNG export from Alaska; NOT the Cook Inlet.	The purpose and need for the proposed ASAP project as described in Section 1.2 of the FEIS would not be met by a North Slope to Valdez pipeline project for LNG export. Section 4.4.3 describes a Spur Pipeline from a North Slope-to-Lower 48 or Valdez Pipeline alternative. A North Slope-to-Lower 48 or Valdez Pipeline is in the planning process and is not currently scheduled to be completed and transporting natural gas by 2019. Furthermore, implementation of the APP is uncertain. Therefore, the Spur Pipeline from a North Slope-to-Lower 48 or Valdez Pipeline would not meet the purpose and need of the proposed Project and would not be a reasonable alternative.
L41	1	Merrick Peirce				The Project follows an un-permitted, unestablished ROW.	The State of Alaska has granted a legal ROW for the ASAP on state owned lands. The required legal ROW on Federal and private lands has not yet been obtained by AGDC. Authorized work areas within obtained legal ROWs would be determined during permitting and final engineering.
L41	2	Merrick Peirce				The Project does not provide affordable gas to Alaskans.	A business case for the proposed project is not presented and evaluated in the FEIS.
L41	3	Merrick Peirce				The Project does not provide gas to Alaska's key military bases: Eielson AFB, and Ft. Greely.	Comment acknowledged.
L41	4	Merrick Peirce				The Project bypasses Fairbanks, North Pole, Salcha, Harding Lake, Pogo Mine, Delta Junction, Copper Center, Glennallen, and Valdez.	The Fairbanks Lateral would provide a gas off-take in Fairbanks. The proposed pipeline route would not pass through the other communities cited in this comment.
L41	5	Merrick Peirce				The Project does not provide Alaska with significant new revenue.	The major categories of state tax revenue related to the proposed Project is provided in Table 5.12-16. Assuming throughput of 250 MMscf of natural gas per day, it is anticipated that the state will realize tax revenues of $358.6 million the first year of operation.

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L41	6	Merrick Peirce				The Project demonstrably does not make gas available to either the greatest number of residents, and the areas of Alaska with the greatest mineral extraction potential.	As provided in Section 4.4.1.1 Alternatives, the Richardson Route Alternative impacts a population of 380,900 people whereas the Parks Route impacts 372,600 people, or a discrepancy of 8,300 people. Despite this, the Richardson Route Alternative was excluded from detailed analysis given that the longer route would not lessen environmental impacts compared to the proposed Project. Furthermore, the primary purpose of the Project is to provide a long-term, stable supply of up to 500 MMscfd of natural gas and NGLs from existing reserves within North Slope gas fields to markets in the Fairbanks and Cook Inlet areas by 2019.
L41	7	Merrick Peirce				By ignoring the high cost of providing gas to these areas, (from the Parks Highway) he then adds these populations to the Parks Highway route. The tariff that has already been proposed for a 250 MCF/D project is over $17.00, if one assumes that 250 MCF/D is used year-round-which is extremely improbable. The tariff to get gas from Dunbar, Alaska to North Pole has not even been calculated, (nor has a route). The only consideration given by AGDC is a spur line that gets gas to the far Western edge of the University of Alaska Fairbanks. Would ratepayers in Anchorage subsidize a tariff to move gas another 20 miles to North pole, and then another 10 miles to Eielson? Not likely, as this would likely be inconsistent with the law.	As provided in Section 4.6 Alternatives, multiple alternatives were considered, but were not carried forward for detailed analysis because they do not meet the objectives of the proposed Project's purpose and need. However, Section 5.20.5.5 Cumulative Effects provides information on reasonable foreseeable actions related to the proposed Project. The Fairbanks Natural Gas Distribution System is one such foreseeable action where distribution from the terminus of the Fairbanks Lateral would most likely involve a pipeline distribution system and possibly new facilities that compress natural gas for distribution by storage tanks. Additionally, as proposed in Section 3.2.3 Connected Actions, fuel products would be supplied to customers along the highway system in the form of propane and butane (LPG).
L41	8	Merrick Peirce				We need affordable, clean, energy to entice people to make the transition to appliances that burn clean Fuels. The higher the deliver cost of that energy, the less likely people will make the transition to clean(er) fuel sources	Comment acknowledged

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L41	9	Merrick Peirce				The line under consideration is not economically feasible and existing reports show a tariff that exceeds $17.00 per million BTUs, with a 250 MCF/D throughput. This is due to the lack of economy of scale for this foolish project. Unaddressed is the fact that gas consumption for space heating is not needed for several months of the year. This means a project with a 250 MCF/D projected throughput, and a tariff that exceeds $17.00 has to account for the three to four months per year May, June, July, August, when little gas will be used; a proportionate increase in the tariff needs to be addressed.	As provided in Section 1.2.1 Purpose and Need, the primary purpose of the proposed Project is to provide a long-term stable supply of 500 MMscfd to markets in the Fairbanks and Cook Inlet areas by 2019. However, as highlighted in Section 3.2 Connected Actions, a reasonable foreseeable action includes the exportation of NGLs to international markets.
L41	10	Merrick Peirce				A pipeline with multiple gas take off points, which this one does NOT provide, is the essential way of providing gas to the greatest number of Alaskans.	As stated in Section 1.2.1 of the FEIS: "The primary purpose of the Project is to provide a long-term, stable supply of up to 500 MMscfd of natural gas and NGLs from existing reserves within North Slope gas fields to markets in the Fairbanks and Cook Inlet areas by 2019."
L41	11	Merrick Peirce				The higher the cost of gas, (or for any, clean energy source) the dirtier the air. The dirtier the air, the more residents who will end up with lung cancer, Leukemia, and other cardio-vascular/pulmonary problems. The extreme, cold climate Alaska residents live in requires clean, affordable energy for the requirements of Article VII of the Alaska Constitution to be met.	For reference, Section 4 under Article 7 of the Alaska Constitution reads: "The legislature shall provide for the promotion and protection of public health." We agree that natural gas is a cleaner healthier fuel option for Alaskans currently using oil, coal, or wood. This position is discussed in detail within the cumulative effects section of Public Health.
L42	1	Merrick Peirce				The attached economic analysis prepared by the Fairbanks Economic Development Corporation documents that the route selected by AGDC for its gasline does NOT serve the greatest Alaska population, nor does it serve the region of Alaska with the greatest mineral exploration potential. This confirms that the route selection for ASAP has not been properly vetted by comparing alternative routes. (See PDF)	As provided in Section 4.4.1.1 Alternatives, the Richardson Route Alternative impacts a population of 380,900 people whereas the Parks Route impacts 372,600 people, or a discrepancy of 8,300 people. Despite this, the Richardson Route Alternative was excluded from detailed analysis given that the longer route would not lessen environmental impacts compared to the proposed Project. Furthermore, the primary purpose of the Project is to provide a long-term, stable supply of up to 500 MMscfd of natural gas and NGLs from existing reserves within North Slope gas fields to markets in the Fairbanks and Cook Inlet areas by 2019.

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L43	1	Rondell Jimmie				Commenter is concerned about impacts to cultural lands.	The effects to cultural resources are addressed in Section 5.13.3.
L43	2	Rondell Jimmie				Commenter is concerned about impacts to critical animal habitat.	Section 5.5.2 explains that the amount of habitat loss would be minimal, and that new vegetative growth within the ROW can provide forage for moose and other grazers if invasive species do not take over the area.
L43	3	Rondell Jimmie				Need to have a copy of the fire or hazard control to insure the people can be employed by the ASAP	A fire or hazard safety control plan will be prepared along with permit applications for the project and will have to meet local and state standards. This information will be gathered during the USACE 404 permitting process.
L43	4	Rondell Jimmie				Commenter would like a spur line to connect Minto - Manley - Tanana and other villages in the future of this project.	Comment acknowledged
L43	5	Rondell Jimmie				Commenter wants to see the safety plan for the project, particularly in reference to clean up.	During detailed design, AGDC will develop plans to address all possible emergencies, including spills, in accordance with Stipulation 2.11, Contingency Plans, of the State Right-of-Way Lease for the Alaska Stand Alone Gas Pipeline/ASAP, ADL 418997, contained in Appendix M of the DEIS. That stipulation requires AGDC to demonstrate its capability and readiness to respond to and clean up any discharge of hazardous substances. AGDC's plans will address safety issues for both construction and operation. These plans are not available at this time. This information will be gathered during the USACE 404 permitting process."

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L45	1	BLM	1.0	1.2.3.1		Sec. 1.2.3.1 - The words "Overall Project Purpose" are tacked onto the end of the second paragraph. This term presumably should be a heading for a section 1.2.3.2. More importantly, the DEIS fails to clearly define the overall project purpose. It states that the USACE defines the overall project purpose, but it does not (at least in this section) say what it is. Instead, it concludes the discussion of the overall project purpose with, "The applicants [sic] overall project purpose is to transport 500 MMscfd of natural gas and natural gas liquids from the North Slope of Alaska to Fairbanks, Anchorage and the Cook Inlet area of Alaska by 2019." This leaves the reader to assume that the USACE has adopted the applicant's overall project purpose as the USACE's overall project purpose. Clarity is important since the Draft EIS states that, "The overall project purpose is used for evaluating practicable alternatives under the Section 404(b)(1) Guidelines and must be specific enough to define the applicant's needs, but not so restrictive as -to preclude all discussion of alternatives." See the discussion below on this topic in Sec. 4.	A BLM purpose and need has been added. As suggested, Section 1.2.3.2 has been corrected and a Section 1.2.3.2 heading has been added to the FEIS. Section 1.2.3.2 of the FEIS has been revised to clearly state the overall project purpose as determined by the USACE.
L45	2	BLM	1.0	1.3	1.5-1	Sec. 1.3 and Table 1.5-1 - Although it is common to cite E.O. 13175 as requiring tribal consultation for proposals such as the one considered here, that authority's relevance to this project is questionable. The E.O. is relevant to "regulations, legislative comments or proposed legislation, and other policy statements or actions." The applicant's proposal does not fit any of these categories. Rather, we suggest that tribal consultation rest on a Presidential Executive Memorandum dated April 29, 1994. Relying on E.O. 13175 also opens the Corps and cooperating agencies to the charge	Section 1.3 and Table 1.5-1 have been edited to reflect this change.

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						that they have not consulted adequately. A Memorandum for the Heads of Executive Departments and Agencies, and Independent Regulatory Agencies issued by 0MB on July 30, 2010, citing Pub. L. 108- 199, 118 Stat. 452, as amended by Pub. L. 108-447, 118 Stat. 3267, noted that federal agencies are to "consult with Alaska Native corporations on the same basis as Indian tribes under Executive Order No. 13175." If E.O. 13175 actually applied, consultation should also have been conducted with the ANCSA corporations.	
L45	3	BLM	2.0	2.1.3.3		2.1.3.3 - The Project description attempts to differentiate between the temporary construction easement (TCE) and what they call temporary extra workspaces (TEW) beyond the limits of the construction right-of-way (ROW). The TCE is described as a 100-foot ROW with an additional but undefined 77 miles portion that would be 243 feet to accommodate cut and fill stretches. This may be sufficient for a cumulative analysis, but it does not allow for any site specific concerns. The TEW are inadequately described as to specific locations and acreages for the BLM to analyze the impacts for site specific locations or the cumulative impacts of the project. These areas could have a significant impact on the total area disturbed during construction. This could result in additional NEPA requirements and authorization on BLM's part before construction can begin.	Section 2.1.3.3 of the FEIS has been revised to present more detailed information regarding TEWS including their quantity, dimensions and acreages. TEWS locations are compiled in a GIS database, however, further discussion is required with AGDC and USACE to determine how best to geographically depict the information in the FEIS. Impacts to wetlands for all construction activities, including TEWS, is discussed in detail in revised Section 5.4 of the FEIS. Estimates of required amounts of fill needed for the project include TEWS. Restoration of locations following removal of TEWS, as well as any other temporary construction features, would be conducted in accordance with the stipulations and requirements associated with the permits and authorizations to be issued for project construction.
L45	4	BLM	2.0	2.2.2		2.2.2 — Under "Standard Design and Construction Procedures" AGDC proposes only winter and summer construction. Snow removal in winter will be difficult in a 100-foot construction ROW. All equipment operation is limited to within the authorized ROW. This section will benefit from further discussion of	Given the current state of project design, further definition of construction windows is not available at present. Section 2.1.3.3 of the FEIS has been revised to present more detailed information regarding TEWS including their quantity, dimensions and acreages. TEWS would be located adjacent to the construction ROW and could be used for such things as spoil

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						construction methods between seasons and defining the construction window for each season.	storage, staging, equipment movement, material stockpiles, and pull string assembly associated with HDD installation.
L45	5	BLM	2.0	2.2.3.2		2.2.3.2 - The project description should include some general TEW need for each type of special construction area such as water crossing describe as well as an estimate of the number of type of construction area for example the estimate the number of HDD crossings. It would be helpful if each type of construction technique came with a site plot or at least cross section view of the areas needed for construction, staging, etc.	Section 2.1.3.3 of the FEIS has been revised to present more detailed information regarding TEWS including their quantity, dimensions and acreages. TEWS would be located adjacent to the construction ROW and could be used for such things as spoil storage, staging, equipment movement, material stockpiles, and pull string assembly associated with HDD installation. The additional specific information requested by the comment is not available at present. The March 2011 POD for the ASAP Project includes a typical plan view of TEWS in Attachment 1, Sheet DB-ROW-07.
L45	6	BLM	2.0	2.2.7		2.2.7 - To say that waste will be disposed of in accordance with the applicable regulations and permitting is insufficient to analyze the potential impacts. There needs to include estimates of how much solid waste is expected to generated, and they should identify the existing facilities and the capacity of the facilities they expect to use. If they are burning waste there may be impacts to air quality.	AGDC has provided an estimate of the volume of camp waste that will be generated by the project during construction. This estimate has been inserted into Section 2.0 as Table 2.2-4. Language providing further explanation of solid waste generation and handling has been inserted into Section 2.2.7
L45	7	BLM	4.0	4		Sec. 4.0, p. 4-1 - Clarify which alternatives are being considered. As presented, the alternatives are confusing. Section 4.6 is titled, "Alternatives Considered but Eliminated from Detailed Analysis." Such a section is required by NEPA. Yet the sentence in Sec. 4.0 on page 4-1 states: "Section 4.6 presents a summary of potential alternatives and identifies reasonable alternatives that meet the purpose and need of the proposed Project, are technically feasible and have potential environmental advantages over the proposed Project." Sections 4.2 through 4.5 should do that. Section 4.6 should do exactly what its title indicates and only include discussion of alternatives that do not meet the	The introduction to Section 4.0 has been revised to improve the description of how the Section is organized. Sections 4.1 through 4.5 describe alternatives that were identified through the scoping process and in the alternatives development process conducted by the USACE and Cooperating Agencies. Sections 4.1 through 4.5 also include an evaluation of the identified alternatives for consistency with the ASAP project purpose and need, and other factors related to reasonableness, and identifies potential environmental advantages over the proposed action. Section 4.6 presents a summary of Section 4.1 through 4.5 including identification of Alternatives Considered But Eliminated from Detailed Analysis. Section 4 could be organized in other ways including the one suggested. The current

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						purpose and need, are not technically feasible, or do not provide potential advantages over the proposed project. By only discussing alternatives that are not going to be considered in detail in 4.6 would leave the earlier sections uncluttered by discussions of alternatives that will not be considered. It will be easier to see the two alternatives to the proposal that will be considered.	organization was developed to follow a logical analytical process, addresses alternatives suggested through the scoping process, disclose Alternatives Considered But Eliminated from Detailed Analysis, and conclude with a summary.
L45	8	BLM	4.0	4.2		Sec. 4.2 - The overall project purpose is seemingly defined in Sec. 1.2.3.1 (probably should be its own section 1.2.3.2): "The applicants overall project purpose is to transport 500 MMscfd of natural gas and natural gas liquids from the North Slope of Alaska to Fairbanks, Anchorage and the Cook Inlet area of Alaska by 2019." if the USACE has adopted the applicant's overall project purpose as its own, then none of the alternatives described in Sec. 4.2, except gas from the Gubik field, meet that purpose and should only be discussed in Sec. 4.6 and clearly identified as being eliminated from analysis because they do not meet the purpose. Other rationales would be secondary at best, and might not be mentioned at all. See comments below on 4.2.2 on suggestions for handling Gubik. Some of the alternative discussed in 4.3 at least theoretically could meet the purpose and need, but can be eliminated from detailed analysis in 4.6 for other reasons. For example, the smaller diameter pipeline alternative described in 4.3.2 meets the purpose (North Slope gas to Cook Inlet; 500 MMscfd; by 2019), but it can be deleted not because it fails to meet the purpose but because it offers no environmental advantages to the project. These discussions belong in 4.6 if the USACE is uncomfortable with adopting the applicant's	The USACE Purpose and need statement in Section 1.0 has been updated in response to USACE comments on the DEIS. The introduction to Section 4.0 has been revised to improve the description of how the section is organized. The discussion of each alternative evaluates consistency with the ASAP project purpose and need, and other factors related to reasonableness, and identifies any potential environmental advantages over the proposed action. The discussion of each alternative concludes with a determination of either eliminating the alternative from further consideration of carrying it forward for detailed analysis in Section 5. The Council on Environmental Quality (CEQ) - Regulations for Implementing the National Environmental Policy Act (NEPA), 40 CFR Part 1502.14, Alternatives Including the Proposed Action, states: "...In this section agencies shall; (a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated...". As noted in the regulation, the requirement to evaluate alternatives is limited to "reasonable alternatives". Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant. (Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed. Reg. 18026 (1981). Ed. Note. March 16, 1981. Section 4.0 does include

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						overall purpose as its own, then it needs to make that clear in Chapter 1 (presumably in what should have been section 1.2.3.2). if the USACE's purpose is different than the applicant's—say, for example, to provide for energy needs in the Cook Inlet and Fairbanks areas—then many of the alternatives discussed in 4.2 through 4.4 could fit the purpose and need. If they are not to be considered for detail analysis, the rationale for not doing so will have to be strongly presented in 4.6.	discussions of unreasonable alternatives including many raised during the scoping process. The intent is to inform the reader as to why an alternative is unreasonable.
L45	9	BLM	4.0	4.2.2		Sec. 4.2.2 - The EIS in several areas, particularly pp. 2-31 and 2-32, mentions or discusses alternative means to cross the Yukon River. There are three options. However, none of these are described in 4.2.2, though they would involve some variation in the route. They should be described. The differing impacts should also be described in the impact analysis. We checked on the water resource discussion and it did have such a discussion, however all resource discussions should be reviewed to confirm that the differing impacts are adequately described.	The three Yukon River crossing options are not addressed in Section 4 - Alternatives because they are not "EIS Alternatives." The EIS Alternatives are 1) the No-Action Alternative, 2) the Proposed Action, and 3) the Denali Park Route Variation. The three Yukon River crossing options are all part of the Proposed Action. Therefore, these "options" are identified and described independently in Section 5 - Environmental Analysis. All three Yukon River crossing options are analyzed throughout Section 5 - Environmental Analysis. Each subsection from 5.1 through 5.19 contains a further division called Environmental Consequences. Each of these Environmental Consequences includes a heading entitled: "Yukon River Crossing Options."
L45	10	BLM	4.0	4.2.2		Sec. 4.2.2 - The first sentence refers to the railbelt, but the rest of the paragraph refers to Gubik, which is hundreds of miles from the railbelt. If the intent is to dismiss the Gubik alternative, discussion of it should be moved to 4.6 and the argument presented so that the concluding sentence is that its resource is unproven.	The Gubik gas field is within reasonable proximity to the railbelt for consideration as a source of natural gas. Section 4.2.2 of the FEIS has been reorganized to clarify that Gubik is not within the Railbelt. Gubik was raised during the scoping process as a potential alternative source of natural gas. The discussion of the Gubik gas found in Section 4.2.2 is intended to inform the reader why it is not a reasonable alternative.

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L45	11	BLM	5.4			5.4 (page 5.4-17) — This section states: "Construction of the ROW in wetland areas during the winter reduces impacts versus the summer construction season." Given that construction/activity will occur beyond winter, impacts discussed in the last paragraph on page 5.4-17 need to be addressed for wetland locations with scheduled summer activity.	Added text to include a discussion on wetland impacts from construction activities in the summer
L45	12	BLM	5.4			5.4 (page 5.4-30) — This section states: "No additional impacts would be expected to occur to wetlands from material sites." Some of the pits likely encompass wetlands. Material removal at those sites would have a direct impact (temporary to permanent) on wetlands. That impact should be discussed.	According to AGDC, all material required for ASAP construction can be obtained from currently open and active sites. ASAP construction would require approximately 14 percent of the available material in these open active sites. Material requirements by location are described in Appendix P.
L45	13	BLM	5.4	5.4.3.2		5.4.3.2 - Effects from accidental spills and releases (as part of permanent operations) are not adequately discussed in the Environmental Consequences section for the Proposed Action. See 5.19.4 for further details and discussion points.	Addressed by adding text to indicate spill response effects and referenced Section 5.19.4
L45	14	BLM	5.6	5.6.2		5.6.2 - The EIS needs to discuss water withdrawal needs and impacts to resources south of Gaibraith Lake. Water availability would be of particular concern if water was needed for winter use (i.e. ice roads) south of Atigun Pass where lakes are scattered geographically. A discussion of potential water sources and impacts due to withdrawal as well as an analysis of alternative construction methods if water is not available is warranted.	Section 5.6.2.2 - Water Withdrawals has been changed to state: Specific water sources and water withdrawal requirements for construction activities for the route south of Galbraith Lake have not been determined to date. This will be identified when detailed engineering and planning occurs, and for water use permit applications. Ice roads and pads would primarily be used in the Arctic Coastal Plain region and therefore, water demand should not be as high for construction activities in areas south of the Brooks Range. The AGDC would likely use similar water sources south of Galbraith Lake that were used for the TAPS construction. These details will be determined later in the process. Table 5.2-22 includes the details of water requirements by spread and season.

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L45	15	BLM	5.6	5.6.2		5.6.2 - Compare this paragraph with the discussion on Page 5.6-19 under the Construction heading. Has each crossing been evaluated and the crossing technique discussed with ADF&G? If yes, state as much. If not, how did AGDC arrive at the crossing methodologies presented starting on page 5.6-24.?	Addressed to state that the ADF&G requires a permit under Alaska Statutes (AS), Title 16, Department of Fish and Game which protects freshwater habitat in streams and rivers that support anadromous and resident fish. Each stream crossing would be individually permitted under AS 16.05.840-871. AGDC made assumptions on crossing methods based on location, size and flow of streams and known anadromous information.
L45	16	BLM	5.6	5.6.2		5.6.2 (page 5.6-30) - These impacts must be compared to some other route besides the Denali National Park Route Variation.	Three EIS Alternatives are analyzed in the ASAP EIS; these are the Proposed Action, the Denali National Park Route Variation, and the No Action Alternative. Three Yukon River crossing options are analyzed. Impacts of each of the three Yukon River crossing options are described independently in the revised Section 5.6.2.2.
L45	17	BLM	5.9	5.9-2		5.9-2 In the discussion of Wilderness Resources Management, we suggest changing last paragraph to reflect "recent wilderness inventories have confirmed that the 1980 assessment is still valid and that no other lands meet the criteria for wilderness characteristics."	The text has been revised to reflect the comment.
L45	18	BLM	5.9	5.9-4		5.9-4 We suggest the paragraph on Title XI be changed to reflect: "Title XI of ANILCA establishes a comprehensive system for the approval or disapproval of transportation and utility system applications if any portion of the system will be within any conservation system unit, national recreation area, or national conservations area in the state."	The text has been revised to reflect the comment.
L45	19	BLM	5.9	5.9-7		5.9-7 This section should be updated to reflect that the state has already issued a lease.	The text has been revised to reflect the comment.
L45	20	BLM	5.9	5.9.1.2		5.9.1.2 The statement "The federal government owns parcels "within" the proposed ROW that are managed by the BLM, DOD, NPS and USFWS." is incorrect in that the proposed ROW does not intersect any NPS or USFWS lands. Only the Denali alternative involves lands under the NPS. There are no lands identified under	The text has been revised to reflect the comment.

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						USFWS.	
L45	21	BLM	5.9	5.9-14		5.9-14 - This section specifically states that no new solid waste disposal sites would be developed. As previously noted there needs to be an estimate of solid waste generated including the identification of the ADEC-approved disposal sites, capacity of the sites that will be used, and trucking traffic that will be generated by hauling waste. Also it states that construction camps for the proposed project would be located on existing permitted construction sites. Many of these old sites are no longer authorized and have been abandoned and rehab to some extent. There will be some impacts to reopening these sites, or in some cases expanding areas of use.	In accordance with Stipulation 1.4.3.1 of ADL 418997 Alaska Stand Alone Gas Pipeline/ASAP Right-of-Way Lease, AGDC will develop plans for Disposal of Sanitation and Hazardous Waste and for Handling of Solid and Liquid Waste. Those plans will be completed following final design of the project and will be utilized for construction planning purposes. AGDC has provided an estimate of the volume of camp waste that will be generated by the project during construction. This estimate has been inserted into Section 2.0 as Table 2.2-4. Language providing further explanation of solid waste generation and handling has been inserted into Section 2.2.7
L45	22	BLM	5.9		5.9-6(a)	Table 5.9-6(a) — This table is confusing in that it doesn't make clear why the operational acreage is greater than the construction acreage. If this is due to the shrinking of the ROW from construction width to operation width, it needs to be made clear.	The text has been revised to reflect the comment.
L45	23	BLM	5.12	5.12.2.1		5.12.2.1 (Page 5.12-7) - Relying on solely on Employment by place of work results in distortions in this analysis. A substantial number of Mat-Su residents work for government offices or military bases in Anchorage. There are fewer governmental employers in Mat-Su than in other communities, perhaps. This suggests that Anchorage should be part of the economic region for this analysis.	Text has been edited in response to this comment and the following comment about the apparent high growth in the study area. With regard to the employment issue noted in this comment, we added information on the number of commuters from Mat-Su to Anchorage with citations as well as reference to the relative income levels for Mat-Su residents who work in Anchorage. To develop the analysis further we added Anchorage Municipality to the study area. The main text and Table 5.12-3 and Fig. 5.12-2 were modified to include Anchorage. The major consequence of including Anchorage in the study area is that, by virtue of its large relative population, Anchorage dominates the study area. Anchorage and FNSB together account for approximately 54% of the total Alaska population, so the practical effect of including Anchorage in the study

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							population is to make the study area economic results very similar to Alaska as a whole.
L45	24	BLM	5.12		5.12-2	Figure 5.12-2 - The high growth within the study area is not explained. There is a need to understand this to understand if it is sustainable.	Text has been revised to provide more information on the relatively high growth in employment, population and income in the Mat-Su borough. With regard to economics, Mat-Su is different than the other CAs or boroughs. We have added information from state and local government on the current economics of Mat-Su Borough and cited local planning studies with regard to this growth.
L45	25	BLM	5.12	5.12.3.2		5.12.3.2 (page 5.12.29) — Is there some way to estimate the number of potential employees reside in the economic area communities to at least get a sense of the potential for resident vs. non-resident impacts on housing and other local services? (This comment applies to construction phase of all facilities.)	At present there are too many unknowns to provide an accurate answer to this question. In response, we added text and citations discussing why there is uncertainty. Reasons cited include: Economic opportunities in Alaska compared to other States; legislative and administrative actions as well as the nature of the project; and the specific work rotation schedule. We have gone into detail with each reason and provided appropriate citations.
L45	26	BLM	5.12	5.12.3.2		5.12.3.2 (page 5.12-30) - Tax revenues are included for Denali Borough, though previous information indicates there will be two camps provided by the project. Will the camps be subject to bed taxes or will there be additional employees using motels & RV camps?	The authors have added the following footnote in response to this comment: "One commenter asked whether or not the work camps would be subject to a bed tax. The answer to this question depends upon the specific tax laws (scope and exemptions) in effect at the time. For applicable laws relating to municipal taxation, see Alaska Statutes Title 29, Chapter 45. Applicable municipal and state laws vary by municipality. For example, in Florida (see Florida Department of Revenue 2009) rentals of living accommodations in migrant work camps are not subject to a tax."
L45	27	BLM	5.20	5.20.5.2		5.20.5.2 — There are existing leases at Gubik field. It may be reasonably foreseeable that further exploration will occur in this field as a consequence of this action, particularly in light of the proposed road to Umiat. Further discussion is needed to determine whether further exploration is speculative.	The text has been revised for accuracy.

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
L45	28	BLM	5.20	5.20.5.4		5.20.5.4 — The State of Alaska has a "Roads to Resources" program (http://dot.alaska.gov/roadstoresources/index.shtmi) to study, permit, and construct roads into undeveloped portions of the state. This program includes the road to Umiat, as well as a road to Ambler and a road to Tanana. Given the State's development plans, it may be appropriate to include the road to Ambler as a reasonably foreseeable future project. The road to Tanana, which may ultimately lead to a road to Nome, should also be discussed and included or rejected. In addition, the access road to the proposed Watana Susitna dam should be incorporated for analysis under this section. These projects have the potential to be transformative in the way Alaskans access wildlife and subsistence resources. The consequences on subsistence uses and needs will then need to be considered. Harvest patterns will likely change and migration patterns may be affected by these projects.	The text has been revised for accuracy.
L45	29	BLM	5.20	5.20.6.2		5.20.6.2 - The road to Umiat, road to Ambler, and the road to the Watana-Susitna dam are all roads that will potentially have cumulative effects on the proposed action. Identified impacts for the road to Umiat are limited to competition to resources from construction workers. Analysis should consider the possibility of this road and the other roads identified in section 5.20.5.4 being accessible on a permanent basis to non-locals for hunting and recreation. Since the project construction and the construction of these future projects may cumulatively change harvest patterns for moose and caribou, these projects need to be included in the cumulative analysis.	The text has been revised for accuracy.

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
L46	1	EPA	1.0	1-3	2	New Comment: Regarding the location "Dunbar" please clarify in the FEIS on the map, the location of Dunbar and describe whether it is a townsite, historical significance, or just a known location in Alaska, etc..	The text in Section 1.1 - Project Overview has been revised to describe Dunbar as a known location. It is one of the many "whistle stops" along the Alaska Railroad that were once of consequence to its operations, but have since faded into history other than the name denoting a general location. The location of Dunbar has been added to the Executive Summary and Project Location Overview Figure 1.0-1.
L46	2	EPA	2.0	2.1.2 "2.4"	"2.1-1b"	New Comment: Rotate figure 90 degrees. Fit to Landscape wider on page.	Figure 2.1-1b has been rotated 90 degrees and fit to landscape.
L46	3	EPA	2.0	2.1.2 "2.7"	"2.1-2c"	New Comment: Rotate figure 90 degrees. Fit to Landscape wider on page.	Figure 2.1-2c has been rotated 90 degrees and fit to landscape on page.
L46	4	EPA	2.0	2.1.2 "2.8"	"2.1-3a"	New Comment: Include "Dunbar" location on map.	Dunbar has been added to map.
L46	5	EPA	2.0	2.1.2 "2.9"	"2.1-3b"	New Comment: Rotate figure 90 degrees. Fit to Landscape wider on page.	Figure 2.1-3b has been rotated 90 degrees and fit to landscape.
L46	6	EPA	2.0	2.1.2 "2.11"	"2.1-4b"	New Comment: Rotate figure 90 degrees. Fit to Landscape wider on page.	Figure 2.1-4b has been rotated 90 degrees and fit to landscape.
L47	1	BLM				General Question - Why isn't there a list of acronyms for the document? A list would have been very helpful while reading the document as some of the acronyms were used in multiple sections and were not defined upon the first use in the section.	A master list of acronyms is provided in the Glossary directly following the Table of Contents.
L47	2	BLM	Executive Summary			2nd paragraph - Remove the 2nd sentence "The Federal Pipeline Safety Improvement Act of 2002 requires operators to develop and follow a written integrity management program that addresses the risks on each transmission pipeline segment." as it is identical to the beginning of the 1st sentence in the paragraph.	This sentence has been removed in the Executive Summary, Reliability & Safety.
L47	3	BLM	Executive Summary			Remove second period after 1st sentence replace with a space.	The period has been removed in the Executive Summary, Soils & Geology.

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
L47	4	BLM	Executive Summary			Paragraph indicates only cultural resources. What are the impacts to historic resources?	The FEIS Executive Summary, Cumulative Effects, Cultural and Historic Resources has been revised to state: "...the incremental contribution to cumulative effects from the proposed Project to cultural and historic resources in the Project area would be expected to be minimal."
L47	5	BLM	Executive Summary and 1.0			Discrepancy in dates - on ES-1 Background (2nd column, lines 4-5) has "The AGDC was established in July 2010..." while on 1-1 Introduction (2nd paragraph, lines 1-2) has "…received a permit request from AGDC on November 16, 2009…"	FEIS Section 1.0, INTRODUCTION, has been revised to state: "... a permit request from The State of Alaska on November 16, 2009 under the USACE jurisdictional authority pursuant to Section 404 of the Clean Water Act (CWA) [33 U.S. Code (USC) 1344].
L47	6	BLM	1.0			Correct year in the following "A Draft EIS was issued on January 20, 2002." to be 2012.	The referenced date has been corrected to 2012.
L47	7	BLM	1.0	1.2.2		Last paragraph, 2nd line - Remove period at the end of the line "...pipeline project that. TransCanada…"	This sentence has been revised in section 1.2.2, 2nd from last paragraph.
L47	8	BLM	1.0	1.2.5.2 BLM		3rd paragraph, 2nd sentence - Remove "a" in front of Temporary, add an "s" to Permit, and change "BLM-managed lands" to "Federal lands".	This sentence has been revised.
L47	9	BLM	1.0	1.2.5.3 USFWS		Add comma after U.S. Fish and Wildlife Service (USFWS).	A comma has been added as requested in section 1.2.5.3, first paragraph.
L47	10	BLM	1.0	1.2.5.3 USFWS		Add (ADEC) after Alaska Department of Environmental Conservation.	This sentence has been revised.
L47	11	BLM	1.0		1.6-1	Add Pipeline in the title line: U.S. Department of Transportation, Pipeline Hazardous Materials Safety Administration (USDOT, PHMSA).	This table header has been revised as requested.
L47	12	BLM	1.0		1.6-1	Change Protection to Treaty - Under Authorization column - change Migratory Bird Protection Act to Migratory Bird Treaty Act	This table header has been revised as requested.
L47	13	BLM	1.0		1.6-1	Add marine as a descriptor for the fish and wildlife resources - The NOAA Fisheries (NMFS) provides consultation regarding effects on marine fish and wildlife resources. [This is directly from the NOAA NMFS website - NOAA's	This table header has been revised as requested.

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
						National Marine Fisheries Service [NMFS] is the federal agency, a division of the Department of Commerce, responsible for the stewardship of the nation's living marine resources and their habitat.]	
L47	14	BLM	1.0		1.6-1	3rd column, lines 12-16 - correct DEC to read ADEC	This table header has been revised as requested.
L47	15	BLM	1.0		1.6-1	2nd column, 1st line - change The ADNR Joint Pipeline office to The ADNR State Pipeline Coordinator's Office. [The Joint Pipeline Office is a consortium of Federal and State agencies responsible for TAPS.]	This table header has been revised as requested.
L47	16	BLM	1.0		1.6-1	2nd column, lines 1-2 - The ADNR Division of Land, Mining and Water Management may not be the permitting office for Temporary Water Use Authorizations.	This table header has been revised as requested.
L47	17	BLM	1.0		1.6-1	2nd column, lines 2-3 - change Temporary Water Use Authorizations to Temporary Water Use Permits.	
L47	18	BLM	2.0		2.1-2b	Label for the airport is incorrect. The Prospect Creek Airport is a State of Alaska airport.	Private airport has been relabeled as State of Alaska Airport in Figure 2.1-2b.
L47	19	BLM	2.0		2.1-3a	The Compressor Station & Straddle and Off-Take Facility appear to be separate from the pipelines, however in the description they were a part of the pipelines.	It is the most accurate information we have at this time depicting the location of the Compressor Station & Straddle and Off-Take Facility. AGDC has not provided or determined a more exact location at this time and therefore the footprints shown on figures are correct based upon the information provided.
L47	20	BLM	2.0		2.1-4a	The NGL Extraction Plant Facility appears to be located prior to the end of the pipeline, however in the description it is sited at the end of the pipeline.	The location of the NGL Extraction Plant Facility was provided by AGDC and illustrate the potential footprint of the facility. It is the most accurate information we have at this time depicting the location of the facility. AGDC has not provided or determined a more exact location at this time and therefore the footprints shown on figures are correct based upon the information provided.
L47	21	BLM	2.0	2.1.3.1		Last paragraph, 1st line - Clarification should be made regarding "Possession of the land…" as	The clarification has been made as requested to Section 2.1.3.1.

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
						BLM issues nonpossessory, nonexclusive authorizations for use of Federal lands.	
L47	22	BLM	4.0	4.0 and 4.3.4		The last paragraph under 4.0 , lines 3-4 -"The cost of potential alternatives was not a consideration in the identification and evaluation of reasonable alternatives." appears to be in conflict with the 2nd paragraph under 4.3.4, lines 5-7 - "This alternative would not be a cost efficient or ...".	The term "cost efficient" has been deleted from FEIS Section 4.3.4.
L47	23	BLM	4.0	4.3.3		Last paragraph under 4.3.3 - remove period following Alberta in the following "...pipeline through Alberta. is in the…"	The period has been removed in section 4.3.3, last paragraph.
L47	24	BLM	4.0	4.4		Remove extra period after co-location in the following "...to as co-location.. A major route…"	The period has been removed in section 4.4, 2nd sentence.
L47	25	BLM	4.0		4.4-1	The lime-green box and text was unreadable. [It was readable after zooming to 300% on the computer.]	The text boxes within figures have been updated for legibility.
L47	26	BLM	4.0		4.4-1	Row 8 - Wetland (acres within a 30 ft ROW) the typical ROW grant issued by BLM is for 50 ft plus the width of the pipeline, which would make this pipeline 52 ft.	Table 4.4-1 is a summary comparing the Parks Highway Route and the Richardson Highway Route from: State of Alaska, 2009. Stand Alone Gas Pipeline Route Alternatives Analysis. September 17, 2009. The analysis completed for that report considered a 30 ft wide permanent ROW for route comparisons. The BLM ROW width of 52 ft. for the ASAP is accurately described in Section 2.1.3.1 of the FEIS. This information will be gathered during the USACE 404 permitting process."
L47	27	BLM	4.0	4.4.2.1		2nd paragraph - spelling correction Dubar should be Dunbar. "...the straddle and off-take facility proposed at Dubar as a…"	This typo has been fixed.
L47	28	BLM	4.0	4.4.2.1		Last paragraph - remove extra period at the end of the paragraph. "...outweighed by increased potential impacts to other key resources."	The period has been removed in section 4.4.2.1, last paragraph.
L47	29	BLM	4.0	4.5		Correct spelling - replace the words constructions an with construction and. "...related to project constructions an operations,	This sentence has been revised in section 4.5, 2nd sentence.

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
						it is…"	
L47	30	BLM	4.0		4.6-1	Natural Gas Transport System, 1st row, 3rd column - add space between proposed and pipeline. "...to the proposed pipeline."	This typo has been fixed.
L47	31	BLM	4.0		4.6-1	Natural Gas Transport System, 4th row, 3rd column - use of "cost efficient" as part of the conclusion is in conflict with Section 4.0 description (page 4-2; also see Comment 22 above).	The term "cost efficient" has been removed from FEIS Table 4.6.1. FEIS Section 4.3.4 and Table 4.6.1, Natural Gas Transport Systems are now consistent with each other.
L47	32	BLM	4.0			Footnote 8 - remove extraneous that from sentence. "...the route variation that has been introduced…" change to "the route variation has been introduced"	Footnote 7 has been revised.
L47	33	BLM	4.0			Remove duplication in citation. "State of Alaska. 2009. State of Alaska, 2009. Stand Alone Gas Pipeline Route Alternatives" change to "State of Alaska. 2009. Stand Alone Gas Pipeline Route Alternatives"	Citation has been revised.
L47	34	BLM	5.9	Utility Corridor RMP		2nd paragraph, Line 6 - two of the example energy transmission ROWs which cross the RNA are of closed cases ("...Trans Alaska Gas Pipeline System, and Alaska Natural Gas Transportation System…"). [TAGS closed in May 2012 and ANGTS closed in December 2008.]	That paragraph has been edited to state the following instead: "The Dalton Highway and the TAPS cross the RNA."
L47	35	BLM	5.9		5.9-13	BLM, Utility Corridor RMP row, 5th column, lines 2-3 - The sentence "The proposed Project would not be located in the Utility Corridor. "Appears to be incorrect upon reviewing the Project Description and maps the Project appears to be within the Utility Corridor described in the Utility Corridor RMP/FEIS.	The table has been edited accordingly: "The proposed Project would be located within the Utility Corridor. The primary management direction and use of BLM-administered lands in the Utility Corridor is for energy transportation."

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L47	36	BLM	5.23			Table of Contents - Missing 5.23.11, 5.23.11.1, and 5.23.11.2	The mitigation chapter has been revised and section 5.23.11.1 and 5.23.11.2 no longer exist. The Table of Contents has been updated.
L47	37	BLM	5.23	5.23.2		Remove extra space before aggradation. "...degradation/ aggradation…"	The extra space between degredation and aggradation in Soils and Geologic Resources (section 5.23.2.1) has been removed.
L47	38	BLM	5.23	5.23.2.2		5th paragraph, line 5 - Remove dash before the number 6. '...Figure 5.1.-6."	The chapter has been revised and the typo no longer exists.
L47	39	BLM	Appendix P			The 4th column contains #VALUE! For ASAP Milepost 241.3 and 246.1.	Appendix D has been corrected. Fourth column no longer contains errors
L47	40	BLM	Appendix P			The 4th column contains #VALUE! For ASAP Milepost 254.3, 265.2, and 273.7.	Appendix D has been corrected. Fourth column no longer contains errors
L47	41	BLM	Appendix P			The 8th column, ASAP Milepost 675.3, Material Site ID 35-2-713-1 - Permit Number should be A 058401	Permit number has been corrected.
L47	42	BLM	Appendix P			The 8th column, ASAP Milepost 682.1, Material Site ID 35-2-005-1 - Permit Number should be A 061923	Permit number has been corrected.
L47	43	BLM-AKSO	5.0	5.5	5.5-3	Delta Caribou Herd is listed in Habitat Association column but not any GMU column. It should perhaps be listed under GMU 20.	Table 5.5-3 was edited to include GMU 20 checked for Delta Caribou herd
L47	44	BLM-AKSO	5.0	5.5	5.5-6	Golden Eagle: There may be more construction activities than just blasting that may cause disturbance or take of golden eagles, depending on distance to nest. Assuming you intend to comply with the Bald and Golden Eagle Protection Act permitting requirements, perhaps state that other conservation measures may be developed in conjunction with FWS.	The text has been revised in section 5.5.2 to state: Other conservation measures may be developed in conjunction with USFWS appropriate to protect Bald and Golden Eagles and their nests.
L47	45	BLM-AKSO	5.0	5.5		In section titled "Sensitive Wildlife Habitats": Any reference to the BLM sensitive species list or use of the term "sensitive species" should be removed or clarified. Currently the introductory paragraph reads as if Dall sheep, raptors, moose and caribou are sensitive species. One option is to refer to these as "species of	The text was clarified in Sec 5.5.2.2, Mainline Construction, Sensitive Species of Concern to replace the word sensitive with habitats of concern or specific of concern. First sentence, first paragraph, and first sentence of the second paragraph.

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
						concern," "habitats of concern", or "key habitats".	
L47	46	BLM-AKSO	5.0	5.5		Statement about it being unknown whether raptors nest near the construction zone is not accurate, as BLM has provided data on known nest locations along the Dalton Highway/TAPS corridor.	AGDC will be required to gather the needed information during the USACE 404 permitting process. Section 5.5.2.2 - Mainline, Construction, Sensitive Wildlife Habitats, Birds states: The BLM has information on nesting raptors along the Dalton Highway/TAPS corridor. This information would be supplied to AGDC when needed (BLM Pers. Comm. 2012).
L47	47	BLM-AKSO	5.0	5.8		The Port of Seward is not in Prince William Sound. The Sound lies north of Montague, Hinchinbrook and Hawkins Islands.	Text has been addressed in the Marine Mammal chapter and T and E to remove the word: Prince William Sound with Gulf of Alaska incidentally inserted.
L47	48	BLM	Appendix P			Are they taking into account that some of these mineral material sites are permitted to two different groups (ADOT&PF and Alyeska)? That would make the permitted amounts not correct.	The information will be gathered during the USACE 404 permitting process
L47	49	BLM	Appendix P			Where is this expansion coming from? What company is permitting it? Do we have Letters of Non-Objection from ADOT&PF and Alyeska?	The information will be gathered during the USACE 404 permitting process
L47	50	BLM	Appendix P			Who was consulted for these pits and the authorized users and authorized amounts?	The information will be gathered during the USACE 404 permitting process
L47	51	BLM	Appendix P			The pits that have no material site owner are from who? Are these future site locations?	The information will be gathered during the USACE 404 permitting process
L47	52	BLM	Appendix P			Where is the map that shows where these material sites are?	The information will be gathered during the USACE 404 permitting process
L47	53	BLM	Appendix P			The numbering of the BLM pit is inconsistent with current file numbers (i.e.: F-093013 should be numbered FF-093013).	Permit number has been corrected.
L47	54	BLM	5.1	5.1.1.1	Table 5.1-2	There are several free published geologic time scales, why try to reinvent the wheel. This table is a bit confusing and should be replaced.	Table 5.1-2 has been replaced with one that is less confusing and easier to read.
L47	55	BLM	5.1	5.1.1.1		Reference (Hamilton 1986) not in reference section	The typo has been corrected and Hamilton 1994 has been added to the references in Section 5.1.3.

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
L47	56	BLM	5.1	5.1.1.1		Reference (Plafker et al 1994) not in reference section	A reference for Plafker et al 1994 has been added to the references in Section 5.1.3.
L47	57	BLM	5.1	5.1.1.1		Reference (Bemis 2010) not in reference section	Bemis 2010 has been added to the references in Section 5.1.3.
L47	58	BLM	5.1	5.1.1.2		The second sentence references "abrasion and plucking." Then the next sentence starts to describe plucking. The last sentence describes abrasion, but not by name. Either the sentences need to be reordered, so they read in order, or add the word abrasion to the last sentence.	Added that "Plucking occurs when…" and "Abrasion occurs when…" to distinguish between these two processes.
L47	59	BLM	5.1	5.1.3	References	Brown, J. 1998 should be put in with the B's in the references.	Brown, J 1998 is now in alphabetical order.
L47	60	BLM	5.3	5.3-23		In the rehabilitation section I would like to see a commitment to use NATIVE SPECIES and to include planting of trees and shrubs in areas where these communities were removed. They should address the need to collect and increase seeds from the various regions along the route prior to and during construction in order to have them available for rehabilitation.	The information will be gathered during the USACE 404 permitting process
L47	61	BLM	5.3	5.3-23		In the non-native and invasives section there needs to be a larger commitment to control and removal of all non-native and invasive species during the life of the pipeline. They have acknowledged the likely hood of these species coming onto or increasing on the ROW but do not seem to be making a commitment to reduce and prevent them now or in future years.	The information will be gathered during the USACE 404 permitting process
L47	62	BLM	Appendix P			Applicant should be aware that the Proposed Management Plan for the BLM's Utility Corridor Resource Management Plan directs BLM to approve extraction of mineral materials in the floodplains of the Jim River and Prospect Creek only if no other economically feasible sites are available. Extraction is prohibited in certain other critical habitats (e.g. Sukakpak Mountain ACEC).	The information will be gathered during the USACE 404 permitting process

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
L47	63	BLM	5.23	5.23.6.2		Very vague. How often is "periodically?" What monitoring methods will be used (field surveys, casual observations, remote sensing)? What criteria will be used to determine whether mitigation is needed? Who will determine what mitigation is appropriate if it is needed?	The information will be gathered during the USACE 404 permitting process
L47	64	BLM	5.23	5.23.10.2		The criteria "Where feasible and prudent" is not compatible with Bureau policy. I don't imagine we're going to cruise and sell black spruce and labrador tea, but where a value can be placed on vegetative resources; they must be appraised and sold, regardless of whether the applicant feels it is feasible and prudent. Per 43 CFR 5420.0-6, all timber or other vegetative resources to be sold or removed shall be appraised and in no case shall be sold at less than the appraised value. Other vegetative resources is considered to be "all vegetative material that is not normally measured in board feet, but can be sold or removed from public lands by means of the issuance of a contract or permit." In terms of ROW, according to 43 CFR 2805.15(c), the United States government retains ownership of the resources of the land, including timber and vegetative or mineral materials and any other living or non-living resources. Grantees have no right to use these resources and any cutting, removal, otherwise damaging or use is subject to the stipulations above. Grantees may do minor trimming, pruning, and removing of vegetation to maintain the ROW or facility.	The information will be gathered during the USACE 404 permitting process
L47	65	BLM	5			I found no mention of potential impacts to forest health or wild land fire fuels, no monitoring of such impacts, and no mitigation measures to protect forest health or prevent creation of wild land fire hazards during and after vegetation clearing.	The information will be gathered during the USACE 404 permitting process.

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
L47	66	BLM	5			There's no mention in the land use section (or any other section I could find) of impacts to existing mining claims, impacts to existing active mining operations, or impacts to mining access.	The information will be gathered during the USACE 404 permitting process.
L47	67	BLM	5.3	5_3	5.3-1	"Woody Wetlands" and "Perennial Ice/Snow" are the same color on the maps. Very confusing.	Figures 5.3-1 have been updated with a new identifiable color for woody wetlands. The legend lists "Woody Wetlands" as a dark purple and "perennial Snow/Ice" as a light blue. Colors show up where applicable on map.
L47	68	BLM	5		Table 5.9-14	I don't understand why the TEW acreages are excluded from the Proposed Action Total.	The information will be gathered during the USACE 404 permitting process.
L47	69	BLM	5.20	5_20		The Five Mile airport is closed and currently being cleaned up by Alyeska in efforts to return it to the public domain. It may not be available as an airport to support pipeline construction.	The information will be gathered during the USACE 404 permitting process.
L47	70	BLM	Executive Summary			Recreation. There is no mention that the proposed pipeline alignment is within one-mile of BLM managed recreation sites in the Dalton Highway Corridor Management Area.	The FEIS Executive Summary, Environmental Analysis, Recreation, has been revised to include: "...BLM managed recreation sites in the Dalton Highway Corridor Management Area…"
L47	71	BLM	Executive Summary			The assumption that "multi-use" paths in an area like the Dalton Highway Corridor is not well considered. Recent road construction projects where grass seed was used attracted game to the roadsides and allowed opportunity for hunters to pursue game that otherwise would not have been as easily accessible. The same would happen with a gleaned pipeline 'trail' in areas where big game hunting is allowed.	The information will be gathered during the USACE 404 permitting process.
L47	72	BLM	Executive Summary			The mention of work camps under the heading Socioeconomics in the project area has not been fully addressed. Historically these camps impact recreation resources and impact traditional recreation users. Case in point: gravel pit/work camp operations near BLM campgrounds in the proposed project area.	The information will be gathered during the USACE 404 permitting process.

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
L47	73	BLM	5.10	10.1.1		Typo? "A listing of management agencies and management plans applicable to the Project area are outlined in Section 5.10.1.2. These plans are outlined in Section 5.10.1.3	This reference has been revised in section 5.10.1.1, 2nd paragraph before "Revised Statute…"
L47	74	BLM	5.10	10.1.3		There appears to be no reference to the Recreation Area Management Plan for the Dalton Highway which was approved on October 11, 1991.	Section 5.10.1.3 now refers to the Recreation Area Management Plan for the Dalton Highway and discusses it further in Section 5.10.2.1.
L47	75	BLM	5.10	10.1.4		Footnote #2. Clearly this analysis DID NOT consider all recreation features with a 20 mile buffer of the proposed route. BLM sites on the Dalton Highway were not considered.	Section 5.10.1.4 now describes the recreation facilities managed by BLM within the Dalton Highway Recreation Management Area. These sites are now included in Table 5.10-1(b).
L47	76	BLM	5.10	Table 5.10.1		The authors are negligent in evaluating all sites impacted by the project. BLM co-manages the award winning Arctic Interagency Visitors Center in Coldfoot (BLM/NPS/FWS), the contact station at the Yukon Crossing, four (4) campgrounds (Five-Mile, Arctic Circle, Marion Creek, Galbraith Lake), and nearly twenty sites with interpretive panels. There are also two trails with interpretive panels, and one living history site. All within the planning area and not mentioned anywhere in the document.	Section 5.10.1.4 now describes the recreation facilities managed by BLM within the Dalton Highway Recreation Management Area. These sites are now included in Table 5.10-1(b).
L47	77	BLM				It is unclear if the authors looked at the Dalton Highway Benefits-Based Management Survey (2007).	The Benefits-Based Management Study for the Dalton, Taylor, and Denali Highways is now discussed in Section 5.10.1.4.
L47	78	BLM	5.10	10.1.4		No mention of Recreation facilities developed by and managed by the BLM in the Dalton Highway corridor. These sites ARE where the traveling public interact with representatives of the federally managed lands dispersed along the proposed project route.	Section 5.10.2.1 now describes the recreation facilities managed by BLM within the Dalton Highway Recreation Management Area.
L47	79	BLM	5.10	10.2.2		Construction project DO disrupt recreation activities. Mitigation measures and strict enforcement of quiet hours can help reduce these impacts.	The effects of construction of the proposed Project on recreation are discussed in Section 5.10.2. Applicant proposed measures to mitigate the effects to recreation are discussed in Section 5.23.

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
L47	80	BLM	5.10	10.2.2		Yukon River Crossing. Placement of a bridge for line greatly impacts the view shed to the west of the current bridge.	Visual effects from the project, including from the Yukon River Crossing Options, are discussed in Section 5.11.
L47	81	BLM				As BLM sites were not included in the evaluation the authors must go back and consider impacts on recreational sites during both construction and operation of the line. Compressor plant locations in proximity to camp grounds is only one area that needs close review.	Impacts on recreational sites managed by BLM along the Dalton Highway are now considered in the Environmental Consequences section (5.10.2).
L47	82	BLM	5.10	Figure 5.10-11		Map does not have ANY BLM Dalton Highway sites identified. Suggest authors look at The Dalton Highway Visitor Guide published annually.	Within Section 5.10, Figure 5.10-2 has been updated to reflect BLM Dalton Highway sites.
L47	83	BLM	5.14	5.14		Compressor stations. The compressor station #1 in the vicinity of MP225 (MP 196 Dalton Hwy) north of Wiseman is in an area of known subsistence activity where noise, emissions, and activity may also disrupt subsistence users and resources. There should also be mention of this in the paragraph.	We have edited the paragraph to read: "A maximum of a two compressor stations will be required for the proposed Project. One will be located in the vicinity of MP225 (MP 196 Dalton Hwy) north of Wiseman and the other will be located near the Minto Flats Game Refuge. Potential compressor station sites, particularly the one located near the Minto Flats Game Refuge could introduce additional noise, emissions, and activity in an area of the Project and disrupt subsistence users and resources."

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L47	84	BLM	5.23	5.23.15.1		What is a "Subsistence Plan of Cooperation"? Is this a cooperative plan with the affected villages?	The "Subsistence Plan of Cooperation" is required by the National Marine Fisheries Service "where the proposed activity would take place in or near a traditional Arctic subsistence hunting area and/or may affect the availability of a species or stock of marine mammal for Arctic subsistence uses. The plan must include: • "Statement that the applicant has notified and provided the affected subsistence community with a draft plan of cooperation; • "Schedule for meeting with the affected subsistence communities to discuss proposed activities and to resolve potential conflicts regarding any aspects of either the operation or the plan of cooperation; • "Description of what measures the applicant has taken and/or will take to ensure that proposed activities will not interfere with subsistence whaling or sealing; and • "Plans the applicant has to continue to meet with the affected communities, both prior to and while conducting the activity, to resolve conflicts and to notify the communities of any changes in the operation." (Reference: http://www.nmfs.noaa.gov/pr/glossary.htm#plan) Such a plan might be required in relation to the barge lift of modules to Prudhoe Bay. Response is based on information provided by AGDC. The Subsistence Plan of Cooperation would take place during the permitting process.
L47	85	BLM	5.23	5.23.6		Bullet #2. Edit sentence to reflect "… when major movements (i.e. migrations) across the ROW do not occur."	Section 5.23.2.5 bullet #2 has been edited to state: 2. Schedule construction activities to avoid effects during sensitive periods for wildlife to the extent practicable, including scheduling excavation activities during times of the year when major movements across the ROW not occur (i.e., migrations);
L47	86	BLM	5.6	5.6-13		Chinook salmon have been documented above Devils canyon	An effort was made to contact Tim Sundlov at BLM on 8/27/12 at the Glen Allen office to obtain specific information on comment. Text in section 5.6.1.1 Project area, South-central Alaska, Susitna River, second

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							sentence states: Chinook salmon have been documented above Devils canyon (BLM Pers. Comm. 2012).
L47	87	BLM	5.6	5.6-13		The most northern population of rainbow trout is the Gulkana River	An effort was made to contact Tim Sundlov at BLM on 8/27/12 at the Glen Allen office to obtain specific information on comment. Text in section 5.6.1 Table 5.6-1 was edited to include: The Gulkana River is the most northern population of rainbow trout (BLM Pers. Comm. 2012).
L47	88	BLM	5.6	5.6-13		Several subsistence fisheries have been documented in the Susitna drainage.	An effort was made to contact Tim Sundlov at BLM on 8/27/12 at the Glen Allen office to obtain specific information on comment. An effort was made to contact Tim Sundlov at BLM on 8/27/12 at the Glen Allen office to obtain specific information on comment. Text in section 5.6.1.1 Project area, South-central Alaska, last sentence.
L47	89	BLM	5.6	5.6-13		"Northern" is not capitalized in northern pike	Text edited in the word "northern" from a capital N to a lower case n in Table 5.6-1
L47	90	BLM	5.2		5.2-21	Should double check your "number of years of record." For example, how do you get 4 years of record for Sheep Creek near Willow between the years 1984-1986? The same is true for Caswell Creek with 25 years between 1963 and 1986.	Table 5.2-21 lists "Water Years" rather than calendar years. A "Water Year" runs from October of one calendar year, through September of the following calendar year. Therefore, depending upon the months in which data were obtained, it is possible to have two "Water Year" data points occurring in the same calendar year. The USGS included 1984 to 1985 as water years with one reading in Sept 1986 and one reading in Oct 1986, so it totals 4 water years of data for Sheep Creek. For Caswell Creek, there was a typo, it was 1963 - 1987. For other numbers in this table and similar tables, the period on record does not necessarily mean the USGS has data in all years within that range. Some years do not have data, and some years have more than one reading in a calendar year, which is not the same as a water year. See footnotes on water year definition. All tables were QC'd and are correct with USGS data.

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L47	91	BLM	1.0	1.2.5.2		3rd paragraph,1st sentence - Under Section 28 of MLA (30 U.S.C. 185), under 43 CFR 2881.11, BLM issues grants for oil or gas pipeline or related facility to cross Federal lands under BLM jurisdiction or the jurisdiction of two or more Federal agencies, except land in the National Park System, land held in trust for Indians, or land within the Outer Continental Shelf.	The subject text in Section 1.2.5.2 has been revised to read: "Under Section 28 of MLA (30 U.S.C. 185), under 43 CFR 2881.11, BLM has the authority to issue grants for oil or gas pipelines or related facilities to cross Federal lands under BLM jurisdiction or the jurisdiction of two or more Federal agencies, except land in the National Park System, land held in trust for Indians, or land within the Outer Continental Shelf. The AGDC would need to obtain a Right-of-Way Grant and a Temporary Use Permit from the BLM for crossing lands managed by the BLM or the Department of Defense."
L48	1	BLM	5			This is written from a geologic and engineering perspective. There is little said about the importance separating the topsoil throughout the project area. Is it a very thin layer but critical to separate as much as possible. There is also spares mention of the organic soils of the north slope and how to deal them.	Text has been added to section 5.1.2.2 to address topsoil segregation and organic soils of the North Slope. During the geotechnical investigation for the pipeline and possible material source sites, topsoil will be characterized within the pipeline ROW to develop topsoil segregation requirements for the construction of the project. The organic soils typical of many locations on the North Slope are easily damaged, which can affect the depth of the active layer and thereby, the depth to permafrost and the drainage patterns of the site. In areas where mineral soils are exposed, the active layer is likely to be considerably deeper than in areas with good vegetative cover. These exposed sites are likely the result of frost action resulting in cryoturbation. In areas of low centered polygons, the ice wedges between the polygons may extend from a few feet to twenty feet or more in depth. When surface hydrology alters the availability of water on ice wedges, the result may become high centered polygons with deep fissure between them that could expose a pipeline. This is also likely to alter vegetative communities towards a dryer regime. In areas with large rocks mixed with finer material, the frost action may create sorted circles in which the larger stones are forced upwards to the surface and may disrupt buried objects. In areas of very

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							coarse material such as along rivers and deltas, there may be no permafrost and very little vegetation, so disturbance is less likely to have long lasting impacts (Geisler 2012, Rieger et al. 1979).
L49	1	BLM - AKSO				Impacts of construction on wintering caribou is not addressed but should be at least mentioned due to potential effect of construction/disturbance on caribou energy demands during a time of lower food availability.	Section 5.5.2.2 Mainline construction, Sensitive Wildlife habitats, Caribou. First paragraph, 3rd sentence States: Construction activity over one season could displace caribou that migrate during the winter near the proposed ROW. Human made noise and activity with heavy equipment and pipe stringing could cause caribou to divert their path of travel, which could impact subsistence resources for Arctic Plains residents.
L50	1	EPA	1.0	1.1	2	Regarding the location "Dunbar" please clarify in the FEIS on the map, the location of Dunbar and describe whether it is a townsite, historical significance, or just a known location in Alaska, etc..	The text in section 1.1 - Project Overview has been revised to describe Dunbar as a known location. It is one of the many "whistle stops" along the Alaska Railroad that were once of consequence to its operations, but have since faded into history other than the name denoting a general location. The location of Dunbar has been added to the Executive Summary and Project Location Overview Figure 1.0-1.
L50	2	EPA	2.0	2.1.2	"2.1-1b"	Rotate figure 90 degrees. Fit to Landscape wider on page.	Figure 2.1-1b has been rotated 90 degrees and fit to landscape on page.
L50	3	EPA	2.0	2.1.2	"2.1-2c"	Rotate figure 90 degrees. Fit to Landscape wider on page.	Figure 2.1-2c rotated 90 degrees and fit to Landscape on page.
L50	4	EPA	2.0	2.1.2	"2.1-3a"	Include "Dunbar" location on map.	The location of Dunbar has been added to Figure 2.1-3a.
L50	5	EPA	2.0	2.1.2	"2.1-3b"	Rotate figure 90 degrees. Fit to Landscape wider on page.	Figure 2.1-3b has been rotated 90 degrees and fit to landscape.
L50	6	EPA	2.0	2.1.2	"2.1-4b"	Rotate figure 90 degrees. Fit to Landscape wider on page.	Figure 2.1-4b has been rotated 90 degrees and fit to landscape.
L51	1	EPA	2.0	2.1.2		Include in the FEIS a new map depicting the general location of the proposed 37 Mainline valves (MLV) located at intervals not greater than 20 miles apart. A table identifying the location of these 37 MLVs should also be included. This information is necessary to	This information is not currently available. Locations of MLVs will be determined during the permitting process.

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						evaluate the impacts to wetlands and other resources.	
L51	2	EPA	2.0	2.1.3.3	"2.1-8"	Map is great! Can the location of all proposed TEWs be included on an aerial photo similar to this map? A map depicting the location of the TEWs along the entire ROW should be included in the FEIS.	This information will be provided during the permitting process.
T1	1	Jack Reakoff	2.0			I see a compressor site north of Wiseman, and I'd like to register a comment that the reality is there are many reasons to have the compressor station in Coldfoot. There is air access to that area. There is power, existing power. There is a truck stop and cafe to provide service. And it's within the development node.	Section 2.1.2 Aboveground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6.Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final engineering, but for the purposes of this document, the analysis includes the locations of the compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed."
T1	2	Jack Reakoff	5.11			There is a scenic byway plan that the BLM drafted for this Dalton Highway corridor, and also the scenic byway plan wanted to reduce visual impacts to specific locations. There is already an existing TAPS, Trans-Alaska Pipeline, DRA site there, and so it would be best to have all of these facilities close together	As indicated in the comment, the TAPS is typically visible from the Dalton Highway, which the ASAP pipeline would also parallel (underground). Aboveground facilities along the Dalton Highway are concentrated at the north end of the highway (GCF facility) where TAPS and other industrial facilities are located, with only mainline valves and one compressor station (either MP 225.1 or 285.6) located elsewhere along the Highway. As described on page 5.11-27, visual impacts of the compressor stations would be reduced in these areas due to existing infrastructure, and impacts are expected to be in accordance with VRM classifications.
T1	3	Jack Reakoff	2.0			Another comment I wanted to make was on the Yukon River crossing; I think the best crossing would be to attach the ASAP pipe directly to the bridge. There is an existing bridge facility. It's the least cost and it has the least impact to boat	The AGDC has proposed three options for crossing the Yukon River: construct a new aerial suspension bridge across the Yukon River (the Applicant's Preferred Option); cross the Yukon River by attaching the pipeline to the existing E.L. Patton Bridge (Option 2); or utilize

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						traffic and so forth on the Yukon River and will be far more advantageous to the Yukon River itself to keep all your facilities close together.	HDD to cross underneath the Yukon River at the location of the proposed new suspension bridge (Option 3). The Yukon River Crossing Options are described in Section 2.2.3.2 of the FEIS. If the pipeline were attached to the existing E.L. Patton Bridge (Option 2), no surface water disturbance would occur as the proposed pipeline would be installed on a hanger pipe assembly that would be placed underneath the existing bridge deck (Figure 2.2-6).
T1	4	June Reakoff	5.17			What kind of noise do these compressor stations make in the disruption? Are they really, really super noisy?	As discussed in Section 5.17 (Noise), Subsection 5.17.2.2 (Aboveground Facilities) of the DEIS, 'Once the aboveground facilities are commissioned and operating normally, the new ambient sound level at the sites would be a logarithmic sum of background and Project noise. Although the noise level resulting from operation of the industrial equipment at the proposed aboveground facilities is currently unknown, it is estimated to range from approximately 85 to 95 dBA (LEQ) at a distance of 50 feet from the facility.
T1	5	Bob Akemann	General			It does mention that there is the possibility of explosion, et cetera, et cetera, and fire. So I'm wondering, do they have some type of a prevention plan or quick response plan? Are they going to have something in the way of firefighting to -- this whole village is built of log cabins, and fire and log cabins don't mix well.	AGDC will develop a safety plan, spill response plan, inspection plans and schedules, in addition to all of the safety features that will be designed into the pipeline.
T1	6	Jack Reakoff	2.0			The comment revolves around we had a scoping on this ASAP back in 2010, and it was objectionable to have compressor sites near Wiseman or outside of the development node and that we requested that engineering be designed for the compressor sites to be in the Coldfoot development node to maintain infrastructure, and especially we did not want to have one right next to the community. And at 225, Milepost 225, that puts it almost right directly across the river from the community. So that's objectionable	Section 2.1.2 Above Ground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6.Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final engineering, but for the purposes of this document, the analysis includes the locations of the compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed."

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T1	7	Jack Reakoff	2.0			I do not feel the hydraulics of the ASAP would dictate that they need to put one right across from Wiseman because the hydraulics shows the fall of a valley continuously falling to Coldfoot 130 feet in elevation below us, and there is really no reason to put a compressor site right next to this community. It was have high impact to this community.	Section 2.1.2 Above Ground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6.Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final engineering, but for the purposes of this document, the analysis includes the locations of the compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed."
T1	8	Bob Akemann	General			The comment would be that the people here in Wiseman do a lot of their subsistence hunting right close to Wiseman, and that would be another reason not to have that compressor in such close proximity to Wiseman. Where it's relatively noiseless around here, makes it for easier hunting, whereas Coldfoot has got truck traffic going through there and generators running and all the noise there already with the airport. So it would be a far better place, I would think, also, to have that compressor.	AGDC will consider the subsistence needs and uses of communities along the pipeline route in determining the best location for above ground facilities.
T2	1	James Patkotak	General			At the last meeting there had been people concerned about getting some of the gasline into their own villages on the North Slope, like Atkusuk, Anaktuvuk Pass, those villages up on the North Slope. I don't think that would come into existence with this proposal as of now. I guess that's why there haven't been any locals at this meeting, because of the knowledge of what is going on with this project itself.	Comment acknowledged.
T2	2	Charles Hopson	General			It would be much cheaper if the State would go right alongside the Dalton Highway. They'd eliminate a lot of the paperwork, and spend the dollars on the land that you want to purchase, because it's already there. And we already have the easement to do a lot of the road to Dalton	The proposed ASAP route is parallel to the Dalton Highway and Trans Alaska Pipeline Corridor from Mile 0 at Prudhoe Bay to Mile 405 near Livengood.

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						Highway. I don't see why we can't just bury some of the gas line right on the road itself, on the side. We already own that Dalton Highway, the State of Alaska.	
T2	3	Charles Hopson	General			What we have here at Barrow is something unique. We have a gas field here. And the power poles do two things -- the gas and the power lines do two things here. It's 20-some miles away. We provide electricity to the East Barrow Gas Field. At the same time, it brings back the 12-inch gas line, right along the pipe, the telephone poles, tied into the telephone. So we have electricity going out and then the gas comes in, piggybacking by the telephone poles that are put in. It just seems a lot cheaper. It can be done without a lateral. The 12-inch lines veer off to Anchorage. They're on the power grid that might be coming from the North Slope. So these are in line with what can be done, and if the industry and the State weren't fighting each other we'd have a big plan that would work.	Comment acknowledged.
T4	1	Marc Van Dongen	General			The Port Commission in December of 2008 passed a resolution supporting the exact route that's proposed in this Alaska Stand Alone Pipeline. It's much shorter than the alternative route going from Fairbanks to Delta Junction down to Glennallen and then down to Palmer with a spur going to Valdez.	Comment acknowledged.
T4	2	Marc Van Dongen	1.0			There are existing facilities in Southcentral, the LNG plant and the fertilizer plant, Agrium fertilizer plant, which is already closed from lack of natural gas and potentially closing the LNG plant. It makes more sense to keep these plants operating or even expand them rather than building new multi-billion dollar facilities at another location	Section 1.2.2 Applicants Stated Need includes the following statements regarding gas supply for commercial and industrial uses : "The proposed Project would fulfill the following needs;... 130 MMscfd – (for) Future commercial and industrial use, • Provide a stable and reliable supply of natural gas needed to spur economic development of commercial and industrial enterprises in Fairbanks and the Cook Inlet area."

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T4	3	Marc Van Dongen	4.0			Rather than cutting through an area that doesn't have any infrastructure like roads or rail that could support the gas line, take it down the Elliott Highway down to Fairbanks and then down the Parks Highway from there. Even though it's a longer route, it would eliminate the need to build a spur that could provide higher volumes of gas to the Fairbanks area, as well as North Pole, the military bases, power plant generation. Also, a lot easier to construct and maintain the line if you build it along an existing transportation corridor rather than going through a wilderness area.	The Fairbanks Route Variation was examined as an alternative that would be collocated with existing road corridors. The analyses of the Fairbanks Route Variation as described in Section 4.4.2.1 concluded that the Fairbanks Route Variation presented issues and challenges related to slope and topography, and would not present environmental advantages over the proposed Project route for this segment.
T4	4	Marc Van Dongen	General			About halfway between Livengood and Fairbanks right along the Elliott Highway there is a 1.6 billion ton deposit of high grade limestone that Dr. Paul Metz from UAF has identified. The gasline, if it comes down and goes by that location, a cement manufacturing plant could go up within commuting distance of both Fairbanks and Livengood, and that would reduce down to about 800 million pounds of cement. About half of the 500 million cubic feet per day needs to be used for some value-added gas processing process. That might be the solution to that problem.	Comment acknowledged.
T4	5	Marc Van Dongen	General			We would love to have a natural gas processing facility of some sort down in Port MacKenzie. We are ideally positioned there. We have a deep draft dock. We have a permit to more than double the size of our deep draft dock where we can have multiple panamax-sized ships or even cape-class vessels at the dock.	Comment acknowledged.
T4	6	Marc Van Dongen	General			There would be long-term exports of the natural gas liquids. So there would be jobs created.	Comment acknowledged.

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T4	7	Ed McCain	General			One of the things for Willow is we are not going to be able to hook into this. It's not going to do us a bit of good, even if it goes through our backyards because the gas that's going to come to Willow, which we need, is going to come from Houston.	Comment acknowledged.
T4	8	Ed McCain	General			I don't see why you put this through residential neighborhoods. You sent out probably 100 notices to people saying this gasline was going to go through their backyard on the edge of the Parks Highway. And why couldn't you move it a mile east or west to get it completely away from neighborhoods?	The final route and alignment for the pipeline will be determined during final design.
T4	9	Ed McCain	4.0			I think this needs to get moved over by the railroad or over by the power line intertie.	FEIS Section 4.4.2.4 addresses the Port MacKenzie Rail Route Variation. Co-location with the Alaska Intertie from the Douglas Substation in Willow south would result in approximately 12 miles of additional pipeline and was therefore not considered as a potential alternative.
T4	10	Tina Owen	General			Burying pipes with three feet of soil on the top sounds a little unrealistic in wetland areas. Since Willow is basically all wetlands, that's a huge disturbance of the ground, which causes water to flow in different directions, none of which we can tell at the time where the water is going to go.	Final wetland construction method and route will be determined through permitting process & collaboration with agency staff.
T4	11	Tina Owen	5.10			People come from Anchorage, some people as far away as Fairbanks, to snowmachine in the Willow area. This pipeline is going right through where the snowmachining is.	Comment acknowledged. Snowmobiling was added to the list of dispersed recreation activities in the 2nd paragraph under Section 5.10.2.2 and a footnote was added to identify the Willow area as a location for dispersed snowmachining use. Snowmobiling was also added to the description of the Willow Creek SRA. The recreation impact analysis presented in Section 5.10.3 addresses impacts on recreation uses generally, but does not focus on specific recreation activities, such as snowmobiling. As presented in Section 5.10.3., the proposed Project could result in short-term adverse

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							effects on recreation, primarily attributed to a general decline in recreation quality and restricted access in proximity to the pipeline route during construction. During operations, there could be minor long-term adverse effects on recreation associated with potential spill events and maintenance activities. Such impacts apply to snowmobiling in the Willow area.
T4	12	Tina Owen	General			I think a lot more research needs to go into trying to pinpoint the best location for this pipeline. I don't agree the pipeline even needs to exist.	Comment acknowledged.
T4	13	Tina Owen	General			I think there are tons of mistakes all the way along this planned route that don't take into account all the landforms and water canals that are going to be disrupted.	AGDC will reduce impacts to the surrounding resources the most practicable. Details on site specific land forms will be taken into consideration as this process develops for the final location of the pipe.
T4	14	Tina Owen	5.23			The route goes right next to, and right into, the Willow Creek recreational area, which is an area that the Natives had established as their fishing grounds, which we were able to protect from the railroad coming through. This is where the salmon spawn. And all the outlets going into what we just think is wetlands is actually the nursery grounds for the spawning salmon, which goes miles out into these wetlands. And to take soils out of the area and put other soils in is going to affect salmon habitat, as well as habitat for all the other animals that use it as a nursery ground.	Each stream crossing will be individually permitted and therefore approved by ADFG before implementation. Impacts will be reduced the most practicable. Please refer to Section 5.23 (Mitigation).
T4	15	Victor Stanculescu	5.23			The proposed route takes a westward alignment, and I think that is a poor choice for the west Willow area. There will be crossing of many anadromous bodies of water, salmon streams which are extremely important to the fisheries in the region.	Final determination of exact stream crossings have not been determined and each crossing will be individually permitted by ADFG to prevent fish impacts as much as possible. Please refer to Section 5.23 (Mitigation).

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T4	16	Victor Stanculescu	5.5			The proposed route takes a westward alignment, and I think that is a poor choice for the west Willow area because it is an extensive nesting and breeding grounds for migratory birds, including trumpeter and tundra swans, as well as numerous other bird species, song birds, waterfowl, et cetera.	As stated in section 5.5.2.2, Sensitive habitat including nesting, and breeding for birds and other wildlife would be avoided at the extent most possible during the construction under permitting requirements. The final location of facilities and the exact location of the pipeline would be determined later in the permitting process. As noted in Table 5.5-6, construction activities would occur primarily during the winter. All considerations will be taken into account to prevent disturbance to migratory breeding birds during the construction of the ROW. Nesting areas would be avoided during sensitive time periods to the extent most practicable to prevent disturbance of the proposed Project (Table 5.5-6).
T4	17	Victor Stanculescu	General			The proposed route takes a westward alignment, and I think that is a poor choice for the west Willow area. This concerns the impacts on the hydrology that I feel would occur with the excavation of a ditch line and the placement of any structure into the wetlands, which fluctuate widely due to rainfall and/or snow melt and river levels. These grounds are very active wetlands, and I would submit that the burying of a pipeline within those wetlands is going to create a damming effect and alter the hydrology in ways that we cannot necessarily predict.	Final wetland construction method and route will be determined through permitting process & collaboration with agency staff.
T4	18	Victor Stanculescu	5.23			The proposed route takes a westward alignment, and I think that is a poor choice for the west Willow area because of the extensive archaeology of those areas, i.e., Native American burial grounds and house sites that are within these areas would warrant the exploration of a route that does not encompass these lands.	The DEIS has proposed mitigation measures including consultation with Alaska Native and other parties, documentation of cultural sites, avoidance of documented cultural resources, and other measures to protect archaeological areas in the west Willow area as well as the remainder of the Project.
T4	19	Victor Stanculescu	4.0			The proposed route takes a westward alignment, and I think that is a poor choice for the west Willow area. To continue the pipeline route down Parks Highway to a point on the south side of the Little Susitna River before heading towards	The suggestion of a westward alignment is considered in FEIS Section 4.4.2.4 - Port MacKenzie Rail Route Variation.

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						the terminus would strike me as a much more suitable route, potentially costing far less in construction and having much fewer environmental impacts.	
T4	20	Marc Van Dongen	General			There is seven times the population coming down the Parks Highway route than there is down the Glenn Highway route that could be serviced in some form, realizing they can't have a separation plant at every community.	Gas off-take facilities would be limited to the Fairbanks and Anchorage regardless of the route.
T4	21	Marc Van Dongen	General			The value of the separation plant, the estimated cost to construct that is 410 million. The estimated cost to construct a fractionation plant is 480 million, according to the study, plus an O&M facility. So almost a billion-dollar investment in the borough as a result of this Alaska Stand Alone Pipeline project. So the borough strongly supports the project, as does Port MacKenzie.	Comment acknowledged.
T5	1	Robert Gerlach	General			I think that a 45-day comment period ought to be after the round of public meetings to give people a chance to get some information, digest it and make informed comments. I'd appreciate if the comment period be extended at least until the end of March	The comment period was extended to April 4, 2012 to allow for more time to comment.
T6	1	Nan Eagleson	4.0			I feel like the routing of this is really inappropriate. I would love, if this ever does happen, it to follow the original corridor down as far south as you can without disturbing more area, particularly through Minto Flats. That's a really important waterfowl area, along with other wildlife.	As described in Section 4.4 of the FEIS, approximately 82 percent of the proposed Project route would be co-located with or would closely parallel existing pipeline or highway ROW. Colocation is desirable as a means of concentrating development within established corridors and minimizing environmental impacts. The Fairbanks Route Variation was examined as an alternative that would be colocated with existing road corridors. The analyses of the Fairbanks Route Variation as described in Section 4.4.2.1 concluded that the Fairbanks Route Variation presented issues and challenges related to slope and topography and would not present net environmental advantages over the proposed Project

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							route for this segment as the advantages to some key resources are outweighed by increased potential impacts to other key resources. As described in Section 4.4.1.1, the Richardson Highway Route Alternative is longer than the proposed route and would result in greater impacts to elements of the environment as summarized in table 4.4-3.
T6	2	Nan Eagleson	General			If it were ever to come to the Denali Park/Healy area, I hope it is in everybody's face. That it goes right down the highway, not hidden back there in the Yanert or Montana Creek disturbing new area.	Comment acknowledged.
T6	3	Nan Eagleson	General			There are tons of oil and gas proposals in the Healy area. And this whole part of the Interior has been designated as one big energy development plan. And it's pretty hard to get on board with most of them because they seem it's like "if you build it, they will come."	Comment acknowledged.
T6	4	Nan Eagleson	General			I see a whole lot of stuff coming down the pike in Healy that's going to affect all of us, and then just to the south of us with the Susitna/Watana dam. And I don't see the need in this state for all of this.	Comment acknowledged.
T6	5	Robert Merrow	General			I work for Alaska Fire Service as a firefighter, and I've spent a lot of time in the Minto Flats area and it is wet, really wet. It's also a really high fire frequency area. I noticed there was a brief mention in the draft about providing buffers around the facilities, but that area in particular had seven fires out there last summer.	The pipeline will be buried through the Minto Flats section to reduce susceptibility to fire.
T6	6	Robert Merrow	2.0			The moose population in Minto Flats seems to be higher density than a lot of other places in Alaska. By putting access roads out there you can't help but be causing increased mortality, It's going to be easier access into a game unit which is really difficult to access.	AGDC would mitigate access into areas developed for the proposed Project in order to reduce the likelihood of increased wildlife mortality. Access road development could potentially increase moose mortality from vehicle collisions but the access roads developed would be narrow (20 - 24) foot wide gravel roads with reduced speeds limits for travel (stated in Chapter 2 section

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							2.1.3.3). AGDC will use existing roads as much as practicable to reduce mortality to wildlife from vehicle collisions.
T6	7	Robert Merrow	General			The main point of concern through Denali Park/Healy that I don't think was well enough addressed in the draft is that you are going to be crossing a plate boundary, the Denali Fault. If you were to reference a document called the Shake-Out Scenario that was commissioned by the U.S. Geological Survey in California in 2008, it specifically states that steel pipelines do well with displacements up to 60 degrees centimeters, but displacements of several meters they tend to fail. The Denali Fault quake of 2002 caused displacements vertically of two to four meters and horizontal displacements of 8.8 meters. I think that's an engineering hurdle that you are going to have a real difficult time getting past.	Detailed engineering has not been completed but will address the exact type of method to be utilized for crossing fault areas. This design has not yet occurred. It is anticipated that the design will be unique to each of the fault crossings.
T6	9	Robert Merrow	General			I notice that there were three options presented for how you could deal with seismic crossings. A couple of them were burial. The Shake-Out Scenario that was commissioned by the U.S. Geological Survey in California in 2008 says that buried pipelines don't generally fare very well.	Detailed engineering has not been completed but will address the exact type of method to be utilized for crossing fault areas. This design has not yet occurred. It is anticipated that the design will be unique to each of the fault crossings.
T6	10	Robert Merrow	General			Since Denali Park/Healy is a low population area, we are classified, I believe, as Class I or Class II when it comes to your safety standards, which is the lowest level of safety standards. We are not going to have the same rigorous safety standards that would be provided for in a high density area. I believe that comes from Part 192 of the CFR. I have concern about that, especially because it is a plate boundary that you are going across with the pipeline.	AGDC will design, construct and operate the pipeline in a manner to ensure the public safety. Further, AGDC would comply with all Federal and state pipeline safety regulations in the design, construction and operation of the pipeline, and in particular, those specified in 49 CFR 190 to 199.

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T6	11	Robert Merrow	4.0			I believe that the Richardson option was eliminated too quickly, and the comparison chart in the draft EIS didn't look at the number of faults each one would cross, the Parks Highway and Richardson Highway.	As described in Section 4.4.1.1, the Richardson Highway Route Alternative is longer than the proposed route and would result in greater impacts to elements of the environment as summarized in table 4.4-3.
T7	1	Tony Delia, Tanana Chiefs Conference	General			If I may make a recommendation, as far as following protocol when you go into the communities, get a hold of leadership, the chief and his council. Out of respect, you follow that protocol. That's what we do.	Comment acknowledged.
T7	2	Tony Delia, Tanana Chiefs Conference	General			Several things that I have concerns with are subsistence issues, socio impact within the regions, tribal allotments, trespassing issues, because there have been those in the past with other pipeline projects.	Potential impacts to Subsistence uses are discussed in Section 5.14 of the FEIS. Socioeconomic impacts are discussed in Section 5.12 of the FEIS. Potential impacts to land uses, including tribal allotments, are discussed in Section 5.9 of the FEIS.
T7	3	Tony Delia, Tanana Chiefs Conference	Appendix M			I wanted to know about the right-of-way agreement. I know with the Alyeska Pipeline right-of-way agreement, Section 28 and Section 29 were issues of local hire, Native hire. Is there anything in this agreement pertaining to local hire or tribal hire? If not, I'd like to see something in there addressing that issue.	State of Alaska Right-of-Way agreement states the following in Section 30: “The Lessee shall, in the Construction and Operation of the Pipeline, comply with, and require its Contractors to comply with, applicable and valid laws and regulations regarding the hiring of residents of the State then in effect or that take effect subsequently."
T7	4	Tony Delia, Tanana Chiefs Conference	General			Another thing I haven't seen out there is workforce development from all the contractors and subcontractors. That's something we would like to see. We definitely want to see contracting opportunities for our tribal members, for Doyon, for our corporations, for our village corporations, Togotelle, Minto Development. I know that Alaska Stand Alone has been working with these people. They have done a tremendous job so far.	Comment acknowledged.
T7	5	Tony Delia, Tanana Chiefs Conference	General			We embrace the idea of development if it's done responsibly, but including our tribal members, our leadership, and their input because subsistence is their way of life. It's our way of life. And we want to be included from day one, if	Comment acknowledged.

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						we can, and just common courtesy.	
T8	1	Lisa Peger	General			It's like we [*Fairbanks community*] have to pay for a straddle plant and we are closer to the source, but we have to pay more than Anchorage.	The tariff estimate in the ASAP Project Plan document is structured to allow the groups involved to recoup their costs over a 20 year period through a levelized tariff (See page 3-8 of the ASAP Project Plan document located at: http://www.agdc.us/wp-content/uploads/2011/07/ASAP-Project-Plan_1July2011_WEB1.pdf). The estimated difference in cost of delivering natural gas to gas to Fairbanks compared to Anchorage is an extra 82 cents per 1 million BTUs (MM BTU). The extra cost pays for the infrastructure required to take off and distribute gas locally in Fairbanks. Moreover, those Fairbanks residents that would have access to ASAP natural gas would enjoy a substantial cost savings compared to the present costs for alternative energy sources.
T8	2	Lisa Peger	General			You take the cost of the line, the cost of the two straddle plants, take that sum, divide it by the number of users, and there would be no Anchorage/Fairbanks "they are screwing us again" issue, which could make some legislators like some other line better. So somebody made the decision to not be Fairbanks friendly. Somebody -- not you guys, of course, but somebody in the decision making process did that.	Comment acknowledged
T8	3	Lisa Peger	General			I think it should be a go. No second thoughts. Because it only costs 400 million to get it going.	Comment acknowledged.
T8	4	Luke Hopkins, Mayor, Fairbanks	General			The difference in tariff rates is an issue for our community [Fairbanks], so I certainly hope that in your socioeconomic analysis that the Corps is supposed to be providing on this draft environmental impact statement that it analyzes the project in terms of a postage stamp rate, where everybody pays the same tariff.	The tariff estimate in the ASAP Project Plan document is structured to allow the groups involved to recoup their costs over a 20 year period through a levelized tariff (See page 3-8 of the ASAP Project Plan document located at: http://www.agdc.us/wp-content/uploads/2011/07/ASAP-Project-Plan_1July2011_WEB1.pdf). The estimated difference in cost of delivering natural gas to Fairbanks versus

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							Anchorage is an extra 82 cents per 1 million BTUs (MM BTU). The extra cost pays for the infrastructure required to take off and distribute gas locally in Fairbanks. Although the estimated cost is 82 cents more per 1 MM BTU more, most Fairbanks residents will have the option to pay less for home heating energy and will reap health benefits associated with substituting clean burning natural gas for wood, oil and coal. These benefits are discussed at length in the Public Health Section of the EIS. With regard to paying less for energy: The AGDC estimate for the cost of 1 million BTUs (MM BTU) of natural gas delivered in Fairbanks by ASAP and a local distributor is $10.45 (in $2011). This cost includes the ASAP tariff, cost of the gas production, and local distribution costs. As documented in the revised health section, the projected cost is substantially lower than the present cost for trucked natural gas ($23/MM BTU). Thus, residents of Fairbanks that would have access to ASAP natural gas would also have the opportunity to save substantially compared to the present source. Moreover, the cost for ASAP natural gas is lower than those for other energy alternatives now in use in Fairbanks. As documented in the revised Public Health section, estimates of the current costs per million BTUs for various energy sources range from $12.32/MM BTU for white birch to $57.76 for electricity. ASAP natural gas ($10.45/MM BTU) would be less expensive than wood, coal ($16.67/MM BTU), or wood pellets ($21.16/MM BTU), #2 fuel oil ($29.54), or HD5 propane ($44.38/MM BTU). In principle, all Fairbanks residents with access to ASAP gas would benefit in direct financial terms.
T8	5	Luke Hopkins, Mayor, Fairbanks	4.0			I've seen in the draft document there are a number of alternative routes that are considered. What I don't see is an analysis to the degree that I believe should be there for the Richardson Highway route in terms of the mining claims and	As described in Section 4.4.1.1, the Richardson Highway Route Alternative is longer than the proposed route and would result in greater impacts to elements of the environment as summarized in table 4.4-3.

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						the industrial uses that could be made available. Along the Richardson Highway there is extensive mineralization there.	
T8	6	Luke Hopkins, Mayor, Fairbanks	4.0			From what I read in the draft report here, I don't see where the opportunities for the mining industry development or mining industrial development have been shown and evaluated for the economic benefits to the State of Alaska for the Richardson route, as opposed to the Parks Highway route.	The Richardson route was screened out by the USACE. As described in Section 4.4.1.1, the Richardson Highway Route Alternative is longer than the proposed route and would result in greater impacts to elements of the environment as summarized in table 4.4-3.
T8	7	Luke Hopkins, Mayor, Fairbanks	General			For the Anchorage line terminus, it terminates at a valve that serves the whole Cook Inlet basin. The line for Fairbanks just touches the edge of a certificate of need. There is no piping in that area. Yes, there could be. Might be a pressure reducing station there to serve some lines that would be put in at a future time. Therefore, it does not serve the industrial uses of the Fairbanks community and, therefore, I would say that it has not been adequately addressed in this EIS. There are industrial uses both for electrical production and the refineries that are located on the opposite side of the populated area of the community that I believe have not been adequately addressed in this economic analysis	The industrial use of natural gas in Fairbanks would be part of the cumulative effects section of the DEIS. During the scoping process, industrial use of natural gas in Fairbanks was not considered to be relevant. This decision is supported by statements made in government publications about industry in Fairbanks. For example, in a 2002 study titled 'The Ongoing Challenge of Managing Carbon Monoxide Pollution in Fairbanks, Alaska' the National Academy of Science noted (pg 49) that "The Fairbanks North Star Borough stands out as the only serious CO [carbon monoxide] nonattainment area with a population under 100,000 and little industry." The NAS elaborates further that in Fairbanks, the large stationary sources, such as power plants and refineries do not contribute substantially to high CO concentrations in the areas around the CO monitors. Essentially the NAS discounted industrial sources as unimportant to studies of CO in Fairbanks. More recently, Fey et al. in 2009 conducted a study of PM2.5 emissions in the Fairbanks North star Borough. The authors excluded industrial sources in Fairbanks on the basis that industrial sources are not the major source for PM2.5 pollution in Fairbanks.
T8	8	Luke Hopkins, Mayor, Fairbanks	General			I think that there are further analyses that need to be done, especially on the economic benefits and socioeconomic aspects of the Fairbanks alternative route as it's proposed the preferred route.	Comment acknowledged.

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T8	9	Luke Hopkins, Mayor, Fairbanks	General			I do not see that it should be a no alternative, a no build. That is, I understand that the Corps has to put in a Fairbanks alternative route, but to try to use an accounting term; I would say its BS that we have to say that there is no alternative to getting gas down here from the North Slope.	Comment acknowledged.
T8	10	Luke Hopkins, Mayor, Fairbanks	General			We need this gas. We need this project. There are issues with the project about route, and as I said, tariff issues and where the line stops in Fairbanks, and I think that that needs a lot further examination	Comment acknowledged.
T8	11	Chris Storhok	General			To me the one fatal flaw in this is that this has got to go near or through Denali, and we all know that anytime you get near a national treasure, we can run into lawsuits real quick.	The proposed route is located east of Denali National Park. The Denali National Park Route Variation alternative is located in the Parks Highway corridor that extends through a portion of Denali National Park.
T8	12	Chris Storhok	General			We need this gas in Fairbanks. We absolutely need this, and we need it as quick as possible.	Comment acknowledged.
T8	13	Chris Storhok	4.0			I would like to know why the Richardson route was not considered as an alternative around Denali. As you mentioned earlier, we have to rely on Congress to actually pass the legislation. We know getting anything through Congress is obscenely difficult in this era.	As described in Section 4.4.1.1, the Richardson Highway Route Alternative is longer than the proposed route and would result in greater impacts to elements of the environment as summarized in table 4.4-3. Also, the proposed route for the ASAP is located east of Denali National Park.
T8	14	Chris Storhok	4.0			The part that's really missing and that should have not been excluded was a full study of the Richardson route because if this thing is going to get stuck in the mud, it's going to be at Denali. And the last thing we want is this to go to some courtroom somewhere and for us not to get gas.	As described in Section 4.4.1.1, the Richardson Highway Route Alternative is longer than the proposed route and would result in greater impacts to elements of the environment as summarized in table 4.4-3.
T8	15	Chris Storhok	4.0			I suppose another alternative could be what does it take to at least get gas to Fairbanks while Denali might be litigated. Can we at least get gas here while Denali is fought? And if Denali is going to be fought and we have to get around it, the alternative would be to study the Richardson route. We absolutely need this. There are no alternatives left.	As described in Section 4.4.1.1, the Richardson Highway Route Alternative is longer than the proposed route and would result in greater impacts to elements of the environment as summarized in table 4.4-3.

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T8	16	Chris Storhok	General			Our community [*Fairbanks*] is getting strangled by high oil prices, and at this point in time, anything you can do to get us gas would be much appreciated.	Comment acknowledged.
T8	17	Bob Sattler, Tanana Chiefs Conference	General			The ASAP team has conducted village outreach meetings and should continue those consultation meetings throughout the NEPA process. There is a tremendous breadth of information in the EIS, and the salient points should be made clear to the directly affected Native communities included in the affected environment.	Comment acknowledged.
T8	18	Bob Sattler, Tanana Chiefs Conference	4.0			Recommendations in the subsistence land use, cultural resources and foreseeable projects should be reviewed with the leadership of Native communities	Comment acknowledged.
T8	19	Bob Sattler, Tanana Chiefs Conference	4.0			Probably the most important issue is to clarify which gasline you represent. I know there is a lot of confusion with all the consultation meetings going on in all these communities	Comment acknowledged.
T8	20	Pamela Miller, Northern Alaska Environmental Center	1.0			We have many people in Fairbanks who are very concerned about P2.5 air pollution and getting coal and diesel generation reduced in our area. That's an aspect of the Clean Air Act attainment issues that needs to be addressed in much more detail in this EIS. I'll speak to that comment on behalf of the Northern Center.	Section 5.15, Public Health, Subsection 5.15.4.2, Proposed Action, Exposure to Hazardous Materials includes analysis of public health from air pollutants, and also describes the air quality benefits from the Project.
T8	21	Pamela Miller	4.0			The heart of the NEPA analysis is identifying the alternatives, and I am quite disappointed in the range of alternatives that this EIS is addressing.	Section 4 of the FEIS identifies and addresses a range of alternatives and evaluates their consistency with the project purpose and need as stated in Section 1 of the FEIS.

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T8	22	Pamela Miller	5.14			An alternative is the issue of transport by truck or trailer. The DEIS said it would require one loaded trailer leaving every three minutes around the clock from the LNG facility to feed this whole huge pipeline with way more gas than current need is expecting. So it's ruled unreasonable because of the exportation of the 500 million cubic feet per day output compared to what we are actually using here in town [*Fairbanks*] and in Anchorage. So there's detailed analysis that could be done to actually compare this pipeline route, a rail option and a truck option. Could there be a reversed route from Cook Inlet back up to Fairbanks in the very short run and then we bring it south?	The purpose and need for the proposed ASAP project as described in Section 1.2 of the FEIS would not be met by the suggested alternatives, therefore, these alternatives have not been described and analyzed in the FEIS.
T8	23	Pamela Miller	4.0			The Richardson Highway route deserves full analysis. The governor has talked quite a bit about if we can combine AGIA with an LNG route, how does this pipeline fit in there in the short run, and it just seems like the most logical all-highway route alternative and should have had a full analysis in the EIS. If you want to consider a non-Denali alternative you have to consider the Richardson Highway route.	The proposed ASAP route would be located East of Denali National Park. As described in Section 4.4.1.1, the Richardson Highway Route Alternative is longer than the proposed route and would result in greater impacts to elements of the environment as summarized in table 4.4-3.
T8	24	Pamela Miller	General			If the benefits to the citizens of Fairbanks are being given short shrift because of how the tariff rate is working and we suffer all of the construction-related impacts of trucks and just the community stress without a tax base and in the future the tariff is calculated in a way that will give us less community benefit, that should be accounted for in the EIS. The tariff is a socioeconomic impact.	The potential adverse impacts related to socioeconomics and public health from the proposed project are discussed in various sections of the DEIS. The anticipated very large and long-lasting benefit associated with the availability of natural gas for use in Fairbanks is documented in the revised Public Health section of the DEIS. This comment also addresses tariffs. Assuming that the projected costs of ASAP gas (including tariffs) are correct, Fairbanks residents would be charged $10.45 per million BTU. This cost is substantially less than that for natural gas now supplied by truck and, for that matter, coal, wood pellets, #2 fuel oil, propane, or electricity. In principle, all Fairbanks residents with

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							access to ASAP gas would benefit in direct financial terms.
T8	25	Pamela Miller	5.15			If we are able to burn natural gas instead of coal or diesel in our power plants -- that was not considered in the health section and it's not considered in the socioeconomic section. It is an attractive feature for Fairbanks to breathe healthier air. The air quality section had some of those things in it, but it didn't carry into the health impact section how air quality in Fairbanks would improve by having a ready source of natural gas.	The cumulative effects section within section 5.15, Public Health addresses this key issue. The discussion is within the cumulative effects section because the infrastructure required to deliver natural gas from the off-take station to commercial and residential properties is not part of the proposed project. We agree with the commenter and urge him or her to review the analysis within the Public Health Section.
T8	26	Pamela Miller	5.5			There are impacts to Tanana Valley State Forest, and where the pipeline skirts not along an existing road or pipeline system, where it cuts away from the Trans-Alaska Pipeline corridor, that will involve fragmentation of Tanana Valley State Forest. It could involve introduction of more exotic plants, disease in the forest, and that issue deserves a little bit more analysis.	As stated in 5.5.2, since the proposed Project would be co-located with existing ROWs, and the pipeline would be buried, additional habitat fragmentation would be minimal. Areas proposed that are not co-located with existing ROWs (south of Willow and Minto Flats) would receive some fragmentation. Construction in these areas would occur in one season, and would result in temporary impacts to wildlife from construction noise and activity. Sensitive habitat including nesting, and breeding for birds and other wildlife would be avoided at the extent most possible during the construction under permitting requirements. The final location of facilities and the exact location of the pipeline would be determined later in the permitting process. In regard to invasive plants, Section 5.5.2 states that AGDC would develop a NIP prevention Plan. This discussion is also included in Mitigation Section 5.23.2.3, Mitigation Measure #4. Text was added in Section 5.5.2 to discuss the potential for disease to occur from project development. The proposed Project would not likely cause a spread of plant pathogens. Disease is primarily found in coastal old growth forests, like SE Alaska. Examples of diseases in AK forests are noted.

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T8	27	Pamela Miller	5.11			Thank you for doing the visual impacts analyses of [*Denali*] park. It's very clear that about a million visitors a year will see this pipeline if it's built up on that hillside. "What's that over there?" people will ask. It's obvious. It's a degradation of the park. This EIS really needs to do a more thorough job of what will be the impacts on the park visitors, those million people a year, who come to visit.	The visual simulations provided in section 5.11 of the EIS indicate the type and magnitude of visual impact of the Proposed Alternative to park visitors looking eastward from the western edge of Denali National Park. There are limited vantage points from which the Proposed Action would be visible within the Park. It is not known how many of the Park visitors access these vantage points or how it would impact their overall visitor experience, given the focus of many visitors on more western areas within the park.
T8	28	Pamela Miller	5.10			Two and a half years construction. How much of that is going to be in the section of the *[Denali]* park? What's going to be the impact to the tourists who are coming to a beautiful national park and they are in a construction zone, to the Glitter Gulch businesses who will be cut out from having people want to stop because there is not a good way to get to them during construction? Those impacts weren't addressed at all in the recreation or land use sections.	The impact analysis covering recreation at Denali National Park and Preserve is presented in Section 5.10.2.3, which notes that construction will occur in the winter months, thereby avoiding potential recreation impacts during the peak summer season.
T8	29	Pamela Miller	General			I think there is a lot of discussion about the facilities that will have a direct footprint impact, but very little discussion about the impacts from this pipeline on traffic, how many helicopters -- how much activity.	Construction processes, workforce, schedule and spreads are described in Section 2.2 of the FEIS. Operations would require minimal workforce and activity as described in Section 2.3 of the FEIS. Sections 5.1 - 5.18 describe the environmental consequences of construction and operations including footprint impacts and other impacts that would result from the construction processes and workforce.
T8	30	Pamela Miller	General			This could be built at the same time as AGIA or at the same time as some other project. How is all that going to happen on top of each other?	Project timing and sequencing will be determined during design. AGDC does not have any affiliation with other pipeline projects that have been proposed.
T8	31	Pamela Miller	General			It would be helpful to understand at Atigun Pass how all these pipelines would be coming together in the right-of-way. It's very narrow there. How many times might that have to be dug up and put back together and how will that disrupt traffic for everybody, including the	AGDC will coordinate with the State Pipeline Coordinator's office and Alyeska Pipeline Company during design to ensure that conflicts will be addressed prior to construction.

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						truckers going back and forth to the pipeline, to Prudhoe Bay?	
T8	32	Pamela Miller	4.0			I think for Fairbanks, considering mitigation measures, I would like to propose that it is a mitigation measure to avoid socioeconomic impacts to route the pipeline down to the existing Alyeska Pipeline corridor as far as Fairbanks and that the Corps consider that.	As described in Section 4.4.1.1, the Richardson Highway Route Alternative is longer than the proposed route and would result in greater impacts to elements of the environment as summarized in table 4.4-3.
T8	33	Pamela Miller	General			It's very strange that the State has already issued its right-of-way, even though ostensibly this process should cover the full project. They have issued a right-of-way for a dotted line of the pipeline, and that's a very bizarre public process. It doesn't seem right to have done it that way.	Comment acknowledged
T8	34	Pamela Miller	General			The right-of-way includes mitigating measures. I believe when it's all said and done, there should be another step by the State of Alaska to consider mitigating measures for the project because we may need some for accommodating the needs of Alaska, especially if this project isn't going to get us much closer to getting gas for the villages in the Yukon region and so on.	Comment acknowledged.
T8	35	Lisa Peger	General			I think that the postage stamp model or distance sensitive rates would be the way to go because Anchorage has grown exponentially because they have had cheap gas, and who knows what the Interior hub would do if they had cheap gas. And so to, in a sense, penalize Fairbanks for not being able to grow while Anchorage has had a sweetheart deal on gas just doesn't seem right, as well as the fact that we are closer to the product and it's colder here	Comment acknowledged

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T8	36	Duffy Halladay	General			We have until March 5th to comment, which is a relatively short time.	The comment period was extended to April 4, 2012 to allow for more time to comment.
T8	37	Duffy Halladay	5.10			I would ask Army Corps of Engineers or whoever to ask the individual unions in Fairbanks to comment. That way they have an input. Whether you are going to use union or nonunion, I would like to at least see that before March 5th they have a chance to comment.	Comment acknowledged.
T9	1	Dale Lynn Gardner	General			You mentioned that [if there were a rupture of the pipeline] that it would be released in gas form and would evaporate quickly, but since it's underground, I don't understand how that would work, because it's underground, which kind of eliminates the possibility of evaporation, doesn't it?	NGL's will still evaporate even if the release occurs underground.
T9	2	Anna Nageak	General			I know there's always a need for energy. And I know Fairbanks is one of the main ones on the line that would really benefit out of it. I would like to see some benefit for those of us that live out in the rural.	The ASAP project would result in new delivery of natural gas to Fairbanks that could result in compressed gas available for transport to rural areas. The propane and other NGL products that would be produced in Nikiski could also be transported and utilized within the state.
T9	3	Anna Nageak	General			Larger urban areas always benefit a lot. Like this pipeline, natural gas would provide a lot of benefits for Anchorage and Fairbanks and those areas, and somewhere along the line we [*Anaktuvuk Pass Community*} get sidewinded and do not really receive -- like the oil. Oil is right in our backyards, and yet we have to pay so much for gas and for fuel oil. Somewhere along the line I think the State or somebody needs to start thinking in terms of benefiting the people where the oil comes from and natural gas.	Comment acknowledged
T9	4	Charles	General			It looks like the urban areas are the main benefactors of this whole construction. Apparently, you concentrate on the cities, like Anchorage, Fairbanks, Valdez, Juneau, the moral majority, if I might say, for lack of a better word.	Comment acknowledged

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T9	5	Charles	General			One thing we could propose, if you can insert it somewhere in your plans, is for the rural communities to have an offset, by all this exploration and building. Maybe we can ask for a subsidized price of our fuels. Because we're paying $9.95 a gallon for gas, and it's only 100 miles away [*from Anaktuvuk Pass*]	Comment acknowledged
T9	6	Charles	General			It's just been too long. We've [*Anaktuvuk Pass Community*} been put off to the side, saying, "Well, you're a subsistence hunter, so what do you have to worry about gas for?"	Comment acknowledged
T9	7	Charles	General			It's been a pain to have to remind you guys over and over that we [*Anaktuvuk Pass Community*} also need the resources that you seem to want to extract from our homelands and then the benefits go to the moral majority. But the people that are directly affected are ignored totally. They don't get any kind of subsidized pricing for their fuels.	Comment acknowledged
T9	8	Bass Gordon	General			The way I'm hearing things is nobody really knows whether this will really go on. We might just be talking for nothing again, like we have between the oil companies. They come here promising us things. But these people don't even know whether they're going to build it or not. There are other companies that want to build these too. So I guess you are competing against each other trying to be the best so you can make the best offer. You just stated you don't even know if you're going to be on this or not. Unless you're sure, how do we know? Our comments are for nothing, as usual.	Comment acknowledged.
T9	9	Raymond Paneak	General			Gasoline, gas and a quart of oil, this winter is really outrageous in this village [*Anaktuvuk Pass*]; something like almost $10 a gallon for gas, almost $25 a quart of oil. That's hurting a lot of us here without jobs, for a lot of people with	Comment acknowledged

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						no job.	
T9	10	Al Haddadi	General			One reason I came to this meeting, I was hoping to hear some alternative solution with the pipeline to flying fuel in here when we're one of the closest communities [*Anaktuvuk Pass*] to this proposed pipeline, 75 miles from the highway. They're asking us for permission to put a pipeline through the subsistence lands and migrating route for the caribou, and yet there's no consideration whatsoever for helping us with our energy needs.	Comment acknowledged
T9	11	Al Haddadi	General			I recommend to the community {*Anaktuvuk Pass*] not to give a positive response to this pipeline. Unless there is a direct benefit to the community, there's really not reason for us to support it.	Comment acknowledged.
T9	12	Al Haddadi	General			If anything happens with this pipeline it's going to disrupt the [*caribou*] migratory route. [*in/near Anaktuvuk Pass*]	Construction of the project would occur over 2 years, AGDC would avoid constructing in areas and during a time period that caribou are known to migrate through to reduce impacts the most practicable.
T9	13	Al Haddadi	General			If anything happens with this pipeline, if there's a problem with leaks or so on, it's going to affect us [*Anaktuvuk Pass*].	Comment acknowledged
T9	14	Al Haddadi	General			We need help with our energy. [*in Anaktuvuk Pass*]	Comment acknowledged
T9	15	Raymond Paneak	General			We're flying our heating fuel on an airplane that was built in the 1940's during World War II, that breaks down on a regular basis. So, between airplanes breaking down and bad weather, we're always exposed to fuel shortages. [*in Anaktuvuk Pass*]	Comment acknowledged
T9	16	Raymond Paneak	General			We go one week with bad weather and airplanes breaking down, and we're [*Anaktuvuk Pass*] susceptible to having emergencies at a worse level than Nome just had, when they have ice breakers supporting them. We don't have that option, unfortunately. I don't think an ice breaker	Comment acknowledged.

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						could make it this way. But we definitely need to have other options.	
T11	1	Rondell Jimmie	5.14			You guys are crossing people's property and disturbing cultural land that's important to us… our subsistence resources [*in/near Minto*] will be scattered mainly because of construction.	The DEIS addressed impacts to subsistence resources during the construction period in Section 5.14.3. The DEIS also proposes mitigation measures such as scheduling work to avoid conflict with subsistence activities and developing a Wildlife Avoidance and Human Encounter/Interaction Plan to address impacts to subsistence users and resources.
T11	2	Irene Sherry	General			[*Regarding previous pipeline construction*] The security on the road system and around the pipeline camps, there was a man there that was targeting Native women. To this day I don't know if there was ever an arrest. Some of the women that were from this village were murdered. So I sure hate to see that happen again the second time around.	Comment acknowledged.
T11	3	Irene Sherry	General			I sure hope we don't lose any of our subsistence because of this pipeline. This is where we hunt. This is where we fish. I sure would hate to see any kind of impact on that land.	Potential impacts to Subsistence uses are discussed in Section 5.14 of the FEIS.
T11	4	Larry Bredeman	General			I'd like to see a spur line to Minto so they could convert everything to natural gas, including their generators, all their heat, and all those things. That would be a positive impact for the community here if they could tap into that natural gas. And it doesn't look like they are going to get to. Construction is four years from now. I think there is plenty of time to position the community of Minto (and Manley is not that far away) considering the length of your pipeline.	Spur lines other than the Fairbanks Lateral are not proposed as part of the ASAP project. The propane and other NGL products that would be produced in Nikiski could also be transported by road or water and utilized within the state.

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T11	5	Rocky Riley	5.16			I'm concerned about the pollutants into the air and the impact on the blueberries in the Minto Flats. In the summertime the wind doesn't blow out here very much, so if there is a forest fire here the smoke just kind of hangs in the air. If there are any kind of pollutants coming off that straddle plant, that may affect the blueberries and that may affect the moose.	As discussed in Section 5.16 (Air Quality), Subsection 5.16.2 (Proposed Action, Straddle and Off-Take Facility) of the DEIS, 'Emissions for the proposed Project from operation of the straddle and off-take facility are provided in Table 5.16-13. These emissions were calculated to represent a worst-case (most conservative) scenario. The AGDC should refine the emissions calculations using vendor specific emission factors upon equipment selection. As indicated in the table, preliminary emission estimates trigger the requirement for a PSD permit for NOX. The PSD permit process would require the AGDC to perform an air quality impact analysis to ensure compliance with air quality standards and increments in 18 AAC 50.010 and 18 AAC 50.020. The permit would also require BACT on emission units to minimize air pollution. Preliminary emission estimates also indicate the straddle and off-take facility would trigger the requirement for a Title V operating permit. Consequently, the proposed Project as permitted by the ADEC would not cause or contribute to a violation of any federal, state, or local air quality standards.'
T11	6	Rocky Riley	General			There are certain places [*in/near Minto*] the moose go right now to gather. One of the areas is down the hill from Ptarmigan Hill. There is another place where you guys are putting the line, and that's going to affect those moose. They are not going to be gathering there anymore because of all the activity that goes on. So you are basically taking away about 500 moose a year from this village and Manley and Tanana.	Construction of the project would occur over 2 years for the entire route; AGDC would avoid constructing in areas and during a time period for sensitive areas that moose gather, to reduce impacts the most practicable. The pipe would be buried therefore after construction; impacts would be negligible if any.
T11	7	Rocky Riley	General			To mitigate [*impacts to moose and blueberries in/near Minto*], I would suggest that this pipeline drop a little spur line. I notice you have a spur line going to Fairbanks, and I would like to see a spur line coming back to Cod Lake and then stubbed out and come here [*to Minto*], and	Comment acknowledged

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						continue it down to Tanana if we have to in later years. That would benefit rural Alaska.	
T11	8	Rocky Riley	General			We would like to see royalty from this gas coming across our lands to mitigate the damage that will be done to the blueberries and moose. For sure you are going to affect the moose, so we would like to see funds come right into the community, to the tune of $10,000,000 a year right into Minto.	Comment acknowledged.
T11	9	Rocky Riley	General			You guys are huge. You guys are kings and queens, with the oil and gas thing. But I'm telling you what we want out of this project is a big chunk of that money. I mean, $10,000,000 would help this community [*Minto*] a lot. We can build a new lodge, lower the price of fuel.	Comment acknowledged.
T11	10	Rocky Riley	General			Economic development would be huge in this village if you built a spur line [*to Minto*]. It's not far. We can see the straddle plant from here… It's not a stretch to lay a small diameter line as you are laying the big line, and then stub it out where we can hook into it here.	Spur lines extending from the Straddle and Off-take Facility that would be located at Dunbar for the Fairbanks Lateral would be technically feasible. However, additional spur lines are not proposed as part of the ASAP project.
T11	11	Rocky Riley	General			For the record, I would like to say that Luke Hopkins [*Fairbanks Mayor*] and his staff agreed to withdraw their statement that Minto was going to pursue litigation. They apologized to me, being the second in chief, saying that we are sorry we tried to speak for you. So their statement is going to be retracted.	Comment acknowledged.
T11	12	Luke Titus	5.14			I see you are going to put the pipeline right on the Minto Flats. That's going to have an impact on all of our subsistence that we have on Minto Flats. People will have access to that. There are so many people out there right now. They come across with snowmachines. It already has an impact on the Fairbanks side of Minto Flats, and when that pipeline goes in, it's going to have a bigger impact.	Effects to Minto Flats subsistence uses are addressed in Section 5.14.3

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T11	13	Luke Titus	General			I hope that we [*Minto community*] get something out of this, not just dividends every year. I feel like we need an upgrade in our village. If we could put a gasline to our village -- you know, we are paying a lot of money for oil, stove oil, electricity, stuff like that.	Comment acknowledged
T11	14	Larry Bredeman	5.10			When the pipeline goes through private property the education of the public is critical. All the road projects that I'm dealing with along the Yukon are working with the State to have included as part of the construction project the signing of private property or refuge property according to Alaska State statute, which is every 300 feet. If property is signed properly, according to the statute, the troopers will enforce trespass and poaching. But as long as it's not posted according to Alaska law, the troopers will not enforce it. So something like that, if it could be included in the construction project for the 737 miles of this pipeline, I think it would go a long way for the law-abiding public to know where they are at. If they know, most of them will not violate the landowners' property.	Potential impacts to recreation and tourism are covered in Section 5.10, including effects on trails. A mitigation measure is included in Section 5.23.10 that states that the project applicant will undertake "Coordination of O&M activities across designated recreational areas", which includes coordination with public land managers, such as NPS and USFWS. In addition, mitigation measures proposed by AGDC in Section 5.23 of the FEIS include: • Limit public accessing to ROW for recreation or hunting by blocking entry areas with large boulders, berms, or fencing. • Keep construction activities within the footprint of the pipeline right-of-way (ROW) and the disturbed area of the adjacent construction zone to the maximum extent practicable • Minimize the construction of new permanent access roads by emphasizing winter construction using snow-ice roads. Further, construction and operation of the ASAP project would be subject to all terms, conditions and stipulations of a BLM's Right-of-Way Grant and Temporary Use Permit for all affected federal lands, and State of Alaska issued Right-of-Way Lease ADL 418977 (Appendix M) for State Lands.
T11	15	Vera Wiser	General			If this pipeline should through and we [*Minto community*] demand $10,000,000 a year, we want things -- we want a school improvement. We want our education to be first class where we can have AP classes here. We want first class education because you are taking our land, because you are taking our food. You are impacting what is our bread basket.	Comment acknowledged

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T11	16	Berkman Silas	4.0			We [*Minto community*] need a pipeline. If it's going to help us we need it. If it's not going to help us go without it.	Comment acknowledged.
T11	17	Berkman Silas	4.0			I have young grandkids that are going to live after me. We need to think of them and what they are going to get out of this. We need to protect our people.	Comment acknowledged.
T11	18	Wilma David	General			This gasline is benefiting Fairbanks and Anchorage. You guys don't care about Native people. We have a voice here. It's time to listen to us. That's our land out there. That's where we get our food.	Federal Agencies are required to comply with the National Environmental Policy Act (NEPA). The ASAP FEIS has been developed as part of the Federal NEPA compliance process. State and local governments may participate in development of the FEIS at their will and digression.
T11	19	Wilma David	5.5			If that pipeline goes through it's going to affect the moose and our berries [*in/near Minto*]. You say it's not going to affect it. The EPA says they do all these studies and all that. It's going to affect us.	As stated in 5.5.2, since the proposed Project would be collocated with existing ROWs, and the pipeline would be buried, additional habitat fragmentation would be minimal. Areas proposed that are not collocated with existing ROWs (south of Willow and Minto Flats) would receive some fragmentation. Construction in these areas would occur in one season, and would result in temporary impacts to wildlife from construction noise and activity. Moose are found throughout the proposed Project area, but the rut and winter feeding periods would be the sensitive habitat of concern. None of the proposed construction activity is scheduled to occur during moose rut periods (Table 5.6-6). Some winter feeding areas along the proposed Route may coincide with winter moose feeding areas; however, winter moose browsing habitat is not limited by the construction of the proposed Project.
T11	20	Wilma David	General			Once the pipeline gets settled you'll hire people from outside. We [*Minto community*] want good schools to teach our kids so they will take all your jobs. They will be up there doing what you are doing or what those guys on the North Slope are doing.	Comment acknowledged.

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T11	21	Sarah Silas	General			We [*Minto community*] are worried about what's going to happen when the gasline goes through because it really takes a lot of effects on our land. Maybe when it's brand new it's okay, but as time goes on they have a lot of problems with pipelines, according to what we hear on the news.	AGDC will design, construct and operate the pipeline in a manner to ensure the public safety. Further, AGDC would comply with all Federal and state pipeline safety regulations in the design, construction and operation of the pipeline, and in particular, those specified in 49 CFR 190 to 199.
T11	22	Rocky Riley	General			I would like to speak on behalf of Tanana, Ruby, Galena, Kaltag, Nulato, Koyukuk, all the villages down the river. They are paying, I think, close to 9 and $10 a gallon for fuel. Earlier I stated that if you ran a gasline back through here, it would really help the people of the village [*Minto*] and Manley Hot Springs. But we can take that one step further and we can run this pipeline all the way to Tanana. They can barge it down from there on the Yukon. That would be a huge economic benefit for those villages to get cheap fuel for their schools, their public buildings, their homes. It will cover all villages all the way from the mouth and up and down the coast.	Spur lines other than the Fairbanks Lateral are not proposed as part of the ASAP project. The propane and other NGL products that would be produced in Nikiski could also be transported by road or water and utilized within the state.
T11	23	Luke Titus	General			I think the impact on Minto Flats is pretty big.	Comment acknowledged.
T12	1	Jack Reakoff	General			Commenter is concerned about a compressor station designed to be located 11 miles north of Wiseman rather than within the Coldfoot development node resulting in impacts to wildlife. "The location the compressor would be in the travel routes of local moose, and also caribou when they use the area. The way the river and the Dalton Highway are configured, the animals avoid human activities. The site with 8-12 personnel and a load station would be disruptive to the game and hunters who watch those areas.	Final locations of facilities would be determined at a later date following additional consultation and design of the project. Impacts to humans and wildlife route or use areas would be reduced by AGDC the most practicable.

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T12	2	Jack Reakoff	5.17			The Wiseman compressor station would be disruptive to subsistence using to compete with the sounds and the compressor crews' activities that would displace game movements at natural funnel points. The ANILCA Title VIII Section 810 requires an analysis of impacts to subsistence uses and resources. If alternative lands are available to deflect impacts, those are to be seriously considered by the federal agencies. The high human activity in the wide valley at Coldfoot would have much lower impact on subsistence resources and the users.	According to Table 5.17-2, the closest human noise receptor from the compressor station in Wiseman is about 7.5 miles. At this distance, noise and vibration levels from operations and maintenance of the compressor station facility would be insignificant. This conclusion is based on the following: Using a conservative assumption of approximately 85 to 95 dBA at 50 feet for noise levels from the industrial equipment at the aboveground facilities (that includes compressor stations), the estimated noise levels from operations at the nearest sensitive receptor would be approximately 55 dBA (LEQ) using a nominal existing ambient level of 55 dBA. This noise level is about the same as the noise emitted from a household microwave oven. With respect to subsistence, as in any other industrial development, noise above ambient levels can displace or divert subsistence resources from traditional areas. As discussed in the Subsistence section, displacement of subsistence during construction and operations would have the greatest effect in the undeveloped Minto Flats vicinity and for subsistence users in communities that lie directly along the Project. Displacement of subsistence resources during operations along other parts of the Project (i.e., TAPS and Parks Highway) would be negligible because of already existing disruption. A maximum of a two compressor stations will be required for the proposed Project. Two of the potential compressor station locations are located along the existing TAPS corridor and potential subsistence impacts from these would be negligible. A third potential compressor station site would be located near the Minto Flats Game Refuge and could introduce additional noise, emissions, and activity in an area of the Project with little to no existing development. Noise impacts and mitigation measures would be assessed should this third compressor be deemed necessary.

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T12	3	Jack Reakoff	2.0			The impact of the Wiseman compressor station to the adjacent Native allotment at 225 would also be detrimental to the land and its value.	As discussed in Section 2.1.2, the location for each of the compressor stations are preliminary and their location could change during the final engineering phase. Despite this, Section 5.17.2.1 reveals that the noise and vibration levels for the Wiseman compressor station would be insignificant for the nearest sensitivity receptor 7.5 miles away in Wiseman during construction and during operations. The closest native interim conveyed lands are approximately 6 miles east of the compressor station at MP 225. It is unlikely that there would be any impact on these lands.
T12	4	Jack Reakoff	General			This is a State of Alaska project, so facilities should be located to the highest degree on the state lands. The hydraulic flow of the compressed gas would continue to drop approximately 250 feet in elevation from Mile Post 225 Nugget Creek's location to Coldfoot itself.··There would be very little, if any, drop in pressure in that short distance with the gravitational flow advantage.··From Coldfoot the terrain rises to the south, and it is a good location to begin compression -- a compression stage to boost the pressure over the hills.··The Trans Alaska Pipeline Service Company has a Drag Reducing Agent site at Coldfoot for exactly the same reason.	AGDC will take this comment into consideration as project design progresses.
T12	5	Jack Reakoff	2.0			The compressor station should be located to Coldfoot as it is centrally located with a 4500 ft airfield, truck stop, café, lodging with 68 rooms, DOT maintenance camp, electrical power to be purchased and a post office. The compressor crews could be rotated out by air. There would be noise reduction of the compressor station without the need to produce electricity. The small Coldfoot community would be beneficial to the compressor crews in the winters. Those crews would be running down to Coldfoot if the site was at Nugget Creek to check mail and get	Section 2.1.2 Aboveground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6.Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final engineering, but for the purposes of this document, the analysis includes the locations of the compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed."

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						out of camp.	
T12	6	Jack Reakoff	2.0			The compressor station located near Wiseman should be located in Coldfoot behind a small ridge that would act as a sound shield.	Section 2.1.2 Aboveground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6.Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final engineering, but for the purposes of this document, the analysis includes the locations of the compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed."
T12	7	Jack Reakoff	5.14			My family and I would be concerned about construction activities during harvest periods. If at all possible, construction should be slated during the mid-May through mid-August time frame within 50 miles of Wiseman and Coldfoot. This would avoid the critical fall moose and sheep hunting seasons. Using this construction timing would also avoid caribou migrations and wintering in this valley also. Trapping also occurs in the wintertime. Subsistence trapping activities consistently use the valley floor of the Dietrich and Middle Fork Koyukuk Rivers.	AGDC has developed mitigation measures, found in Section 5.14.4 of the DEIS that address potential impacts to access to subsistence resources. Through this public review process and the formal permitting process for the project, AGDC anticipates that additional mitigation measures for subsistence will be developed.

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T12	8	Jack Reakoff	General			Consideration is needed for unimpeded subsistence use and access of the lands associated with the gas line ROW. ··The Trans Alaska oil pipeline Act (Public Law 93-153) that sets out the Utility Corridor specifically requires stipulations in all oil and gas pipeline right-of-way permits to protect the "interest of individuals living in the general area of the right-of-way permit who rely on fish, wildlife, and biotic resources of the area for subsistence purposes."	Construction and operation of the ASAP project would be subject to all terms, conditions and stipulations of the BLM's Right-of-Way Grant and Temporary Use Permit for all affected federal lands, and the State of Alaska issued Right-of-Way Lease ADL 418977 (Appendix M) for State Lands. In addition, AGDC proposes the following mitigation measures related to subsistence resources in Section 5.23 of the FEIS: •Identifying locations and times when subsistence activities occur, and minimizing work during these times and in these areas to the maximum extent practicable • Scheduling work (e.g., blasting) to avoid conflict with subsistence activities when possible. • Notifying workers that subsistence activities are ongoing in the area and directing them to avoid actions that may affect these activities (e.g., not removing trap line markers) • A Wildlife Avoidance and Human Encounter/Interaction Plan will be developed and implemented for the construction and operation of ASAP to avoid impacts to subsistence species • Develop a Subsistence Plan of Cooperation to mitigate potential conflicts between ASAP activities and subsistence activities.
T12	9	Jack Reakoff	General			Regarding Alternative B: the proposed action, Appendix L, Analysis of Section of Subsistence Impacts, there is a need to reflect the stated subsistence impacts in all a) -- of that document, of (a), (b), (c) and (d) of ANILCA Section 810 analysis.··The therefore mentioned concerns and mitigations must be reflected in the Final EIS.	The FEIS includes a Final ANILCA Section 810 Analysis of Subsistence Impacts completed by BLM. The Section 810 Analysis is presented as Appendix L.
T12	10	June Reakoff	2.0			Commenter is concerned about a compressor station designed to be located near Wiseman. She feels it is an intrusion into that area and would be better located near Coldfoot where there is already infrastructure.	Section 2.1.2 Aboveground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6.Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final

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							engineering, but for the purposes of this document, the analysis includes the locations of the compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed."
T12	11	Heidi Schoppenhorst	2.0			Commenter is concerned about a compressor stations designed to be located near Wiseman and feels that Coldfoot would be a better location for the station.	Section 2.1.2 Aboveground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6.Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final engineering, but for the purposes of this document, the analysis includes the locations of the compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed."
T12	12	Heidi Schoppenhorst	General			Commenter is concerned about the language used in the Executive Summary regarding spur roads and the lack of monitoring of public use of those roads.	AGDC would mitigate access into areas developed for the proposed Project and will use existing roads as much as practicable to reduce impacts. The lead federal agency will decide mitigation to address user access impacts.
T12	13	Heidi Schoppenhorst	5.14			Commenter is concerned about impacts to subsistence from the roads created by the project. More roads increases the access to remote locations for hunting.	In Section 5.14 the EIS identifies that impacts to user access in the Interior region would be greatest among seven Interior communities. The EIS notes that impacts on user access to communities would be not be expected in areas where the pipeline follows existing or officially designated transportation and utility corridors. The lead federal agency will decide mitigation to address user access impacts.
T12	14	Heidi Schoppenhorst	5.11			Commenter is concerned about impacts to the viewshed along to roads.	The visual simulations depicted in Figures 5.11-15 and 5.11-16 in the EIS indicate the type and magnitude of visual impact of the construction and operation phases to travelers along roads paralleling the proposed ASAP pipeline. As described in the text, impacts during construction are expected to be moderate to weak due to line and color contrast created by vegetation. Expected visual impacts to roadside travelers during the

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							long-term operations phase are reduced to weak due to re-vegetation and the fact that the pipeline would be underground for nearly all of the route.
T12	15	Heidi Schoppenhorst	5.10			Commenter is concerned about impacts to recreation and tourism and wants to be sure to work with the Park Service and US Fish and Wildlife Service to keep the land as impact-free as possible and limit the number of trails.	Potential impacts to recreation and tourism are covered in Section 5.10, including effects on trails. A mitigation measure is included in Section 5.23.10 that states that the project applicant will undertake *"Coordination of O&M activities across designated recreational areas"*, which includes coordination with public land managers, such as NPS and USFWS.
T12	16	Heidi Schoppenhorst	General			Commenter is concerned that the impacts on subsistence would not be offset by new jobs created by the project.	AGDC proposes to identify and promote work opportunities for local residents by coordinating with local village corporations, tribal governments, city governments and other groups to identify qualified individuals that are interested in working on the project. AGDC also proposes to coordinate with Alaska training centers and universities on workforce development and training opportunities, which may include, but are not limited to future job fairs in the region.
T12	17	Erik Salitan	2.0			I wanted to bring up the issue of the labor force that's going to build this and maintain this. I think that it should be made clear in their employment that they're here to work and not to hunt, trap, or fish, and that should be against the rules. They should sign a contract or something to that effect... Other projects in the past, there's been people where they've rode ATVs around, poached animals, etc.	Section 2.2.6 of the FEIS indicates that construction workers in remote areas would be housed in construction camps near the pipeline. As indicated in Section 5.14.4, recommended mitigation measures include: Prohibiting hunting, fishing, and gathering of wild resources during construction activities by non-local employees.
T12	18	Kristin Reakoff	2.0			Commenter is concerned about the location of the compressor station near Wiseman.	Section 2.1.2 Aboveground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6.Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final engineering, but for the purposes of this document, the

Comment Letter or Transcript Number (L or T)	Comment Number	Commenter	Section	Sub-Section	Figure / Table	Comment	Response
							analysis includes the locations of the compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed."
T12	19	Kristin Reakoff	5.23			Commenter is concerned about construction during hunting seasons.	The EIS has proposed the following mitigation measures related to timing of construction: "The ADGC has proposed the following mitigation measures that can be implemented to address effects on subsistence activities: • Identifying locations and times when subsistence activities occur, and avoiding work during these times and in these areas to the maximum extent practicable; • Scheduling work (e.g., blasting) to avoid conflict with subsistence activities when possible"
T12	20	Bob Akemann	5.14			Commenter is concerned about impact to subsistence hunting	Effect to subsistence uses are addressed in Section 5.14.3
T12	21	Bob Akemann	2.0			Commenter is concerned about the location of the compressor station near Wiseman.	Section 2.1.2 Aboveground Facilities of the FEIS states: "Under the one compressor station scenario, the compression facility would be located at approximately MP 285.6.Compression facilities would be located at MP 225.1 and MP 458.1 (collocated with the straddle and off-take facility at this location) under the two compressor station scenario. The location of these compressor station facilities may change during final engineering, but for the purposes of this document, the analysis includes the locations of the compressor station facilities described in Table 2.1-2 and presented in Figures 2.1-2 and 2.1-3 are analyzed."