Appendix A

Public Comments on the Draft EIS

Table A-1 Public Comment Letters on the Draft EIS

Letter ID	Author/Affiliation
F01	U.S. Fish and Wildlife Service
F02	U.S. Environmental Protection Agency
F03	U.S. Nuclear Regulatory Commission
T01	Standing Rock Sioux Tribe
S01	Riverton & Lander Workforce Centers
S02	Wyoming Department of Transportation
S03	Wyoming Office of State Lands and Investments
S04	Wyoming Department of Agriculture
S05	Wyoming Department of Transportation
S06	Wyoming Game and Fish Department
S07	Governor State of Wyoming
S08	Wyoming Department of Environmental Quality
S09	Wyoming Department of Environmental Quality
L01	Popo Agie Conservation District
N01	Wyoming Outdoor Council
P01	Ginger Bennet
P02	Jim Gores
P03	Jonathan Buscher
P04	Personal Information Withheld
P05	Ron Smith – Strathmore
P06	Jazmyn McDonald
P07	Jeanie Wolford – Cameco Resources

Table A-2 Responses to Public Comments on the Draft EIS

Letter ID/ Comment Number	Comment	Response
F01-1	Netting ponds that are over 1 acre in size are an engineering challenge and maintenance intensive as the weight of the net and/or a heavy snow load can cause the netting to sag into the pond fluids. The DEIS should provide the surface area of the ponds as well as assess the feasibility of enclosing the evaporation ponds with netting to exclude birds and other wildlife. Information should be included on how the netting will be installed to prevent net, sagging and also how the netting will be maintained to ensure that wildlife is adequately excluded from the evaporation ponds. Flagging is not effective at excluding birds and bats from pits and industrial wastewater ponds (Esmoil and Anderson 1995, Ramirez 2010).	The feasibility of using netting has been updated in the Final EIS, Section 2.4.5 and within Section 4.17.2.4, subsection Mitigation. Based on comments on the Draft EIS, Cameco has committed to monitor the ponds for bat and bird use and consulting with the USFWS on appropriate mitigation measures to avoid impacts.
F01-2	Page 4.8-4 Section 4.8 - Public Health and Safety: This section states that the response to all spills of hazardous materials would be implemented according to a Spill Contingency Plan (SCP) based on the current SCP use at the Smith Ranch-Highland Facility. The DEIS should include a copy of the Smith-Ranch-Highland facility SCP for reference and review.	The Spill Prevention Control and Countermeasures Plan for Smith Ranch-Highland Uranium Operations is included in the Administrative Record for the Project and can be provided for reference and review. This plan also is included as Appendix L in the Final EIS.
F01-3	Page 4.17-4 Section 4.17.2.2 Raptors and Other Migratory Birds: The second paragraph states that the raptor breeding season is from February 1 to July 31. Please include a statement specifying that the breeding season for golden eagles is from January 15 through July 31 and revise the breeding season for all other raptors to February 1 through August 31 or until the young have fledged and are no longer dependent on the nest.	The text in Section 4.17.2.2 Raptors and Other Migratory Birds has been revised based on the stipulations in the Lander RMP (BLM 2013).
F01-4	The second paragraph states that a reduction in habitat suitability and overall carrying capacity for ferruginous hawks would occur if surface disturbance activities occur within 0.75 mile from an active nest. Please change the buffer distance to 1 mile (see attached Raptor Guidelines).	The text in Section 4.17.2.2 Raptors and Other Migratory Birds has been revised based on the stipulations in the Lander RMP (BLM 2013).
F01-5	Page 4.17-10 Section 4.17.2.4 Special Status Wildlife Species: Mitigation measure WFM-4 and SSS-2 should be revised as follows: In addition, to prevent electrocution to raptor species, all new power lines will be constructed to meet or exceed the 2006 APLIC guidelines. All existing power lines will be retrofitted to meet the 2006 APLIC guidelines. Perch management cannot be a replacement for following the 2006 APLIC guidelines in the construction and retrofitting of power lines to reduce the potential for electrocution of migratory birds. Perch management can displace birds from APLIC-compliant power poles to other power poles in the area that	New transmission power lines would be constructed to comply with APLIC (2006), as noted in Section 2.3.1.5. Text has been added to mitigation measure WFM-4 to note that all existing transmission power lines would be retrofitted to meet the APLIC guidelines, which would reduce the potential for electrocution of migratory birds. Text also has been added to mitigation measure SSS-2 to note that because all transmission lines associated with the Project will be constructed/retrofitted to meet the APLIC

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Letter ID/ Comment Number	Comment	Response
F01-5 (Cont)	may not be raptor-friendly and thus increase the number of raptor electrocutions. Perch management is discouraged and should only be undertaken when there is no other alternative. Perch management is only appropriate as a last resort in the following situations: 1. When constructing new lines, proper separation and/or insulation should be used. Equipment that is dangerous to birds, for which there is no insulation available, should be avoided or installed in a way that provides proper separation without perch management. Perch management alone may be acceptable only for temporary emergencies where proper preparation or insulation is not possible. 2. When used along with insulation as a redundant form of protection. 3. When necessary to deter perching areas where increased predation of sensitive species by raptors are an issue, and only when specifically recommended by a state or federal management agency. When perch management is used for this purpose, it will only be placed on equipment that is raptor-friendly prior to installation of the perch management device. Extreme care will be used to ensure that perch management does not increase the chance of electrocution of birds.	guidelines, electrocution impacts from the use of anti-perching devices will be minimized.
F01-6	Page 4.17-10 Section 4.17.2.4 Special Status Wildlife Species: The second paragraph assigns a 0.75-mile protection buffer for ferruginous hawk nests. This should be changed to a 1-mile buffer.	The text in Section 4.17.2.4 Raptors and Other Migratory Birds has been revised based on the stipulations in the Lander RMP (BLM 2013).
F01-7	Page 4.17-12 Section 4.17.3.2 Raptors and Other Migratory Birds: The second paragraph states that the raptor breeding season is from February 1 to July 31. Please include a statement specifying that the breeding season for golden eagles is from January 15 through July 31 and revise the breeding season for all other raptors to February 1 through August 31 or until the young have fledged and are no longer dependent on the nest.	The text in Section 4.17.3.2 Raptors and Other Migratory Birds has been revised based on the stipulations in the Lander RMP (BLM 2013). Additionally, the 0.75 mile buffer from an active ferruginous hawk nest has been changed to 1 mile as described in the USFWS Raptor Guidelines.
F01-8	For our internal tracking purposes, we would appreciate notification of any decision made on this project (such as issuance of a permit or signing of a Record of Decision or Decision Memo). Notification can be sent in writing to the letterhead address or by electronic mail to FW6_Federal_ Activities_ Cheyenne@fws.gov.	The BLM has notified, and will continue to notify, the USFWS of updates to the Gas Hills EIS.

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F02-0.5	The Proposed Action presents three options for handling the wastewater from the facility: solar evaporation ponds, a combination of solar evaporation ponds with forced evaporation and crystallization equipment, or a combination of UIC injection wells and solar evaporation ponds. For the solar evaporation ponds-alone option, for the maximum of 420 acre-feet of net evaporation needed in Project Year 7, the EPA calculates that over 180 acres of ponds would be needed. For the other two options, the Draft EIS does not identify either the number of ponds or the amount of evaporative surface area of ponds necessary.	Section 2.3.1.2 of the EIS describes two water disposal methods. Under either method, three sets of two ponds (six ponds in total) would be constructed for wastewater storage. The first method is a combination of solar evaporation ponds and forced evaporation (FE) together, and would entail the use of six solar evaporation ponds that would be built-out in 3 stages to evaporate and store the wastewater, along with the operation of FE equipment beginning in operation year 6. The second method is deep-aquifer injection. If deep-aquifer injection were found feasible, this method would be used to supplement water disposal by solar evaporation with FE. Both options for water disposal would employ methods in addition to solar evaporation, such that the ponds do not need to be sized to handle all of the anticipated wastewater from the Project.
F02-1	We appreciate that the BLM addressed many of our PDEIS comments in this Draft EIS. As a result, we have narrowed our concerns to the following issues: 1) solar evaporation pond design, 2) monitoring and underground injection control (UIC) wells, 3) wastewater disposal options, 4) phased development, 5) air quality resources, and 6) water resources.	Thank you for your comment.
F02-2	Based on the design presented in the Draft EIS, the solar evaporation ponds option will not meet the current regulatory requirements of 40 CFR Part 61 Subpart W, National Emission Standards for Radon Emissions from Operating Mill Tailings, and it is unclear whether the other two options can comply with these requirements. This regulation allows for two impoundments (i.e., ponds), each no more than 40 acres. No new impoundment can be built unless it meets the work practice standards in Subpart W. In addition, an application for approval must be submitted to the EPA for the construction of any new radon source or the modification of an existing radon source, in accordance with 40 CFR §61.07. I Unless the impoundment facility design meets the regulatory requirements of 40 CFR Part 61, Subpart W, the EPA cannot grant its approval.	BLM acknowledges the EPA's concern regarding compliance of the proposed Project with the regulations under 40 CFR 61 Subpart W. BLM is also aware that EPA is in the process of reviewing and revising the Subpart W requirements and that these revisions could call for modification of the proposed pond designs. This review process is currently anticipated to be finalized in 2014 after the anticipated completion of the ROD for this Project. In addition, BLM requires that applicants comply with all applicable state and federal rules and regulations. However, the BLM recognizes that further revisions to the pond design may be required for the Project to be in compliance with the revised Subpart W requirements and that further environmental review may be necessary. A footnote has been added to Table 1-2 and text has been added to Section 2.3.1.2 discussing requirements under Subpart W.

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F02-3	The Draft EIS states that for the options utilizing solar evaporation ponds, double liners are planned. According to 40 CFR Part 61, Subpart W and to CFR Part 40, Appendix A, Criteria SA, SE and 13, the impoundments must incorporate the basic groundwater protection standards specified by 40 CFR Part 192, Subpart D, which require a minimum of double liners with leak detection for ponds utilized in milling operations. We recommend that the Final EIS include an explanation of how the pond design details would meet these groundwater protection standards.	A discussion of how the evaporation pond designs meet the basic groundwater protection standards specified by 40 CFR Part 192, Subpart D has been incorporated into Chapter 2 of the Final EIS.
F02-4	We recommend that the latest information from the wastewater disposal well testing program and wastewater disposal well permitting in the project vicinity be included in the Final EIS. For example, groundwater sampling data submitted by Cameco on February 29, 2012, to WDEQ indicates that the Flathead may be an underground source of drinking water (USDW).	The text has been revised in Sections 2.3.1.2 and 3.15.2 of the Final EIS to include the most recent results from the test wells for disposal of wastewater.
F02-5	The WDEQ issued a final permit for two Class V wells (Gas Hills #1 and #2 wells) on November 3, 2011 with a minor modification issued on February 14, 2012. The Gas Hills #1 well reaches the Flathead formation (3850' depth) and is permitted to inject into the Phosphoria, Tensleep, Madison, and Flathead formations. Gas Hills #2 well is also drilled to the Flathead (5400' depth) and permitted to inject into the Cloverly, Morrison, Nugget, Phosphoria, Tensleep, Madison, and Flathead formations. These wells were permitted as Class V wells for performing injectivity tests. For Class V wells, the injectate cannot exceed MCLs or background, whichever is greater. We note that the Proposed Action Alternative anticipates the use of Class I wells for wastewater disposal. This would require that the two permitted Class V test wells be converted for permitted use as Class I deep disposal wells. Because this can be a complex process, if it becomes likely that this approach will be selected, we recommend contacting our office to discuss the process and requirements for conversion.	The BLM appreciates EPA's offer to discuss the process and requirements for converting a Class V well to a Class I well and has used this information to update the text in Section 2.3.1.2.
F02-6	If the Flathead is determined to be a USDW, conversion of Class V test wells to Class I UIC disposal wells will require aquifer exemptions. Approval of an aquifer exemption removes a portion of a USDW from protection under the SDWA. Denial of an aquifer exemption impacts the Proposed Action Alternative and may render it infeasible. In addition, if waste fluid is planned to be injected into any of the formations above the Flathead through a Class I UIC well, a determination would need to be made as to whether these formations are USDWs. If they are, aquifer exemptions would be necessary.	The Flathead Formation would be a USDW based on TDS. The water analysis was as follows: Gas Hills #1; 3010 mg/l, Gas Hills #2: 3220 mg/l. An aquifer exemption would have to be obtained in order to inject wastewater into this formation. Text has been added to Section 2.3.1.2 generally explaining the requirements which must be met in order to obtain an exemption. Table 1-2 has been updated as suggested to indicate EPA's role in allowing the use of

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Letter ID/ Comment Number	Comment	Response
F02-6 (Cont)	Requests for aquifer exemptions for Class I wells typically must demonstrate, among other things, that the exempted aquifer does not currently serve as a drinking water resource (i.e., no drinking water wells) within a defined radius of the Class I UIC disposal well, and that the disposed wastewater will not migrate outside of the aquifer exemption boundary. Additionally, if the USDW proposed for injection is found to be at or below 3,000 mg/l total dissolved solids, approval of such an exemption would be considered a substantial revision to the State's UIC program and require rulemaking signed by the EPA Administrator. We recommend that the Final EIS Table 1-2 indicate that the EPA would be responsible (per 40 CFR 144 and 146) for approving or denying any aquifer exemptions should a request be made by WDEQ to allow injection into the Class I wells.	Class I injection wells.
F02-7	Since Class I UIC wells are included in the Proposed Alternative, we recommend that the Final EIS confirm the ability of all receiving formations to receive injectate and include data from testing conducted in this regard. This information will be important in determining the viability of Class I disposal options.	Please see the response to Comment F02-4.
F02-8	The Draft EIS states that the WDEQ injection permit would require monitoring of groundwater conditions to establish baseline data and to ensure collection of information on migration and behavior of injected fluids. This information is not accurate. Current WDEQ Class I well permit monitoring requirements do not track the migration of the injected fluids or collect the in-situ water samples necessary to understand the geochemical behavior of the injected fluids in contact with the receiving formation. We recommend correcting this in the Final EIS and explaining that current Class I well monitoring requirements cannot detect unwanted migration of disposed wastewater beyond the permitted boundary.	The text has been revised to clarify that monitoring injection wells would be associated with ISR wells, and that monitoring of WDEQ Class I wells (deep disposal wells) are not part of the monitoring requirements for permitting that type of well.
F02-9	The EPA recommends that the Final EIS further evaluate the UIC Class V wastewater disposal option for the Resource Protection Alternative. The potential significant impacts associated with exempting a portion of the Flathead aquifer from the SDWA for UIC Class I disposal would be avoided if the UIC Class V disposal option were selected. Under the Class V option, wastewater will be treated to reduce regulated contaminants to maximum concentration limits (MCLs) or background so that injection can be permitted without an aquifer exemption. The EPA recommends that the Final EIS evaluate onsite treatment using a combination of ion exchange, reverse	The BLM does not believe there is value in analyzing the use of Class V wells for deep disposal of wastewater because the proponent has not proposed the use of these wells. In addition, should the proponent opt to treat wastewater that would otherwise be injected, the treated water would more likely be recycled for other uses given the general scarcity of water in Wyoming. The impacts from deep injection into Class I wells is disclosed in Section 4.15.2.

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Letter ID/ Comment Number	Comment	Response
F02-9 (Cont)	osmosis, and radium settling followed by deep disposal in Class V injection wells, land application, or a combination of deep well disposal in Class V injection wells with land application during the irrigation season.	
F02-10	The Draft EIS Figure 2-3, Project Activity Schedule, shows that mine unit restoration and reclamation would be performed concurrently with production from adjacent operating units. It is our understanding that both the production process and restoration process may use the same reverse osmosis (RO) treatment units. Since it is critical to sustain restoration activities without interruptions that could lead to excursions, we recommend including in the Final EIS a more complete description of the RO treatment capacity and associated RO production and restoration operational design capacity. We also suggest constructing a process water balance from this Schedule to determine production and wastewater demand for the RO units.	The process water balance contained in the 2012 WDEQ mine permit application indicates that only 1% of production water will require RO treatment, while 100% of restoration water will be treated, and the Final EIS has been updated to reflect this information. This means that the restoration water treatment has a much larger demand (generally one order of magnitude larger) than the production water when both are occurring together. Please note that Section 2.3.1.1 of the EIS indicates the ability for Cameco to add future RO capacity if deemed necessary.
F02-11	There are a number of inconsistencies between tables in the Draft EIS and Appendix E which make it difficult to confirm many of the air quality conclusions reached in the Draft EIS. For example, the annual PM emissions listed in Table 3-2 do not appear to be consistent with the emissions listed in Table 3-1. In another example, Appendix E, Table 3-4 lists four to eight drill rigs operating at any one time. However, Chapter 4 of the Draft EIS, Table 4.1-2 identifies up to 14 drill rigs could be operated simultaneously. In addition, Table 2-3 of Appendix E lists the emission factors used to calculate emissions of criteria pollutants from internal combustion engines. These emission factors appear to yield significantly higher emission rates than those presented in the total hourly criteria pollutant emission rates listed in Table 3-6 of Appendix E. Based on our reviewed of Appendix E, it appears that the Draft EIS underestimates maximum short -term emission rates for the activities conducted by the equipment in the emission inventory. We recommend that the BLM re-evaluate its emissions inventory and reassess whether substantial changes have occurred from any revisions to the Plan of Operations assumptions in the Proposed Action Alternative. Additional modeling may be warranted if the changes are significant.	Appendix K and Table 3-2 have been revised to resolve these differences.
F02-12	The EPA has found from similar information in other ISR projects that there is the potential for short-term impacts associated with fugitive dust and NOx emissions. We recommend an adaptive management strategy to prevent adverse PM impacts by minimizing the magnitude and duration of PM emissions and by requiring lower-emitting technology for the drill rigs. The strategy could involve suppressing fugitive dust during drilling with a stand-by	Text has been revised to include recommended mitigation strategies.

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Letter ID/ Comment Number	Comment	Response
F02-12 (Cont)	water truck. Emission controls on the equipment exhaust gases such as catalytic oxidation converters and particulate filters with regeneration have been employed to mitigate adverse impacts at other ISR facilities.	
F02-13	Chapter 3 of the Draft EIS lists the Annual PM2.5 NAAQS as being 15 micrograms per cubic meter (ug/m3) (page 3. 1-4). On December 14, 2012, the EPA lowered the NAAQS to 12.0 ug/m3. We recommend including the current NAAQS in the Final EIS. The EPA recommends that Chapter 3 of the Final EIS include current information regarding NAAQS attainment within the State of Wyoming. In March 2009, the Governor of Wyoming recommended to the EPA that Sublette County and parts of northeastern Lincoln and Northwestern Sweetwater Counties be designated non-attainment for ozone due to exceedances of the 75 parts per billion ozone NAAQS. The EPA published final air quality designations for the ozone NAAQS in the Federal Register on May 21, 2012.	Text describing the NAAQS in Ch 3 has been revised to reflect the new standards.
F02-14	According to the Draft EIS, the Project potentially would impact 15 acres of wetlands along West Canyon Creek in Mine Unit 4, including the perennial reaches of the Creek. We recommend that the Final EIS explain that siting wellfields and crossing tributaries upstream of jurisdictional wetlands may require the applicant to obtain Clean Water Act Section 404 permits. The discharge of dredged and fill material into waters of the U.S. is permitted by the United States Army Corps of Engineers (USACE) with nationwide permits for construction activities (e.g., drilling wells, laying pipeline, and constructing access roads). The USACE may need to conduct additional environmental impact analyses to support issuance of CWA Section 404 permits associated with the project.	The SWPPP and proposed mitigation measure VEG-1 would be implemented to mitigate the impacts of erosion and sedimentation on wetlands and riparian areas, which would limit USACE involvement. Additionally, coordination by the applicant with the USACE would take place prior to the development of Mine Unit 4. Consultation with the USACE will determine the jurisdictional status of the wetland and riparian areas. If wetlands and riparian areas are determined to be jurisdictional, mitigation measures will be determined by the USACE. The text has been modified for clarification.
F02-15	In addition, it appears that some of the wastewater evaporation ponds may be within the 100-year floodplain as calculated in Table 3.15-2. The EPA recommends evaluating options to avoid discharge from these facilities during flood events.	Clarification has been added to Section 4.15.1.2 that indicates Cameco's plans to protect Ponds 1 and 2 (NWNW S.28, T33N, R89W) with an upstream runoff control berm and runoff diversion ditch that would divert runoff into West Canyon Creek from the drainage that passes just east of the ponds. Ponds 3 through 6 would be located in areas that appear to be well outside any floodplain.

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F02-16	We recommend including in the Final EIS any updates on the status of the USACE permitting process for the Gas Hills project, information on the specific acreages of wetlands that could be impacted and the identification of mitigation for impacts.	Coordination by the applicant with the USACE would take place prior to the development of Mine Unit 4, but has not occurred as of the printing of the Final EIS. Erosion and sedimentation on wetlands and riparian areas, which would limit USACE involvement. Additionally, coordination by the applicant with the USACE would take place prior to the development of Mine Unit 4. Consultation with the USACE will determine the jurisdictional status of the wetland and riparian areas. If wetlands and riparian areas are determined to be jurisdictional, mitigation measures will be determined by the USACE.
F02-17	Table 3.15-4 presents average concentration data for background groundwater in the proposed mine units. The table includes a column showing the Wyoming Class III standards. We find the inclusion of these standards in this table to be confusing and without context. We recommend deleting these standards in the revised table in the Final EIS.	Because of background radium concentrations, the GHPA groundwater will not be suitable for any use other than WY class III industrial water. Without the radium, the water would meet stock water and agricultural water standards, but would probably not be suitable for drinking water. Therefore the WY Class III standards are what apply for impact assessment and are included in Table 3.15-4 for comparison to measured concentrations in the area. Concentrations of all constituents measured in the groundwater have been included in this table; WY Class III standards only exist for those constituents indicated in the table. Footnotes associated with the table have been clarified to state this.
F03-1	First bullet in Section 1.3 (Page 1-3 of the DEIS): NRC doesn't consider what is proposed as "mining" but as "milling."	BLM recognizes that the NRC considers ISR operations milling; however, the BLM considers ISR to be mining activities managed under the 43 CFR 3809 regulations. The term 'mining' been added to the glossary to make this clarification.
F03-2	Paragraph 8 of Section 1.4.2 (Page 1-5 of the DEIS): "U.S. NRC approved the amendment of SUA-1548 to include Gas Hills on January 29, 2004." or some such wording to state NRC's approval of the amendment action.	Text has been revised as suggested.
F03-3	First sentence in paragraph 9, Section 1.4.2 (Page 1-5 of the DEIS): This broad statement calls into question the entire NRC EA - Is this intended?	NEPA analysis of the Gas Hills ISR Project performed by the NRC was triggered by the agency's decision to approve an amendment to Cameco's Source Material License which

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Letter ID/ Comment Number	Comment	Response
F03-3 (Cont)		is granted by NRC. The BLM, as a land management agency, must balance multiple development uses with a mandate to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. Because of the differences in the goals of the two agencies, there are different requirements for consideration of impacts under NEPA, and as stated in text, the analysis performed for the NRC did not meet BLM needs. The text has been revised to more clearly articulate this difference in agency requirements.
F03-4	Fourth sentence in paragraph 9, Section 1.4.2 (Page 1-5 of the DEIS): "Milling"?	Please see the response to comment F03-1.
F03-5	Last sentence of paragraph 4, Section 1.4.4, (DEIS Page 1-6): A financial surety arrangement for reclamation and decommissioning for the Gas Hills site also is required under the NRC license.	Text has been revised to include this information.
F03-6	Second permit/approval listed in Table 1-2 in Section 1.4.4 (DEIS Page 1-6): "milling"	Please see the response to comment F03-1.
F03-7	Tenth permit/approval listed in Table 1-2 in Section 1.4.4 (DEIS Page 1-7): License amendment for Gas Hills already completed. This wording implies a future action.	Text has been adjusted to reflect this comment.
F03-8	Last sentence of paragraph 4, Section 2.3 (DEIS Page 2-6): Cameco would also have to address NRC requirements for final radiological surveying of operational areas as part of mine unit and site reclamation and decommissioning.	Text has been adjusted in Sections 2.5.3.2 and 2.6 to reflect this comment.
F03-9	First sentence of paragraph 1, Section 2.3.1.2, (DEIS Page 2-9): "uranium milling"	Please see the response to comment F03-1.
F03-10	Second sentence of paragraph 3, Section 2.3.1.2 (DEIS Page 2-9): Pond design would need NRC approval.	Text has been adjusted to reflect this comment.
F03-11	Fourth sentence of paragraph 7, Section 2.3.1.2 (DEIS Page 2-11): NRC approval of deep well injection also is required under 10 CFR 20.2002 or 20.2003.	Table 1-2 has been adjusted to reflect this comment.

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F03-12	First sentence of paragraph 13, Section 2.3.1.2 (DEIS Page 2-12): This radioactive waste would likely be stored onsite, in an area dedicated for that purpose, prior to offsite shipment. Does BLM need to account for any disturbance related to this onsite area?	Cameco has provided information on surface disturbance needed to appropriately store radioactive waste on-site, prior to shipment. Storage would be within a designated area of an unused pond or within the area associated with the Carol Shop facility. Text has been revised to reflect this information.
F03-13	Table 2-2, Section 2.3.1.6 (DEIS **Page 2-14),**: Any thought to also provide the total consumptive water use for the full anticipated 20 years of operation? Also, does operation include groundwater restoration? Restoration can involve a substantial amount of water consumption. Does it include consumptive water use from delineation drilling?	The total consumptive use of water for the Project has been added to Table 2-2. Consumptive use of water for groundwater restoration is reflected in Table 2-2. Text has been added to note whether consumptive water use from delineation drilling is included in Table 2.2. Consumptive use from delineation drilling is not included in estimates provided in this document.
F03-14	Fourth sentence in paragraph 2, Section 2.3.2 (DEIS Page 2-15): Sentence is not clear as to where the completed restoration is to occur prior to MU4 production.	Text has been revised to clarify the timing.
F03-15	Second sentence in paragraph 3, Section 2.3.3.1 (DEIS Page 2-22): NRC allows other than pre-operational levels. See 10 CFR 40, Appendix A, Criterion 5(B)(5).	The text has been revised to clarify that pre-operational water quality or class of use meet the requirements of NRC and WDEQ for restoration of groundwater quality following ISR. See additional discussion on groundwater restoration in Section 4.15.2.1.
F03-16	Third sentence in paragraph 4, Section 2.3.3.1 (DEIS Page 2-22): "aquifer"	Text has been adjusted to reflect this comment.
F03-17	Second sentence of paragraph 2, Section 2.3.3.2 (DEIS Page 2-22): These monitor wells (in the horizontal or lateral direction) can be considered part of the mine unit, but at some distance (400 feet) from the production/injection wells. Suggest that the wording here be a more clear.	Text has been revised to clarify that monitoring wells are considered to be associated with the mine unit.
F03-18	Third sentence in paragraph 2, Section 2.3.5 (DEIS Page 2-24): Again see 10 CFR 40, Appendix A Criterion 5(B)(5) for the three options.	Please see the response to comment F03-15.
F03-19	First sentence of paragraph 1, Section 2.3.5.1 (DEIS Page 2-25): "pre-operational"	The term 'pre-mining' is based on WDEQ-LQD language. No text was modified as a result of this comment.

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F03-20	First sentence of the first paragraph of Section 2.3.6 (DEIS Page 2-26): Discussion doesn't appear to include surface areas affected by spills of lixiviant during operations. These areas would need to be surveyed for radiological contamination levels and addressed as part of either mine unit or final site reclamation. If radiological levels are sufficiently high, the soils would need to be disposed offsite.	Text has been added to Section 2.3.5 to reflect this comment; language associated with surveys for radiological contamination and disposal was maintained in Section 2.3.6.
F03-21	First sentence of paragraph 3, Section 2.3.6 (DEIS Page 2-27): "NRC- or NRC-agreement State- licensed facility" here and in the following discussion.	Text has been adjusted to reflect this comment.
F03-22	Second sentence of paragraph 9, Section 2.3.6 (DEIS Page 2-28): Is this disposal a given as stated?	Disposal of any materials that could not be decontaminated to U.S. NRC unrestricted release standards would be disposed of at a U.S. NRC- or NRC-agreement State-licensed facility. Text was modified in the document to clarify.
F03-23	First sentence of paragraph 1, Section 2.3.6 (DEIS Page 2-28): NRC's regulations concerning "timeliness in decommissioning" are found at 10 CFR 40.42. You might want to cite these regulations so as to lead the reader to the specifics of this process. Also, it might be good to point out that should a company go bankrupt, the financial surety will be available for cleanup of the facility and site.	A citation has been added to Section 2.3.7 to reflect this comment. Text in Section 1.4.4 has been modified to clarify that the surety bond is meant to ensure that surface reclamation and groundwater restoration would occur.
F03-24	Last bullet in paragraph 5, Section 2.3.8 (DEIS Page 2-30): Not sure where this requirement comes from. This sentence is unclear.	The text has been updated to reflect changes in Cameco's plans for the existing water supply well at the Carol Shops as specified in their comments on the Draft EIS (see Comment P07-43 and BLM's corresponding response).
F03-25	First sentence of paragraph 1, Section 2.4.6 (DEIS Page 2-40): The NRC license is SUA-1548.	Text has been adjusted to reflect this comment.
T01-1	Section 106 Identification Efforts under the National Historic Preservation Act (NHPA) The SRST THPO would like to assist in identification of historic and religious properties that may be significant to the tribes. The SRST THPO would like identification efforts in the form of a Traditional Cultural Properties study in order to fulfill the Section 106 requirements under the NHPA regulations. In section 4.2-4 the TCP's (or sites of significance to Tribes) would have a .25 mile buffer from proposed impacts. Since we do not yet know what the TCPs are we cannot reasonably place this pre-determined length of a buffer around	Darlene Conrad (THPO, Northern Arapaho) currently is leading the effort to work with the other tribes in preparing a proposal to conduct TCP surveys. Once completed, the proposal will be submitted to Cameco. The EIS will be updated to reflect the results of the TCP surveys and any proposed mitigation measures. The text regarding the 0.25-mile avoidance has been revised to address the comment. The 0.25-mile avoidance was based on past tribal consultation efforts and the types

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T01-1 (Cont)	sites that have not been identified. It would be imperative to have Traditional Cultural specialists or Tribal Monitors on-site during identification efforts and construction monitoring.	of sites that currently exist in the GHPA.
T01-2	Mitigative Measures and Treatment Plans Traditional Cultural Specialists and (or) Tribal Monitors can serve as Construction monitors as part of the construction phase of the project. This would ensure that any TCP's and historic and religious properties associated with Indian tribes are protected. The specialists would also assist in establishing buffers-this could be done with pre-planning efforts and on-site in case of an inadvertent discovery. In May of 2012 the PA for this project was amended to extend the terms of the original PA from 2003. To our knowledge the SRST THPO did not receive notice soliciting comments for this PA. We would like to be notified on any amendments, changes or new proposed PA's for BLM projects that may affect historic and religious properties of significance to Indian tribes.	Darlene Conrad currently is leading the effort to work with the other tribes in preparing a proposal to conduct TCP surveys. Once completed, the proposal will be submitted to Cameco. The EIS will be updated to reflect the results of the TCP surveys and any proposed mitigation measures (e.g., tribal monitors during construction, tribal monitors assisting in establishing buffers). The PA amendment specifically focused on designating BLM as the lead federal agency for Section 106 responsibilities instead of NRC, so only the original signatories were involved. Interested tribes will be integral to the development of the Historic Properties Treatment Plan (HPTP). In accordance with the PA, Cameco may not proceed with construction in any given area until the HPTP is developed and approved by BLM, NRC, SHPO, and interested tribes. The HPTP will include site-specific avoidance measures, and mitigation measures for any sites that cannot be adequately avoided. The BLM considers "avoidance" to mean avoidance of effects and not just physical avoidance, so consideration of the viewshed and landscape around sites of cultural and religious significance are appropriate.
S01-1	In Fremont County we generally have one of the higher unemployment rates in the state and have a significant number of workers that could benefit greatly from more good paying jobs in our area.	Thank you for your comment. The economic and social impacts associated with the Project are described in Section 4.10 of the EIS.
S01-2	It is my hope that the EIS for Cameco will move forward in a positive and productive manner that results in approval of their work beginning soon. I believe this can be done in a way that allows for multiple use of the lands to benefit Wyoming's people while protecting Wyoming's lands in a sensible way.	Thank you for your comment.

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S02-1	Primary transportation route should be from mine site to US 20-26 at Waltman. Right now charts show primary transportation route through Riverton, a much longer haul.	As detailed in Section 4.12.2, the analysis is based on the anticipation that the majority of workers (80 percent) and the needed construction equipment would be based in the Riverton and Lander area, utilizing WY 136. Transportation of resin would utilize the Gas Hills Road and U.S. 20-26 as weather permits. Figure 2-5 and Section 4.12 have been updated to reflect modifications in Cameco's transportation plan including an increased number of truck trips to remove waste from water treatment from the Project area.
S02-2	We are not opposed to this plan, but transportation needs must be considered as part of future conversations w/WYDOT.	Thank you for your comment.
S02-3	We need to know this ASAP so we can establish Wyo 136 as a higher-priority road and possibly budget money for highway improvements. The Gas Hills Rd (Wyo 136) is currently the lowest priority road for snow plowing and maintenance.	Thank you for your comment. Cameco could begin construction upon signing of the Record of Decision, which currently is anticipated to occur in early 2014. Traffic would increase at that time.
S03-1	Based on a brief internal analysis, OSLI staff concurs that there will be no direct impacts and negligible indirect impacts to state trust lands.	Thank you for your comment.
S03-2	According to the description provided in the document, 164 acres of state trust lands would be directly impacted by this project. All acreage is included in OSLI Uranium Lease #0-15211, executed on December 2, 2003 and expiring on December 1, 2013. Based on the activity described in the proposed action, this acreage would be substantially included in Unit 4.	Thank you for your comment.
S03-3	The project proponents are advised that they must comply with the Rules and Regulations adopted by the Board of Land Commissioners in accordance with W.S. §36-2-107 and §36-9-118, in the event that development occurs on, or is necessary to traverse, state lands.	Thank you for your comment. This requirement has been included in Table 1-2, Major Federal and State Laws, Regulations, and Applicable Permits.
S03-4	In addition, siting of any sort on state trust lands will require the proponent to comply with the Governor's Executive Order 2011-5, Greater Sage-Grouse Core Area Protection.	Text has been modified in this Section 1.4.4 (Table 1-2) to reflect this comment.
S04-1	This project will impact grazing permittees, agriculture producers, landowners, and other citizens, as well as our natural resources, both in and near this 8500-acre project area. This project will heavily impact livestock grazing permittees, especially those utilizing the Gas Hills Allotment. The WDA appreciates commitments by the BLM and Cameco Resources to mitigate	Thank you for your comment.

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S04-1 (Cont)	impacts to livestock grazing permittees by holding annual meetings to discuss operations, conducting surveys of range improvement projects prior to mine unit construction, correcting damage to livestock and range improvements and striving for timely and appropriate reclamation.	
S04-2	1.5.2.1 Cooperating Agency Participation, Table 1-5, p. 1-11. Jason Fearneyhough and Michelle MacDonald are contacts with the Wyoming Department of Agriculture, not the USDA.	Text has been adjusted to reflect this comment.
S04-3	The WDA believes it is essential that Cameco and the BLM control noxious weeds in all areas affected by ISR operations, not just in those areas that had few noxious weeds to begin with.	The proposed mitigation measure NOX-1 has been developed to augment the commitment of the Applicant-Committed Environmental Protection Measure for weeds on page 2-36 of the Draft EIS.
S05-1	There is some confusion within the EIS and the public meeting held in Lander on the haul route for the slurry/resin to the Highland Resin Transfer System. In some areas it shows the route going to US 20-26 on the Gas Hills Road and in others it shows the route going to Riverton along WYO 136 then US 26 towards Casper, which is the route mentioned in the public meeting.	As detailed in Section 4.12.2, transportation of resin would utilize the Gas Hills Road and U.S. 20-26.
S05-2	WYO 136 was built in the 1960's and last overlayed in 1990. Due to its age and WYDOT's current funding limitations there is concern about maintaining its condition. With increased heavy truck traffic WYDOT may have to impose a weight restriction to maintain its integrity. Tables 4.8-3 and 4.8-5 would also have to be revised if the route along WYO 136 is used for this haul.	Tables 4.8-3 and 4.8-5 represent the accident rate for transportation of yellowcake slurry or hazardous materials for both the Proposed Action and the Resource Protection Alternative. A limited amount of hazardous materials may be transported via WY-136. No revisions to text were made as a result of this comment.
S05-3	On page 2-24 it is mentioned that "….Cameco would contract with road maintenance crews to provide passage." I am assuming that you are referring to snow removal on the roads off of the state highway system. WYDOT provides all maintenance on the state highway system and Cameco will have to abide by all road restrictions and closures. WYDOT does have an Authorized Travel program which may allow passage through some closed areas based on the discretion of the local maintenance crews and the Highway Patrol. The application can be obtained on the WYDOT web site or by calling WYDOT Public Affairs Office at 307-777-4375.	Text has been added to the document to reflect this comment.

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S05-4	In the Transportation of Materials section on page 4.8-6 you state "WYDOT will respond immediately to hazardous materials accidents…" While it is true that WYDOT will respond we would like to clarify that our personnel do not have the training or materials to properly mitigate this type of spill. Cameco and its hauling contractor should provide the personnel, materials and equipment to respond to these types of incidents and will be responsible for the efforts and costs required to mitigate a hazardous spill.	Text in Sections 4.8.2.2 and 4.8.2.3 have been revised to better reflect Cameco's response in the event of a hazardous materials spill.
S06-1	Impacts from disturbance are consistently downplayed in the DEIS by repeated statements regarding past and future reclamation efforts, which have not been substantiated as "successful". Despite repeated statements regarding habitat reclamation, no quantitative data is presented in the document detailing any success at re-establishing native plant communities from decades old reclamation work. In fact, casual examination of reclamation efforts in the area suggests past efforts have not been successful at re-establishing native plant communities. If the BLM has data showing the successful re-establishment of native plant communities, it should be presented in the DEIS to add credibility to statements made regarding interim and final reclamation in the Proposed Action Alternative and enhanced reclamation in the Resource Protection Alternative (RPA). If quantitative data regarding vegetation cover and plant species composition does not exist for previous reclamation efforts in the area, the WGFD believes the BLM should not analyze those efforts as having been successful and should not project future successful reclamation until demonstrated.	For the purposes of this analysis, reclaimed areas refers to areas that were affected by mining or other activities and subsequently reclaimed utilizing the applicable standards and practices at the time, but the success of these reclaimed areas has not been evaluated and compared to current reclamation guidelines. Due to the lack of consistent or planned reclamation standards and activities in the study area and the historic disturbance, the success of reclamation is difficult to determine based on the current vegetation communities in the reclaimed areas. Reclamation success has been a concern for the BLM and different methodologies historically have been implemented with success on other projects. Based on the best information available it is reasonable to assume that implementation of the proposed mitigation in the document and the guidance outlined in the RPA would result in successful reclamation over the majority of the GHPA. Areas that are classified as low reclamation potential, saline-sodic soils, and have other reclamation constraints may require additional mitigation to be deemed successfully reclaimed. These areas have been identified in both the soils and vegetation sections of the document. Additional text has been added to the vegetation section to further highlight the difficulties in reclamation in these areas.
S06-2	In summary, the WGFD does not believe the BLM has adequately supported claims of successful reclamation efforts in the area, and is therefore concerned wild life habitat loss as a result of this project is underestimated; or at least, the longevity of the impact is underestimated. The WGFD further believes additional vegetation changes associated with the proposed project	Thank you for your comment. Please see the response to comment S06-1 for a discussion regarding past reclamation success and see Section 2.5 of the Final EIS for a description of the BLM-Preferred Alternative.

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S06-2 (Cont)	will result in significant cumulative impacts to wildlife habitat in the area when combined with past and projected disturbance. Unless documentation is included in the DEIS substantiating the successful reclamation of native shrub communities, the WGFD believes the only way to minimize impacts from the proposed project is to minimize the acres of disturbance. Thus, the WGFD believes the RPA will have far fewer impacts to wildlife than the Proposed Action Alternative.	
S06-3	With regard to aquatic wildlife, the DEIS has adequately addressed our concerns to minimize soil erosion, water quality/quantity impacts, and direct impacts to wetlands and riparian habitats.	Thank you for your comment.
S06-4	2.1.2 Existing Disturbance (pg. 2-3) Approximately 1,300 acres in the project area has previously been disturbed. It is stated the majority of disturbed areas have re-established vegetation and generally have a diverse species composition. The WGFD believes these statements regarding the success of past reclamation are inadequate given the extent the project claims to minimize future disturbance through reclamation efforts. Further, the document indicates planning for this project has been ongoing since at least the early 1990s, and the BLM should have much more detailed, quantitative data regarding past reclamation efforts. Of the 900 acres stated to be reclaimed and re-vegetated, the WGFD recommends detailing the ground cover percentage, species composition, percent forb cover, and percent shrub cover. Additionally, the document should describe how the vegetation statistics on the re-vegetated areas compare with undisturbed areas.	Please see the response to comment S06-1 for past reclamation success. A comparison between types of vegetation (COMA) is required to meet the revegetation standards discussed in DEQ Application to Mine, and additional discussion of COMA selection has been added to the description of the Proposed Action.
S06-5	2.1.2.1 Historic Mining, Exploration Drilling (pg. 2-4) The document states reclamation at exploratory drilling sites occurs within 1 year and that 12 sites were plugged and abandoned in 2008. The document should detail how the reclaimed vegetation at these sites compares to undisturbed areas.	Exploratory drilling is conducted under Notice-level approvals by the BLM, and reclamation of associated surface disturbance is completed within one year of initial disturbance. However, reclamation success takes significantly longer. Based on BLM's experience with reclamation of Notice level activities, reclamation can be determined successful on most of these small sites after three to four growing seasons. Revegetation success is typically dependent upon seasonal conditions and topsoil handling practices during operations.

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S06-6	2.3 Proposed Action (pg. 2-6) Under "Final Project Reclamation and Decommissioning" the document states disturbed areas outside mine unit boundaries will be reclaimed. Again, in the last paragraph on the page the document states that, "disturbed areas will be reclaimed to the pre-mining land use." These statements lack credibility because the document has not detailed instances of past reclamation success in the area. Moreover, "pre-mining" land use is not described.	Pre-mining land use in this statement refers to the current use (pre-Project), and is described in Section 3.4 (Affected Environment/Land Use) of the FEIS. Current status of vegetation is discussed in Section 3.13 (Affected Environment/Vegetation) of the FEIS. The Proposed Action does not set standards or criteria for vegetation reclamation success other than returning the area to previous land use such as wildlife habitat and livestock grazing. See Section 2.3.9 for Applicant-committed steps towards achieving reclamation success, and see Section 2.3.8 for post operational vegetation monitoring plans. Furthermore, the RPA and the BLM-preferred Alternative (see Section 2.5 of the FEIS) would utilize criteria from the recently finalized Lander RMP to determine final vegetation reclamation goals. Please see the response to comment S06-1 for a discussion of past reclamation success.
S06-7	2.3.6 Final Project Reclamation and Decommissioning (pg. 2-26, 27) This section should provide more detail regarding what constitutes final vegetation reclamation, including credible documentation that reclamation goals can be met based on quantifiable success of past reclamation efforts. Additionally, with the foresight that the GHPA contains a large percentage of soils with limited reclamation potential (described further in the document), the proponent's proposed action should include information on steps that will be taken if reclamation fails.	Please see the response to comment S06-1 and S06-6 for past reclamation success.
S06-8	2.3.8 Existing Monitoring Plans, Post-operational Vegetation Monitoring (pg. 2-30) In general, this section lacks detail. Given the extensive planning time for this project, a vegetation monitoring protocol should be well defined. The Proposed Action Alternative does not mention a vegetation monitoring plan to be implemented during operations/production, which should include weed monitoring and prevention across the GHPA.	Noxious weed monitoring is discussed in the proposed mitigation measure NOX-1. Monitoring would occur in compliance with WYDEQ and NRC regulations, as well as the BLM RMP requirements. Cameco has prepared a monitoring program that has been approved by the WYDEQ LQD and NRC. More detail on the monitoring program is provided in the Wyoming DEQ Mine Permit Application. More detailed vegetation monitoring requirements also have been included in the RPA and for the BPA as outlined in Chapter 2.

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S06-9	The Proposed Action Alternative proposes the use of a Comparison Area (COMA) for determining re-vegetation success, but docs not indicate that one has been established. Additionally, the criteria for success states that total vegetation cover after reclamation must be at least equal to total vegetation cover on the area prior to mining. Tills statement should specify which period of mining, since the GHPA is in a historic mining area, or before mining in general.	Additional description of the COMA development has been added to the description of the Proposed Action. Specific information on reclamation goals has been added to Section 2.4 (RPA)
S06-10	2.3.8 Existing Monitoring Plans, Wildlife Monitoring (pg. 2-31) The Proposed Action Alternative discusses a Wildlife Monitoring Plan prepared in coordination with the WGFD. Planning and monitoring activity for renewed mining efforts in the Gas Hills area has been ongoing since at least the early 1990s. The WGFD requested but has not received an updated monitoring plan specific to the current Proposed Action.	The updated Wildlife Monitoring Plan is a part of the Administrative Record for this Project, and is included as Appendix C of the Final EIS. Note: A current plan (as of 4/2013) is included as an appendix; however need to verify the very latest plan is included on the date of publication
S06-11	2.3.9 Applicant-committed Environmental Protection Measures, Operation (pg. 2-34) This section states fencing will prevent wildlife from accessing evaporation ponds, but is not clear on what type of wildlife the effort will target to exclude and does not support the statement with a credible citation that such exclusion can be achieved. This section states Cameco will monitor waterfowl activity at the evaporation ponds and will implement certain actions to exclude waterfowl if necessary. Further in the document (pg. 3. 17.1.2) it is noted that, "Common waterfowl species that may occur within the study area year-round depending on the availability of open water include Canada goose, mallard, green winged teal, northern pintail, gadwall, and American widgeon ... These species distributions are limited to the ponds and wetland/riparian habitats found within the study area." The assumption should be waterfowl will attempt to access evaporation ponds given the scarcity of open water in the area. The Proposed Action Alternative should include more detail regarding exclusionary practices and documentation of effectiveness.	Text in the Draft EIS has been updated to indicate that only terrestrial, non-burrowing wildlife will be excluded from evaporation ponds by fencing. Text has been adjusted to indicate that waterfowl are likely to access the evaporation ponds. In comment P07-41 on the Draft EIS, Cameco stated that vegetation and algal growth would be controlled to eliminate food sources within and along the shoreline of the evaporation ponds to discourage long-term residence of waterfowl, and committed to monitor the ponds for bat and bird use and consult with the USFWS on appropriate mitigation measures to avoid impacts to these species. The feasibility of using netting to exclude waterfowl has been updated in the Final EIS, Section 2.4.5 and within Section 4.17.2.4, subsection Mitigation, and Cameco's commitment has been noted in the Final EIS, Section 4.17.2.4, subsection Mitigation.
S06-12	2.3.9 Applicant-committed Environmental Protection Measures, Reclamation (2-35) This section states "the seed mixture used would be comparable to mixes used on other reclamation mines in the area ... ", however no documentation	A discussion of past reclamation success is included in the response to comment S06-1.

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S06-12 (Cont)	of reclamation success has been presented in the document. Additionally, the document again states the reclamation goal will be to return land to conditions able to sustain pre-disturbance use. This statement implies wildlife habitat will be comparable to pre-disturbance, but no credible, quantifiable data has been presented to support claims of successful past reclamation. Specifically, success in reclaiming forb and shrub communities should be demonstrated.	
S06-13	2.4 Resource Protection Alternative (pg. 2-36) A stated purpose of this alternative is to reduce impacts of the Proposed Action Alternative mining activities to wildlife; however, the RPA does not discuss or analyze any seasonal timing restrictions or buffers to protect sensitive species during construction phases (see comments under 2.5.2). Additionally, the RPA discusses a reduction in the amount of heavy truck traffic as a result of additional on-site processing. Cameco's transportation plan indicates that the majority of workers will come from either Riverton or Casper and will work regular weekday 12 hour shifts. As was included in our April 2012 comments, we recommend consideration for providing bus transportation for employees to and from central locations (i.e., Casper and Riverton) to further reduce traffic and associated dust, noise, and wildlife mortality impacts, especially given the number and length of daily travelled, unpaved roads.	The proponent has not proposed busing employees and the impact analysis does not indicate the need to propose this mitigation; therefore, no text has been adjusted as a result of this comment.
S06-14	2.4.5 Reduced Number of Evaporation Ponds (pg. 2-40) The RPA states evaporation ponds will be flagged or netted as necessary to prevent waterfowl access. The WGFD recommends that, unless the BLM has documentation that flagging is successful at excluding waterfowl, evaporation ponds should be required to have netting installed and maintained. Further in the document (pg. 3.1 7.1.2) it is noted that, "Common waterfowl species that may occur within the study area year-round depending on the availability of open water include Canada goose, mallard, green winged teal, northern pintail, gadwall, and American widgeon … These species distributions are limited to the ponds and wetland/riparian habitats found within the study area." As stated previously, it should be assumed that waterfowl will attempt to access evaporation ponds given the scarcity of open water in the area.	Reducing the number of evaporation ponds has not been carried forward as an element of the RPA in the Final EIS; therefore this comment no longer applies to the FEIS. However, for discussion of concerns associated with excluding waterfowl from ponds, please see the response to comments S06-11 and P07-41.
S06-15	2.4.7.1 Reclamation Success Criteria (pg. 2-43, 44) This section discusses the disturbance caused by past mining activity and the goal of the RPA to return the site to its ecological potential or to historic	The development of a noxious weed plan is discussed in the proposed mitigation measure NOX-1.

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S06-15 (Cont)	conditions without a clear description of those conditions. Additionally, the document states Cameco would be required to submit a noxious weed plan. Given the long-term extent of the planning for this project, the WGFD believes the BLM should require a detailed noxious weed plan prior to commencement of the project, which would encompass GHPA-wide monitoring and prevention, treatment, and control measures to be implemented at the commencement of construction, and ongoing through final reclamation.	
S06-16	2.5.2 Seasonal Operation (2 -45) The document states the BLM has eliminated from further consideration an alternative that would limit mine unit operations during wildlife timing limitation stipulations (TLS). As previously noted, no TLS have been included in any of the three existing alternatives, in particular the RPA. The stated reason for TLS exclusion is regarding the nature of ISR operations, which requires constant underground pressure created by the injection wells to maintain flows towards the production wells. This phase of the mining process is considered "production" and the WGFD does not disagree with the exclusion of TLS during tills process. However, the WGFD does recommend the BLM analyze TLS (including appropriate buffers) during the "construction" phase of each mine unit that has not been previously disturbed. As stated in the DEIS, construction includes delineation drilling; installation of injection, production, and monitoring wells; pipelines; header houses; and roads. Specifically, the RPA should consider TLS and other protections for identified species of concern that are likely to occur or are known to occur in the GHPA: • Non-core area sage-grouse leks, nesting, and early brood rearing habitat within 2mi of the GHPA. Core area noise guidelines for identified core area leks within 4 mi of the GHPA. Sage-grouse are classified as a federal candidate species, as well as a BLM sensitive species (pg. 3.17-6). • Other sagebrush-dependent avian species known to occur or likely to occur in the GHP A based on the presence of suitable habitat, including brewer's sparrow, loggerhead shrike, sage sparrow, and sage thrasher. Identified as BLM sensitive species (pg. 3.17-9). • Mountain plover mapped habitat in the GHPA. Identified as a BLM sensitive species (pg. 3.17-9). • Ferruginous hawk suitable nesting and foraging habitat in the GHPA. Identified as a BLM sensitive species (pg. 3.17-6).	Seasonal constraints for migratory birds (including raptors), mountain plover, and greater sage-grouse were included in mitigation measures found in Section 4.17.2.4. The mitigation measures are applicable for both the Proposed Action and Resource Protection Alternative. There are no required TLS for prairie dog colonies, bat species, and the northern leopard frog. The seasonal restriction dates for construction activities were modified to March 15 – June 30 for greater sage-grouse breeding, nesting, and brood rearing in the Final EIS as indicated in the Governor's Executive Order 2011-5.

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S06-16 (Cont)	• Burrowing owl suitable habitat in the GHPA. Identified as a BLM sensitive species (pg. 3.17-6) • Townsend's big-eared bat and spotted bat foraging and roosting habitat in the GHPA. Identified as BLM sensitive species in the GHPA (pg. 3.17-6). • White-tailed prairie dog active colonies in the GHPA. Identified as a BLM sensitive species (pg. 3. 17-4). • Northern leopard frog suitable habitat in the GHPA. Identified as a BLM sensitive species (pg. 3.17-11). • Great Basin spadefoot suitable habitat II1 the GHP A. Identified as a BLM sensitive species (pg. 3.17-11).	
S06-17	2.6 Comparison of Alternatives, Table 2-4 Summary of Surface Disturbance for the Alternatives (pg 2-47) This table describes the Carol Shop Facility as disturbing 27 acres under the No Action Alternative, and 0 acres under both the Proposed Action Alternative and the RPA. However, both the Proposed Action Alternative and the RPA will involve maintenance and upgrade of the Carol Shop for use during mining operations until decommissioning and final reclamation ensue. The disturbance associated with the facility should be 27 acres for both of these alternatives.	Under the No Action Alternative, approximately 27 acres of new disturbance would be required to demolish and reclaim the existing Carol Shop Structure. Under the Proposed Action Alternative and the RPA, no new disturbance would occur at the Carol Shops until final closure of the project.
S06-18	2.6 Comparison of Alternatives, Table 2-5 Comparison of Impacts (pg. 2-51) Under "Vegetation", both the column on the Proposed Action Alternative and the RPA state it would take 3-5 years to re-establish shrub-dominated vegetation communities. The WGFD disagrees with this assessment. Other sections of the document claim up to 20 years to reestablish shrub species. Appropriate data should be presented if the BLM has documented success at re-establishing shrub-dominated communities in this area in the short-term.	The text has been adjusted to match Section 4.13 Vegetation, indicating that shrub-dominated vegetation would take up to 20 years to re-establish.
S06-19	3.4.3. 1 Special Management Area (pg. 3.4-3) This section states that according the draft Lander RMP (2011), the GHPA is a designated development area (DDA). Until a record of decision is signed, the GHPA should be managed according to the existing Lander RMP (1987).	Text has incorporated direction from the most recent Lander RMP.
S06-20	3.9 Recreation (pg. 3.9-1,3,4,5) This section is missing information on the Sweetwater Rocks mule deer hunt	Section 3.9 has been updated to include information on the Sweetwater Rocks mule deer hunt area. Additionally, the term used for pronghorn antelope has been made

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S06-20 (Cont)	area, which encompasses a small area of the southern portion of the GHPA. This section uses both "pronghorn" and "antelope", and we recommend one term is used consistently throughout. Additionally, figures 3.9-2 and 3.9-3 do not depict mule deer or pronghorn hunt area bounds.	consistent throughout the document. Figures 3.9-2 and 3.9-3 have been updated to depict mule deer and pronghorn antelope hunt boundaries.
S06-21	3. 17.2.2 Birds, Greater Sage-grouse (pg. 3.1 7-7) According to WGFD lek data, there are 21 lek sites within 11 miles of the GHPA, all classified as occupied. There are 4 occupied leks within 4 miles of the GHPA: 1. Puddle Springs (data captured in DEIS) 2. West Canyon Creek (data captured in DEIS) 3. Black Mountain (discovered in 2012; peak male count 18; Greater South Pass core area) 4. Leighi Point (discovered in 20 12; peak male count 18; non-core area) Leks discovered in 2012 (i.e., Black Mountain and Leighi Point) should be included in the Affected Environment description (Table 3.17-1 describing leks within 2 miles of the GHPA) and the impacts analyses. TLS protections for these leks should be included and analyzed as part of the RPA.	Lek data presented in this document has been reviewed, and the most recent information has been incorporated.
S06-22	Footnote " a" under Table 3.17-1 refers to the title of the table "Activity Status of Greater Sagegrouse Leks Located within 2 miles of the GHPA." The footnote states, "that a 2-mile buffer of occupied leks is required for leks outside of core area" but this section does not describe or clarify what is the purpose of the buffer, what seasonal use stipulations should be considered, or when the stipulations should be applied. This section should discuss the 2-mile buffer around non-core area, occupied sage-grouse leks as intended to protect breeding, nesting, and brood rearing habitat from March 15 - June 30 during construction activities. Additionally, since the GHPA is in a sage-grouse non-core area (12 acres of the GHPA falls within the Greater South Pass core area); there are 4 known, occupied leks within 2 miles of the GHPA and proposed mine units containing habitat not previously disturbed by past mining activity (an occupied, core area lek exists within 2 miles of the boundary and proposed mine units); and the GHPA contains suitable sage-grouse habitat where birds have been consistently documented, the WGFD feels the BLM should include in the RPA and in the impacts analyses a description and discussion of non-core area TLS for construction activity and core area noise guidelines for construction/production activities to minimize	Two additional leks existing within 2 miles of the GHPA have been updated in the Final EIS. The Final EIS also has been updated to clarify that the 2-mile buffer around non-core area, occupied greater sage-grouse leks is intended to protect breeding, nesting, and brood rearing habitat from March 15 - June 30 during construction activities within the affected environment Section 3.17.2.2. Non-core area TLS for construction activities are described in Section 4.17.2.4 and are applicable to the RPA, as well as the proposed action.

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S06-22 (Cont)	the proposed project impacts on sage-grouse. Again, a stated purpose of the RPA is to reduce impacts of the Proposed Action Alternative mining activities to wildlife.	
S06-23	4.11.4 Irreversible and Irretrievable Impacts (pg. 4.11-10) This section of the soils impacts analysis states that no irreversible impacts would be anticipated; however, the Proposed Action Alternative describes 182 acres of disturbance in soils with limited reclamation potential (LRP). Statements made concerning the successful reclamation of these soils seem unfounded without documentation that such reclamation can be achieved.	Please refer to Section 4.13.2.1, where a saline-sodic seed mixture is included as a mitigation measure for LRP soils. Although LRP soils exist in the GHPA, revegetation of these soils with plants adapted to the saline-sodic qualities should be successful given adequate conditions and reclamation practices.
S06-24	4.11.5 Relationship between Local Short-term Uses and Long-term Productivity This section states, " ... implementation of reclamation measures would restore the long-term productivity of affected soils after the Project was reclaimed, assuming regular monitoring for effectiveness demonstrates successful reclamation." Again, without evidence that successful reclamation can be achieved, particularly on LRP soils, this statement does not present a credible assumption.	Please see the response to comment S06-23.
S06-25	4.13 Vegetation (pg. 4.13-1) This section presents conflicting information on whether or not the loss of shrub-dominated communities as a result of mining operations is a short-term or long-term impact. For example, "Surface disturbance activities would result in the conversion of woody vegetation cover types to grass/forb-dominated vegetation in the short-term." Given that shrub-dominated communities may take upwards of 20 years to become re-established, if at all, the WGFD believes the BLM should analyze the loss of this vegetation community as a long-term impact and detail the potential consequences of long-term shrub loss to shrub-dependent wildlife species.	The text in the fifth bullet on Page 4.13-1 has been revised to remove reference to the short-term. In Section 4.13, long-term impacts are identified as impacts lasting longer than 5 years. Text also consistently refers to a time-frame of up to 20 years for re-establishment of mature shrub species. Long-term impacts to shrub-dependent wildlife species are discussed in Section 4.17.
S06-26	4. 13.2.1 Vegetation (pg. 4.13-2, 5) This section presents the same conflicting statement as mentioned above. Additionally, Table 4.13-2 describes a seed mix to be used under the Proposed Action Alternative for interim and final reclamation. The reclamation seed mix contains big sage and antelope bitterbrush. The DEIS states that reclamation efforts to re-establish shrubs of similar stature as compared to undisturbed sites would require up to 20 years. The citation for this statement is the record of decision for the BLM Casper Field Office RMP.	The text has been updated with the most recent information on sagebrush reclamation from the recently published revised Lander RMP. The Lander RMP states that in the planning area, sagebrush takes 30 to 35 years to reclaim, while in areas with soil restraints, sagebrush reclamation can take up to 100 years. Due to the lack of consistent or planned reclamation activities in the study area and the continuous disturbance that has occurred historically, it is

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S06-26 (Cont)	Documentation that sagebrush dominated vegetation communities can be successfully re-established in 20 years should be specific to the Gas Hills area. With decades of reclamation activity in the Gas Hills area, such data should be available. If no such data has been collected and given the previous discussion about LRP soils, the BLM may consider analyzing the loss of shrub communities in the GHPA as permanent or irreversible impact.	difficult to determine the success of reclamation based on the current vegetation communities in the reclaimed areas.
S06-27	4.17. 2.1 Terrestrial Wildlife, Big Game Species (pg. 4.17-2) The impacts analysis for this section should include potential exposure to toxic wastewater and local populations experiencing higher levels of hunting and poaching pressure due to improved access, as is analyzed in the Small Game Species section.	Table 4.17.2.1, subsection Big Game Species has been revised in the Final EIS.
S06-28	4.17.2.4 Special Status Wildlife Species, Greater Sage-grouse, Table 4.17-1 Greater Sage-grouse Habitat Potentially Impacted by the Project under the Proposed Action (pg. 4.17- 7). This table identifies 421.6 acres of short-term surface disturbance acres in non-core area nesting habitat. Given that the lifecycle of a sage-grouse is highly dependent on sagebrush vegetation, and that sagebrush communities in the GHPA may take 20 years or more to become reestablished after disturbance, the WGFD believes that all disturbance acres in sage-grouse habitat should be considered a long-term loss. Additionally, footnote "c" states that core areas are designated by the WGFD. Wyoming's core population area strategy and the delineated core areas were established by the Governor's Sage-Grouse Implementation Team (SGIT) and approved by the Governor.	Table 4.17-1 and the corresponding analysis has been updated in the Final EIS.
S06-29	4.17.3.4 Special Status Wildlife Species, Greater Sage-grouse, Table 4.1 7-2 Greater Sage-grouse Habitat Potentially Impacted by the Project under the Proposed Action (pg. 4.17-15). This table identifies 260.3 acres of short-term surface disturbance acres in non-core area nesting habitat. Given that the lifecycle of a sage-grouse is highly dependent on sagebrush vegetation, and that sagebrush communities in the GHPA may take 20 years or more to become reestablished after disturbance, the WGFD believes that all disturbance acres in sage-grouse habitat should be considered a long-term loss. Additionally, footnote "c" states that core areas are designated by the WGFD. Wyoming's core population area strategy and the delineated core areas were established by the Governor's Sage-Grouse Implementation Team (SGIT) and approved by the Governor.	Table 4.17-2 and the corresponding analysis has been updated in the Final EIS.

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S06-30	5.4 Land Use & Table 5-1 Cumulative Impact Study Area (pg. 5-5, 11) The table lists "Land Use" as a resource and states no impacts are anticipated from the project, thus a cumulative impacts analysis is not needed. The description of land use includes land ownership, special management areas, special designation areas, mineral development, grazing, and recreation. However, Chapter 2 of the DEIS describes "pre-mining land use" as livestock grazing and wildlife habitat (pg. 2-27). The return and support of these two land uses is essentially the bar that Cameco's final reclamation must achieve. Discussion and use of the term "land use" should be consistent and clear and should include wildlife habitat.	The term 'land use' in Chapter 2 is sufficiently described within the sentence. Both Livestock Grazing and Wildlife and Fisheries are discussed within dedicated subsections of the document. Land Use, as discussed within the dedicated subsections of the document, is consistent with BLM definitions. No changes were made to text as a result of this comment.
S06-31	5.9 Recreation (pg. 5-15) The cumulative impacts analysis discloses that the quality of recreational experience in the GHPA and immediate surrounding area within 2 miles of the GHPA (i.e., the CISA) may be reduced as a result of noise and activity. However, on the previous page (5.6 Noise), the document states, "The Project is not anticipated to result in noise impacts. Therefore, it is not necessary to analyze cumulative impacts from noise." Chapter 4 discussed potential direct impacts on resources as a result of a projected 25 years of noise-generating activity in the GHPA. These analyses seem contradictory.	Section 4.6.2 details that recreational activities could be impacted by construction-related noise. Text in Section 5.6 has been revised to reflect this comment.
S06-32	5.13 Vegetation (pg. 5-16) The analysis states, "The additional impacts to vegetation as a result of the Proposed Action Alternative or RP A would be long-term during the life of the Project, but would be reclaimed at the end of the Project." The WGFD believes this analysis is misleading and downplays the loss of shrubland habitat. The DEIS has established the loss of shrub-dominated vegetation communities in the GHP A is a long-term impact in itself. Thus, the long-term impacts to vegetation would not cease upon the ending of the project, but would extend 20 or more years into the future until the shrub-dominated communities have been re-established, if reclamation efforts prove to be successful. The analysis states, "As several of the past projects are in reclamation, many of these impacts would be reduced as these historic mines are successfully reclaimed." Again, the assumption that successful reclamation can occur in the GHPA has not been substantiated. The DEIS previously described some past reclamation efforts as having resulted in monotypic grassland communities, which would not reduce vegetation impacts for shrub-dependent species in the GHPA.	See response to S06-1 for past reclamation success. In addition text has been modified to clarify that shrubland reclamation would take at least 2- to 30 years after the end of the Project.

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S06-33	Finally, the document states shrub-dominated communities would take 10 to 15 years to reestablish. This statement is different than the claimed 20 years in Chapter 4 and also different from the claimed 3 to 5 years in Chapter 2, Table 2-5. None of the shrub re-establishment timelines are supported by adequate citations or data from past reclamation efforts in the Gas Hills area.	Clarifying text has been added to the document.
S07-1	The economic impacts to the region and development of an important energy resource are significant.	Thank you for your comment.
S07-2	The sage-grouse discussion in the DEIS does not adequately address development in non sage-grouse core areas. Only 12 acres of the 8,500 project acres are within core habitat. The lack of specificity leaves little direction or certainty for the project. I ask you specifically reference Governor's Executive Order 2011-5 on Sage-Grouse Core Area Protection.	The EO 2011-5 is referenced in Tables 3.17-1, 4.17-1, and 4.17-2 of the Draft EIS. Details on the development of the project within non-core areas is included in Sections 3.17 and 4.17, and have been updated in the Final EIS.
S07-3	The access road is still being discussed between the counties and Cameco, and I support BLM's requirement for on-site storage of raw materials in the event of road closures.	Text reflects the most current status of the Dry Creek Road.
S07-4	I ask that the Record of Decision for this project conform to the permit-to-mine under consideration by the Department of Environmental Quality Land Quality Division.	The WDEQ-LQD is a cooperating agency in the development of this document, and content has been coordinated.
S08-1	The 1-hour NO2 and 1-hour SO2 Wyoming Ambient Air Quality Standards (WAAQS) have been adopted by the State of Wyoming. Additionally, the State of Wyoming has removed the WAAQS for annual and 24-hour sulfur dioxide (60 µg/m3 and 260 µg/m3, respectively) from the list of regulated pollutant standards; the current WAAQS can be found at the following link: http://deq.state.wy.us/aqd/stnd/Chapter%202_draft%204-6-12_CLEAN%20FINAL.pdf	The table and text have been revised to reflect the new standards as adopted by Wyoming.
S08-2	Table 2-1 contains the current WAAQS. Table 2-1 references the wording "NAAQS" in the column header, and the table is labeled "Applicable Federal and State AAQS". It is recommended that separate columns be used to list out the WAAQS and the NAAQS, and avoid combining the terms (WAAQS and NAAQS) into a single definition (AAQS) to avoid confusion.	Please see the response to comment S08-1.

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S08-3	There is a typographical error in this sentence which discusses the distance from the Gas Hills project site to the nearest Class I Area (Bridger Wilderness Area). The distance is listed as being 128 kilometers and 95 kilometers. The distance of "about 80 miles" is correct and the 128 kilometer reference should be used throughout this sentence. This comment also applies to the 95 kilometer reference on Page 1-2.	Text has been revised to indicate the distance to Bridger Wilderness Area is 128 kilometers.
S09-1	The Proposed Action generally protects water quality though required constraints, monitoring and implementation of BMPs; however. The WQO prefers the Resource Protection Alternative (RPA) because of the significantly reduced surface disturbance, use of closed loop drilling techniques, required proof of interim reclamation success, and reclamation of existing surface disturbances. Because of limited soils, and the cold and dry climate in the Gas Hills, reclamation is extremely expensive and time consuming. Because the RPA reduces the amount of surface disturbance by about 40%, reclamation costs for the producer should be reduced similarly.	Thank you for your comment.
S09-2	Page 2-25, Section 2.3.5. 1 Methodology: Sampling wells only on a monthly basis during groundwater restoration, and only for conductivity, chloride and uranium appears to underestimate the frequency of monitoring and the number of analyzed parameters. It is our understanding that sampling for many more parameters occurs on a more frequent basis so the operator can better manage the reinjection fluid. Please contact Cameco and the WDEQ Land Quality Division for specifics on groundwater restoration, and include those in the Final EIS.	Monitoring during mine unit operation is described in Section 2.3.3.2, and reflects the more frequent testing planned during that stage. The Methodology discussion in Section 2.3.5.1 (Groundwater Restoration) has been updated based on Cameco's updated WDEQ-LQD Permit to Mine Application, Operations Plan and Reclamation Plan.
S09-3	Construction Timing Constraints, global comment: In many sections of the document, where construction timing constraints for the RPA are discussed, the language states that construction within a unit cannot begin until reclamation of another unit has been achieved; this gives the impression that final, not interim, reclamation is required prior to construction within the next unit. The entire document should be checked and corrected where necessary to clarify that successful interim reclamation in one unit is the prerequisite for construction in the next unit.	Text has been adjusted to reflect this comment.
L01-1	2.3.9 Applicant-committed Environmental Protection Measures, p. 2-36, 2nd bullet “In those areas where there were few or no noxious weeds prior to being affected by the ISR operations, Cameco would control and minimize the	The proposed mitigation measure NOX-1 has been developed to augment the commitment of the Applicant-Committed Environmental Protection Measure on page 2-36.

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L01-1 (Cont)	introduction of noxious weeds into the revegetated areas for at least 5 years after the initial seeding had taken place." PACD recommends Cameco and the BLM control and minimize the introduction of noxious weeds in all of the areas affected by ISR operations, not just in those areas that had few noxious weeds to begin with.	
N01-1	The Wyoming Outdoor Council supports adoption of the Resource Protection Alternative (RPA) as the preferred alternative for this project. The RPA would allow uranium mining to proceed pursuant to existing mining rights; however, this alternative would do a far better job of preventing unnecessary and undue degradation of the natural environment than would Cameco's Proposed Action. The Proposed Action would lead to the disturbance of 1,315 acres, or 15 percent of the Gas Hills Project Area (GHPA), whereas the RPA would lead to the disturbance of only 783 acres, or 9 percent of the GHPA. This is a dramatic difference in the level of environmental disturbance, yet this lesser level of disturbance could be achieved while still permitting mining. Under these circumstances, the RPA should be selected by the Bureau of Land Management (BLM) as the preferred alternative for this project.	Thank you for your comment.
N01-2	The RPA would include a number of important environmental protections, These would include provisions for annual development planning, construction timing constraints, the use of closed-loop drilling systems, a disturbance offset for the additional onsite processing so as to reduce the number of truck trips, enhanced reclamation standards, and requirements for burial of power lines. The construction timing constraints are probably most significant, as they would require that before new mine units could be constructed interim reclamation at previously developed units would have to be shown to have achieved significant progress towards meeting reclamation success criteria. Reducing the number of evaporation ponds by the use of deep injection wells will also be beneficial so long as there is assurance these deep disposal wells have no "communication" with culinary sources of water (or potential culinary sources), either on the surface or subsurface; and providing for the use of closed-loop drilling systems is an additional beneficial provision that will help protect water quality.	Thank you for your comment.
N01-3	For these reasons the RPA is far more likely to prevent unnecessary or undue degradation of the public lands, as the Federal Land Policy and Management Act requires. 42 U.S.C. § 1732(b). Therefore, the RPA should be selected as the preferred alternative in the final environmental impact statement. The	Thank you for your comment.

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N01-3 (Cont)	value of adopting this alternative is emphasized by the widespread occurrence of limited reclamation potential soils that occur in the project area. Gas Hills Draft Environmental Impact Statement at 3.11-4 (Fig. 3.11-1 2). Selection of the RPA as the preferred alternative would also be in alignment with BLM's "hard rock" mining regulations. Providing for the standards specified in the RPA as conditions in the Record of Decision for this project will help ensure that unnecessary or undue degradation is prevented, as required by regulation. 43 C.F.R. §§ 3809.5, 3809.40 I (a). This alternative best meets the performance standards specified at 43 C.F.R.§ 3809.420, so it clearly should be selected as the preferred alternative over the Proposed Action. In contrast, due to the high level of surface disturbance associated with the Proposed Action--it would disturb almost twice as much land as the RPA--it clearly has a greater level of unnecessary or undue disturbance associated with it than does the RPA. Given that mining could still successfully occur under the terms of the RPA, its terms clearly provide for improved compliance with the BLM's performance standards, whereas the Proposed Action could lead to violations related to sequencing of operations, mitigation, providing for concurrent reclamation, access routes, handling of mining wastes, reclamation, protection of water quality, and reduction of solid waste, among other provisions. See 43 C.F.R. § 3809.420 (making these and other provisions). Accordingly, the RPA should be selected as the preferred alternative.	
P01-1	Please allow this project to move forward quickly.	Thank you for your comment.
P01-2	Allowing this project to move forward would provide much needed jobs for Fremont County. It will also provide an increase in the average household income for Fremont County, as some of those unemployed workers will be able to have income and decrease the percent of the population in poverty by providing jobs.	Thank you for your comment.
P02-1	I would offer that I find no know adverse environmental impacts associated with Cameco Resource's proposed Gas Hills in-situ uranium project. The proposed technology is well proven and has, to my knowledge, allowed the extraction of a valuable energy resource with no documented degradation of groundwater resources.	Thank you for your comment.
P02-2	The safeguards proposed by Cameco are, in my opinion, adequate to safeguard the area's environmental resources.	Thank you for your comment.

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P02-3	The company's use of the existing Carol Shop as a processing plant will reduce impacts that would otherwise certainly occur in building a new building at some alternate location. It makes use of a facility that might otherwise degrade into an abandoned building and a visual blight.	The Draft EIS addresses Cameco's responsibilities for maintaining the Carol Shop and its obligation to remove it and reclaim the area if the mine does not proceed. No text was adjusted as a result of this comment.
P02-4	In all, the project will provide improvement of the natural environment while providing significant socioeconomic benefits to the human environment through the energy resources obtained and the employment provided.	Thank you for your comment.
P03-1	Reopening a uranium mine facility in the Gas Hills of Wyoming would be a good thing for the economy and if proper safety restrictions are set in place the surrounding environment could also flourish.	Thank you for your comment.
P03-2	If the 'No Action Alternative Plan' is to take effect, then the current environment would improve.	Thank you for your comment.
P03-3	In using existing power lines and roads, only improvements will need to be done in order to maintain safety for workers and the environment.	Thank you for your comment.
P03-4	Improved power lines would allow minimizing potential electrocution of raptors.	Thank you for your comment.
P03-5	As of late there have been many issues with the water table in neighboring states where there is not enough water for farmers and ranchers to use as much as has been used in previous years. With the mine accessing this water it will provide less water for those ranchers and farmers.	A discussion of the estimated amount of and impacts from groundwater drawdown on existing uses is included in Section 4.15.2.2.
P03-6	The proposed alternative plan would be the best plan for the mining of uranium in the Gas Hills. Though this method does follow the proposed action plan there are many different alternatives which make this more appealing and better for the environment. The plant would still operate in the same number of years but not all the mines would start operations at the same time. Mines would operate two at a time with Unit 1 and Unit 2 open. As soon as Unit 1 was reclaimed then Unit 3 construction would begin. Not only would the mud pits be eliminated but they would be replaced by closed loop drilling, minimizing greenhouse gasses and surface disturbances. The use of closed loop drilling systems will allow for control and containment of hazardous chemicals and drill cuttings without being disposed of in a mud pit (Pendery 2010).	Thank you for your comment.

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P03-7	When it comes to the mining of uranium other hazards could come to life such as radon. Radon is found in uranium and can pose disastrous affects to the surrounding environment. One of the higher uranium emissions is radon which accounts for approximately 80% of the collective effective dose equivalent which can negatively affect the biological diversity in the area as well as pose a threat of exposure to people living in the area (Xie et al. 2012). With the addition of a closed loop potential radiation levels emitted from uranium can be diminished.	Please see a description of radon in Sections 3.8.1.1 and 4.8.2.1. No text was modified as a result of this comment.
P03-8	Yet another advantage to this plan is the change in how the uranium is transported. The method to be used in the alternative plan would be to transport yellowcake slurry which has a higher concentration of uranium than the ion-exchange method, resulting in fewer truckloads of material.	Thank you for your comment.
P03-9	In the long run, reopening the Gas Hills facility for Uranium mining would be a good thing. The state of Wyoming has one of the largest uranium ore deposits in the country and much of that is in the Gas Hills area. The opening of the plant would benefit the state economy and provide jobs for many people for many years.	Thank you for your comment.
P03-10	Out of all three methods the alternative plan is the best choice because of its outlined plan in obtaining the uranium.	Thank you for your comment.
P04-1	I propose moving forward with this project under action of the Resource Protection Alternative discussed. I understand that the “No Action Alternative” would have no future, additional impacts on the environment within the Gas Hills development area; however, I believe that the BLM has a duty to uphold its mission to promote multi-use of the land, including recreational, agricultural, and mining activities.	Thank you for your comment.
P04-2	The Resource Protection Alternative decreases surface disturbance by more than 50%, and as a result, decreases noise disturbance, public road access, and destruction of habitat. Having less noise disturbance creates a natural buffer zone between development areas and areas utilized by certain wildlife species, such as active nest sites for raptors, or winter range for pronghorn and deer.	Thank you for your comment.
P04-3	Limiting public road access reduces opportunities for poaching activity as well as noise disturbance.	Thank you for your comment. The Resource Protection Alternative, as described in Section 2.4, does not include limiting public access to public roads in the Project area.

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P04-4	Less surface development also means a reduction of habitat loss (increased food resources) and a less likely chance of destroying burrowing species such as prairie dogs, rabbits, and mice, all of which play a role in sustaining populations of predators such as raptors, coyotes, foxes, and bobcats.	Thank you for your comment.
P04-5	Another benefit of limiting development is shortening the amount of time it takes to reclaim areas back to their natural setting. Short-term reclamation times mean bringing back vegetation and habitat, which in turn, brings back species who utilize that particular resource faster.	There is the potential for a shorter reclamation time based on decreased disturbance, however, reclamation is likely to take the same amount of time to occur regardless of how much area has been disturbed based on the level of disturbance, climate, soils, and vegetation in the area. Text has been modified to clarify.
P04-6	Burying power lines underground will also be beneficial to protecting birds from perching on wires and being electrocuted, especially in areas where raptors and species of special concern can be found. With this alternative, the company eliminates the risk of having to mitigate for species killed by above – ground power lines- - a win-win for all parties involved.	Thank you for your comment. These benefits are documented in the RPA in Section 4.17.3.
P04-7	One of the negative aspects of this project, which both action plans share, is the need for having “evaporation ponds,” which can hold toxic wastewater and have the potential of causing death to any wildlife using the water. Both propose fencing around the ponds in an effort to keep species out of harm’s way, however, this is difficult to do when trying to prevent burrowing species and birds from getting past the fence. It is inevitable that such species will be negatively impacted by this, however, the Resource Protection Alternative permits fewer of these ponds in the project, thus decreasing the statistical probability of having as many or more deaths caused by consuming the toxic water.	Thank you for your comment. These impacts have been documented in the RPA in Section 4.17.2.2.
P04-8	The last benefit to operating under the Resource Protection Alternative is constructing a “closed loop drilling system.” This is opposed to drilling traditional well-like pits in the ground which can turn into mud and provide an excellent habitat for mosquitoes. Having more of these “mud pits” and more evaporation ponds allows for a higher risk of transmission of the West Nile virus (WNv) from mosquitoes to birds. This type of closed drilling system does not require development of such pits, nor does it require as many evaporation ponds; this ultimately benefits the wildlife in the area by decreasing their chances of consuming toxic wastewater and becoming infected with WNv.	Thank you for your comment. These impacts have been documented in the RPA in Section 4.17.2.4, under the greater sage-grouse subsection.

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P04-9	In order to reduce the overall environmental impacts this project is facing, I strongly suggest implementing the Resource Protection Alternative because it takes into account the intrinsic value natural resources hold and recognizes that we have a duty to develop in a responsible, sustainable way. Thank you again for taking time to review this comment.	Thank you for your comment.
P05-1	1. Appendix E of the Draft EIS cites the method for estimating non-traffic-related fugitive dust. Section 4.1 of Appendix E states, "A generally accepted method of estimating fugitive dust emissions is to use a typical construction project. The average daily fugitive dust emissions for a typical construction project are estimated to be 1.2 tons PM10 per acre per month for construction activities (USEPA 1985)." Several issues are raised by this statement. First, the citation is incorrect; this method comes from a 1995 EPA document incorporated into AP-42, Section 13.2.3.3. Second and more importantly, had this method been applied correctly, the maximum annual PM10 emissions would be far greater than 9.0 tons per year (tpy) as listed in Appendix E, Table 3-2. To illustrate, the project schedule in Figure 2-3, Section 2 of the Draft EIS, and the acreages listed in Table 2-1, Section 2 of the Draft EIS imply that total construction disturbance in the summer of year 3 is 521 acres. If construction only occurred during June and July, total PM10 emissions would be 521 acres X 2 months X 1.2 tons/acre/month = 1,250 tons for the year – far from the 9.0 tpy represented in the document.	The 1995 document is cited in Section 3.1; The 1985 date was incorrect and has been corrected. Table 3-1 in Appendix K shows the project total emissions with 1,341.7 acres disturbed, and total PM10 emissions have been corrected for construction and operation.
P05-2	2. Appendix E, Table 3-1 shows a PM10 emission rate of 1.82E-11 g/sec/m2. Even if the 9.0 tpy of PM10 emissions in Table 3-2 were correct, this equates to a much higher emission rate intensity. For example, spreading 9.0 tpy uniformly over 521 acres would yield an average emission rate of 1.23E-07 g/sec/m2 – nearly four orders of magnitude higher. Since this emission rate is input to the SCREEN3 model to predict impacts, those impacts would be artificially low. This may explain the predicted, highest 24-hour impact (0.8 µg/m3 in Table 4-2 of Appendix E). This error further compounds the understatement of emissions from general construction activities. An experienced modeler would expect predicted 24-hour PM10 impacts from construction activities to be much higher than 0.8 µg/m3 at model receptors placed along the project boundary.	The 9 tpy is associated with tailpipe emissions only; the footnote in Table 3-2 of Appendix K has been adjusted to reflect this. The controlled emission rate used in modeling assumed 50 percent controls, and is equal to 1.2 tons per acre per month times 50 percent, or 0.6 tons per acre per month. On a gram/second/m2 basis this equals 5.19383E-05 g/s/m2.

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P05-3	3. A footnote to Table 4-3 in Appendix E states, "Emission estimates do not include commuter vehicle emissions." In most ISR projects, commuter traffic constitutes the single largest source of fugitive dust from unpaved roads. This component should be included in the analysis to make the results more representative.	All estimated traffic on mine property is included; commuter traffic on county roads is not included. Table 4-3 was removed from text since it was the same as Table 3-6.
P05-4	4. Appendix E appears to be internally inconsistent. Table 4-5 of Appendix E summarizes total project emissions for all criteria pollutants. It shows estimated annual PM emissions of 9.0 tpy. This is the same figure presented for PM10 in Table 3-2 of Appendix E, which does not include engine combustion or road dust contributions. Appendix E, Table 3-5 shows total engine PM emissions of 15 tpy. Road dust emission totals are not listed; the document only shows the formulas used to obtain these totals and their modeled impacts on ambient PM10 concentrations. Logically, however, the total PM10 emissions can be no less than 24 tpy.	Appendix K, Table 4-5 has been corrected.
P05-5	The suggested solution to these problems is to present sufficient detail to enable the reader to verify the calculation of emission rates from the project schedule, equipment activity levels, and disturbed acreage. Even when properly applied, EPA frowns upon using the cited method for calculating fugitive dust emissions from construction related activity for specific projects. Section 13.2.3.3 of AP-42 states, "It is strongly recommended that when emissions are to be estimated for a particular construction site, the construction process be broken down into component operations." Had this procedure been followed, the calculation errors might have been avoided.	Please see Appendix K for more detail on methods used to calculate emission rates.
P05-6	The mistakes in the Draft EIS could establish a false reference that might jeopardize the ability of future projects in the region to obtain regulatory approval. If the fugitive dust emissions of those future projects are calculated correctly, they may appear large by comparison to the proposed Gas Hills project. ISR projects in other regions of Wyoming have estimated much higher annual fugitive PM10 emissions than the Gas Hills Draft EIS (for example, 136 tons/year at the Nichols Ranch ISR Project and 203 tpy at the Ross ISR Project).	Thank you for your comment. The text has been corrected. The BLM regrets any confusion that arose from errors in the Draft EIS. A draft EIS should never be cited or used as a reference for the reason that public input identifies such errors.
P06-1	1) as Table 2-5 points out on pg 2-50 under Population, Employment and Income: the largest number of jobs (166) would be created under that option.	Thank you for your comment.
P06-2	2) and again with reference to Table 2-5, page 2-53, under the RPA approximately 733 acres of habitat would be disturbed; and as posited on	Thank you for your comment.

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P06-2 (Cont)	page 2-29 under Noise, there would be less noise disturbance due to fewer heavy truck trips across the area. Having spent time in this spot, I can assure you that the visual and auditory impact of even one vehicle carries for several miles. Given that it is an increasingly established fact that these kinds of disturbances do interfere not only with the feeding and general security of the local bird and wildlife populations, but also with their ability to communicate (by snort or song or alarm thump), it seems that the RPA would be a win / win for both the operators and the wildlife.	
P06-3	3) And finally, I'd just like to say that I have observed eleven of the 17 Migratory Bird Species listed in Appendix D as birds 'potentially' occurring in the area; so at least that many Species of Conservation Concern (most particularly the Great Sage Grouse) actually do occur in the GHPA.	Thank you for your comment.
P07-1	Cameco supports efforts to prevent unnecessary environmental harm similar to many of the proposals advanced in the DEIS. Unfortunately, several aspects of both the RPA and the DEIS's mitigation measures are severely flawed.	Thank you for your comment.
P07-2	To begin with, a number of the proposals in the RPA, and several of the proposed mitigation measures, would impose unwieldy administrative burdens on Cameco without corresponding environmental benefits. Cameco is already obligated to make numerous submissions to state agencies, including an annual report required by the Wyoming Environmental Quality Act W.S. 35-11-411. The additional paperwork suggested in several parts of the RPA and in several mitigation measures would be redundant of these submissions. More problematic, such new and unnecessary reporting requirements would threaten project timing by adding layers of bureaucracy. Because the timing of the Project is essential to its economic viability, Cameco cannot support the inclusion of extra administrative hurdles as part of the DEIS.	The BLM is open to Cameco fulfilling its reporting obligations through existing reporting to other agencies as long as the report contains the information and analysis requested by BLM. A figure has been added to Appendix B and referenced in text in Section 2.4.1 to more clearly detail the estimated 50 percent reduction in disturbance. In addition, a new Section 2.5 has been added to the Final EIS detailing the BLM's preferred alternative. This section references WDEQ's reporting requirements and includes a description of the additional detail that will need to be included in the existing WDEQ report in order to meet BLM's ADP requirement.
P07-3	In addition, several proposals in the RPA and several proposed mitigation measures would add significant costs to Cameco. In some cases, these costs would be enough to threaten the Project's economic viability. If degradation cannot be prevented without threatening the overall Project, then that degradation does not qualify as "undue or unnecessary" under applicable regulations. Put differently, the alternative ultimately approved by the BLM should not be so costly that Cameco must reconsider its Project, because that	The BLM and decisions made by the agency must strike a balance between development activities and the protection of natural, historic, cultural and other resources on lands managed by the BLM. However, the legal issue is moot unless the Record of Decision chooses an alternative that would impose an economic cost sufficient to cause Cameco to reconsider its project.

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P07-3 (Cont)	would contravene the BLM's obligation to "allow and encourage" the development of mining claims.	
P07-4	More broadly, the DEIS does not always clearly identify the environmental harms that the RPA and mitigation measures are designed to protect against, much less explain how the RPA and mitigation measures would prevent those harms. The DEIS rightly observes that is the Project "located in an area of historic uranium mining development." DEIS at 1-1. This past development, which has occurred in cycles since the 1950s, has permanently altered the landscape in the Gas Hills area. The BLM's responsibility to prevent undue or unnecessary degradation of the current landscape does not extend to requirements designed to improve existing (pre-Project) environmental conditions. Unless Cameco's Project will cause a specific and identifiable environmental effect, there is no need for an RPA provision or a mitigation measure.	Chapter 4 of the Draft EIS clearly details the potential impacts from the Proposed Project and RPA, and identifies the measures to be employed to mitigate these impacts. In addition, the introduction to Section 2.4 describes the BLM's including a reduction of impacts to soils, vegetation, and wildlife. While the BLM agrees that past mining has altered the landscape in the Gas Hills we do not believe that the degradation, particularly in regard to reclamation of soils and vegetative cover, should be permanent. In fact, the recently updated Lander RMP contains revised reclamation requirements which call for establishment of vegetative and soil conditions based on a site's undisturbed condition. Please also see the response to Comment P07-13.
P07-5	Cameco wants to work with the BLM as it prepares an FEIS for the Project that will protect the environment while ensuring that the Project remains economically viable and technically feasible.	Thank you for your comment.
P07-6	Although the DEIS acknowledges that "the BLM has the obligation to allow and encourage claim holders to develop their claims" (id.), it does not include any discussion of Cameco's purposes or needs. Such a discussion is fully appropriate as a complement to the agency's statement of its own purpose and need. Indeed, the Tenth Circuit Court of Appeals has recently noted that "where a private party's proposal triggers a project, the agency may give substantial weight to the goals and objectives of that private actor." BioDiversity Conservation Alliance v. Bureau of Land Mgm't, 608 F.3d 709, 715 (10th Cir. 2010). Cameco believes that a brief discussion of its "goals and objectives" in developing the Project would provide invaluable context for the reader of the DEIS, and would better frame the agency decisions discussed in section 1.3. Accordingly, Cameco proposes adding the following language after the last paragraph in Section 1.2:	The BLM does not share Cameco's interpretation of the cited case. However, text has been added to Section 1.2 to provide a summary of Cameco's purpose and need for the Proposed Project.

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P07-6 (Cont)	In conducting its NEPA review of the PoO, the BLM also gives substantial weight to Cameco's goals and objectives. As noted above, Cameco intends to develop the uranium deposits in the Gas Hills Project Area using an ISR process. Cameco's PoO envisions five different mine units, constructed and operated in phases over the course of approximately twenty-five years (including time for final project reclamation and decommissioning). Cameco's PoO is intended to ensure the Project's economic viability in light of applicable reclamation requirements.	
P07-7	Although the DEIS indicates that the RPA "would utilize the same processes and take place over the same time period" as Cameco's proposed action (id.), Cameco has identified several aspects of the RPA that would threaten the proposed timing of the project. Furthermore, while the DEIS's discussion indicates that the RPA is intended to reduce the Project's environmental effects, many of the provisions of the RPA are either already included in Cameco's plans, or already required by law.	The introduction to Section 2.4 has been expanded to more clearly describe the agency's reasoning for detailed analysis of the RPA. More detailed discussion is also included in responses to comments P07-8 through P07-22.
P07-8	Cameco supports project-appropriate, economically and technically feasible changes to its PoO that will reduce the Project's environmental effects. Unfortunately, as discussed in more detail below, Cameco believes that many of the changes proposed as part of the RPA are unnecessary, impractical, infeasible, or not appropriately tailored to the Project. Cameco therefore recommends that the BLM either revise the RPA to address the concerns described below, or reject the RPA as inconsistent with the Project's purpose and need. A summary of these recommendations can be found in Appendix 1.1 at the end of this letter.	Please refer to the BLM's responses to Cameco's specific comments P07-9 through P07-61. The text has been revised to include a new Section 2.5 which describes the BLM's preferred alternative that was developed, in part, to address Cameco's comments regarding mitigation measures and the RPA.
P07-9	As an initial matter, Cameco believes that submission of a topsoil management plan would not result in any substantially different environmental consequences than the Proposed Action Alternative. By meeting the requirements of the PoO, the Wyoming Department of Environmental Quality Land Quality Division (WDEQ-LQD) permit, and the Surface Water Pollution Prevention Plan (SWPPP), by training its employees and contractors, and by participating in the LQD and BLM inspections of the project area, Cameco will protect important topsoil resources will and minimize erosion. Moreover, Cameco is already required to submit an annual report to the WDEQ Land Quality Division on or before August 7 of each year pursuant to Wyoming Environmental Quality Act W.S. 35-11-411. The BLM will receive a copy of this annual report.	The topsoil management plan would differ from DEQ requirements because it would address the need to maintain topsoil viability in long-term (remaining longer than 1 year) topsoil stockpiles. The overall goal of the topsoil management is to utilize appropriate techniques to protect topsoil during construction activities and to ensure topsoil remains viable during mine unit operations. Reference to a topsoil management plan was removed from text, however mitigation has been added to provide similar protections.

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P07-9 (Cont)	The following are requirements under this reporting format: G. New Disturbance during the Reporting Period Past Year 1. List the depth and volume of topsoil and subsoil salvaged and stockpiled. Show all stockpiles both short-term and long-term on a map. Include the topsoil pile identification number, and protection measures employed and show the location on a map. 2. List the volume of overburden removed and stockpiled. Include the location, overburden stockpile identification number, and protection measures employed. 3. Describe new buildings constructed, location, purpose, and square footage. 4. Describe new ponds constructed including location, purpose, size, capacity, and disturbance acreage. 5. List new drill holes including the total number, location, depth of each hole, Hole ID #, method of abandonment and status of abandonment. 6. New roads and utilities such as pipelines and power lines shown on a map and total acres disturbed indicated. 7. Other.	
P07-10	The additional requirement in the RPA that, prior to any surface-disturbing activity, Cameco flag and survey all areas of disturbance, including 2-track access routes, and that it further require mechanized equipment to remain within the flagged areas is impractical, and still would not result in substantially different consequences than the Proposed Action Alternative. Flags posted around 2-track access routes would be impractical because the flags would be subject to harsh weather and wind, which would leave them prone to being blown and scattered around the mining areas. Cameco proposes instead to mark the entrance to well fields with signs advising traffic to stay on established 2-tract access routes. In addition, Cameco employees are trained to follow the mine site transportation policy of “one way in, one way out” to minimize disturbance.	As described in Section 2.3 Cameco's Proposed Action is based on 100 percent disturbance of each mine unit during well field construction. The BLM's proposed flagging and survey procedures are part of an effort under the RPA to reduce surface disturbance by about 50 percent, a substantially different consequence than the Proposed Action. Furthermore, Cameco's "one way in, one way out" policy appears to apply to the operational phase of the project and would not have a benefit during construction. BLM does not agree that temporarily flagging 2-track access routes is impractical or that the flags could not hold up for the amount of time for construction which is when flagging would be needed. Once a well has been installed, the appropriate 2-track will be established; prior to construction, this is not the case. The flagging is to make sure that new 2-tracks are not randomly established by drilling operations. Operators on BLM surface have utilized this process very successfully. While the signage is a good idea, it does not properly identify the 2-tracks for the drilling

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P07-10 (Cont)		operators. The text in Section 2.4 has been modified to clarify the intent of flagging or otherwise limiting cross country (overland) travel by multiple vehicles. BLM is also open to other suggestions and techniques of managing and limiting soil compaction via overland travel in areas where topsoil has not been stripped.
P07-11	Finally, the DEIS proposes that Cameco designate reclamation coordinators to observe surface-disturbing activities and ensure proper topsoil protection measures are being taken. This modification, like the other changes required by the annual development plan, would not result in environmental consequences substantially different than the Proposed Action Alternative. Cameco has already agreed that all mine unit construction and operations personnel, including contractors, will be instructed on the importance of topsoil and vegetation resource conservation and management prior to starting work at their respective jobs. Acceptable work practices that will conserve and protect these resources will be outlined in a Standard Operating Procedure. The designation of separate reclamation coordinators is thus an expense that is not needed to ensure protection of topsoil.	The BLM does not intend that Cameco add an additional employee to serve as a reclamation coordinator. Instead BLM would find it acceptable for Cameco to provide the proper training in soils management to one or more staff who will ensure appropriate oversight for site-specific reclamation and topsoil handling activities. No revisions to text were made as a result of this comment.
P07-12	For all of these reasons, Cameco disagrees with the DEIS's estimate that annual planning would reduce surface disturbance by 50 percent, and cross-country travel effects by 30 percent. (The DEIS does not explain how these quantitative conclusions were reached, beyond reference to "an analysis" of Figures 2-6, 2-7 and A-1. If Figures 2-6, 2-7 and A-1 need to be adjusted to reflect the discussion above, Cameco would be happy to provide such updated figures.) Beyond the fact that an annual development plan would not offer significant environmental benefits, the requirement proposed in the RPA would place additional, unreasonable administrative burdens and expenses on Cameco. The Project already requires Cameco to interact with numerous regulators on a consistent basis. Adding another annual requirement would almost certainly require a longer administrative process, which would upset the timing of the Project as a whole. Since the Project's economic viability depends on its ability to remain on schedule, this additional, redundant planning process is completely impracticable. Thus, if the Annual Development Planning requirements are not dropped from the RPA, that alternative will fail to meet Cameco's objectives for the Project.	The text in Section 2.4 (introduction) has been revised to include a more detailed description of how the BLM estimated the reduction in surface disturbance under the RPA. Also, please see the response to Comment P07-2.

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P07-13	From a technical standpoint, BLM's proposal in the EIS is unrealistic and unsupported in that it is based on an artificially established vegetation density (80% Ground Cover) and diversity (65% of the total plant species must be from major grasses, forbs and shrubs and no invasive species present. Currently Gas Hill's reclamation practices have established the use of Comparison Areas (COMA) which address species (density/diversity and invasive species) based on what is actually out there. Upon DEQ Permit update approval, Cameco will likely be subject to something similar for vegetation bond release. Interim reclamation will be adequate ground cover and erosion stabilization. It is unrealistic to establish a criterion that is more stringent than what site conditions dictate i.e. what is naturally present under baseline. However, in reality the proposed Cameco mine units range from badlands (significantly less than 80% cover), high prairie, already disturbed lands (with invasive species) and lands that have been reclaimed by past mining practices and/or the Wyoming AML. This latter zone has existing reclaimed disturbances which clearly do not meet the BLM requirements of successful interim reclamation. Not only did previous operators and AML not use the same seed mix as BLM requires- hence existing ground may not have 65% of the total plant species from major grasses, forbs and shrubs, but more importantly invasive weeds are present. Cameco has committed to a weed control program, but given the unlimited source of invasive weed seeds, cannot guarantee the annual success of this program. Furthermore, interim reclamation should be to establish groundcover and stabilize erosion, It would be unreasonable to establish a criterion for reclamation that does not consider the baseline conditions. Successful revegetation in the Gas Hills is not only dependent on Cameco's revegetation practices which are carefully addressed in the DEQ/LQD permit and the BLM Plan of Operations, but more importantly site conditions like soil depth, soil quality, microclimate conditions (aspect, elevation and protection from wind) and timing. The availability of moisture varies not only annually but even locally. Whereas a convection cell may drop ½ inch or rain in the West Gas Hills, there may be no moisture in the East Gas Hills. Storm intensity will affect the success of revegetation within a mine unit. Should a major event destroy a revegetation effort, Cameco has committed to reseed and revegetate the disturbed area at the next available seeding window. This need to reseed will adversely affect the timing of revegetation success and the BLM	BLM is responsible for maintaining an effective multiple-use land management program for Wyoming's federally-managed public lands. As described in the memo released with the Wyoming Reclamation Policy (Appendix F of the Draft EIS), those seeking approval to conduct surface-disturbing activities on Public Lands must include reclamation planning as part of their permit process. To meet the requirements of the Wyoming Reclamation Policy, which identified ten reclamation requirements, the Lander BLM FO has developed the reclamation objectives and standards outlined in Appendix D of the Revised Lander RMP and Final EIS. These are the same requirements outlined in the Resource Protection Alternative. These objectives and standards are based on the dominant Ecological Site Descriptions, referenced plant communities and soil map units. These objectives and standards provide a consistent and science-based approach to reclamation. BLM's proposal in the Draft EIS does not require vegetation density (80% Ground Cover). The interim reclamation requirements for percent ground cover are 80 percent of the Erosion indicator as listed on NRCS Reference Sheet for Ecological Site. For example, if the erosion indicator is 50 percent then the percent ground cover would need to be 80 percent of the 50 percent indicator for a total of 40 percent ground cover. Ground cover includes litter, rock, and plant cover. The NRCS reference sheets for the Ecological Site erosion indicators take into account the natural vegetation composition, cover, and density in the area, which does account for areas with high percentages of bare ground, rock, or litter. The timing requirements set forth in Section 2.4.2 of the EIS have been updated to clarify what the requirements are for achieving successful reclamation, when interim or final reclamation requirements would be applied, and to remove any conflicting language. To meet the successful reclamation requirements for the construction timing constraints, each mine unit will need to show successful

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P07-13 (Cont)	EIS RPA proposal does not adequately address these site conditions beyond Cameco's control. Setting aside the uncertainty it creates, the provision's imposition of new construction timing constraints of any kind is both unnecessary and infeasible. Under its Wyoming Department of Environmental Quality's Land Quality Division permit and its PoO, Cameco has already committed to timely interim reclamation, which will occur as soon as each mine unit is developed. Moreover, requiring Cameco to cease construction of a new mine unit could lead to a temporary shut-down of the mining facilities, resulting in significant economic hardship and an unplanned extension of the Project schedule. This sort of threat to the Project's viability would be completely inconsistent with Cameco's objectives for the Project, with the DEIS's assertion that the RPA would not change the Project's timing or processes, and with the BLM's obligation to encourage the development of mining claims. For all of these reasons, either the discussion of Construction Timing Constraints should be removed from the RPA, or the RPA should be rejected as inconsistent with Cameco's purpose and need for the Project.	interim reclamation, as defined in the RPA in the EIS. The BLM believes that requiring Cameco to demonstrate successful interim reclamation before authorizing additional disturbance in another mine unit provides a strong incentive for the company's commitment to reclamation. Also please see new Section 2.5 for a description of how this element of the RPA is incorporated into the BLM's preferred alternative.
P07-14	A closed loop drilling system is both unnecessary and technically and economically infeasible for the Project. To begin with, although closed loop drilling systems have proven beneficial for much larger oil and gas drilling operations, its use for ISR drilling would not be as useful for a number of reasons. The DEIS provides no evidence that use of a closed loop drilling system in the Project would result in significantly different environmental consequences than the Proposed Action Alternative beyond a reduction in surface disturbance. In fact, the vegetation disturbance impacts associated with the portable mud pits included in the Proposed Action Alternative would be no greater than the impacts associated with a centrally located closed loop pit. Additionally, the need for longer hoses from a centrally located closed loop pit to well locations increases the risk of spills and leaks and increases surface disturbance as the hoses are moved between wells. The disposal of drilling mud and cuttings at a centralized closed loop pit could require more than one trip per day from each well, thereby increasing on-site traffic and associated impacts, including increased potential for accidents. In light of these considerations, Cameco does not believe that a closed loop system would reduce surface disturbance.	The Draft EIS states in Section 2.4.3 that the use of closed loop drilling systems would eliminate the excavation of mud pits, which would reduce the intensity of disturbance associated with drilling activity. The BLM's research indicates that closed loop systems are technically feasible and can result in cost savings, particularly where the total number of wells is considered. While the technology may not be used in ISR operations, it is extensively used in oil and gas drilling and has been used for the type of drilling that is employed for ISR. Hence, the BLM believes the use of these systems would have a beneficial consequence relative to the Proposed Action. However, the BLM recognizes that the elimination of mud pits at each well would require the installation of a central mud pit with additional surface disturbance that could offset the benefits of using closed loop systems. In addition, the NRC may consider drill cuttings placed in a centralized mud pit to be Technically Enhanced Naturally Occurring Radioactive Material (TENORM) that would require additional approvals not currently included in Cameco's

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P07-14 (Cont)		approved license. The BLM determined that requiring Cameco to obtain additional licensing would be unreasonable. For these reasons this element of the RPA has not been included in the BLM's preferred alternative described in Section 2.5 of the Final EIS.
P07-15	The DEIS further asserts that use of closed loop drilling systems could increase drilling rates, thereby reducing the time required to drill a well, reducing water use during drilling, enabling the recycling of water and drilling mud between wells, and facilitating improved reclamation by eliminating excavation of subsoils. Again, the DEIS does not provide evidence to support its conclusion that closed loop drilling systems are faster than the proposed drilling method; nor does the DEIS take into consideration the additional time necessary to transport or dispose of wastewater under the closed loop proposal. For these reasons, Cameco does not believe that a closed loop system would increase drilling rates.	The BLM is aware that drilling rates have been shown to increase with the use of closed loop systems for oil and gas drilling. Since closed loop systems have not been used in ISR operations the BLM recognizes that an increase in drilling rates may not be realized with the use of these systems. Therefore, the text referring to the potential increase in drilling rates with the use of closed loop drilling systems has been deleted from Section 2.4.3. Also please refer to the response to Comment P07-14.
P07-16	It is also vital to recognize that use of a closed loop drilling system would significantly increase costs. Specialized equipment would be required for the system, and, during cold weather conditions, keeping fluids in the additional above ground equipment such as tanks and hoses from freezing would increase drilling time and fuel costs. Given the lack of environmental benefits discussed above, an alternative that required such a significant expenditure would be inconsistent with the Project's purpose and need. Therefore, the closed loop drilling system should either be eliminated from the RPA, or the RPA should be rejected in its entirety.	The BLM recognizes that the use of closed loop drilling systems could increase costs. However, the BLM also recognizes the environmental benefits of using these systems for ISR drilling activities especially given the routine use of such systems for the types of rigs used for ISR. The BLM has the option in the Record of Decision for this project of selecting portions of each of the alternatives analyzed in the EIS to compile a selected alternative. In the case of closed loop drilling the BLM could require pilot testing of the technology as part of the selected alternative. No text was revised as a result of this comment.
P07-17	4. Disturbance Offset for Additional Satellite Facility Section 2.4.4 of the DEIS proposes to require the reclamation of existing unreclaimed or poorly reclaimed surface disturbance in the Gas Hills Project Area to offset surface disturbance associated with construction and operation of an additional satellite facility. Cameco is already required to reclaim the surface that is disturbed as a result of the Project, including any additional satellite facilities. The requirements of Section 2.4.4 seem to require additional reclamation of locations that would not be affected by the Project. This sort of "double reclamation" greatly	The BLM is charged with the management of public lands for multiple uses while preserving natural, historic, cultural, and other resources. This would include restoration of lands degraded by past activity that have not been adequately reclaimed to BLM standards. The disturbance offset portion of the RPA addresses this need for bringing past reclamation, such as the area surrounding the Buss Pit, up to current standards. This portion of the RPA was also meant to provide an incentive for Cameco to limit the surface disturbance associated with the proposed project. The BLM agrees that this disturbance offset would

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P07-17 (Cont)	increases the burdens on Cameco, especially given the open-ended language in the DEIS. Requiring Cameco to reclaim areas that it is not responsible for disturbing creates significant cost and schedule uncertainty for the Project. It is impossible to know how much time and effort would be required to implement the type of "offset" reclamation contemplated in the DEIS. Because maintaining the Project's timing and cost are both essential to maintaining the Project's overall viability, Cameco cannot accept the proposal in Section 2.4.4. Accordingly, the disturbance offsets for possible additional satellite facilities contained in that section should be eliminated from the RPA. If the requirements of Section 2.4.4 were not eliminated, the entire RPA would have to be rejected as inconsistent with the Project's purpose and need.	constitute a double reclamation requirement given that the disturbance associated with an additional satelite facility would be reclaimed according to current standards. Therefore, the BLM has not carried this portion of the RPA forward into the BLM-Preferred Alternative described in Section 2.5 of the Final EIS.
P07-18	5. Reduced Number of Evaporation Ponds Section 2.4.5 of the DEIS provides that the number of evaporation ponds would be reduced during operations and that the primary method of wastewater disposal would be injection into deep disposal wells. While Cameco agrees that use of deep disposal wells is the preferred solution for wastewater disposal at the Project, the technical feasibility of such wells is dependent on specific geologic conditions at the site. The evaluation and permitting of potential deep disposal well sites requires an analysis of the geologic conditions to ascertain if the receiver formation not only meets the stringent regulatory requirements but is also able to accept a significant amount of water. Currently, the permitting with the Wyoming Department of Environmental Quality, Water Quality Division of the two test wells is an ongoing project. Even the successful permitting of the disposal wells does not guarantee that the capacity of the geologic formations will be sufficient to meet the disposal needs for the Project. Cameco currently does not have the data required to evaluate the quality of the receiver formation to conclude that enough disposal capacity exists to limit the project to two evaporation ponds. The evaluation of data on the quality of test wells will allow Cameco to understand the expected capacity of the wells and factor that capacity into the overall production and restoration plans. Only then will Cameco be able to commit to a diminished pond capacity at the operation. In light of these factors, Cameco recommends that the first paragraph of Section 2.4.5 be stated as follows:	During a meeting between Cameco and BLM on March 21, 2013, Cameco indicated that disposal wells, should they be viable, would receive brine only from the water treatment process, and the majority of water disposal would occur through evaporation. Therefore, disposal capacity would require all planned evaporation ponds regardless of whether potential of disposal through deep injection. Based on this information, the potential for reduction in the number of evaporation ponds is no longer a component of the RPA, and has become an alternative considered but eliminated.

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P07-18 (Cont)	……..Two test wells have been drilled and perforated as of January 2012, and results have been incorporated to the Class I Permit Application for the Gas Hills wells #1 and #2. This Class I Permit Application will be submitted to the WDEQ for their evaluation during the first quarter of 2013 and is expected to be approved before year end. If deep disposal wells meet all regulatory requirements and are determined to be technically feasible, disposal wells would be completed and equipped at 2 of the 3 test well locations to receive wastewater for disposal. This would enable the construction of a reduced number of evaporation ponds which would be installed as back-up to the deep disposal wells. With this clarification, Section 2.4.5 is acceptable to Cameco.	
P07-19	6. Additional On-site Processing Section 2.4.6 of the DEIS proposes additional on-site processing, which would produce yellowcake slurry. According to the DEIS, the resulting slurry from the precipitation circuit would be transferred to a storage vessel, allowing the uranium to settle and consolidate by gravity. The precipitated and thickened yellowcake slurry would then be sent to a filter press for washing to remove soluble contaminates and then de-watered prior to transport to the Smith Ranch-Highland facility. The dewatered yellowcake slurry would be placed into USDOT approved containers and transported in exclusive-use USDOT authorized transport vehicles. Cameco Resources is unique concerning existing facilities. It has drying and packaging facilities fully capable of receiving resin from its mines and toll milling customers throughout the region. Cameco has developed their planning based on shipping loaded resins from some of Cameco's remote sites to its central processing facilities at Smith Ranch and Highland Ranch. The facilities consist of a resin receiving stations, elution, precipitation, and drying circuits. Satellite facilities typically are limited in capacity to loading and transferring resins to a main plant for additional processing. Ultimately, the decision whether to expand a satellite to process uranium into a slurry form is most appropriately left to Cameco based on its evaluation of economic and technical feasibility. Transportation costs, the projected life of mine, the pounds of uranium available to mining, and the market value of the finished product would all have to be evaluated as part of a determination regarding the practicability of adding slurry capabilities to the Project. Cameco accordingly recommends that the FEIS acknowledge the possibility that Cameco may conduct additional onsite processing in the future, if conditions warrant.	In the text suggested for deletion, the BLM included additional on-site processing in the RPA in order to compare the impacts to those for the Proposed Action (transport of resin only). This option was included based on lengthy discussions between Cameco and BLM in 2011. The BLM can select both options in the Record of Decision and is not limited to selection of just one. The text has been revised to include the suggested phrase "have the option to" in Section 2.4.6. This portion of the RPA has been carried forward into the preferred alternative described in new Section 2.5.

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P07-19 (Cont)	For these reasons, Cameco recommends the following changes to the first paragraph of Section 2.4.6: In this alternative, Cameco would have the option to conduct further processing of the ion-exchange resin at the Gas Hills facility to produce yellowcake slurry, which would then be transported to the Smith Ranch-Highland facility. Because the uranium concentration in yellowcake slurry is higher than in ion-exchange resin, the advantage of this alternative would be the transportation of fewer loads of material to the Smith Ranch-Highland facility. ~~Due to this advantage, the BLM is analyzing this additional processing step as part of the RPA to enable comparison of the environmental impacts of slurry transportation with those of resin transportation under the Proposed Action.~~	
P07-20	7. Enhanced Reclamation Goals and Timing Section 2.4.7 of the DEIS proposes to "require prompt reclamation of disturbed areas and the use of reclamation goals appropriate to the site's ecological potential," including post-mining landscape closer to historic conditions, rather than re-establishment of current conditions, which may have been degraded by historic mining and grazing activities. Inclusion of this modification is unnecessary, as Cameco has already committed to contemporaneous reclamation through its Operation Plan and Reclamation Plan, as approved by the Wyoming Department of Environmental Quality and through its PoO, which provides that "[f]ollowing the completion of any construction activity (six months to one year), the disturbed areas surrounding the facility, individual wells, pipelines, and roads will be reclaimed. This process is referred to as 'contemporaneous reclamation,' meaning that large disturbed areas will be reclaimed before new areas are disturbed". Because Cameco's existing plans and commitments are consistent with the proposed requirements of the RPA in Section 2.4.7, Cameco recommends against including this Section in the FEIS. The redundant requirements would not reduce environmental effects, but they could add to administrative burdens.	The BLM does not agree that Cameco's existing plans and commitments are consistent with the reclamation requirements of the RPA. WDEQ's methods to evaluate revegetation success are based upon analysis of a control area or reference area, whereas reclamation on BLM lands would be required to meet the Lander RMP (BLM 2013) requirements for reclamation where revegetation success is based on the NRCS ecological site description. A proposed interim seed mixture has been included in the Final EIS, as well as criteria that would be used to determine success of interim reclamation at the first mine unit to be constructed before Cameco could begin construction on the third mine unit. Please refer to text in Section 2.5 of the Final EIS for this information. BLM and DEQ cooperate to determine when reclamation is determined successful; however, on BLM managed lands the BLM will determine final reclamation success.
P07-21	8. Burial of New Power Lines Section 2.4.8 of the DEIS proposes to require that new power lines constructed to supply Project components with electricity be buried within road right-of-ways rather than being constructed overhead. The DEIS	The BLM appreciates Cameco's detailed explanation of the technical and economic issues associated with the burial of new overhead power lines for the Proposed Project. The suggested text revisions would make this requirement of

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P07-21 (Cont)	concludes that this modification would reduce potential electrocution and collision impacts to migrating and foraging migratory bird species, and would eliminate new perches for raptor and corvid species, thus reducing the potential for predatation on greater sagegrouse. There are two distinct applications for high voltage power lines, which include power 'distribution' and power 'transmission'. The application for power transmission is to move large amounts of energy over considerable distances while minimizing losses. Consideration is given to the transmission from one location to another without interruption or dissemination to other places. The application of power distribution is used primarily to lower the voltage to something useable by the end user and suitable to disseminate where required for its safe use. Transmission of power is accomplished by boosting voltages and lowering the current which aides in reducing the losses due to resistance to power flow in a conductor. Power lines with voltages equal to or greater than 69,000 volts are referred to as "transmission" voltages, while power lines with voltages less than 69,000 volts are referred to as "distribution" voltages. For application at the Gas Hill facility, it is the intent to utilize the existing overhead power transmission (69,000 kV) line and reduce it to a nominal distribution voltage of 24,900 volts. Distribution of power will occur over several miles and at several undetermined locations (at the time of application) for which the system voltage will be reduced to something useable. An underground power distribution system requires that the power lines be terminated at a predetermined location, whereas an overhead distribution line does not. A splice can be added to continue the overhead power run. A predetermined location may not be the best location(s) suitable for future distribution to various header house applications among several distances.The overhead power distribution line is capable of being 'hot-tapped' without interruption of power to the line at virtually any place among the distribution line. This allows the mine unit design to be maximized without knowledge of the location of the source of power. In this application, power will need to be distributed to a variety of 'header houses'. These header houses will be placed strategically throughout a mine unit to maximize the recovery of the ore deposit. The location of the header houses has not been determined and should be considered a 'work in progress' at the time of this application.Safety should be a consideration of power distribution. The first safety precaution when	the RPA the same as the Proposed Action. The burial of distribution lines within well fields (i.e., between header houses and well heads) is the same as the Proposed Action, and conformance to APLIC (2006) standards through the use of anti-perching and anti-roosting devises is already included in mitigation measures WFM-4 and SSS-2. Therefore, the text in the RPA has not been revised as suggested. However, based on your explanation of the technical and safety issues associated with burying electric lines, the BLM has not carried this portion of the RPA into the BLM-Preferred Alternative described in Section 2.5 of the Final EIS. Please also see the BLM's response to Comment F01-5 from the USFWS regarding retrofitting of existing power lines. This requirement has been included as part of mitigation measure WFM-4.

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P07-21 (Cont)	performing maintenance activities is that the line should be visually grounded prior to commencement of any work activity. This practice has lent itself well to the safety of qualified electrical workers. Visual grounding of a direct buried power distribution system is not easily achieved. Along with the electrical safety of working a high voltage power system, there should be other considerations such as physical limitations. For a buried or underground electrical system, there exist confined spaces as well as oxygen deprived environments to consider which potentially expose workers to these hazards. In cases where distribution line burial is not an option, overhead lines would be constructed to current standards using publications such as those from the (rural utility specification – RUS- 1782F-803 & Avian Protection Plan). This would include cross-arm and transformer design. This design would minimize potential mortality due to electrocution. This proposed requirement of the RPA is technically and economically infeasible. Installation cost estimations differ widely among industry experts, but the installation cost in several published documents offer anywhere from 5-to-10 times greater than (Entergy, 1998-2012) the cost of an overhead power distribution system. Additional protective relaying would have to be employed to protect direct burial cable from ground faults. To emphasize the cost difference, a $500,000 overhead, high voltage distribution system could cost $5 million for underground distribution. This alone could seriously jeopardize the economic viability of the Gas Hills Project Area development, and thus contravene the purpose and need for the Project. Cameco proposes instead to limit overhead lines to the high voltage portion of the total system, including the line from the power company terminus to the main substation at the Carol Shop, and from the main transformer to each pole mount and pad mound transformer for individual service areas. All of the distribution of power in the wellfields (tertiary power), such as to a production well (extraction well), is proposed to be buried. This is done to minimize obstructions to wellfield service activities. This is relatively low voltage applications, at or below 440 Volt, 3 phase power as compared to plus 20,000 volts for the primary and secondary power distribution. The proposed distribution lines would be placed in or adjacent to the access road right-of-way to help minimize habitat impacts where possible. To prevent the electrocution of raptors, the primary and secondary distribution lines and power poles would be built to the latest approved methods. Tertiary distribution lines would be buried where practical in order to minimize risks to	

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P07-21 (Cont)	raptors and large birds. In addition, to discourage roosting by raptors and corvids (and, in turn, increased predation of Greater sage-grouse), appropriate anti-perching and anti-roosting devices would be placed on power poles and crossarms where conductor separation cannot be achieved and covering or reframing is impractical, perch guards (triangles) with optional perches may be used for large perching bird protection. To implement this proposal, Cameco recommends the following changes to Section 2.4.8: Approximately 21 miles of new power lines are anticipated to be constructed to supply Project components with electricity. Under this alternative, all of the distribution power in the well fields would be buried~~new power lines would be buried within road ROWs~~ rather than be constructed overhead. ~~However, burial of new power lines would have no impact on construction or operational disturbance, but would~~To reduce potential electrocution and collision impacts to migrating and foraging migratory bird species, and ~~would~~to eliminate new perches for raptor and corvid species, thus reducing the potential for predation on greater sage-grouse, overhead power lines would employ anti-perching and anti-roosting devices.	
P07-22	9. Conclusions Cameco does not object to the concept of a resource protection alternative, in principle. As explained above, there are several aspects of the RPA described in the DEIS that are technically or economically infeasible. Where appropriate,Cameco has suggested changes that would make the RPA acceptable, including the elimination of Sections 2.4.1, 2.4.2, 2.4.3 and 2.4.7. If the BLM decides not to make these changes, Cameco believes that the RPA should be rejected as inconsistent with Cameco's goals and objectives.	The BLM has retained portions of the RPA in the Final EIS and believes selection of all or portions of this alternative in the ROD would be consistent with the agency's requirements under the 3809 regulations and with BLM's overall mission of managing public lands for multiple uses while preserving natural, historic, cultural and other resources. Please see Section 2.5 of the Final EIS for a description of the BLM's preferred alternative which includes selected elements from the RPA and is based on input obtained during public review of the Draft EIS.
P07-23	1. Cultural Resources and Native American Concerns As the DEIS recognizes, Section 106 of the National Historic Preservation Act (NHPA) "requires that federal agencies consider the potential effect of an undertaking on historic properties and provide the Advisory Council on Historic Preservation with an opportunity to comment." DEIS at 4.2-2. The DEIS further notes that the relevant parties have developed a Programmatic Agreement (PA) to satisfy Section 106. Id. at 4.2-3. Cameco's position is that all present and future concerns about the Project's potential effects on cultural resources should be resolved through the Section 106 process and, more	No change was made to CR-1. Since there is no reference to "sites of religious or cultural significance" or any reference to "avoidance by recommended distance" in the PA, we cannot state that the measure is "consistent with the PA." Therefore, the statement "consistent with the PA" has been deleted from CR-2. The remaining text for CR-2 has been revised based on this comment.

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P07-23 (Cont)	specifically, through the processes set forth in the PA. The DEIS does not suggest otherwise. Cameco anticipates, however, that it will be necessary to continue working with the BLM in connection with the PA while the NEPA process is separately brought to a conclusion. The DEIS contains two proposed mitigation measures directed at protection of cultural resources, including training and consultation requirements. As noted, Cameco is already party to a PA among the Wyoming State Historic Preservation Officer, U.S. Nuclear Regulatory Commission, U.S. Department of the Interior Bureau of Land Management regarding the Gas Hills Uranium Recovery Project (the PA). Under the PA, if avoidance is not feasible, the historic properties would be treated in accordance with a historic properties treatment plan. Moreover, in Cameco's experience, mandatory training for all contractors and construction personnel is not necessary to prevent unauthorized collecting of archaeological materials. Rather than providing mandatory trainings, Cameco proposes to educate all relevant employees regarding the significance of cultural resources and the federal regulations that protect them. Contractors, consultants, and others would be notified of the federal regulations. Given the provisions of the PA and Cameco's experience in this area, it recommends the following changes to mitigation measures CR-1 and CR-2:CR-1: To minimize unauthorized collecting of archaeological material or vandalism to known archaeological sites, Cameco will educate all applicable employees of the significance of cultural resources and the federal regulations intended to protect them. Others, including contractors would be notified of~~and their contractors, and all construction personnel, would attend mandatory training and be educated on the significance of cultural resources and~~ the relevant federal regulations intended to protect them. CR-2: Consistent with the PA, if any sites of religious or cultural significance to Native American tribes cannot be avoided by the recommended distance, mitigation measures would be developed in consultation with interested tribes and incorporated into a historic properties treatment plan.~~Native American sites including, but not limited to, rock art, cairns (rock piles), and stone circles would be avoided by a minimum of 0.25 mileunless closer activities are approved through completion of consultation with the affected tribes and written permission is given by the BLM Authorized Officer.~~	

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P07-24	Section 4.2 proposes one mitigation measure intended to address the engineering of slopes steeper than a 25% grade. Cameco has no intention of employing major construction on grades greater than 25%. It is possible, however, that well installation could occur within slopes of this magnitude. Cameco does not think that the additional measure of engineered design is a necessary component for wellfield installation. By understanding the historical aspects of landslides within the area, and educating the construction crews and Cameco's employees of the potential hazard, Cameco can avoid the potential for a landslide. Cameco is committed to the following recommendations as defined by the United States Geological Survey (USGS): "The hazard from landslides would be reduced by avoiding construction on steep slopes and existing landslides, or by stabilizing the slopes. Stability increases when ground water is prevented from rising in the landslide mass by (1) covering the landslide with an impermeable membrane, (2) directing surface water away from the landslide, (3) draining ground water away from the landslide, and (4) minimizing surface irrigation. Slope stability is also increased when a retaining structure and/ or the weight of a soil/rock berm are placed at the toe of the landslide or when mass is removed from the top of the slope". (USGS, 2004). A Standard Operating Procedure (SOP) will be put in place to meet this requirement. Cameco recommends the following changes to mitigation measure GEO-1: GEO-1: ~~Where surface disturbance is proposed for locations with slopes greater than 25 percent, an engineering plan would be submitted for review by the AO prior to the initiation of surface disturbing activities. The plan would include engineering drawings, geotechnical studies, drainage design, cut and fill estimates, and final reclamation contours to demonstrate mitigation of mass movement potential.~~ Cameco has no plans to implement any major construction on slopes greater than 25%; however, well installation could occur in areas where there are slopes at this grade. The hazard from landslides would be reduced by avoiding construction on steep slopes and existing landslides, or by stabilizing the slopes. Stability increases when ground water is prevented from rising in the landslide mass by (1) covering the landslide with an impermeable membrane, (2) directing surface water away from the landslide, (3) draining ground water away from the landslide, and (4) minimizing surface irrigation. Slope stability is also increased when a retaining structure and/ or the weight of a soil/rock berm are placed at the toe	The BLM recognizes Cameco's potential need to drill on slopes greater than 25 percent, and that the USGS's SOP does address landslide issues; however, erosion is the main concern on slopes greater than 25 percent. Therefore, mitigation measure SOL-1 has been updated to include a requirement for a site-specific development/reclamation plan for Mine Unit #3 (Peach Deposit) to address issues related to operation in steep terrain.

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P07-24 (Cont)	of the landslide or when mass is removed from the top of the slope. A Standard Operating Procedure will be adopted to meet this requirement.	
P07-25	3. Livestock Grazing 4. Section 4.5 proposes three mitigation measures to mitigate Project-related impacts to livestock grazing resources. Cameco proposes that these mitigation measures be modified, as outlined below to further clarify the livestock grazing mitigation measures in Section 4.3. Cameco acknowledges the proposed mitigation measures in GRA-3 and agrees that the proposed language is reasonable in light of the proposed changes to GRA-1 and GRA-2. 5. GRA-1: Cameco would coordinate annually or more often when necessary with affected livestock operators to discuss: 1) problems, if any, encountered during the past grazing season; 2) agreed-upon corrective actions, if applicable; and 3) planned development and operations during the next grazing season. This meeting would need to occur on a date early enough to allow grazing permittees sufficient time to make decisions and allocate their resources for the upcoming grazing season. 6. GRA-2: Prior to construction of each mine unit, surveys would be conducted to identify active existing range improvements. Based on the results of these surveys, surface facilities would be located, to the extent practical, ~~200 meters~~a reasonable distance from existing range improvements, as agreed to by the grazing permittee or landowner, as appropriate. If avoidance is not feasible, range improvements would be relocated to an alternate location per the BLM guidance. Alternate locations would be approved by the grazing permittee for public lands or the landowner for private lands. 7. GRA-3: Damage to livestock and range improvements identified during surveys would be reported as quickly as possible to the BLM and affected livestock operators and corrective action would be taken.	Text has been adjusted to incorporate the suggested changes to mitigation measure GRA-1. Mitigation measure GRA-2 has been removed from the Final EIS. Mitigation measure GRA-3 has been re-numbered as GRA-2 and has been slightly revised.

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P07-26	a. PAL-1 Cameco does not feel it is necessary to train all personnel about the types of fossils they could encounter. Rather, Cameco would propose to train the onsite geologists and project managers on the types of fossils that could be encountered within the Gas Hills Permit boundary during mine facility construction. A Standard Operating Procedure would be put into place to cover the specific handling and requirements of paleontological resources. Cameco employs a number of geologists who would best be utilized for identifying any such resources. Cameco does not feel it is necessary to train all personnel about the types of fossils they could encounter. Rather, Cameco would propose to train the on-site geologists and project managers on the types of fossils that could be encountered within the Gas Hills Permit boundary during mine facility construction. A Standard Operating Procedure would be put into place to cover the specific handling and requirements of paleontological resources. Cameco employs a number of geologists who would best be utilized for identifying any such resources. PAL-1: ~~Construction and drilling personnel~~Cameco's onsite geologists and project managers would be instructed about the types of fossils they could encounter and the steps to follow if fossils were uncovered during mine facility construction. Instructions would stress the nonrenewable nature of paleontological resources and that collection or excavation of fossil materials from federal land without a federal permit is illegal.	Your suggestion has been considered; however, it is important that construction personnel understand the need to protect paleontological resources. Training could be incorporated into the Cultural Resources training and included in employee orientations run by Cameco. No text was revised as a result of this comment.
P07-27	b. PAL-2 Cameco completed a Paleontological Resource Survey through contract with Arcadis U.S., Inc. for the Gas Hills Uranium Project. Paleontological surveys were conducted from July 11, 2011 through August 4, 2011. The investigation was carried out in accordance with policies and regulations implemented by the Paleontological Resources Preservation Act, the National Environmental Policy Act, and the Federal Land Policy and Management Act. The resource survey was completed to locate, identify, document, and mitigate potential impacts to paleontological resources that could be affected through construction and development activities. During the survey 25 new fossil locations were discovered and three locations were identified as previously recorded. Of these 28 identified locations, very few would be adversely affected by the Project. Based on the findings of the	Your suggestion has been considered; however, only BLM-permitted paleontologists can evaluate the significance of fossils found during construction. No text was revised as a result of this comment.

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P07-27(Cont)	Survey, Cameco believes that each location should be addressed on a case-by-case basis. Cameco is committed to stopping work immediately if fossils are uncovered during construction or mud pit excavation. (This is a standard practice at all of Cameco's mining sites.) The findings would be assessed by the onsite geologist. If the findings are determined to be significant, mitigation methods would be commenced. Mitigation could include consultation with a certified paleontologist, additional field surveys and possible salvage of any paleontological resources. A Standard Operating Procedure would be put into place to cover the specific handling and requirements of paleontological resources. For the reasons outlined above, Cameco recommends the following changes to mitigation measure PAL-2: PAL–2: If suspected fossil materials were uncovered during construction or mud pit excavation, work would stop immediately and the findings would be evaluated by an onsite geologist to determine their significance. If the findings were determined to be significant, ~~to allow the AO to assess the situation and determine~~ if additional mitigation measures would be undertaken ~~before further construction or operations could continue~~. Mitigation could include consultation with a certified paleontologist, additional field surveys and possible salvage of any paleontological resources. A standard operating procedure would be put into place to cover the specific handling and requirements of paleontological resources.	
P07-28	c. PAL-3 In areas identified in the Paleontological Resource Survey, Cameco would commit to mitigation methods if avoidance is not possible. Mitigation could include consultation with a certified paleontologist, monitoring during ground disturbing operations, and salvage of any paleontological resources. Cameco will work directly with BLM to create a monitoring plan for identified areas. A notice will be given to BLM at least 30 days prior to beginning activity within these known areas so that Cameco and BLM can work together to mitigate possible disturbance. In areas that have not been identified in the Paleontological Resource Survey, Cameco staff will be advised to spot check excavated material for bedrock disturbance. Cameco has a standard policy that if any cultural resources, fossils or remains are found during the excavation process that work would immediately cease at that location and	Your suggestion has been considered; however, only BLM-permitted paleontologists are qualified to perform spot checks, paleontological monitoring and mitigation. No text was revised as a result of this comment.

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P07-28(Cont)	the proper personnel would be notified. This language will be added to a Standard Operating Procedure for inclusion. If the findings are determined to be significant, mitigation methods would be commenced. Mitigation could include consultation with a certified paleontologist, additional field surveys and possible salvage of any paleontological resources. Accordingly, Cameco proposes the following changes to mitigation measure PAL-3: PAL-3: During construction and installation of wellfields and related facilities in areas that have not been identified in the Paleontological Resource Survey, spot checks of spoil piles would be conducted by ~~a qualified paleontological resources monitor~~ Cameco employees. Spot check inspection would involve visually examining any excavated material for bedrock disturbed during excavation. Where bedrock was identified, it would be visually inspected for fossils of any kind. Where no bedrock was identified, no additional inspection would be recommended. If spot checking indicated the presence of important fossils, mitigation methods would be commenced. Mitigation could include consultation with a certified paleontologist, additional field surveys and possible salvage of any paleontological resources.~~a representative sample of these fossils would be collected and the data (including standard geologic descriptions) recorded for each locality. In addition, the BLM would require monitoring of certain high potential areas during active construction (not just spot checks).~~	
P07-29	d. PAL-4 Cameco agrees that removal of any specimens would not occur without the permission of the landowner, where applicable. According to the Guidelines for Assessment and Mitigation of Potential Impacts to Paleontological Resources (United States Department of the Interior, 2008), Cameco has already assessed the possible effects to significant paleontological resources for direct and indirect effects. Under the guidelines, Cameco has completed field surveys and potential fossil yield classification (PFYC) as requested. Cameco is aware of the potential for finding fossil remains during excavation of certain areas within the Gas Hills Project Area, and agrees to monitor those locations if avoidance is not possible. As already noted, Cameco has a standard policy that if any cultural resources, fossils or remains are found during the excavation process, that work would immediately cease at that location and the proper personnel would be notified. This language will be added to a Standard Operating Procedure for inclusion. If the findings are	Your suggestion has been considered; however, preparation necessary to produce a paleontological report for the BLM is the responsibility of the project proponent. The cost of laboratory work is the responsibility of the proponent. The BLM does not accept specimens. No text was revised as a result of this comment.

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P07-29 (Cont)	determined to be significant, mitigation methods would be commenced. Mitigation could include consultation with a certified paleontologist, additional field surveys and possible salvage of any paleontological resources. If salvage is determined to be necessary it is Cameco's understanding according to the Guidelines presented by the BLM that Cameco's responsibility ends after salvage is completed: By regulation, after a 3809 plan of operations is approved or where there is no plan, the BLM is responsible for the cost of any investigation and recovery of fossil materials. (United States Department of the Interior, 2008) Cameco agrees to salvage of any finds that may be recovered during Cameco's disturbance if avoidance is not possible. After removal of the find it would be handed over to the BLM, or a museum of their choice to be curated. Cameco will not be responsible for specimens to be prepared to the point of identification, identified, and catalogued into the permanent collections of an established institution. Based on the above, Cameco proposes the following changes to mitigation measure PAL-4: PAL4: Fossil specimens recovered on BLM lands during monitoring or spot inspections considered of scientific value would be curated into the collections of a museum repository acceptable to the BLM. Cameco agrees to salvage finds that may be recovered during Cameco's disturbance if avoidance is not possible. After removal of the find it would be handed over to the BLM, or a museum of their choice to be curated. Cameco will not be responsible for specimens to be prepared to the point of identification, identified, and catalogued into the permanent collections of an established nstitution.~~Specimens would be prepared to the point of identification, identified, and catalogued into the permanent collections of an established institution.~~ Specimens would not be taken from private properties except upon permission of the landowner. ~~A final technical report would be prepared and submitted following completion of construction. The final report would be prepared according to BLM standards.~~	
P07-30	10. Soils (Construction) As stated in GEO-1 Cameco has no plans to implement any major construction on slopes greater than 25%, although it is possible that well installation could occur in areas where there are slopes at this grade. Cameco is diligent in their reclamation practices which have been shown in the Gas	Under the previous and newly approved Lander RMPs the BLM prohibits surface-disturbing activities on slopes over 25 percent unless an exception, waiver or modification is granted by the Authorized Officer. The BLM appreciates Cameco's proposed text modification describing specific

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P07-30(Cont)	Hills Project Area and our other operating sites. Further, as stated in Cameco's operation plan, Section 3.1.1, Topsoil Management, Cameco has committed to the following for surface reclamation at a slope greater than 25%: Areas with slopes greater than 25% will be mulched with straw mulch crimped at a rate of 2 tons per acre or planted with a temporary cover crop as soon as possible to assist in preventing erosion. Geotextile "mulched matting" and select erosion control products will be utilized on areas where erosion control and vegetation establishment is particularly difficult. Best Management Practices will be utilized to control sediment loss from stripped and or recently topsoiled and seeded areas. Cameco accordingly proposes the following changes to mitigation measure SOL-1: SOL-1: As indicated in mitigation measure GEO-1, Cameco has no plans to implement any major construction on slopes greater than 25%; however, well installation could occur in areas where there are slopes at this grade. Areas with slopes greater than 25% will be mulched with straw mulch crimped at a rate of 2 tons per acre or planted with a temporary cover crop as soon as possible to assist in preventing erosion. Geotextile "mulched matting" and select erosion control products will be utilized on areas where erosion control and vegetation establishment is particularly difficult. Best Management Practices will be utilized to control sediment loss from stripped and or recently topsoiled and seeded areas.~~surface disturbance on slopes over 25 percent would require a site-specific engineering plan. Additionally, a site-specific reclamation plan would be developed and submitted for approval by the AO prior to initiation of surface disturbing activities. The plan would address each of the reclamation requirements detailed in BLM IM No. WY-2009-022 (Appendix F).~~	mulching and other erosion control procedures. However, because of the agency's concerns regarding accelerated erosion on steep slopes, particularly within Mine Unit #3 (Peach Deposit), mitigation measure SOL-1 has been revised to incorporate a requirement for a site-specific development/reclamation plan for this mine unit to address the issues related to operating in steep terrain.
P07-31	11. Soils (Operation) The monitoring and maintenance of two-track roads used for Project activities will be consistent with Section 3.7 in the Operations Plan of the WDEQ-LQD permit. An example of a maintenance activity for a two-track road in the Operations Plan is as follows: "Mud holes and washouts that may develop in any road, including non-constructed two-track well field roads, will be repaired in a timely manner to prevent topsoil resource damage resulting from vehicles being driven around these damage features onto adjacent land surfaces."	Section 3.7 of the DEQ Permit Application, Operations Plan, does not specifically address monitoring frequency for access roads to determine need for maintenance. Mitigation measure SOIL-2 has been modified as suggested. Generally, scarification and disking are not adequate for decompaction except on shallow soils. Mitigation measure SOL-3 has been modified with the following language

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P07-31(Cont)	The operations plan indicates all surface disturbances will be reclaimed in accordance with the WDEQ-LQD approved Reclamation Plan (Section 3.5.1). Cameco recommends modifying mitigation measure SOL-3 to include the processes of scarifying and disking, in order to increase the flexibility when dealing with compacted soil. The increased amount of available options will aid in achieving successful reclamation. The specific changes that Cameco recommends appear below: SOL-2: The monitoring and maintenance of two-track roads used for Project activities will be consistent with Section 3.7 in the Operations Plan of the Wyoming Department of Environmental Quality permit. Mud holes and washouts that may develop in any road, including non-constructed two-track well field roads, will be repaired in a timely manner to prevent topsoil resource damage resulting from vehicles being driven around these damage features onto adjacent land surfaces. In the event of inclement weather conditions which would cause poor road conditions, unnecessary travel on the two-tracks will be prevented in order to avoid any potential negative impacts to soils.~~Two-track roads used for Project activities would be monitored quarterly for erosion, braiding, or severe rutting. If any of these were noted the appropriate steps would be taken to prevent further degradation (e.g., water bars, gravel, prohibition of traffic on native surface roads during wet periods).~~ SOL-3: During interim and final reclamation, compacted areas (typically any area that received repeated traffic or 3 or more passes by heavy equipment) would be decompacted, to the depth of compaction, by subsoiling (method for deep decompaction of soils, using a subsoiler, that does not result in soil mixing), or ripping to the depth of compaction, scarifying, or disking. This would help prepare the seed bed, encourage infiltration and help to prevent accelerated runoff and erosion. Scarification would only be used on shallow soils. This mitigation measure also would apply to decommissioning activities.	"scarification and/or disking may be utilized for decompaction on shallow soils less that are less than 20 inches in depth to bedrock."
P07-32	12. Soils (Decommissioning) As stated in multiple responses throughout these comments, Cameco has already committed to monitoring soils, vegetation, and weeds. Cameco submits an annual report as required by Wyoming Environmental Quality Act, W.S. 35-11-411. This report is submitted to the Wyoming Department of Environmental Quality Land Quality Division on or before August 7 of each year. Under the requirements of the Wyoming Environmental Quality Act,	As noted in our response to Comment P07-2, the BLM is open to Cameco fulfilling the BLM reporting requirements through the WDEQ reporting process as long as information requested by BLM is included in the report, and this is reflected in the text changes to the mitigation measure.

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P07-32(Cont)	Cameco's annual report discusses all activity that has occurred throughout the year and all anticipated activity. This report is copied to BLM as a courtesy. Allowing Cameco to meet its obligations to BLM through the existing reporting obligations will increase efficiency, eliminate unnecessary duplication, and is consistent with Memorandum of Understanding (MOU), No. WY 19 between BLM and the Wyoming Department of Environmental Quality Land Quality Division for the management of Surface Mining and Exploration for Locatable Minerals. MOU No. WY 19 provides that the purpose of the MOU is to: 1. Foster Federal-State coordination of procedures for the prevention of unnecessary or undue degradation as defined in 43 CFR (Code of Federal Regulations) 3809.5 with respect to locatable mineral operations on Public lands and to foster responsible land use with respect to mineral operations on Public lands under existing laws and regulations; 2. Prevent unnecessary administrative delay pursuant to 43 CFR 3809.200; 3. Prevent, to the degree allowed by law, duplication of administration and enforcement of reclamation regulations governing the exploration for, or mining of, minerals locatable under the Federal mining laws described in 43 CFR 3809; and 4. Minimize impacts to and ensure proper reclamation of those lands affected by exploration and/or mining. Requiring Cameco to submit a separate report to BLM, rather than using the existing state mandated report would be inconsistent with these goals and would result in an unnecessary duplication of efforts and potential for delays. Requiring Cameco to submit a separate report to BLM, rather than using the existing state-mandated report would be inconsistent with these goals and would result in an unnecessary duplication of efforts and potential for delays. Therefore, Cameco recommends the following changes to mitigation measure SOL-4: SOL-4: Cameco would submit its annual report as required by the Wyoming Environmental Quality Act, which covers monitoring of soils, vegetation, and weeds to BLM each year. ~~A monitoring plan would be developed and submitted to the BLM for approval. The plan would address the following:~~ ~~• Soil erosion/movement;~~ ~~• Vegetation: density, diversity (species composition) and age class (e.g.,~~	

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P07-32 (Cont)	~~seeding, mature plant, decadent plant);~~ • ~~Weeds: density, species composition~~ • ~~Photo reference points;~~ • ~~Compliance with reclamation plan;~~ • ~~Documenting/monitoring protocols;~~ • ~~Timing of monitoring during the year; and~~ • ~~Identification of sites needing additional work or more reclamation activities outlining a site-specific prescription for actions to be implemented, including:~~ o ~~Re-seeding of areas not attaining reclamation success,~~ o ~~Soil stabilization,~~ o ~~Weed control, and~~ o ~~Mulching/fertilization or other cultural practices.~~	
P07-33	13. Vegetation Cameco agrees with proposed mitigation measures VEG-1 and VEG-2, so long as the seed mix goes through the proper channels of approval as an alternative to the currently approved seed mix.	All seed mixes to be used would be approved by the BLM prior to use. No revisions to text were made as a result of this comment.
P07-34	14. Noxious Weeds and Invasive Species Section 3.1.9 of Cameco's Operations Plan states that "during operations and following surface reclamation, noxious weeds will be controlled by annual spraying, on an as needed basis. This procedure will continue until final bond release is obtained Noxious Weed Control will be performed only by individuals that have appropriate state and BLM pesticide certifications." As stated in Section 2.3.8 of the DEIS, Cameco has committed to several post-operational vegetation monitoring steps and will be assessed by the State of Wyoming in concurrence with BLM prior to bond release. According to the vegetation studies that were completed as a requirement for Cameco's Permit to Mine application, very few noxious weeds were identified in the Gas Hills Project Area. Cameco has committed to controlling and minimizing the introduction of noxious weeds into the re-vegetated areas for at least five years after the initial seeding has occurred. By continuous monitoring of the reclamation efforts, Cameco would be able to control any possibility of noxious weed occurrence. If noxious weeds are identified, Cameco would notify the proper individuals to perform noxious weed control. Cameco believes that prevention, early detection, and rapid response are crucial in dealing with the spread of invasive species.	The development of a noxious weed plan is a BLM requirement outlined in the BLM Wyoming Reclamation Policy. The Applicant-Committed Protection Measure for noxious weeds on page 2-36 of the Draft EIS does not meet the BLM requirements for a noxious weed plan. Additional detail about the requirements for this mitigation measure have been added to text based on the correlation with noxious weed establishment and surface disturbance, the impacts noxious weeds have on the success of reclamation, the prevalence of noxious weeds within the project area, and BLM policy. In addition, comment L01-1 from the Popo Agie Conservation District and comment S04-3 from the Wyoming Department of Agriculture both stated that the Applicant-Committed Protection Measure on noxious weeds was inadequate for noxious weed control in the GHPA. BLM does not require a car wash at the GHPA, but is requesting that earth-moving vehicles that were used outside Wyoming be washed before coming on-site. No changes to text were made as a result of this comment.

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P07-34 (Cont)	Cameco does not believe that it is reasonable to require the washing of all vehicles that enter or leave the Gas Hills Project Area. According to an article Cooperative Prevention Systems to Protect Rangelands from the Spread of Invasive Plants written by Kim Goodwin and others, a study to understand the importance of private vehicles as vectors of weed dispersal found that while an average of three seeds per vehicle were carried, "most seeds that dislodge will fail to establish." Moreover, the study concluded that "cleaning vehicles by normal car washing procedures—or at portable wash stations that can be economically expensive—might not entirely remove all the mud, debris, and seeds." (Kim Goodwin, 2012) Cameco is committed to controlling and minimizing the introduction of noxious weeds including cheatgrass from invading the Gas Hills Project Area. Control measures for monitoring invasive species have been incorporated into Cameco's Operating Plan and Plan of Operations as required by the State of Wyoming and BLM. For the reasons articulated above, Cameco recommends the following changes to mitigation measure NOX-1, and the complete deletion of mitigation measure NOX-2: NOX–1: ~~Development of a noxious weed management plan that includes preconstruction surveys, education of construction and operation personnel during construction and operation activities, the washing of vehicles and equipment before entering and leaving the GHPA, herbicide spraying, and annual monitoring. Survey information collected during pre-construction surveys would include species name, GPS location of weed infestations, percent cover, and approximate size of weed infestations. Control of noxious and invasive species would be consistent with the Vegetation Treatments on Public Lands Administered by the BLM in the Western U.S. (BLM 2007b), and could include chemical, mechanical, and biological methods. Herbicide treatment methods also would be consistent with BLM (2007c) guidance. It is recommended that the Fremont County Weed and Pest be consulted in the development of the noxious weed management plan.~~ Cameco will comply with Operations Plan requirements for noxious weeds. During operations and following surface reclamation, noxious weeds will be controlled by annual spraying, on an as needed basis. This procedure will continue until final bond release is obtained Noxious Weed Control will be performed only by individuals that have appropriate state and BLM pesticide certifications.	

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P07-35	15. Special Status Plant Species In 2010, surveys were conducted for persistent sepal yellowcress by Hayden-Wing Associates (HWA). No populations of persistent sepal yellow cress were found in the permit area and according to the Wyoming Natural Diversity Database, there is no known population of persistent sepal yellowcress within 40 miles of the Gas Hills Project Area. Based on the 2010 survey and the fact that the permit area does not contain suitable habitat, additional surveys are not warranted for persistent sepal yellowcress. In 2010 HWA performed surveys for Rocky Mountain twinpod within the gas Hills permit area. No populations were found within the permit area, although portions on the Beaver Rim's north slope does contain adequate habitat due to its elevation, clay and gravelly soils, and relatively sparsely vegetated slopes. Positive habitat indicators include open silt-clay soils on or near outcrops or ridges with 25-50 degree slopes. Due to the rough terrain and location of potential habitat, Cameco believes that additional surveys are not warranted because Cameco will not be disturbing these areas, which occur on the steep slopes of the Beaver Rim. Cedar Rim Thistle surveys will be conducted 1 year prior to development of each mine unit and associated access roads within the modeled habitat boundary. Accordingly, Cameco proposes the following minor changes to mitigation measure SSP-1: SSP-1: Perform pre-construction surveys for ~~persistent sepal yellowcress,~~ Cedar Rim thistle, ~~and Rocky Mountain twinpod in identified habitat (HWA 2011a,b)~~ 1 year prior to development of each mine unit and associated access roads within the modeled habitat boundary. Locations of any populations or individuals ~~of Persistent sepal yellowcress, Cedar Rim thistle or Rocky Mountain twinpod~~identified during pre-construction surveys would temporarily be flagged during construction. Surface disturbance would not occur within 100 feet of any identified individuals or populations.	Suitable habitat was modeled for persistent sepal yellowcress within the GHPA, and BLM feels that past surveys have not provided sufficient detail to determine that suitable habitat or individuals are not present. Therefore, BLM feels additional surveys are warranted prior to construction. Because the potential remains for indirect impacts to Rocky Mountain twinpod, the BLM will require pre-construction surveys of Rocky Mountain twinpod in suitable habitat. No revisions were made to text as a result of this comment.
P07-36	17. Surface Water Resources The currently approved Nuclear Regulatory Commission and the WDEQ-LQD fluid spill detection practice includes a catchment basin with a conductivity probe or level transducer for each injection and production well connected to a header house Project Logic Control (PLC).	A new subsection within existing Section 2.3.3 of the EIS has been added based on the description of Cameco's proposed leak detection system in this comment. Mitigation measure SWR-1 has been deleted from the Final EIS as the BLM believes it is no longer necessary.

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P07-36 (Cont)	All injection and production wells will be equipped with a fiberglass, or other comparable material, basin over which the insulated well head cover is placed. The basin will contain spilled or leaked fluids that are detected by a fluid level transducer, or equivalent, located approximately 2" off the bottom of the basin and secured to the well head. The indicator line will be installed in the same trench as the 2-3" fluid pipeline and electrical cable connecting the injection or production wells to the appropriate header house. In the event fluids are detected in the basin a trip alarm would be activate in a header house and documented in the PLC with the well number(s) of concern. A colored beacon would be activated on the roof of the header house indicating a problem for Well Field Operator to investigate. The source of the alarm would be shut-in and investigated for corrective actions prior to re-start. All header houses would be similarly equipped with leak detection located in the basement sump and alarms fed to the PLC. The sump pump would activate at a pre-determined fluid level and evacuate fluids to the appropriate satellite. A colored beacon would be activated on the roof of the header house indicating a problem for Well Field Operator to investigate. In both of the above cases the source of the leak would be determined and corrected prior to restarting of the well or header house. The evolution of the leak detection equipment has occurred over the past four years and is expected to continue with technological/materials advancements. Consequently, Cameco recommends the following changes to mitigation measure SWR-1: SWR-1: Cameco will continue to work with the Nuclear Regulatory Commission and Wyoming Department of Environmental Quality to apply spill leak/detector monitoring devices that are acceptable to both agencies. The present accepted NRC and WDEQ-LQD fluid spill detection practice includes a catchment basin with a conductivity probe or level transducer for each injection and production well connected to a header house PLC.~~would submit details of the proposed types and locations of the mine unit fluid spill detection devices and alarms to the BLM for review and approval.~~	
P07-37	18. Groundwater Resources Cameco believes that BLM has no authority to request mitigation measure GWR-1 because groundwater is managed through the Wyoming Department of Environmental Quality Land Quality Division. The Wyoming Department of Environmental Quality Land Quality Division administers the EPA	The BLM, under NEPA, has the responsibility to ensure protection of water resource users, including use by wildlife, through monitoring and mitigation. Therefore, overlapping jurisdiction exists between the Wyoming DEQ and the BLM under NEPA when it comes to monitoring and mitigation of

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P07-37 (Cont)	underground injection control program and regulates the mining activities of the Gas Hills Project Area. A cumulative impacts study was required by the Wyoming Department of Environmental Quality and the Nuclear Regulatory Commission during the permitting process and the license renewal for the Gas Hills Mine. Additionally, the State Engineers Office is in charge of the appropriation of groundwater in the State of Wyoming and is in charge of determining an encroachment on water rights. Mitigation measure GWR-1 should therefore be removed from the EIS.	impacts to water resources, both surface and groundwater. Cameco's mine permit application to WDEQ includes monitoring of groundwater during the groundwater restoration process. Furthermore, BLM's analysis of potential impacts from drawdown indicates a limited potential for impact. Therefore, the BLM has removed mitigation measure GWR-1 from the EIS.
P07-38	19. Wild Horses Cameco does not object to mitigation measure WHS-1, but believes that a posted sign addressing wildlife and livestock would be more comprehensive: WHS-1: Signage would be posted in the GHPA to notify Project personnel that wildlife and livestock wild horses may be encountered along the road.	Text has been modified in section 4.16.2 in response to this comment.
P07-39	20. Special Status Wildlife Species The DEIS contains multiple mitigation measures directed at the protection of special status wildlife species, each of which is addressed in turn below. 20.8 WFM-1 The Gas Hills Project Area is located primarily outside of sage-grouse core area. Approximately 40 acres of the permit area does fall within core area. There is no planned activity within the portion of the permit area that falls within core area. Cameco will follow and abide by the Sagegrouse Executive Order (SGEO) and address each instance on a case -by -case basis as the project area is located outside of core area. Cameco will work with the WGFD as the lead agency when dealing with sage-grouse issues, as they have the management authority over greater sagegrouse (SGEO 2011-5). Cameco will also work collaboratively with USFWS and BLM to ensure a uniform and consistent application of the SGEO is followed. Cameco does not feel that the protection measures for breeding migratory birds are warranted. Most of the disturbance would begin before the migratory bird breeding time frame. With the ongoing activity continuing into the breeding bird timeframe, species whose habitat would be affected would relocate to adjacent, undisturbed areas and likely return to their previously occupied habitats after construction ended and suitable habitats were re-established. Birds are mobile and would likely disperse into adjacent areas with an abundance of similar habitat. In general, because only a small	To be in compliance with the Governor's Executive Order 2011-5 for activities outside of Core Population Areas, no more than a one-quarter (1/4) mile no surface occupancy standard and a two (2) mile seasonal buffer should be applied to occupied greater sage-grouse leks and a TLS of March 15 to June 30 as stated in the original mitigation measure. No change to mitigation measure EFM-1 was made as a result of this comment. It is important to note that most ground disturbing activities are likely to have some impact on breeding migratory birds and their associated habitats. Loss of an active nest site, incubating adults, eggs, or young would violate the MBTA and could potentially impact populations of important migratory birds that occur within the GHPA. In addition, loss of an active nest would not be in compliance with BLM EO 13186. The BLM signed an MOU with the USFWS in April of 2010 and that, along with EO 13186, specifies responsibilities and commitments that the BLM is obligated to follow. As long as ground disturbing activities are planned within suitable migratory bird breeding habitat and within the breeding period, Cameco would need to comply with mitigation measures provided by the USFWS and BLM or be in violation of the MBTA, EO 13186, and the BLM

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P07-39 (Cont)	percentage of the total Permit Area would be disturbed, migratory bird species are expected to disperse as construction activities continue and approach, minimizing the occurrence of direct mortality. Direct mortality is not expected to have a population-level effect. Cameco's proposed changes to mitigation measure WFM-2 appear below: WFM-1: Cameco will follow and abide by the Sage-grouse Executive Order (SGEO). Cameco will work with the Wyoming Game and Fish Department as the lead agency when dealing with sage-grouse issues, as they have the management authority over greater sage-grouse. Cameco will also work collaboratively with U.S. Fish and Wildlife Service and BLM to ensure a uniform and consistent application of the SGEO is followed.~~To protect breeding migratory bird species and greater sage-grouse, surface disturbing activities would be restricted on currently undisturbed lands within the GHPA between May 15 and June 30 for nesting migratory birds and between March 1 and July 15 within 2 miles of an occupied lek for lekking, nesting, and brooding greater sagegrouse. Should removal of habitat be required between these dates, Cameco would coordinate with the BLM and USFWS to conduct breeding migratory bird and greater sage-grouse surveys and implement appropriate mitigation, such as buffer zones around occupied nests, as needed.~~	WO IM 2013-005. Therefore, the mitigation measures for reducing impacts to migratory birds under WFM-1 remain for any surface-disturbing activities planned within the timing period listed for the project (May 1 to July 15).
P07-40	20.9 WFM-2 Cameco commits to conducting annual surveys in suitable habitat to identify active raptor nesting sites prior to construction and to avoid beginning construction in active raptor nest sites by implementing seasonal protection buffers zones. It is requested that Cameco be allowed to follow the species specific buffer zones already recommended by U.S. Fish and Wildlife Service for raptor nests, as they are the lead contact and regulator of raptor protection. It has been discussed with BLM that depending on the species, mitigation for the nest might be possible by limiting site activity to certain times of day, limiting daily activity duration, limiting noise levels, working in areas not visible from the nest, etc. and will be decided on a case-by case basis alongside BLM. WFM-2: To protect breeding raptor species, Cameco commits to conducting annual surveys in suitable habitat to identify active raptor nesting sites prior to construction and to avoid beginning construction in active raptor nest sites by implementing seasonal protection buffers zones.~~Cameco would avoid all~~	Commitment to performing yearly surveys and to avoid beginning construction in active raptor nesting sites is captured as an applicant-committed mitigation measure in Section 2.3.9.12 of the Final EIS. Timing restrictions for the indicated species have been retained, as they are consistent with the Lander RMP (BLM 2013). Please also see the BLM's response to comment F01-7.

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P07-40 (Cont)	~~existing raptor nest sites and surface disturbing activities during the breeding season (February 1 to July 31) within applicable nest protection buffers (i.e., 0.75 mile, unless site-specific, species-specific distances are determined and approved by the BLM~~ (as established by U.S. Fish and Wildlife Service). ~~If construction were to extend into the raptor breeding season, Cameco would conduct aerial and/or pedestrian nesting raptor surveys, as applicable, through areas of suitable habitat to identify active nest sites within the GHPA, prior to construction.~~ Since a number of variables (e.g., nest location, species' sensitivity, breeding, phenology, topographical shielding) would determine the level of impact to a breeding pair, appropriate protection measures, such as seasonal constraints and establishment of buffer areas, would be implemented at active nest sites on a species-specific and site-specific basis, in coordination with the jurisdictional agencies (e.g., BLM or USFWS).	
P07-41	20.10 WFM-3 Section 3.5.9 of Cameco's Operating Plan (Lidstone and Associates, Inc., 2009-2011) discusses the estimated quality of the evaporation pond water in detail. The Storage Ponds would contain produced groundwater and process waters with a near neutral pH and no petroleum-based products would be sent to the Storage Ponds. It is anticipated that the ponds will not attract long-term residence of water fowl because they will not contain any food source or shoreline vegetation for hiding or nesting. The amount of freeboard, and water depth maintained for the Storage Ponds should make it difficult for land birds (such as Greater sage-grouse), passerine birds, and wading birds (such as herons) to drink from the Storage Ponds. The location of the Storage Ponds, and associated human activity (including daily checks of the Storage Ponds), is anticipated to reduce the attractiveness of the Storage Ponds to wildlife. Due to implementation of fencing, deterrents, and the control of algae and plankton, the water quality in the Storage Ponds is not expected to pose a risk to birds. There are more attractive water bodies in the area that can provide food and hiding/nesting vegetation; these include small stock ponds and reclaimed open pit mines. If significant use of the ponds by bird species is noticed, Cameco will consult with the Wyoming Department of Environmental Quality, BLM, the Wyoming Game and Fish Department and the U.S. Fish and Wildlife Service in developing mitigation action plans for the ponds. Such actions may include	Commitment to monitoring evaporation ponds and working with appropriate wildlife agencies to develop mitigation if significant use of the ponds by bird species is observed has been added as an applicant-committed mitigation measure in Section 2.3.9.12 of the Final EIS. BLM believes that the ponds would likely attract birds due to the arid nature of the GHPA. The USFWS, in comment F01-1, agrees that netting ponds over 1 acre in size would be challenging, and also notes that flagging is not an effective bird deterrent. The mitigation measure has been revised to require development and application of a deterrent system prior to operation of the evaporation pond rather than waiting for results of monitoring after operation has commenced.

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P07-41 (Cont)	propane cannons, brightly colored pennants and predator silhouettes/decoys. Due to the size of ponds it would be infeasible and uneconomical to construct netting over the ponds. Any wildlife mortality would be reported immediately to BLM and the U.S. Fish and Wildlife Service. However, if mortalities or frequent habitation of the Storage Ponds are noted, Cameco will work with the Wyoming Department of Environmental Quality Land Quality Division, the BLM, and U.S. Fish and Wildlife to develop additional protective measures to ensure the protection of birds. The goal of such reporting would be to identify and resolve the problem as quickly as possible. For the reasons just discussed, Cameco proposes the following changes to mitigation measure WFM-3: WFM-3: To protect bat species and migratory bird species, including raptors and waterfowl, Cameco will monitor storage ponds to ensure ponds are not used by bird species. If significant use is observed, Cameco will consult with the Wyoming Department of Environmental Quality, BLM, the Wyoming Game and Fish Department and the U.S. Fish and Wildlife Service in developing mitigation action plans for the ponds. Such actions may include propane cannons, brightly colored pennants and predator silhouettes/decoys.~~Would install bird exclusion netting over evaporation ponds containing waste water in order to eliminate migratory bird and bat exposure to potentially toxic waste water.~~	
P07-42	20.14 SSS-3 Mountain plover occupancy surveys are being conducted as required under Cameco's current Gas Hills Wildlife Monitoring Plan in designated potential habitat. Cameco will follow the requirements of the Gas Hills Wildlife Monitoring Plan which will be updated as needed. Cameco accordingly proposed the following changes to mitigation measure SSS-3: SSS-3: Cameco will follow the requirements of the Gas Hills Wildlife Monitoring Plan which will be updated as needed. To protect nesting mountain plovers, nest surveys would be conducted if construction were to occur during the breeding season (April 10 to July 10). If a nest is located, a 0.25 mile protection buffer would be implemented around the active nest until the birds fledge from the nest.	Text has been adjusted as suggested. In addition, a copy of the Gas Hills Wildlife Monitoring Plan has been included as Appendix C to the Final EIS.

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P07-43	1. Chapter 2 (2-29) - 2.3.8 Existing Monitoring Plans: The DEIS states that the "current drinking water supply well for the Carol Shop facility would be plugged and abandoned due to high radium concentrations. Cameco intends to drill a new supply well for the Carol Shop facility under a separately permitted action, and as permitted by the Wyoming State Engineer's Office. Currently, Cameco anticipates the water would come from formations below the Wind River Formation, either from the Nugget Sandstone formation, or from a formation within the Chugwater group. Monitoring of the new well would follow the requirements of the permit and the U.S. NRC license stated for the existing drinking water supply well." Cameco believes that the Carol Shop well was never used as a drinking water supply well but as an industrial water supply well. It was mainly used to clean the Carol shop pad and trucks and feed the commodity. A chemical analysis of this well water does not show high radium concentration (4.4 pico Curie/l max). If more commercial fresh water is needed during the life of the project Cameco will drill a supply water well and will permit this new well with the adequate State Agency. Cameco does not intend to drill any drinking water supply well. Potable water will be brought in.	The text in Sections 2.3.1.2 and 2.3.8 as well as Figure 3.15-4 have been revised to reflect Cameco's changes in plans for water supply wells detailed in this comment.
P07-44	2. Table 3.3-1: the Cody shale is identified as being part of the stratigraphic column in the GHPA. The Cody shale does exist in the Wind River Basin, but there is no indication that it exists within the GHPA. The two deep disposal wells that were drilled within the permit boundary did not intersect the Cody shale.	Table 3.3-1 has been updated to reflect the most current understanding of geology in the Gas Hills region based on available information, which includes drill logs for the deep disposal wells.
P07-45	3. Section 2.3.2.1: The second paragraph of this section has a sentence that says, "The drilling mud pits would be fenced until the contained fluid has been removed or has evaporated and the pits have been reclaimed." Please substitute "backfilled" for" reclaimed" in that sentence; because once the subsoil is pushed back into the pit, the fence is removed. "Reclaimed" implies that the pit has been graded and seeded, which will not be the case when the fence is taken down.	The text has been revised as suggested.
P07-46	4. Section 2.3.2.2: The last paragraph talks about the approximate spacing of the monitor ring wells. They are assuming a distance of 400 feet from the patterns and having a spacing of 400 feet. Cameco believes that the language needs to be consistent with what is currently stated in the Ops Plan: "The location and spacing of these wells will typically be determined by hydrologic modeling and delineation drilling data."	The text in the last paragraph of Section 2.3.2.2 describes the process that would be followed to determine actual monitoring well ring spacing for each mine unit. For the purposes of estimating surface disturbance in the EIS the BLM has used the spacing assumptions provided in Cameco's Plan of Operations (Section 6.2.2) which state

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P07-46 (Cont)	Assumptions for distance cannot be made, because each mine unit will have different hydrologic properties and potentially different values for the spacing of monitor wells.	that the monitoring well perimeter would be approximately 400 feet outside each mine unit boundary with wells spaced approximately every 400 feet. The text in Section 2.3.2.2. has been revised to further clarify the language. Footnote "c" for Tables 2-1 and 2-3 provide further detail on how surface disturbance was estimated for each alternative.
P07-47	5. Section 2.3.9: Similar to comments made for Section 2.3.2.1, the first bullet needs to be modified to say that the pits will be “backfilled” and not “reclaimed” when the fencing will be removed.	The text has been revised as suggested.
P07-48	6. Section 4.1.5 Water Resources: Figure 4.15-3: This figure sources Cameco 2009, Figure OP5-5. This is an incorrect representation of the figure which has been modified from the original.	This figure has been updated to exactly match the text within the original Figure OP5-5 by using the term 'high TDS' rather than 'historically contaminated.
P07-49	7. Page 2-40/Reduced Number of Evaporation Ponds: Cameco would like BLM to clarify Section 2.4.5, second paragraph: If Cameco is able to dispose of sufficient water without construction of any 1 of the test wells or disposal wells, the amount of disturbance avoided (approximately 2.0 acres per well) would be credited to Cameco and available for other disturbance.	The discussion of the Reduced Number of Evaporation Ponds in Section 2.4.5 has been removed from Section 2.4 and is no longer a part of the Resource Protection Alternative. This discussion has been added as a new subsection in Section 2.6, which discusses alternatives considered but eliminated from detailed analysis. The text referred to in the comment has been removed from the EIS.
P07-50	8. Table 5-1: The CISAs are of inconsistent scale and BLM fails to justify their selections. For example, the soil resource is limited to the GHPA while the livestock and vegetation CISA are significantly larger, i.e. approximately 14,000 acres. How is this justified? The soils CISA should be increased to at least a similar scale or perhaps larger to reflect the regional character of MLRA.	As stated in Section 5.0.3 of the Draft EIS and Final EIS, the definition of the CISA is different for each resource because the physical boundaries are established to encompass the anticipated lateral extent of impacts for each resource. For example, the air quality effects are anticipated to extend beyond the Project boundary resulting in a CISA defined beyond the GHPA. Soil impacts are not anticipated to extend beyond the GHPA; therefore, the GHPA is defined as the CISA and the scope of potential cumulative activities is narrower.
P07-51	9. Section 5.11 Soils: The section recognizes that soils have been impacted regionally from wildfire, recreation and grazing, among others, but fails to assess the proposed alternative and RPA against a reasonably scaled CISA. Instead, the text artificially compares the proposed project to the RPA without comparing each to the larger regional conditions.	Soil resource impacts and characteristics are site-specific in nature. In some cases where major surface disturbance is going to occur it may make sense to examine a larger area (such as a watershed). For this project the CISA is adequate in relation to the scale of cumulative

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P07-51 (Cont)		disturbances. No revisions to text were made as a result of this comment.
P07-52	10. Section 3.11 Soils: Understanding the character of the MRLA 34 in this region is critical to the assessment. Overall soil types and the presence of disturbance on a regional scale must be added to the assessment. Comparing alternatives to each other within the GHPA fails to assess the GHPA in the context of regional conditions.	The MLRA provides a very general overview of soil resources on a regional scale. It is not adequate alone to assess impacts. Therefore more detailed soil survey data was utilized to asses overall soil conditions and limitations within the Gas Hills Project Area including site-specific impacts. No changes to text were made as a result of this comment.
P07-53	11. Section 3.13 Vegetation: The study area is artificially limited to the GHPA. The analysis recognizes the livestock grazing as a principal land use but fails to assess its impacts on vegetation on either a regional or GHPA-specific basis. Regional data are not provided.	The study area for the affected environment boundary provides baseline conditions for the area that would be impacted by the Proposed Project. The area defined as the GHPA provides reasonable context to assess the affected environment from the Proposed Project. The regional discussion of impacts to vegetation from the Proposed Project and any other potential disturbances including livestock grazing and noxious weeds are discussed in the cumulative effects section. Any expansion of the affected environment boundary would require additional biological surveys to provide the detailed information consistent with what is already provided for the GHPA. No revisions to text were made as a result of this comment.
P07-54	12. Section 3.13.2: Similarly, the study area for noxious weeds is artificially limited. Data as to the pervasiveness of noxious weeds is not provided for areas within the GHPA or on a regional basis. These data are necessary to evaluate project impacts, compare the project to the RPA, and to assess cumulative impacts.	Please see the response to comment P07-53.
P07-55	13. Section 5.13: The section fails to assess the proposed alternative and RPA against a reasonably scaled CISA. Instead, the text artificially compares the proposed project to the RPA without comparing each to the larger regional conditions.	The CESA for vegetation encompasses the past, present, and reasonably foreseeable future projects that would cumulatively add to the Proposed Project impacts to vegetation. The grazing allotments provide a reasonable context to assess cumulative vegetation impacts for the Proposed Project. No revisions to text were made as a result of this comment.

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P07-56	14. Section 5.13.1: The Section fails to include NOX- 1, and fails to assess whether NOX-1 will provide actual benefits in light of grazing as the principal regional land use. Further, no regional data is presented to justify imposition of this costly and time consuming mitigation measure.	Introduction of Chapter 5 states that cumulative assessments assume successful implementation of the environmental protection and Mitigation measures discussed in Chapter 4 of the Final EIS.
P07-57	1. Appendix E of the Draft EIS cites the method for estimating non-traffic-related fugitive dust. Section 4.1 of Appendix E states, "A generally accepted method of estimating fugitive dust emissions is to use a typical construction project. The average daily fugitive dust emissions for a typical construction project are estimated to be 1.2 tons PM10 per acre per month for construction activities (USEPA 1985)." Several issues are raised by this statement. First, the citation is incorrect; this method comes from a 1995 EPA document incorporated into AP-42, Section 13.2.3.3. Second and more importantly, had this method been applied correctly, the maximum annual PM10 emissions would be far greater than 9.0 tons per year (tpy) as listed in Appendix E, Table 3-2. To illustrate, the project schedule in Figure 2-3, Section 2 of the Draft EIS, and the acreages listed in Table 2-1, Section 2 of the Draft EIS imply that total construction disturbance in the summer of year 3 is 521 acres. If construction only occurred during June and July, total PM10 emissions would be 521 acres X 2 months X 1.2 tons/acre/month = 1,250 tons for the year – far from the 9.0 tpy represented in the document. The cited method for estimating fugitive dust emissions from a typical construction project comes from Section 13.2.3.3 of EPA's AP-42, Compilation of Air Pollution Emission Factors, Volume I, Fifth Edition (January 1995). This section of AP-42 also states, "It is strongly recommended that when emissions are to be estimated for a particular construction site, the construction process be broken down into component operations." This method, correctly applied, would lead to unreasonably high emission totals for the proposed action, notwithstanding the understatement of such emissions in the DEIS. Therefore, in accordance with EPA's recommendation, estimated fugitive PM10 emissions from construction activities for the proposed action have been revised and summarized in Table 1 below. To arrive at total fugitive dust emissions, Table 1 also summarizes fugitive dust emissions from wind erosion and from transportation over the primary, on-site access road.	Please see the response to comment P05-1

Table A-2 Responses to Public Comments on the Draft EIS

Letter ID/ Comment Number	Comment	Response
P07-57 (Cont)	Total fugitive PM10 emissions of 131 tons per year (tpy) are consistent with other ISR projects of similar scale (e.g. Uranerz, Nichols Ranch ISR Project, 136 tpy). Table1 Fugitive Source Type PM10 (tpy) Construction Equipment 47.87 Wind Erosion 42.01 Mine Access Road Traffic 41.29 TOTAL FUGITIVE PM10 131.18 Supporting detail for Table 1 is provided in the tables and accompanying citations at the end of this section. Table 2 below estimates fugitive PM10 emissions from significant construction equipment, including mobile equipment, backhoes and drill rigs. Equipment fleet sizes and duty cycles are taken from the DEIS. A control efficiency of 50% is assumed for traffic on primary and secondary roads, consistent with the DEIS and standard practice for unpaved roads with periodic water spray application. Non-travel-related emissions apply to near-stationary construction activities (i.e. loading, dumping, drilling, etc.). In those cases where emission factors are provided for total suspended particulates (TSP), PM10 was assumed to be 30% of TSP. This conversion factor has been approved by the Wyoming Department of Environmental Quality for surface mining applications. The result is nearly 48 tons of PM10 emissions in the worst-case year. Table 3 estimates fugitive PM10 emissions from heavy truck and passenger vehicle traffic accessing the site during a peak year when both the construction and operation phases are ongoing. The maximum number of vehicles is taken from the DEIS. A control efficiency of 50% is assumed for traffic on primary and secondary roads, consistent with the DEIS and standard practice for unpaved roads with periodic water spray application. This results in just over 41 tons of PM10 emissions in the worst-case year. Table 4 estimates fugitive PM10 emissions from wind erosion on disturbed areas. Since AP-42 provides the emission factor for wind erosion in terms of total suspended particulates (TSP), PM10 was again assumed to be 30% of TSP. The total disturbed area from mine unit construction was calculated based on the mine unit acreage provided in the DEIS and an assumed	

Table A-2 Responses to Public Comments on the Draft EIS

Letter ID/ Comment Number	Comment	Response
P07-57 (Cont)	average of 3 years to develop each mine unit. Table 2-1 of the DEIS shows a maximum total disturbed area of 1,178 acres. Figure 2-3 of the DEIS shows construction activities extending over approximately 15 years. Assuming a uniform rate of mine-unit advancement and next-year surface reclamation (as discussed in the DEIS), this yields 78.53 acres disturbed in a given year. Conservatively, all 290 acres of disturbance from infrastructure development (e.g. Roads, pipeline corridors, water diversion and containment structures, etc.) would also be exposed to wind erosion. This leads to a total exposed area of nearly 370 acres, resulting in 42 tons of PM10 emissions in the worst-case year.	
P07-58	2. Appendix E, Table 3-1 shows a PM10 emission rate of 1.82E-11 g/sec/m2. Even if the 9.0 tpy of PM10 emissions in Table 3-2 were correct, this equates to a much higher emission rate intensity. For example, spreading 9.0 tpy uniformly over 521 acres would yield an average emission rate of 1.23E-07 g/sec/m2 – nearly four orders of magnitude higher. Since this emission rate is input to the SCREEN3 model to predict impacts, those impacts would be artificially low. This may explain the predicted, highest 24-hour impact (0.8 µg/m3 in Table 4-2 of Appendix E). This error further compounds the understatement of emissions from general construction activities. An experienced modeler would expect predicted 24-hour PM10 impacts from construction activities to be much higher than 0.8 µg/m3 at model receptors placed along the project boundary. Table 3-1 of Appendix E is in error, as evidenced by the appearance of identical emission rates for all four scenarios listed in the table. This number is a misprint and does not reflect the emission rates used in modeling. The comment also references a maximum 24-hour PM10 impact from construction-related fugitive dust, of 0.8 µg/m3 (Table 4-2 of Appendix E). This number is in error, based on the understatement of construction emissions addressed in the response to Comment #1 above. The corrected emissions of 47.87 tpy (see Table 2 below) would logically lead to a higher contribution from construction activities to the maximum 24-hour PM10 impact predicted by the SCREEN3 model. Without re-running the model, the following procedure is used to infer this level of increase and to revise the total 24-hour impact:	Please see the response to comment P05-2.

Table A-2 Responses to Public Comments on the Draft EIS

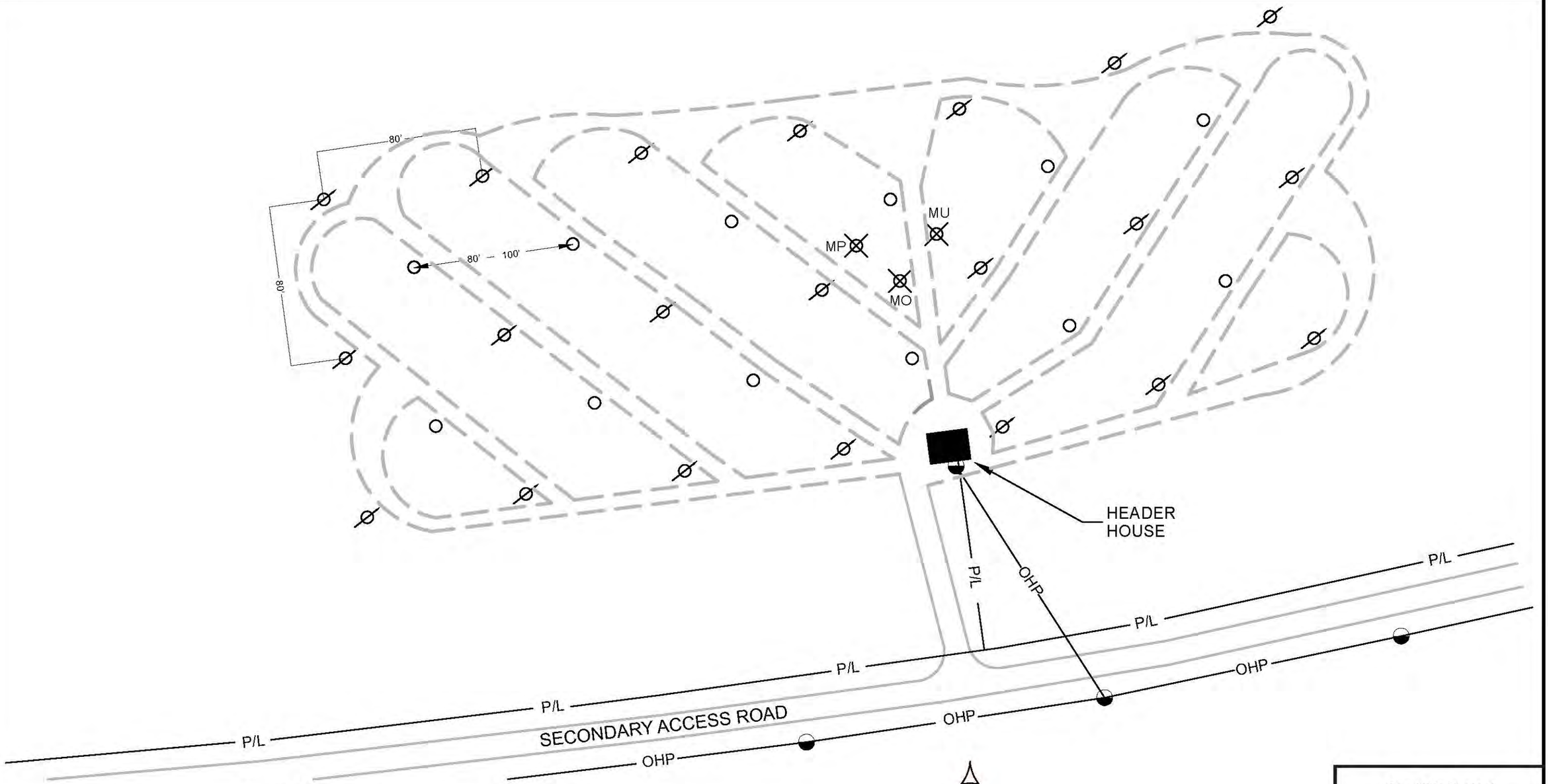
Letter ID/ Comment Number	Comment	Response
P07-58 (Cont)	(1) Table 4.1-6 of the DEIS shows a maximum modeled 24-hour impact from roads, of 39.9 µg/m3. Since this impact applies to all project phases, it can be said to result from the 41.29 tpy of transportation-related fugitive PM10 emissions calculated in Table 3 below. (2) The revised, construction-related fugitive PM10 emissions of 47.87 tpy (Table 2 below) can be inferred to have an impact similar in proportion to the transportation impact, resulting in a contribution of 39.9 X 47.87/41.29 = 46.3 µg/m3. This is conservative since emissions from construction activities would tend to be more dispersed than emissions from a single access road, and would therefore have less impact on any given model receptor. (3) The fugitive PM10 emissions from wind erosion of 42.01 tpy (Table 4 below) can likewise be inferred to have a proportionate impact, resulting in a contribution of 39.9 X 42.01/41.29 = 40.6 µg/m3. This is extremely conservative since the transportation emissions would be concentrated along roadways (and therefore near model receptors), whereas wind erosion emissions would be distributed over a much larger area and would therefore have less impact on any given model receptor. (4) Adding impacts from transportation, construction and wind erosion to a background of 10.2 µg/m3 results in a total of 39.9 + 46.3 + 40.6 + 10.2 = 137.0 µg/m3. This is lower than the National Ambient Air Quality Standard (NAAQS) of 150 µg/m3. Since the above method of inferring modeled outcomes is conservative, and since the SCREEN3 model itself is conservative, the conclusion that the proposed action will comply with the NAAQS appears reasonable.	
P07-59	3. A footnote to Table 4-3 in Appendix E states, “Emission estimates do not include commuter vehicle emissions.” In most ISR projects, commuter traffic constitutes the single largest source of fugitive dust from unpaved roads. This component should be included in the analysis to make the results more representative. Table 4-3 applies only to emissions from fuel combustion, not to fugitive dust emissions. Particulate emissions from mobile engine exhaust typically constitute a small fraction of the accompanying fugitive dust emissions. Moreover, gasoline-powered commuter vehicle engines generate far less particulate emissions than larger diesel trucks (which are accounted for in Table 4-3). Therefore, the exclusion of commuter vehicles from this table is	Please see the response to comment P05-3.

Table A-2 Responses to Public Comments on the Draft EIS

Letter ID/ Comment Number	Comment	Response
P07-59 (Cont)	inconsequential to the overall project impacts on air particulate concentrations.	
P07-60	4. Appendix E appears to be internally inconsistent. Table 4-5 of Appendix E summarizes total project emissions for all criteria pollutants. It shows estimated annual PM emissions of 9.0 tpy. This is the same figure presented for PM10 in Table 3-2 of Appendix E, which does not include engine combustion or road dust contributions. Appendix E, Table 3-5 shows total engine PM emissions of 15 tpy. Road dust emission totals are not listed; the document only shows the formulas used to obtain these totals and their modeled impacts on ambient PM10 concentrations. Logically, however, the total PM10 emissions can be no less than 24 tpy. These inconsistencies are addressed in the response to Comment 1 above. The conflicting information is resolved by the revised PM10 emission totals shown in Table 1 above and supported in Tables 2, 3 and 4 below.	Appendix K, Table 4-5 has been corrected.
P07-61	Cameco fully expects further discussion with the BLM on many of the issues discussed in this letter, and looks forward to engaging with the agency as the FEIS is being prepared.	Thank you for your comment.

Appendix B

Typical Construction Figures



LEGEND

- INJECTION WELL
- PRODUCTION WELL
- MONITORING WELL
- POWER POLE
- OHP — OVERHEAD POWER LINE
- P/L — PIPELINE
- WELLFIELD TRAILS

50' 0' 50' 100'

SCALE: 1" = 50'

Source: PRI 2009, Figure 5.

Gas Hills Project

Appendix B
Figure B-1

Typical Well Field Pattern

General Construction Requirements:

1. ALL EXCAVATION CUT SURFACES AND EMBANKMENTS SHALL BE COMPACTED TO 95% OF STANDARD PROCTOR DENSITY. PRIOR TO POND SITING THE ENGINEER SHALL DIRECT A SUBSURFACE INVESTIGATION PROGRAM TO IDENTIFY DEPTH TO CONSOLIDATED ROCK AND/OR COLLECT SAMPLES AND MEASUREMENTS TO DETERMINE CONSOLIDATION OF SUBSTRATE. UNSUITABLE CONDITIONS MAY RESULT IN THE RELOCATION OF THE POND.
2. GRANULAR BEDDING MATERIAL SHALL BE COMPACTED TO 90% OF STANDARD PROCTOR DENSITY.
3. SECONDARY LINER SHALL BE CONSTRUCTED OF NATIVE SOILS OR A SYNTHETIC LINER.
4. AN AUTOMATIC SUMP PUMP SHALL BE INSTALLED IN THE INSPECTION MANHOLE WITH A FLOAT SWITCH AND DISCHARGE PIPE BACK INTO THE EVAPORATION POND.
5. INFLUENT PIPES SHALL BE PLACED SUCH THAT THE PIPE INVERT IS AT LEAST SIX INCHES ABOVE THE MAXIMUM OPERATING LEVEL OF THE POND.
6. A VENTED CLEANOUT SHALL BE INSTALLED PRIOR TO THE ENTRANCE OF THE INFLUENT PIPE INTO THE PONDS, LOCATED CLOSE TO THE POND EMBANKMENT.
7. ALL EMBANKMENTS AND DISTURBED AREAS WHICH ARE NOT BELOW THE INTERNAL OPERATING LEVEL OF THE PONDS SHALL BE SEEDED WITH DRYLAND GRASSES TO PREVENT EROSION.
8. PERIMETER FENCES SHALL BE INSTALLED AROUND ALL PONDS, CAPABLE OF KEEPING LIVESTOCK AND WILDLIFE FROM ENTERING THE AREAS (NOT SHOWN).

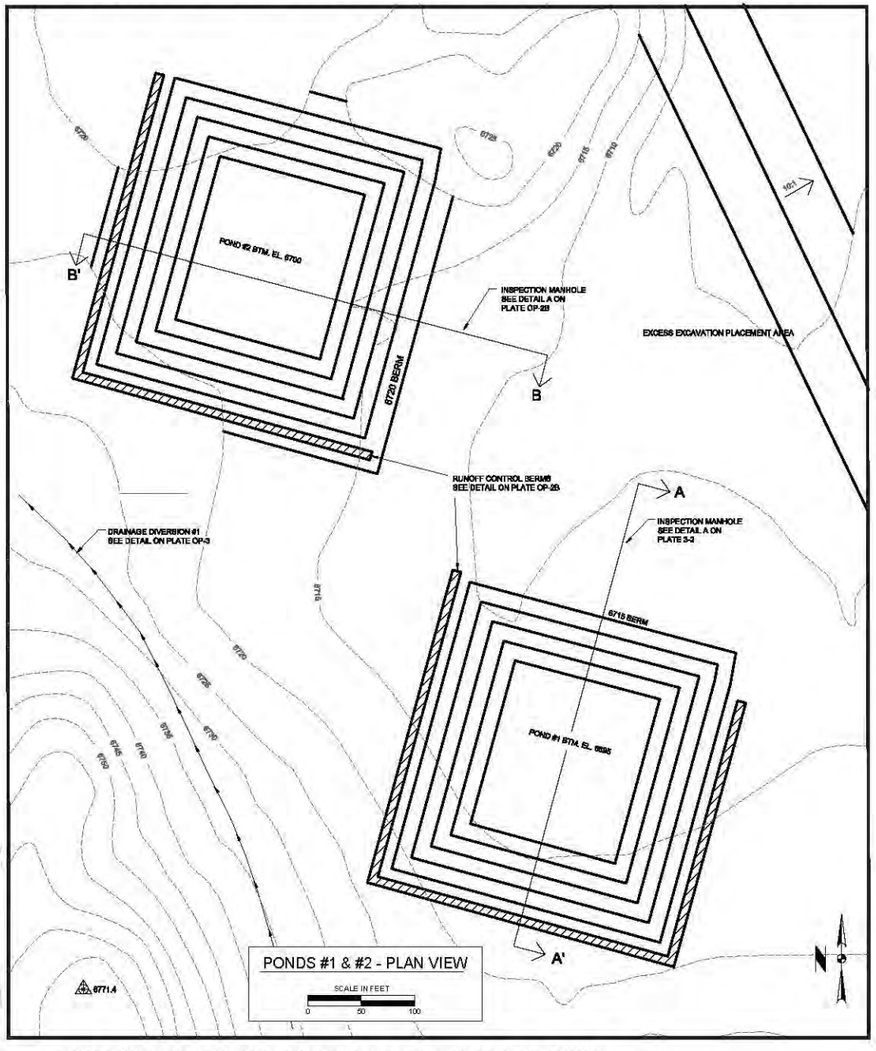
CONSTRUCTION INSPECTION AND QUALITY CONTROL:

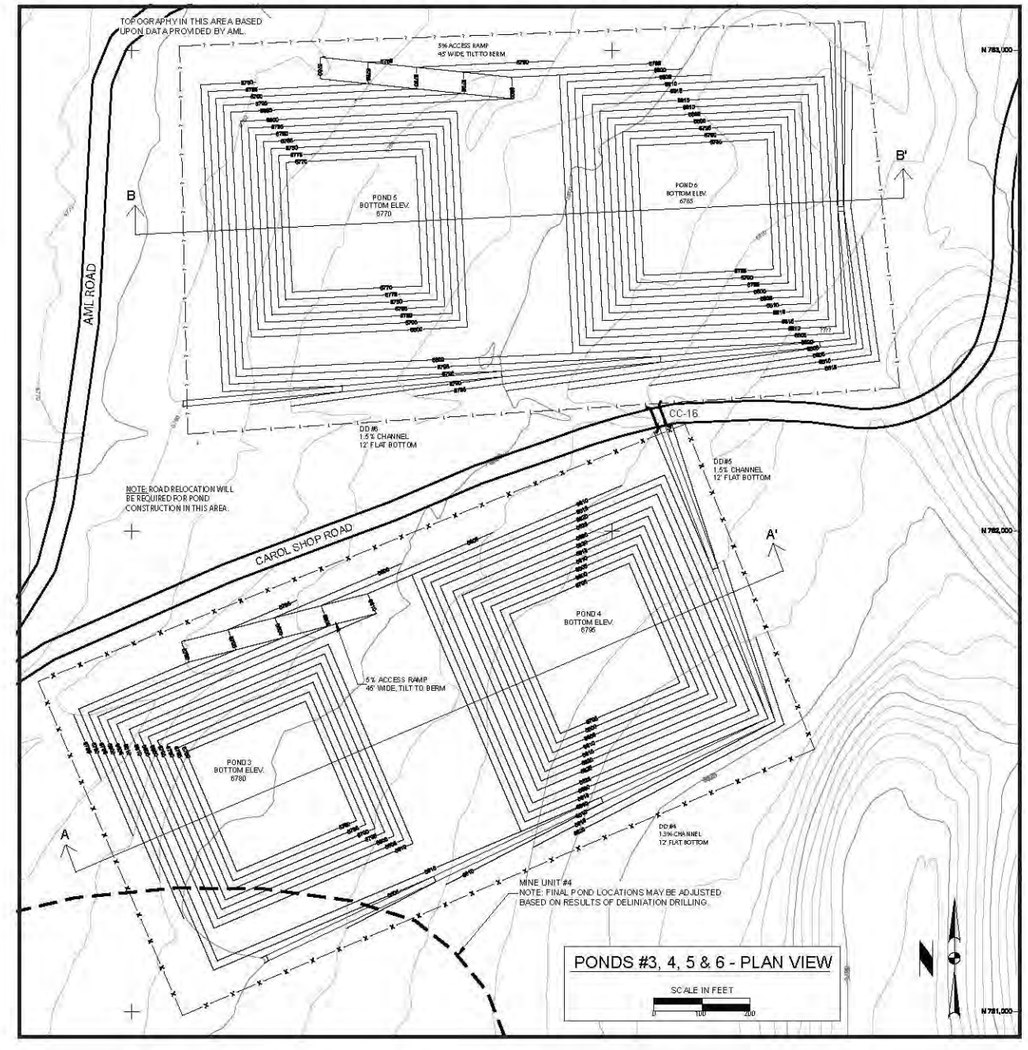
1. DURING CONSTRUCTION, SIDE INSPECTION AND QUALITY CONTROL TESTING SHALL BE COMPLETED UNDER THE DIRECTION OF A PROFESSIONAL ENGINEER DULY REGISTERED IN THE STATE OF WYOMING AND EXPERIENCED IN SIMILAR CONSTRUCTION REQUIREMENTS AND/OR METHODS.

PERFORATED PIPE SHALL MEET OR EXCEED THE FOLLOWING SPECIFICATIONS:

1. NOMINAL INSIDE DIAMETER 4 INCHES.
2. PIPE STIFFNESS RATING 50 PSI.
3. PIPE WORKING PRESSURE RATING WILL BE 160 PSI OR BETTER AND THE CONVEYANCE PIPE WILL BE HDPE PE 3408 OR BETTER.
4. WATER INLET AREA 2.95 SQUARE INCHES PER LINEAR FOOT.
5. MAXIMUM PERFORATION DIMENSIONS (MANUFACTURER); DRILLED HOLE DIAMETER 3/6 INCH; SLOTTED HOLES WIDTH 1/8 INCH (3.18 MM), LENGTH 7/8 INCH (22.2MM).
6. COMPLETELY ENCASED IN GEOTEXTILE FABRIC.

SITE LOCATION: PONDS 1 AND 2 ARE LOCATED IN FREMONT COUNTY; NW1/4, SECTION 28, T33N, R89W. PONDS 3, 4, 5, AND 6 ARE LOCATED IN FREMONT COUNTY; NE4/1, SECTION 28, T33N, R89W.





CONVEYANCE PIPE SHALL MEET OR EXCEED THE FOLLOWING SPECIFICATIONS:

1. NOMINAL INSIDE DIAMETER 4 INCHES.
2. PIPE STIFFNESS RATING 50 PSI.
3. HDPE OR SDR 35 PIPE.
4. WATER TIGHT CONNECTIONS.

PRIMARY LINERS SHALL MEET OR EXCEED THE FOLLOWING SPECIFICATIONS:

1. NOMINAL THICKNESS (GAUGE) SHALL BE AT LEAST 60 MIL (1.5 MM).
2. MINIMUM TENSILE STRENGTH AT BREAK SHALL BE AT LEAST 240 LBS.
3. MINIMUM PUNCTURE RESISTANCE SHALL BE AT LEAST 270 LBS.
4. LINER INSTALLATION, INCLUDING PERFORMANCE AND INSPECTION, SHALL MEET OR EXCEED THE LINER MANUFACTURER'S RECOMMENDATIONS, AND CURRENT APPLICABLE ASTM STANDARDS.
5. LINEAR DESIGN IS PRELIMINARY AND THE FINAL DESIGN MAY CHANGE. THE POND LINER SYSTEM WILL CONFORM TO THE CRITERIA OUTLINED IN THE CFR'S.
6. SECTION 3.5.6 OF THE OPERATIONS PLAN PRESNTS SPECIFICATION SOF GRANULAR MATERIALS ABOVE, BELOW, AND BETWEEN LINERS. IN SUMMARY, GRANULAR BACKFILL SHALL CONSIST OF ROUNDED SAND OR GRAVEL 100% PASSING ¾ INCH SIEVE AND NO MORE THAN 10% ASSING THE #200 SIEVE AND HAVING A HYDRAULIC CONDUCTIVITY OF 10-1 CM/SEC.

Source: PRI 2009, Plates OP7-2A.

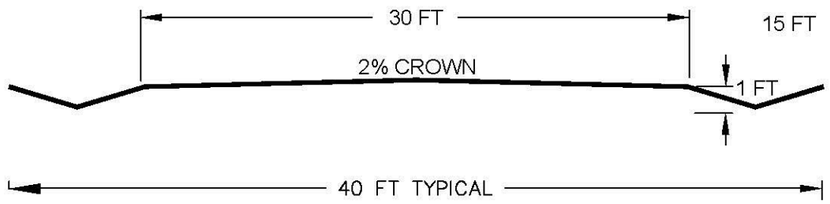
Gas Hills Project

Appendix B
Figure B-2

Evaporation Pond Design

MAIN ACCESS ROADS

TYPICAL CROSS SECTION



DITCH SLOPES 3:1 OR FLATTER
SLOPE VARIES TO MATCH TOPOGRAPHY
TYPICAL ROW 60 FT

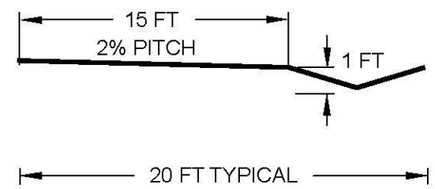
ROAD DESIGN CRITERIA

DESIGN USE	TWO-WAY TRAFFIC, INCLUDING HEAVY TRUCK TRAFFIC.
MAXIMUM SPEED	40 MPH MAXIMUM, REDUCE SPEEDS FOR AREAS OF LIMITED VISIBILITY AND ROAD JUNCTIONS.
MAXIMUM GRADE	8% FOR NO MORE THAN 2,000 FEET; 6% OVERALL FOR NORMAL TERRAIN CONDITIONS.
ROADWAY WIDTH	30 FOOT RUNNING SURFACE WITHIN 60 FOOT ROW.
MINIMUM PITCH	2% FROM CENTERLINE.
MINIMUM CURVE	MINIMUM CURVE RADIUS 500 FEET WITH A 5 DEGREE CENTRAL ANGLE.
ROAD DITCH	MINIMUM 1 FOOT DEPTH, 3:1 (H; v) SIDE SLOPES, AT 2 TO 4% GRADES, VARY TO MATCH TOPO.
CULVERT DESIGN	25 YEAR DESIGN, MINIMUM SIZE 18 INCHES.
SURFACING	NO SURFACING FOR SP, SW, GC, GM, GP, GW - ALL OTHERS SOILS 4 INCHES GRAVEL SURFACING.
MAINTENANCE	GRADING TO MAINTAIN CROWN, DITCHING, AND SURFACING.

NOT TO SCALE

SECONDARY ACCESS ROADS

TYPICAL CROSS SECTION



DITCH SLOPES 3:1 OR FLATTER
SLOPE VARIES TO MATCH TOPOGRAPHY
TYPICAL ROW 40 FT

ROAD DESIGN CRITERIA

DESIGN USE	ONE-WAY TRAFFIC, INCLUDING LIGHT TRUCK TRAFFIC.
MAXIMUM SPEED	30 MPH MAXIMUM, REDUCE SPEEDS FOR AREAS OF LIMITED VISIBILITY AND ROAD JUNCTIONS.
MAXIMUM GRADE	8% OVERALL FOR NORMAL TERRAIN CONDITIONS.
ROADWAY WIDTH	15 FOOT RUNNING SURFACE WITHIN 40 FOOT ROW; TURNOUTS EVERY 1,000 FT.
MINIMUM PITCH	2% FROM UPHIL SIDE OF ROAD.
MINIMUM CURVE	MINIMUM CURVE RADIUS 200 FEET.
ROAD DITCH	MINIMUM 1 FOOT DEPTH, 3:1 (h: v) SIDE SLOPES, AT 2 TO 4% GRADES, VARY TO MATCH TOPO.
CULVERT DESIGN	10 YEAR DESIGN, MINIMUM SIZE 18 INCHES.
SURFACING	NO SURFACING MOST AREAS; REQUIRED ONLY IN AREAS OF POOR DRAINAGE AND SOILS.
MAINTENANCE	GRADING TO MAINTAIN PITCH, DITCHING, AND SURFACE.

NOT TO SCALE

NOTES

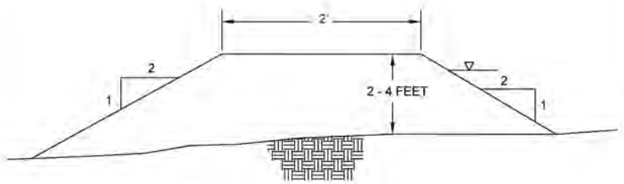
1. MAIN ACCESS ROADS WILL BE ESTABLISHED AND MAINTAINED FROM THE GAS HILLS ROAD TO ALL SATELLITE FACILITIES.
2. SECONDARY ACCESS ROADS WILL BE ESTABLISHED AND MAINTAINED IN ALL ACTIVE WELL FIELDS.
3. TO THE EXTENT PRACTICAL,ALL PIPELINES AND UTILITIES WILL BE LOCATED WITHIN THE MAIN AND SECONDARY ACCESS ROAD ROW.
4. WHERE REQUIRED, GRAVEL SURFACING SHALL BE 3 INCH MINUS PIT RUN OF THE FOLLOWING SOIL TYPES; SW, SP, GP, GW.
5. WATERING FOR DUST CONTROL WILL BE USED AS NECESSARY.
6. WATER USED FOR DUST CONTROL SHALL BE FROM AN APPROVED AND PERMITTED SOURCE.
7. ROAD SIGNAGE SHALL MEET UNIFORM TRAFFIC CONTROL STANDARDS INCLUDING SIGNAGE FOR SPEED LIMIT, EQUIPMENT CROSSING, AND STOP AND/OR YIELD AT ALL INTERSECTIONS.
8. TOPSOIL DISTURBED ALONG THE MAIN ACCESS ROAD WILL BE STRIPPED AND STOCKPILED FOR FUTURE RECLAMATION IN A MANNER WHICH PROTECTS THE TOPSOIL RESOURCE FROM CONTAMINATION AND/OR EROSION.
9. TOPSOIL ALONG SECONDARY ACCESS ROADS (WITHIN WELL FIELD AREAS) WILL BE STRIPPED TO AN AVERAGE DEPTH OF 6 INCHES UNLESS SOILS HAVE BEEN DEMONSTRATED TO BE UNSUITABLE AS A PLANT GROWTH MEDIUM SALVAGED TOPSOIL WILL BE STOCKPILED IN A MANNER WHICH PROTECTS THE TOPSOIL RESOURCE FROM CONTAMINATION AND/OR EROSION UNTIL USED FOR FINAL RECLAMATION.
10. WHERE POSSIBLE UTILITIES INCLUDING POWER LINES AND PIPELINES WILL BE LOCATED WITHIN THE ROW ON EITHER SIDE OF THE MAIN AND SECONDARY ACCESS ROADS.

Gas Hills Project

Appendix B
Figure B-3

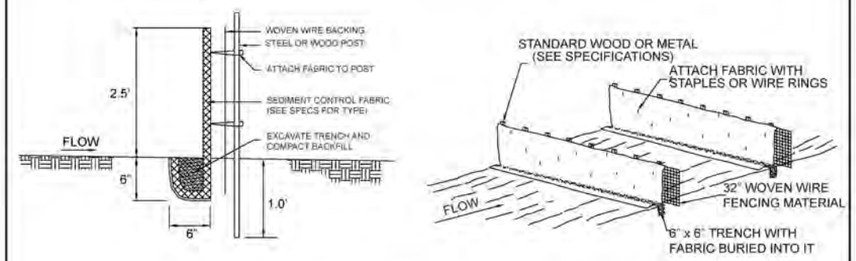
Typical Road Construction

Source: PRI 2009, Plate OP-4.



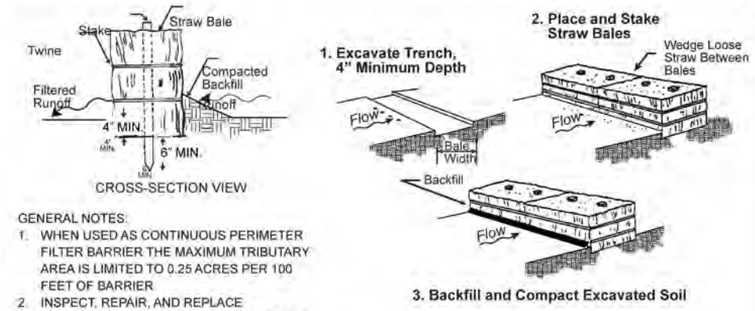
TYPICAL BERM CROSS SECTION

NOT TO SCALE



SEDIMENT CONTROL FENCE DETAIL

NOT TO SCALE



GENERAL NOTES:

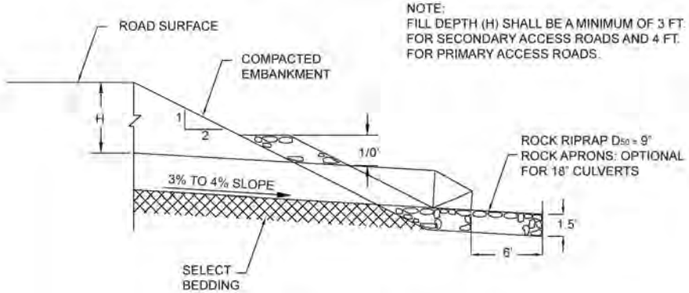
1. WHEN USED AS CONTINUOUS PERIMETER FILTER BARRIER THE MAXIMUM TRIBUTARY AREA IS LIMITED TO 0.25 ACRES PER 100 FEET OF BARRIER
2. INSPECT, REPAIR, AND REPLACE (IF NECESSARY) THE FILTERS AFTER EACH STORM EVENT.

TYPICAL STRAW BALE DIKE

NOT TO SCALE

18' TO 30" DIA. CULVERT DETAILS

NOTE:
FILL DEPTH (H) SHALL BE A MINIMUM OF 3 FT. FOR SECONDARY ACCESS ROADS AND 4 FT. FOR PRIMARY ACCESS ROADS.

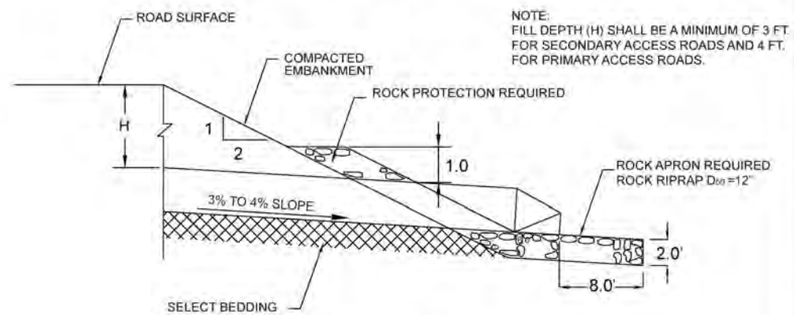


CULVERT OUTLET PROFILE DETAIL

NOT TO SCALE

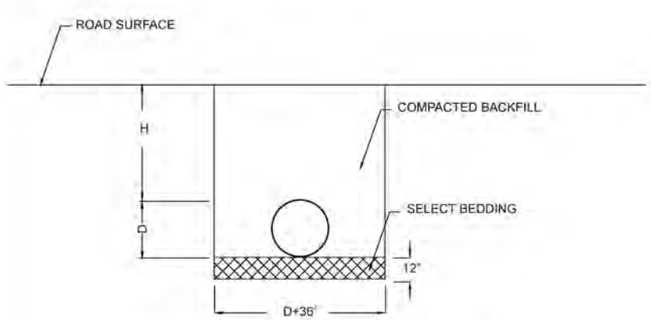
36" TO 48" DIA. CULVERT DETAILS

NOTE:
FILL DEPTH (H) SHALL BE A MINIMUM OF 3 FT. FOR SECONDARY ACCESS ROADS AND 4 FT. FOR PRIMARY ACCESS ROADS.



CULVERT OUTLET PROFILE DETAIL

NOT TO SCALE



CULVERT TYPICAL CROSS SECTION

NOT TO SCALE

CULVERT SIZING TABLE

CULVERT DIAMETER (IN)	MINIMUM FILL (FT)	CULVERT CAPACITY (CFS)
PRIMARY ACCESS ROADS		
18	4	18
24	4	35
30	4	60
36	4	92
42	4	130
48	4	176
SECONDARY ACCESS ROADS		
18	3	16
24	3	32
30	3	55
36	3	82

NOTES

GENERAL CONSTRUCTION REQUIREMENTS:

1. ALL EXCAVATION CUT SURFACES, EMBANKMENTS, AND TRENCH BACKFILL MATERIALS SHALL BE COMPACTED TO 90% STANDARD PROCTOR DENSITY.
2. SELECT BEDDING MATERIAL SHALL BE COMPACTED TO 90% OF STANDARD PROCTOR DENSITY.
3. SELECT BEDDING MATERIAL SHALL CONSIST OF SELECTIVELY HANDLED SANDS AND GRAVELS OR AN EQUIVALENT SOIL MATERIAL WITH NO PARTICLES GREATER THAN 1-INCH, AT OPTIMUM MOISTURE CONTENT FOR COMPACTION.
4. WHERE WET AND UNSTABLE SOIL INCAPABLE OF SUPPORTING THE CULVERT IS ENCOUNTERED, SUCH MATERIAL SHALL BE REMOVED, AND REPLACED WITH SELECT BEDDING MATERIAL.
5. TRENCH BACKFILL SHALL CONSIST OF SELECTED EXCAVATION OR BORROW MATERIALS WITH NO LARGE ROCKS, AND AT OPTIMUM MOISTURE CONTENT FOR COMPACTION.
6. TRENCH BACKFILL SHALL BE PLACED IN LIFTS NOT EXCEEDING 6" IN COMPACTED DEPTH, AND BROUGHT UP EVENLY ON BOTH SIDES OF THE CULVERT FOR ITS FULL LENGTH.
7. ROCK PROTECTION AND ROCK APRONS SHALL CONSIST OF WELL-GRADED DURABLE MATERIALS WITH A D50 DIAMETER OF 9" OR 12" AS SHOWN ON THE PLANS.
8. METAL OR PLASTIC CULVERT END SECTIONS, CONSISTING OF THE SAME MATERIAL TYPE AS THE ATTACHED CULVERT, WILL BE INSTALLED ON THE CULVERT INLETS AND OUTLETS.

CORRUGATED STEEL PIPE AND END SECTIONS SHALL MEET THE FOLLOWING SPECIFICATIONS:

1. CONFORM TO THE APPLICABLE SECTIONS OF AASHTO M 36 AND EITHER AASHTO M 218 OR AASHTO M 274 FOR THE SPECIFIED SECTIONAL DIMENSIONS AND THICKNESS.
2. THE SHEET THICKNESS OF THE STEEL PIPE SHALL BE A MINIMUM OF 14 GAGE.
3. CORRUGATED STEEL PIPE MAY BE USED FOR ALL SIZES OF CULVERTS.

CORRUGATED POLYETHYLENE PIPE AND END SECTIONS SHALL MEET THE FOLLOWING SPECIFICATIONS:

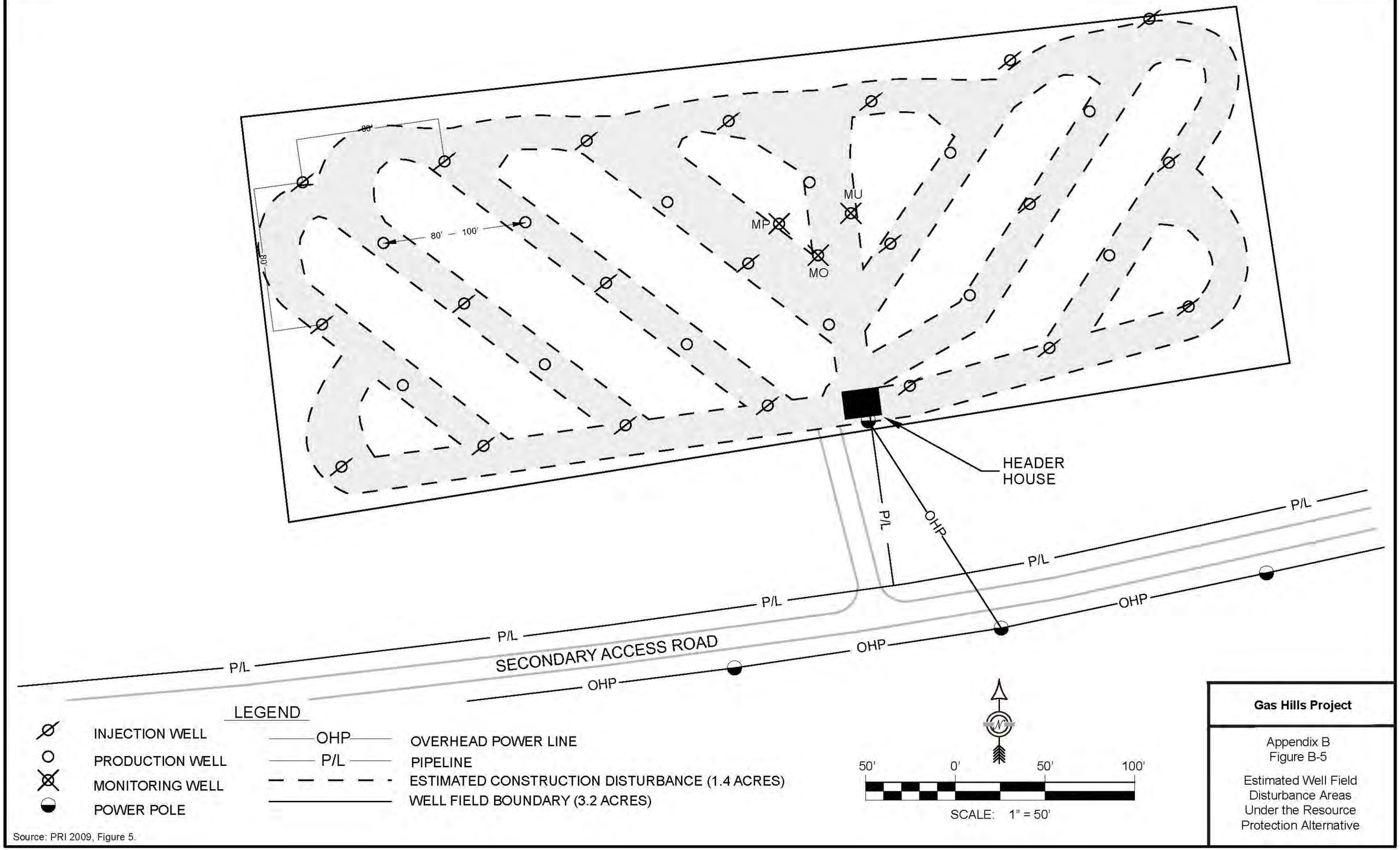
1. CONFORM TO THE APPLICABLE SECTIONS OF AASHTO M 294-92 FOR THE SPECIFIED SECTIONAL DIMENSIONS AND THICKNESS.
2. CORRUGATED POLYETHYLENE PIPE MAY BE USED FOR CULVERT SIZES 18", 24" AND 36" ONLY FOR CULVERTS GREATER THAN 36", STEEL SHALL BE USED.

Source: PRI 2009, Plate OP-5.

Gas Hills Project

Appendix B
Figure B-4

Typical Culvert Installation



Source: PRI 2009, Figure 5.

Gas Hills Project

Appendix B
Figure B-5

Estimated Well Field Disturbance Areas Under the Resource Protection Alternative

Appendix C

Gas Hills Wildlife Monitoring Plan

OPERATIONAL WILDLIFE MONITORING PLAN

CAMECO RESOURCES'

GAS HILLS IN-SITU URANIUM RECOVERY PROJECT

AUGUST, 2013

INTRODUCTION

Baseline wildlife surveys were conducted for Cameco Resources' Gas Hills In-situ Uranium Recovery Project during 2009-2010 following guidelines outlined in the *Wildlife Monitoring Plan for Cameco Resources' Gas Hills In-situ Uranium Recovery Project - 2010*. The purpose of the surveys were to update the baseline data and identify other species in the project area that have become sensitive since the original data was collected in 1992-1994, 1996-1997, and 1999. After a review of the updated baseline data, the Bureau of Land Management (BLM) – Lander Field Office (LFO) identified species of concern that required annual monitoring efforts.

Wildlife monitoring in and near the permit area will be conducted on an annual basis through the life of the project. Consultation with BLM-LFO, WGFD, and U.S. Fish and Wildlife Service (USFWS) will be conducted as needed prior to completing any annual survey work. Monitoring and survey methods are designed to be consistent with standard protocol used by the WGFD and the BLM-LFO. An annual wildlife monitoring report will be prepared and submitted to the WDEQ-LQD and BLM-LFO each year. Target species for annual monitoring within the permit area and applicable buffers will include greater sage-grouse, raptors (including burrowing owls), and mountain plovers.

ANNUAL AND PRE-CONSTRUCTION SURVEYS

Greater Sage-grouse

Four occupied sage-grouse leks occur within two miles of the Permit Area. In order to determine trends in local sage-grouse populations, ground count surveys on known leks within two miles of the Permit Area will be conducted three times during the leking season between April 1 and May 5 using protocols dictated by the Wyoming Game and Fish Department. The State of Wyoming's Greater Sage-grouse Executive Order will be followed during operations.

Raptors

Three ground surveys will be conducted to determine current nest locations and assess raptor activity and productivity. In late April/early May, a ground survey will be conducted to determine activity at known nest sites and to search for new or previously undocumented nests within one mile of the Permit Area. In late May/early June, a ground survey will be conducted to: 1) verify the locations and status of raptor nests located during the first ground survey, 2)

determine productivity of early nesting raptors (i.e., great horned owl), 3) determine the activity of late nesting raptors (i.e., Swainson's hawk), and 4) search for new or previously undocumented nests that were not located during the previous survey. In late June/early July, a third ground survey will be conducted to determine productivity of the active nests found during previous surveys. During construction activities the U.S. Fish and Wildlife Service's (USFWS) Protection for Raptors Guideline will be followed. Mitigation of the USFWS Protection for Raptors Guideline will be coordinated with the BLM-LFO.

Burrowing Owl

Suitable nesting habitat for burrowing owls exists within the Permit Area on the scattered white-tail prairie dog towns. Additionally, suitable nesting habitat in predator and rodent burrows occurs intermittently throughout the Permit Area. Two surveys for burrowing owl occurrence and sign will be conducted at delineated prairie dog colonies that occur in and within the permit area and 0.25 mile buffer to document nest locations and activity. Surveys will be performed between May and July and also specific to any planned construction that may occur between April 15 and September 1. Incidental observations of burrowing owls will be recorded throughout the survey season. If a burrowing owl nest is located, USFWS spatial and seasonal buffer protection will be applied to the nest.

Mountain Plover

Two ground surveys to determine the presence or absence of mountain plover will be conducted annually between April 20 and July 10 in the delineated suitable habitat. These surveys will be carried out in accordance with current USFWS and BLM protocols. When or if new habitat patches are located within a quarter mile of the Permit Area, they will be delineated and presence/absence surveys will be conducted. Prior to construction in or within 0.25 mile of delineated mountain plover habitat, surveys will be conducted to determine presence and absence. If a mountain plover is found to be present in a delineated habitat patch then nest surveys will be conducted. A 0.25 mile buffer will be applied to active nests; if an active nest is located, the planned activity will be delayed 37 days or seven days post-hatching. If a nest is not located in an active habitat patch then the habitat patch will receive a 0.25 mile buffer. If a habitat patch is determined to be unoccupied then the planned activity must begin within 14 days of the last survey.

Migratory Birds of High Federal Interest

Cameco Resources is still exploring options in how to effectively mitigate and minimize the use of the proposed evaporation ponds on site by Migratory Birds of High Federal Interest.

Other Species

Opportunistic sightings of other wildlife species will be documented during the course of annual field surveys. The location, number, age, sex, activity, and habitat type for each wildlife sighting will be documented.

SURVEY SCHEDULE

An outline and schedule of annual wildlife surveys to be conducted is presented below.

April

- Ground counts of sage-grouse on the four known leks and any new leks discovered.

May

- Ground survey for raptor nest activity and to search for new or previously undocumented nests.
- Mountain plover occurrence surveys in previously mapped suitable habitat.

June

- Ground surveys for raptor nest activity and fledgling status.
- Burrowing owl ground surveys for nest locations within delineated white-tailed prairie dog colonies.
- Mountain plover occurrence surveys in previously mapped suitable habitat.

July

- Document productivity status of active raptor nests.
- Burrowing owl ground surveys for nest locations within delineated white-tailed prairie dog colonies.

Appendix D

Appendix D of the Lander Proposed RMP and Final EIS

Appendix D. Reclamation Objectives and Standards

Reclamation will be required for any surface-disturbing activity occurring on public lands. A reclamation plan appropriate in detail and complexity and tailored to a specific surface-disturbing activity will be required for this activity. This appendix details the reclamation objectives and standards necessary to achieve a timely and proper recovery according to management objects of the disturbed site and is consistent with the Wyoming Reclamation Policy.

The reclamation plan will provide comprehensive as well as detailed site-specific reclamation procedures, methods and actions to successfully meet the objectives and standards for any surface disturbance. The reclamation plan will also include sufficient monitoring requirements and reports to ensure reclamation success has been accomplished. Site-specific reclamation plans will identify the dominant Ecological Site Descriptions, referenced plant communities, and soil map units. The approved reclamation plan must adhere to federal, state and local requirements, which can be used by regulatory agencies in their oversight roles to ensure that the reclamation measures are implemented, are appropriate for the site, meet area resource objectives (such as for wildlife, including greater sage-grouse), and are ecologically functional.

Limited Reclamation Potential (LRP) areas as identified in the LRP Map (Map 11) will require site-specific measures in the reclamation plan and will address the critical characteristics associated with these sites. These critical characteristics include but are not limited to soil erosivity, chemical and physical soil restrictive characteristics, steep slopes, and inadequate affective precipitation.

Project level reclamation objectives and standards will be established prior to disturbance and must be consistent with the objective set forth. The objectives and standards may be modified by the Authorized Officer if site-specific situations are deemed necessary to meet the overall land management objectives. To ensure objectives are being met, they will identify metrics, with triggers such as plant composition, percent cover, or other site-specific factors. Reclamation objectives are as follows:

- The objective of interim reclamation in the Designated Development Areas (DDAs) is to rehabilitate disturbed sites during the interim phase of development to achieve landscape continuity, minimize non-designated invasive species, and stabilize the soil. Interim reclamation will emphasize native plant species and will be designed to minimize re-disturbance during final reclamation activities and to initiate and accelerate ecological succession.

- Nonnative plants are permissible only as an approved short-term and non-persistent alternative to native plant materials. Nonnatives will not hybridize, displace, or offer long-term competition to the endemic plants, and are designed to aid in the reestablishment of native plant communities.

- The objective of interim reclamation in non-DDAs is to rehabilitate disturbed sites during the interim phase of development to achieve landscape continuity, minimize non-designated invasive species, and stabilize the soil and to promote a diversified plant community with the end result of accelerating the vegetative successional process to meet wildlife habitat goals. Interim reclamation will emphasize native plant species and will be designed to minimize

re-disturbance during final reclamation activities and to initiate and accelerate ecological succession.

- The objective of final reclamation in DDAs is to rehabilitate disturbed sites to achieve landscape continuity, minimize non-designated invasive species, and provide for a stabilized ecologically diverse plant community. Final reclamation is successful when a state of ecological progressive succession is achieved which can eventually advance to full ecosystem restoration.

- The objective of final reclamation in the non-DDAs is to reclaim disturbed sites to achieve landscape continuity, minimize non-designated invasive species, and provide for a stabilized ecologically diverse plant community, which will support approximately similar composition and density of organisms that were originally present. Final reclamation is successful when a state of ecological progressive succession is achieved which can eventually advance to full ecosystem restoration.

- During predisturbance onsites, the Natural Resources Conservation Service Ecological Site Descriptions will be determined, and the operator may explain why a Vegetation Reference Area might be more appropriate for use than the Ecological Site Descriptions, and whether a return to baseline condition is appropriate. The reclamation standard to be applied in determining if interim or final reclamation has been achieved will be part of the National Environmental Policy Act analysis of the action, and the Vegetation Reference Area will be part of at least one alternative analyzed, if requested by the operator.

Interim Reclamation Standards for Designated Development Areas Reclamation will be considered successful 3 years after seeding if the following criteria are met:	
Site Characteristics	**Standards**
Percent Ground Cover	80 percent of the Erosion indicator as listed on NRCS Reference Sheet for Ecological Site is met
Plant Species Composition (by weight)	● At least 65 percent total plant species must be from major grasses, forbs and/or shrubs listed in the Ecological Site Desired Plant Community and/or BLM authorized plant species from seeding mix ● No greater than 15 percent of the total reclaimed disturbance will be composed of non-designated invasive species ● No greater than 35 percent of a 500 square foot contiguous area within a reclaimed disturbance will be composed of non-designated invasive species ● No designated federal and state invasive plant species present
Site Stability, Erosion Potential, and other Variables	Meet NRCS Reference Sheet Indicators for Ecological Site with the following exceptions: ● Soil Surface Structure and Soil Organic Matter content ● Average Percent of Litter Cover and Depth ● Expected Annual Production ● Functional/Structural Groups
BLM Bureau of Land Management NRCS Natural Resources Conservation Service	

Interim Reclamation Standards for non-Designated Development Areas Reclamation will be considered successful 5 years after seeding if the following criteria are met:	
Site Characteristics	**Standards**
Percent Ground Cover	At least 90 percent of the Erosion indicator as listed on NRCS Reference Sheet for Ecological Site is met
Plant Species Composition (by weight)	● At least 75 percent total plant species must be from major grasses, forbs and shrubs listed in the Ecological Site Desired Plant Community and/or BLM authorized plant species from seed mix ● At least 5 percent of the total plant species must be woody plants as listed in the Ecological Site Desired Plant Community ● At least 5 percent of the total plant species must be forbs as listed in the Ecological Site Desired Plant Community ● No greater than 15 percent of the total reclaimed disturbance will be composed of non-designated invasive species ● No greater than 35 percent of a 500 square foot contiguous area within a reclaimed disturbance will be composed of non-designated invasive species ● No designated federal and state invasive plant species present
Site Stability, Erosion Potential, and other Variables	Meet NRCS Reference Sheet Indicators for Ecological Site with the following exceptions: ● Soil Surface Structure and Soil Organic Matter content ● Average Percent of Litter Cover and Depth ● Expected Annual Production ● Functional/Structural Groups
BLM Bureau of Land Management NRCS Natural Resources Conservation Service	

Final Reclamation Standards for Designated Development Areas Reclamation will be considered successful after receipt of project abandonment if the following criteria are met:	
Site Characteristics	**Standards**
Percent Ground Cover	90 percent of the Erosion indicator as listed on NRCS Reference Sheet for Ecological Site is met
Plant Species Composition (by weight)	● At least 80 percent total plant species must be from major grasses, forbs and/or shrubs listed in the Ecological Site Desired Plant Community and/or BLM authorized plant species from seeding mix ● At least 5 percent of the total plant species must be woody plants as listed in the Ecological Site Desired Plant Community ● At least 5 percent of the total plant species must be forbs as listed in the Ecological Site Desired Plant Community ● No greater than 10 percent of the total reclaimed disturbance will be composed of non-designated invasive species ● No greater than 25 percent of a 500 square foot contiguous area within a reclaimed disturbance will be composed of non-designated invasive species ● No designated federal and state invasive plant species present
Site Stability, Erosion Potential, and other Variables	Meet NRCS Reference Sheet Indicators for Ecological Site with the following exceptions: ● Soil Surface Structure and Soil Organic Matter content ● Average Percent of Litter Cover and Depth ● Expected Annual Production ● Functional/Structural Groups
BLM Bureau of Land Management NRCS Natural Resources Conservation Service	

Final Reclamation Standards for non-Designated Development Areas Reclamation will be considered successful after receipt of project abandonment if the following criteria are met:	
Site Characteristics	**Standards**
Percent Ground Cover	100 percent of the Erosion indicator as listed on NRCS Reference Sheet for Ecological Site is met
Plant Species Composition (by weight)	● At least 85 percent of total plant species must be from dominate grasses, forbs and woody plants listed in the Ecological Site Desired Plant Community and/or BLM authorized plant species from seed mix ● All major grasses must be present ● Major woody plant species will meet minimum percentage and/or total woody plants present will meet minimum percentage of growth form characteristics listed in the Ecological Site Desired Plant Community. ● At least 3 of the listed forb must be present and at least 5 percent of the total plant species must be forbs as listed in the Ecological Site Desired Plant Community ● No greater than 5 percent of the total reclaimed disturbance will be composed of non-designated invasive species ● No greater than 15 percent of a 500 square foot contiguous area within a reclaimed disturbance will be composed of non-designated invasive species ● No designated federal and state invasive plant species present
Site Stability, Erosion Potential, and other Variables	Meet NRCS Reference Sheet Indicators for Ecological Site with the following exceptions: ● Soil Surface Structure and Soil Organic Matter content ● Average Percent of Litter Cover and Depth ● Expected Annual Production ● Functional/Structural Groups
BLM Bureau of Land Management NRCS Natural Resources Conservation Service	

Monitoring of reclaimed areas will be required and will ensure reclamation standards have been met. Reclaimed areas will be monitored annually by project proponent or BLM personnel if designated in the reclamation plan. Reclamation monitoring protocol will be included in the reclamation plan as approved by BLM.

Reclamation monitoring will be documented in an annual reclamation report submitted to the Authorized Officer by December 31 of each year after one full growing season following seeding. The report will document all aspects of the following:

- The 10 requirements of the Wyoming Reclamation Plan;
- The requirements of the Resource Management Plan reclamation objectives and standards;
- Requirements of the Onshore Oil and Gas Orders;
- Identify whether the reclamation objectives and standards are likely to be achieved in the near future without additional actions; and
- Identify actions that have been or will be taken to meet the objectives and standards.

The report will also include acreage figures for the following:

- Initial disturbed acres;
- Successful Interim Reclaimed Acres; and/or
- Successful Final Reclaimed Acres.

Annual reports will not be submitted for approval by the Authorized Officer as having fully met interim or final reclamation standards. Any time 15 percent or more of an interim reclaimed area is re-disturbed, monitoring will be reinitiated. Actions will be taken to ensure that reclamation

standards are met as quickly as reasonably practical. The Authorized Officer will be notified in a separate document by the project proponent when the reclamation operations have been completed that indicate the site meets reclamation standards and is ready for final inspection.

Appendix E

WDEQ-LQD Required Annual Report Information

REQUIRED ANNUAL REPORT INFORMATION
FOR NON-COAL LARGE MINING OPERATIONS

Land Quality Division, Districts I, II & III

RE: Wyoming Environmental Quality as Amended §35-11-411, Annual Report

1. (a) Name of Permittee.
   (b) Address and Phone Number.
   (c) Mining Permit Number.
   (d) Date of Permit Issuance (and any Amendment).
   (e) Mineral(s) Mined.
   (f) State and Federal Mineral Lease Numbers.

2. Time period covered by the report.

3. Mining:
   (a) Tabulate acreage disturbed (by pits, roads, facilities, etc.) during the report period and illustrate on map.
   (b) Tabulate acreage affected to date by years and illustrate on map.
   (c) Tabulate all topsoil stockpile volumes, date of stockpiling and illustrate on map.
   (d) Tabulate all out-of-pit spoil volumes, dates of placement and illustrate on map.
   (e) Tabulate quantity of commodity mined by years.
   (f) Describe any new construction during the report period and illustrate on map; include:
      1. Shop facilities, erection sites.
      2. Roads.
      3. Culverts.
      4. Diversion ditches, collector ditches, interceptor ditches, etc.
      5. Sediment ponds, containment ponds.
      6. Monitoring sites.

   (g) Describe any environmental problem areas, the proposed plan for mitigating them and illustrate areas on map; including:
      1. Pit stability problems.
      2. Subsidence.
      3. Accidental water discharge, dam failure, etc.

4. Slumping or sliding.

5. Revegetation problem areas.

4. Reclamation

(a) Tabulate the acreage completed during the report period and illustrate on map. Distinguish between:

1. Backfilled, graded, and contoured. Including date of approval for coal permits.

2. Topsoiled.

3. Seeded.

4. Reseeded.

5. Indicate where special construction or reclamation practices were used such as for sand bodies or alluvial material.

(b) Submit a map showing the reconstructed contours. The map must be the same scale and contour interval as the PMT map in the approved permit.

(c) Tabulate acreage reclaimed (seeded with permanent seed mix) to date by years and illustrate on map.

(d) Describe reclamation procedures used during the report period:

1. Depth of topsoil applied. Indicate whether from stockpile or directly applied.

2. Type of seed used for seeding during the report period.

3. Dates of seeding during the report period.

4. Seeding procedures used.

5. Rate of seed application.

6. Type and rate of any fertilizer applied.

7. Type and rate of mulch applied.

8. Rate of irrigation water applied.

9. Any deviations to the approved reclamation plan including, in addition to the items above, changes to the contour or location of post mining features.

(e) Describe results of previous revegetation efforts; include:

1. Types of seed that have germinated and are growing.

2. Types of seed that are not growing successfully.

3. Areas experiencing problems with weeds and weed types.

4. Significant erosional problems.

5. Areas of unsuitable overburden on the surface.

6. Procedures used or proposed to correct these problems.

(f) Summarize the actual reclamation costs incurred during the report period. Costs should be itemized for each operation (i.e. grading, topsoil replacement, seeding, etc.) and for each type of disturbance (i.e. spoil, haul roads, facilities removal, etc.) on a per-acre basis.

5. Describe in detail mining plans for the coming year including revised time schedules and all proposed deviations from previously approved plans. Acreages should be tabulated and illustrated on a map.

6. Describe in detail reclamation plans for the coming year including revised time schedules and deviations from previously approved plans. Acreages should be tabulated and illustrated on a map.

NOTE: On Items 5 and 6 above, any proposed deviation from the approved mine and reclamation plan must be described in detail. The proposed mining and reclamation plans will be reviewed and the operator will be notified if further information is required. "Significant" deviations will require permit revision application (Form 11) and public notice pursuant to Chapter 7, Section 2 of Land Quality Division Noncoal Regulations.

7. Describe in detail all monitoring activities during the report period, summarize the data, and describe procedures to correct any noted problems and deviations from previously approved methods, including:

(a) Groundwater analyses.

(b) Surface water analyses and discharge data.

(c) Precipitation data.

(d) Subsidence monitoring.

(e) Overburden analyses.

(f) Topsoil quantities - compare calculated and actual.

(g) Vegetation data.

(h) Wildlife data.

(i) A map showing and identifying monitoring locations.

8. Operator's Reclamation Performance Bond Estimate as required by Wyoming Statute §35-11-417. Reclamation cost estimates should be itemized in detail to reflect the actual estimated costs of reclaiming all lands which have been affected to date and those lands to be affected during the next report period. Costs must reflect procedures as specified in the

approved mine and reclamation plan. The estimated cost of dismantling and disposal of all facilities and structures must be included. Salvage value will not be used to offset bonding requirements. Reclamation projected for the coming year will not be used to offset bonding requirements. Pit backfill costs must reflect actual yardages to be moved. Actual yardages to be moved will reflect the removal or placement of additional material to correct any deviations between the PMT map and the map submitted for part 4.(b).

9. Supply any additional information as requested by the Division related to:

   (a) Notices of violation

   (b) Orders

   (c) Permit stipulations; and

   (d) Other special conditions.

10. All drill holes used for immediate developmental expansion of the advancing pit(s) shall be tabulated by location and depth and shown on the mining plan map. Pursuant to W.S. §35-11-404(e), all drill holes used for exploration shall be reported to the LQD Abandoned Drill Hole Program Supervisor and the State Engineer.

ANNUAL REPORT MAPS

1. Maps must be clear and legible contour maps or recent aerial photos. The preferred scale is 1" = 500'.

2. Map sheets should be of a reasonable size, generally not to exceed 48" on a side.

3. Maps must have a title block with:
   - (a) Map title.
   - (b) Name and address of permittee.
   - (c) Permit and amendment numbers.
   - (d) Annual report period.
   - (e) Scale, north arrow, contour interval, date of photography, etc.

4. All maps must show:
   - (a) Legal subdivisions -- section, township, and range lines clearly labeled.
   - (b) Permit area boundary clearly shown and labeled.
   - (c) Amendment areas clearly shown and labeled.

5. The following features should all be clearly identified:
   - (a) Topsoil stockpiles (numbered).
   - (b) Settling ponds and sediment control structures.
   - (c) Haul roads.
   - (d) Pits identified by location, name, number, etc.
   - (e) Ramps (numbered).
   - (f) Out-of-pit spoil dumps including date of initial placement of material (if permanent, give approval date).
   - (g) All waste disposal sites including, but not limited to:
     1. Carbonaceous waste dumps.
     2. Partings dumps.
     3. Fly ash disposal sites, etc.
     4. Landfill sites.
   - (h) Diversion ditches
   - (i) Monitoring sites
   - (j) Facilities location (silos, labs, crushers, washbays, etc.)

6. History of mining and reclamation should be documents for all areas. The preferred method

is to outline separate areas on the map and assign each a number. Then a summary should be presented listing the following information for each separate area:

(a) Acreage.

(b) Initial date of disturbance.

(c) Date of regrading.

(d) Date of approval of grading.

(e) Date of topsoiling and approximate depth, source of topsoil.

(f) Date of mulching and type of mulch.

(g) Date of seeding.

(h) Seed mix.

(i) Date and mix of reseeding.

(j) Any reworking such as repair of gullies, etc.

(k) Bond status of areas (type of bond, date of any release and percent released).

7. All areas to be affected by mining and reclamation activities in the coming year should be outlined and labeled.

Annual Report Attachment

A. Please indicate any change in company name or business organization.

_____

_____

B. List the names, addresses and phone numbers for the following:

1. General Manager:_____

_____

_____

2. Party to Receive Notice _____

_____

_____

C. List the names, addresses and phone numbers of all officers, owners and/or controllers. Include titles/positions and beginning and ending dates.

_____

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Appendix F

Wyoming BLM Reclamation Policy

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Wyoming State Office
P.O. Box 1828
Cheyenne, Wyoming 82009-1828

IN REPLY REFER TO:
3042 (921Gamper) P

March 27, 2012

EMS TRANSMISSION: 4/2/2012
Instruction Memorandum No. WY-2012-032
Expires: 9/30/2013

To: District Managers and Deputy State Directors

From: Associate State Director

Subject: Wyoming Bureau of Land Management (BLM) Reclamation Policy

Program Areas: All Surface Disturbing Activities.

Purpose: Implement the Wyoming Reclamation Policy

Policy/Action: In order to ensure a consistent and science-based approach to reclamation, this Instruction Memorandum (IM) identifies ten reclamation requirements (see Attachments) that must be addressed when developing reclamation proposals for all surface disturbing activities. Addressing these ten requirements will help achieve both short and long-term reclamation success for site stabilization and eventual ecosystem reconstruction. The Wyoming Reclamation Policy was previously issued under IM No. WY-2009-022 which expired on September 30, 2010. This IM replaces IM No. WY-2009-022.

Background: Successful reclamation efforts are critical in maintaining an effective multiple-use land management program. Nearly all authorizations for surface disturbing actions are based upon the assumption that an area can and ultimately will be successfully reclaimed. Those seeking approval to conduct surface disturbing activities on Public Lands must include reclamation planning as part of their permit process and the BLM must make this requirement clear early in the permitting process. This IM applies to all BLM authorized actions including those initiated by the BLM.

Timeframe: Effective immediately.

Budget Impact: Savings to Project funds in the long-term.

Manual/Handbook Sections Affected: This IM will be supported with more detailed guidance including new reclamation bond standards and a statewide monitoring and reporting strategy.

Specific reclamation information, sample templates for both reclamation and weed management plans, and other technical guidance is posted on the Wyoming Reclamation web site (http://www.blm.gov/wy/st/en/programs/reclamation.html).

Coordination: The coordination and review of the Wyoming Reclamation Policy has been completed with the WY BLM Reclamation Team: Brenda Neuman, Mining Engineer, WSO; Ken Henke, Natural Resource Specialist, WSO; Adrienne Pilmanis, Botanist, WSO; Travis Bargsten, Physical Scientist, WSO; and Merry Gamper, Physical Scientist, WSO Lead. Other non-Wyoming BLM specialists, WO-310, the Wyoming Governor's Office (for review by all appropriate State Agencies), the University of Wyoming, some local Governments, and numerous interested reclamation professionals in private industry statewide.

Contact: Merry Gamper at 307-775-6272, and by e-mail at MGamper@BLM.gov.

Signed By:	Authenticated By:
Ruth Welch	Sherry Dixon
Associate State Director	Secretary

2 Attachments

1 - Wyoming BLM Reclamation Policy (6 pp)
2 - Wyoming BLM Oil and Gas Reclamation Plan Template (4 pp)

Distribution

Director (200), Rm. 5644, MIB 1	1 (w/o atch)
Director (300), Rm. 5625, MIB 1	1 (w/o atch)
Field Managers	1 (w/atch)
CF	1 (w/atch)

Wyoming Reclamation Policy

The Wyoming Reclamation Policy is guidance for the modification, preparation and/or review of all reclamation plans. It applies to all Federal actions authorized, conducted, or funded by the BLM that disturb vegetation and/or the mineral/soil resources. This policy is intended to be support all BLM program objectives.

A reclamation plan shall be developed for all surface disturbing activities and will become part of the proposed action in the NEPA document. The level of detail for the reclamation plan shall reflect: the complexity of the project, the environmental concerns, the reclamation potential for the site, and the re-vegetation strategy. These plans shall also incorporate any program or regulatory specific requirements for reclamation. The reclamation plan shall address short term stabilization to facilitate long term reclamation. The reclamation plan is considered complete when all the reclamation requirements described below have been addressed, the techniques to meet the reclamation requirements are described in detail, and the BLM concurs with the reclamation plan.

Many landscapes can be reclaimed using established conventional reclamation methods. However, some areas have unique characteristics that make achieving all the reclamation requirements described in this policy unrealistic. Innovative techniques beyond conventional practices must be considered and applied to reclaim these more challenging areas. Areas posing the most extreme reclamation challenges will be identified as having Limited Reclamation Potential (LRP). These areas are often characterized by highly sensitive and/or erosive soils, highly sensitive vegetation types, soils with severe physical or chemical limitations, extremely steep slopes, etc. These LRP areas may require site-specific reclamation measures not specifically addressed in the Wyoming Reclamation Policy. Each Field Office shall develop a unique set of reclamation success requirements for those areas within the framework of the attached Policy. The additional difficulty of reclaiming these LRP areas should be considered in the Resource Management Plan and evaluated when planning surface-disturbing activities. During the NEPA process, alternatives to approving development activities in LRP areas should be carefully analyzed. Alternatives considered should include: avoidance and/or unconventional site specific reclamation requirements. Resource development activities approved in these areas may require additional bonding.

A. RECLAMATION GOALS

1. Short term goal: immediately stabilize disturbed areas and provide conditions necessary to achieve the long term goal.

2. Long term goal: facilitate eventual native plant community and ecosystem reconstruction to maintain a safe and stable landscape and meet the desired outcomes of the land use plan.

B. RECLAMATION REQUIREMENTS

The following Reclamation Requirements apply to all surface disturbing activities, including BLM initiated activities, and must be addressed in each reclamation plan. These requirements also must be met prior to release of the bond and/or the reclamation liability. Where these Reclamation Requirements differ from other applicable Federal laws, rules, and regulations, those requirements supersede this policy. State and/or local statutes or regulations may also apply.

1. **Manage all waste materials:**

   a. Segregate, treat, and/or bio-remediate contaminated soil material.

   b. Bury only authorized waste materials on site. Buried material must be covered with a minimum of three feet of suitable material or meet other program standards.

   c. Ensure all waste materials moved off-site are transported to an authorized disposal facility.

2. **Ensure subsurface integrity, and eliminate sources of ground and surface water contamination.**

   a. Properly plug all drill holes and other subsurface openings (mine shafts, adits etc.).

   b. Stabilize, properly back fill, cap, and/or restrict from entry all open shafts, underground workings, and other openings.

   c. Control sources of contamination and implement best management practices to protect surface and ground water quality.

3. **Re-establish slope stability, surface stability, and desired topographic diversity.**

   a. Reconstruct the landscape to the approximate original contour or consistent with the land use plan.

   b. Maximize geomorphic stability and topographic diversity of the reclaimed topography.

   c. Eliminate highwalls, cut slopes, and/or topographic depressions on site, unless otherwise approved.

   d. Minimize sheet and rill erosion on/or adjacent to the reclaimed area. There shall be no evidence of mass wasting, head cutting, large rills or gullies, down cutting in drainages, or overall slope instability on/or adjacent to the reclaimed area.

4. **Reconstruct and stabilize water courses and drainage features.**

   a. Reconstruct drainage basins and reclaim impoundments to maintain the drainage pattern, profile, and dimension to approximate the natural features found in nearby naturally functioning basins.

   b. Reconstruct and stabilize stream channels, drainages, and impoundments to exhibit similar hydrologic characteristics found in stable naturally functioning systems.

5. **Maintain the biological, chemical, and physical integrity of the topsoil and subsoil** (where appropriate).

   a. Identify, delineate, and segregate all salvaged topsoil and subsoil based on a site specific soil evaluation, including depth, chemical, and physical characteristics.

   b. Protect all stored soil material from erosion, degradation, and contamination.

   c. Incorporate stored soil material into the disturbed landscape.

   d. Soil storage piles to be stored beyond one growing season, should be seeded with appropriate vegetation (native or sterile non-native species).

   e. Identify stockpiles with appropriate signage.

6. **Prepare site for revegetation.**

   a. Redistribute soil materials in a manner similar to the original vertical profile.

   b. Reduce compaction to an appropriate depth (generally below the root zone) prior to redistribution of topsoil, to accommodate desired plant species.

   c. Provide suitable surface and subsurface physical, chemical, and biological properties to support the long term establishment and viability of the desired plant community.

   d. Protect seed and seedling establishment (e.g. erosion control matting, mulching, hydro-seeding, surface roughening, fencing, etc.)

7. **Establish desired self-perpetuating native plant community.**

   a. Establish species composition, diversity, structure, and total ground cover appropriate for the desired plant community.

b. Enhance critical resource values (e.g. wildlife, range, recreation, biodiversity, etc.), where appropriate, by augmenting or accelerating restoration of plant community composition, diversity, and/or structure.

c. Select genetically appropriate and locally adapted native plant materials (e.g. locally sourced or cultivars recommended for seed zone) based on the site characteristics and ecological setting.

d. Use locally sourced and/or collected seeds to the extent possible (local collection and logistics should be included in the Reclamation Plan).

e. Select non-native plants only as an approved short term and non-persistent (i.e. sterile) alternative to native plant materials. Ensure the non-natives will not hybridize, displace, or offer long-term competition to the endemic plants, and are designed to aid in the re-establishment of native plant communities.

8. **Reestablish a complementary visual composition**

a. Ensure the reclaimed landscape features blend into the adjacent area and conform to the land use plan decisions.

b. Ensure the reclaimed landscape does not result in a long term change to the scenic quality of the area.

9. **Manage Invasive Plants**

a. Assess for invasive plants before initiating surface disturbing activities.

b. Develop an invasive plant management plan.

c. Control invasive plants utilizing an integrated pest management approach.

d. Monitor invasive plant treatments.

10. **Develop and implement a reclamation monitoring and reporting strategy.**

a. Conduct compliance and effectiveness monitoring in accordance with a BLM (or other surface management agency) approved monitoring protocol.

b. Evaluate monitoring data for compliance with the reclamation plan.

c. Document and report monitoring data and recommend revised reclamation strategies.

d. Implement revised reclamation strategies as needed.

e. Repeat the process of monitoring, evaluating, documenting/reporting, and implementing, until reclamation goals are achieved.

GLOSSARY

Contamination - The presence of man-made chemicals or other alterations in the natural soil or water environment (pesticides, hazardous substances, petroleum, salts).
Adapted from various sources

Desired Outcome*:* Specific goal/objectives and allowed uses outlined in land use plans. Desired outcomes should be identified for and pertain to resources (such as natural, biological, and cultural), resource uses, (such as energy and livestock grazing), and other factors (such as social and economic conditions).
BLM Handbook H-1601-1

Ecosystem **-** Includes all the organisms of an area, their environment, and the linkages or interactions among all of them; all parts of an ecosystem are interrelated. The fundamental unit in ecology, containing both organisms and abiotic environments, each influencing the properties of the other and both necessary for the maintenance of life.
Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement (BLM 2007)

Federal Action - Approval of specific projects, such as construction or management activities located in a defined geographic area. Projects include actions approved by permit or other regulatory decision as well as federal and federally assisted activities.
National Environmental Policy Act (NEPA) [42 U.S.C. 4321 et seq.]

Invasive Plant **-** A species that is not native (or is alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Plants listed on the State of Wyoming, Designated Noxious Weed List, would be included under this definition.
Executive Order 13112, Invasive Species (1999)

Limited Reclamation Potential (LRP) - Areas possessing unique landscape characteristics (e.g., sensitive geologic formations, extremely limiting soil conditions, biological soil crusts, badlands, rock-outcrops, etc.) often make reclamation success impractical and/or unrealistic due to physical, biological, and/or chemical challenges. When disturbed, these areas may require unconventional reclamation strategies to address the ten requirements established by this Policy.
Adapted from various sources

Locally-sourced native plant materials - seeds, seedlings, transplants, and/or inocula obtained and/or increased from collection at the project location or from nearby similar sites.

Adapted from various sources including the Integrated Vegetation Management Handbook 1740-2, Ch. 8, and Johnson et al 2010 "What Are The Best Seed Sources For Ecosystem Restoration on BLM and USFS Lands?", Native Plants, 11:2:117-131

Reclamation Plan – The Reclamation Plan is a written document that addresses the reconstruction of disturbed ecosystems by returning the land to a stable and productive condition compatible with the land use plan. The Plan must address all ten requirements included in this Policy.
Adapted from various sources

Scenic Quality – The overall impression of a landscape retained after driving or walking through, or flying over an area. The Scenic Quality of an area is rated as Class A (outstanding visual characteristics), Class B (combination of outstanding and common visual characteristics), and Class C (common visual characteristics). See BLM Handbook H-8410 Visual Resource Inventory and BLM Handbook H-8431Visual Resource Contrast Rating.

Soil – A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthly parent material, as conditioned by relief over periods of time.
Glossary of Soil Science Terms

Subsoil – Technically, the subsoil includes the B horizon. This is roughly, the part of the solum below the organic topsoil and above the rocky parent material of the C horizon. When suitable, the subsoil may be salvaged to supplement the topsoil for plant establishment.
Adapted from various sources

Soil Material – Includes the topsoil and/or the topsoil and a portion of the subsoil salvaged and separated to be used to provide a growth medium for plant establishment.
Adapted from various sources

Surface Disturbing Activities – An action that alters the vegetation, surface/near surface soil resources, and/or surface geologic features, beyond natural site conditions and on a scale that affects other Public Land values. Examples of surface disturbing activities may include: operation of heavy equipment to construct well pads, roads, pits and reservoirs; installation of pipelines and power lines; and the conduct of several types of vegetation treatments (e.g., prescribed fire, etc.). Surface disturbing activities may be either authorized or prohibited.
Wyoming Information Bulletin 2007-029, Guidance for Use of Standardized Surface Use Definitions

Surface Management Agency –Any Federal or State agency having jurisdiction over the surface estate. *Adapted from Onshore Oil and Gas Order No. 1*

Topsoil – The biologically active, upper part of the soil profile, being the most favorable material for plant growth.
Adapted from U.S.D.A., Natural Resources Conservation Service

Waste materials – Any discarded or abandoned material that can interfere with successful reclamation, safety, and long term stability of a site (contaminated soil or water, drilling mud, solid waste). *Adapted from various sources*

Wyoming-BLM Reclamation Policy
Suggested Reclamation Plan Template for Oil and Gas Operations

I. Reclamation – Baseline Information

Site Description
- Climate/Precipitation/Ecological Site Description (ESD)
- Orientation/Aspect
- Existing land use(s)
- Surface and groundwater hydrology
- Topography/Relief

Soils Description
- Soil features
- Soil stripping and stockpiling (length of time and storage configuration)
    - Soil map (optional, but highly recommended on large locations or those exhibiting different micro-communities)
- Viability management
- Soil inhibiting factors
    - Management prescriptions/recommendations

Pre-Disturbance Vegetation Composition
- Photo log with locational information
- Species with density
    - Map (optional, but highly recommended on large locations or those exhibiting different micro-communities)
- Known weed infestations
    - Proposed treatment

II. Reclamation Objectives:

The objective of interim reclamation is to restore vegetative cover and a portion of the landform sufficient to maintain healthy, biologically active topsoil; control erosion; and minimize habitat, visual, and forage loss during the life of the well or facilities.

The long-term objective of final reclamation is to return the land to a condition approximating that which existed prior to disturbance. This includes restoration of the landform and natural vegetative community, hydrologic systems, visual resources, and wildlife habitats. To ensure that the long-term objective will be reached through human and natural processes, actions will be taken to ensure standards are met for site stability, visual quality, hydrological functioning, and vegetative productivity.

III. Reclamation Performance Standards

The following reclamation performance standards will be met:

Interim Reclamation – Includes disturbed areas that may be redisturbed during operations and will be redisturbed at final reclamation to achieve restoration of the original landform and a natural vegetative community.

- Describe “Success” Criteria

Final Reclamation – Includes disturbed areas where the original landform and a natural vegetative community have been restored.

Describe "Success" Criteria

IV. Reclamation Plan Requirements

1) Operator Contact/Responsible Official
   Project Title and Responsible Party
   Include existing leases/wells (for geographic field plan only)

2) Construction Control Actions (actions that will be taken to minimize erosion until Reclamation can begin):
   Stormwater and erosion control
   Slope stabilization
   Topsoil viability management
   Monitoring

3) Management of Invasive, Noxious, and Non-Native Species (Policy Section B9)
   Pre-disturbance presence/Treatment
   Invasive plant management plan
   Monitoring

4) Interim Reclamation
   a) Production-held Surfaces (Policy Sections B1, B2 and B3) (layout diagram)
      Stormwater and Erosion control
      Facility installation
      Housekeeping/Monitoring

   b) Pipelines located on-lease (Policy Sections B2 thru B8)
      Pressure testing and disposal (if applicable)
      Seeding Methods/Mix and Source
      Erosion Control measures
      Risers (location, work areas, safety barricades)

   c) Roads (Policy Sections B2 thru B9)
      Production running surface width
      Drainage/Erosion controls remaining
      Seeding methods/mix

   d) Pit Closure (Policy Sections B1, B2 and B3)
      Known contents
      Length of time pit has been/will be open
      Current pit problems (torn pit liner, non-RCRA materials, etc)
      Closure methodology
      Closure testing plan

Closure sample results submittal

e) Ancillary facilities closure (i.e. water wells, monitor wells, powerlines, fences, etc)

f) Site Preparation (i.e. Recontouring) (Policy Sections B2, B3, B4, B5 and B6)
Equipment
Methods
Suitable soil redistribution
Final recontour layout diagram

f) Establish desired self-perpetuating native plant community (Policy Section B7):
Application of Topsoil & Revegetation:
Seeding:

- Methods
- Schedule
- Seed Mix

Example Seed Mix Table

Species of Seed (Cultivar)	Seed Source (genetic source; distributor)	App. Rate PLS (lbs/ac)
		Total:

g) Visual Resources Mitigation (Policy Section B8)
Actions
Final goal description

h) SME Notification Procedure

i) Reclamation Monitoring (Policy Section B10)
Methods and Reporting
Erosion control

j) Invasive Weeds (Policy Section B9)

k) Additional Measures proposed to enhance “success” (ie irrigation, fertilization, fencing, etc)

5) Final Reclamation Procedures – Additional (Policy Sections B1-B10)

a) Facility Removal

Facilities to be removed
Site assessment clearance (spills, trash)

b) Roads

Road proposed to remain? (two track, fully constructed, none)
Removal of surface materials
Road bed preparation
Seeding methods, timing, and mix

c) Pipeline Decommissioning

Pipeline abandonment procedure
Seeding methods, timing, and mix (if necessary)

d) Ancillary facilities decommissioning (water wells, powerlines, monitoring wells, fences, etc.)

e) Additional Site Prep (pad, road, pipeline)

Source of soil materials (if necessary)
Additional dirt work/Recontouring
Final recontour layout diagram
Final surface drainage
Seeding methods, timing and mix

f) Reclamation Monitoring (pad, road, pipeline)

Methods and reporting
Erosion control

g) Invasive weed management

h) Final abandonment approval timeline

Appendix G

PFYC System

U.S. DEPARTMENT OF THE INTERIOR **BUREAU OF LAND MANAGEMENT**
National

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Washington, D.C. 20240

October 15, 2007

In Reply Refer To:
1610, 8270 (240) P

EMS TRANSMISSION 10/18/2007
Instruction Memorandum No. 2008-009
Expires: 09/30/2009

To: All State Directors
From: Assistant Director, Renewable Resources and Planning
Subject: Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands

Program Areas: Paleontological Resources Management, Resource Management Planning, Lands and Realty Management, Minerals Management, Range

Purpose: This Instruction Memorandum (IM) transmits the Bureau of Land Management (BLM) classification system for paleontological resources on public lands. The classification system is based on the potential for the occurrence of significant paleontological resources in a geologic unit, and the associated risk for impacts to the resource based on Federal management actions. Copies of the classification system and implementation guidance are attached.
Policy/Action: The Potential Fossil Yield Classification (PFYC) system will be used to classify paleontological resource potential on public lands in order to assess possible resource impacts and mitigation needs for Federal actions involving surface disturbance, land tenure adjustments, and land-use planning. Implementation of the PFYC system will not mandate changes to existing land use plans, project plans, or other completed efforts. Integration into plans presently being developed is discretionary. All efforts subsequent to issuance of this IM should incorporate the PFYC system. This system will replace the current Condition Classification in the Handbook (H-8270-1) for Paleontological Resource Management.
Timeframe: This guidance is effective immediately for all BLM offices.
Background: This classification system for paleontological resources is intended to provide a more uniform tool to assess potential occurrences of paleontological resources and evaluate possible impacts. It uses geologic units as base data, which is more readily available to all users. It is intended to be applied in broad approach for planning efforts, and as an intermediate step in evaluating specific projects. This is part of a larger effort to update the Handbook H-8270-1 (General Procedural Guidance for Paleontological Resource Management) Chapter III (Assessment & Mitigation) and Chapter II.A.2 and will be incorporated into that Handbook update.
Impact on Budget: Costs for the initial classification of geologic units for those States that have not already determined the classification will be borne by each Office. Implementation of the PFYC system will have no additional costs.
Manual/Handbook Affected: Supersedes H-8270-1 (General Procedural Guidance for Paleontological Resource Management) Chapter II.A.2.
Coordination: The classification system is the product of the BLM's regional paleontologists, other BLM employees, and outside reviewers. This system is very similar to the Forest Service's Fossil Yield Potential Classification and will enable closer coordination of paleontological resource management between the agencies.

Contact: For questions regarding application of this policy and guidance, please contact Lucia Kuizon, National Paleontologist, at (202) 452-5107 or lkuizon@blm.gov.

Signed by:
Todd S. Chirstensen

Authenticated by:
Robert M. Williams

Acting, Deputy Assistant Director
Renewable Resources and Planning

Division of IRM Governance

2 Attachments:
1 – The Potential Fossil Yield Classification (PFYC) System (4 pp)
2 – Guidance for Implementing the PFYC System (5 pp)

Potential Fossil Yield Classification (PFYC) System.

Occurrences of paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them. The probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Therefore, geologic mapping can be used for assessing the potential for the occurrence of paleontological resources.

Using the Potential Fossil Yield Classification (PFYC) system, geologic units are classified based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts, with a higher class number indicating a higher potential. This classification is applied to the geologic formation, member, or other distinguishable unit, preferably at the most detailed mappable level. It is not intended to be applied to specific paleontological localities or small areas within units. Although significant localities may occasionally occur in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class; instead, the relative abundance of significant localities is intended to be the major determinant for the class assignment.

The PFYC system is meant to provide baseline guidance for predicting, assessing, and mitigating paleontological resources. The classification should be considered at an intermediate point in the analysis, and should be used to assist in determining the need for further mitigation assessment or actions.

The descriptions for the classes below are written to serve as guidelines rather than as strict definitions. Knowledge of the geology and the paleontological potential for individual units or preservational conditions should be considered when determining the appropriate class assignment. Assignments are best made by collaboration between land managers and knowledgeable researchers.

Class 1 **– Very Low**. Geologic units that are not likely to contain recognizable fossil remains.

- Units that are igneous or metamorphic, excluding reworked volcanic ash units.
- Units that are Precambrian in age or older.

(1) Management concern for paleontological resources in Class 1 units is usually negligible or not applicable.

(2) Assessment or mitigation is usually unnecessary except in very rare or isolated circumstances.

The probability for impacting any fossils is negligible. Assessment or mitigation of paleontological resources is usually unnecessary. The occurrence of significant fossils is non-existent or extremely rare.

Class 2 **– Low**. Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils.

- Vertebrate or significant invertebrate or plant fossils not present or very rare.
- Units that are generally younger than 10,000 years before present.
- Recent aeolian deposits.
- Sediments that exhibit significant physical and chemical changes (i.e., diagenetic alteration).

(1) Management concern for paleontological resources is generally low.

(2) Assessment or mitigation is usually unnecessary except in rare or isolated circumstances.

The probability for impacting vertebrate fossils or scientifically significant invertebrate or plant fossils is low. Assessment or mitigation of paleontological resources is not likely to be necessary. Localities containing important resources may exist, but would be rare and would not influence the classification. These important localities would be managed on a case-by-case basis.

Class 3 – **Moderate** or **Unknown**. Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential.

- Often marine in origin with sporadic known occurrences of vertebrate fossils.
- Vertebrate fossils and scientifically significant invertebrate or plant fossils known to occur intermittently; predictability known to be low.

  (or)
- Poorly studied and/or poorly documented. Potential yield cannot be assigned without ground reconnaissance.

Class 3a – **Moderate Potential.** Units are known to contain vertebrate fossils or scientifically significant nonvertebrate fossils, but these occurrences are widely scattered. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for hobby collecting. The potential for a project to be sited on or impact a significant fossil locality is low, but is somewhat higher for common fossils.

Class 3b – **Unknown Potential.** Units exhibit geologic features and preservational conditions that suggest significant fossils could be present, but little information about the paleontological resources of the unit or the area is known. This may indicate the unit or area is poorly studied, and field surveys may uncover significant finds. The units in this Class may eventually be placed in another Class when sufficient survey and research is performed. The unknown potential of the units in this Class should be carefully considered when developing any mitigation or management actions.

(1) Management concern for paleontological resources is moderate; or cannot be determined from existing data.

(2) Surface-disturbing activities may require field assessment to determine appropriate course of action.

This classification includes a broad range of paleontological potential. It includes geologic units of unknown potential, as well as units of moderate or infrequent occurrence of significant fossils. Management considerations cover a broad range of options as well, and could include pre-disturbance surveys, monitoring, or avoidance. Surface-disturbing activities will require sufficient assessment to determine whether significant paleontological resources occur in the area of a proposed action, and whether the action could affect the paleontological resources. These units may contain areas that would be appropriate to designate as hobby collection areas due to the higher occurrence of common fossils and a lower concern about affecting significant paleontological resources.

Class 4 – **High**. Geologic units containing a high occurrence of significant fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. Surface disturbing activities may adversely affect paleontological resources in many cases.

Class 4a – Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two acres. Paleontological resources may be susceptible to adverse impacts from surface disturbing actions. Illegal collecting activities may impact some areas.

Class 4b – These are areas underlain by geologic units with high potential but have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

- Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted.
- Areas of exposed outcrop are smaller than two contiguous acres.
- Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.
- Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources.

(1) Management concern for paleontological resources in Class 4 is moderate to high, depending on the proposed action.

(2) A field survey by a qualified paleontologist is often needed to assess local conditions.

(3) Management prescriptions for resource preservation and conservation through controlled access or special management designation should be considered.

(4) Class 4 and Class 5 units may be combined as Class 5 for broad applications, such as planning efforts or preliminary assessments, when geologic mapping at an appropriate scale is not available. Resource assessment, mitigation, and other management considerations are similar at this level of analysis, and impacts and alternatives can be addressed at a level appropriate to the application.

The probability for impacting significant paleontological resources is moderate to high, and is dependent on the proposed action. Mitigation considerations must include assessment of the disturbance, such as removal or penetration of protective surface alluvium or soils, potential for future accelerated erosion, or increased ease of access resulting in greater looting potential. If impacts to significant fossils can be anticipated, on-the-ground surveys prior to authorizing the surface disturbing action will usually be necessary. On-site monitoring or spot-checking may be necessary during construction activities.

Class 5 – **Very High**. Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation.

Class 5a – Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two contiguous acres. Paleontological resources are highly susceptible to adverse impacts from surface disturbing actions. Unit is frequently the focus of illegal collecting activities.

Class 5b – These are areas underlain by geologic units with very high potential but have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has very high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

- Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted.
- Areas of exposed outcrop are smaller than two contiguous acres.
- Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.
- Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources.

(1) Management concern for paleontological resources in Class 5 areas is high to very high.

(2) A field survey by a qualified paleontologist is usually necessary prior to surface disturbing activities or land tenure adjustments. Mitigation will often be necessary before and/or during these actions.

(3) Official designation of areas of avoidance, special interest, and concern may be appropriate.

The probability for impacting significant fossils is high. Vertebrate fossils or scientifically significant invertebrate fossils are known or can reasonably be expected to occur in the impacted area. On-the-ground surveys prior to authorizing any surface disturbing activities will usually be necessary. On-site monitoring may be necessary during construction activities.

Guidance for implementing the Potential Fossil Yield Classification (PFYC) System

Introduction

The Potential Fossil Yield Classification (PFYC) system will aid in assessing the potential for discovery of significant paleontological resources or the impact of surface disturbing activities to these resources.

It is intended to assist in determining proper mitigation approaches for surface disturbing activities, disposal or acquisition actions, recreation possibilities or limitations, and other BLM-approved activities. It will provide consistent information for input and analysis during planning efforts. The PFYC system can also highlight the areas most likely to be a focus of paleontological research efforts or illegal collecting. It is hoped that this system will allow BLM to direct management efforts toward potentially significant areas and reduce efforts in areas of lower potential.

This classification system was originally developed by the Forest Service's Paleontology Center of Excellence and the Region 2 (FS) Paleontology Initiative in 1996. Modifications were made by the BLM's Paleontological Resources staff in subsequent years.

Paleontological resources are closely associated with the geologic rock units containing them; that is, fossils are found more frequently in some rock units than others. The management of paleontological resources can thus be tied to the geologic units present at or near the ground surface, with greater management emphasis aimed at higher potential geologic units.

Uses

This PFYC system is utilized for land use planning efforts and for the preliminary assessment of potential impacts and proper mitigation needs for specific projects. It is intended to provide a tool to assess potential occurrences of significant paleontological resources. It is meant to be applied in broad approach for planning efforts, and as an intermediate step in evaluating specific projects.

There are five Classes with Class 1 being Very Low Potential and Class 5 being Very High Potential. Although granite, lava beds, and other igneous or metamorphic rock types are usually considered to be void of any fossils, outcrops of these rocks may have fissure fillings, cave-like structures, sinkholes, and other features that may preserve significant paleontological resources or information, so the potential is not zero; therefore Class 1 is applied to these rock types usually considered not to contain fossil resources.

It is intended that this system replace the current Condition Classification in the Handbook (H-8270-1), for Paleontological Resource Management. In general, the following is a comparison of the Condition Classification rankings to the new PFYC Classes:

Condition (from H-8270-1)	PFYC Class (this Instruction Memorandum)
Condition 1 – Areas known to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. (Note: this refers to known localities or groups of localities)	PFYC Class 4 (High) or Class 5 (Very High), based on geologic unit.
Condition 2 – Areas with exposures of geological units or settings that have high potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils.	PFYC Class 3 (Moderate), Class 4 (High), or Class 5 (Very High), based on geologic unit.
Condition 3 – Areas that are very unlikely to produce vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils.	PFYC Class 1 (Very Low) or Class 2 (Low).

Assignment of Classes

A separate class ranking is assigned to each recognized geologic formation or member present at the surface. Deposits of young alluvium (post-Pleistocene) or thick soils can often be ignored. However, geologic mapping may not separate the older Pleistocene alluvium which, may contain significant vertebrate fossils, and thus these units need to be carefully considered. Available geologic mapping, depending on map scale, may combine multiple formations or units. In these cases, the assigned classification should use the highest class of those included units. For ease of application, the classifications should be integrated into a Geographic Information System (GIS) based geologic map.

The classification is initially determined by the Regional Paleontologist; the State Office Paleontology Lead in collaboration with the Regional Paleontologist; or by knowledgeable individuals from a paleontology museum, university paleontology department, or consulting firm working under a formal agreement. Several States have already completed an initial classification and are incorporating the system into new planning and mitigation efforts.

To maintain consistency in planning efforts, mitigation requirements, and other management approaches, the classification should be applied to each formation on a state-wide basis, and even across State boundaries. But in some situations, geologic characteristics within formations may change across the State or region and may alter the potential for fossil occurrence. These differences may be a characteristic of the formation, be variable in occurrence, and unmappable at a workable scale; or may indicate a regional gradient, where a formation is highly fossiliferous in one portion of the State, but has lowered potential in another area. A variable occurrence in potential may be included in the general information about the formation. A regional gradient can be addressed by assigning a different class for separate areas.

Multiple class assignments for an individual formation should be applied in consultation with the State Office to maintain consistency across Field Office boundaries.

Over time, additional information may be acquired or developed that may suggest that a change in the class assignment is appropriate, especially from the Unknown Class (3b) to a higher or lower class. The classification should reflect the most current information, and recent research or discoveries may indicate a change is warranted. However, any changes should be measured against existing applications or use of the current classification, such as usage in Resource Management Plans (RMPs) or other planning or management documents.

Application

In planning documents and other general applications, these classes allow for uniform discussion of the paleontologic resource, potential adverse impacts, and management approaches. Assessment of general conditions, such as acres or percentages of each class, or spatial identification of important areas can be determined and presented in simple manner. Identification of areas of potential concern with other resources can be identified using GIS mapping or explained in the text body in simple fashion.

The PFYC classes may also be utilized to assess the possibility of adverse or beneficial impacts from land tenure adjustment (disposal or acquisition) proposals prior to on-the-ground surveys.

A primary purpose of the PFYC is to assess the possible impacts from surface disturbing activities and help determine the need for pre-disturbance surveys and monitoring during construction. This assessment should be an intermediate step in the analysis process; and local conditions such as amount of exposed bedrock should be considered when final mitigation needs are determined. The determination should also be supplemented by occurrences of known fossil localities and local geologic and topographic knowledge.

Mitigation Needs Assessment

Impacts of most surface-disturbing activities, and the need for mitigation efforts, are addressed by the local Field Office. Some larger actions, such as major pipeline projects, may be handled by the State Office, or even as multi-State projects. In all these cases, the assessment of impacts to paleontological resources and need for mitigation can be addressed in similar fashion through a progression of steps. The following outlines the general steps used to apply the PFYC system to this mitigation process.

1. **Identify the proposed action and affected area.** Consider the area directly impacted by the action, as well as areas that may be impacted by vehicle drive ways, equipment parking, storage areas, and increased access. Also consider the depth of disturbance to determine possible subsurface impacts.

2. Identify the potential impacts to paleontological resources. Determine the geologic units that may be impacted and the associated PFYC classes, and consult other sources of information about known localities or paleontological research that may have been done previously.

Based on the PFYC class and any additional resource information, determine the probability of impacting significant paleontological resources. If known localities are in the area of possible impact, determine if those localities can be avoided by altering the proposed action, such as repositioning a well pad location or rerouting a pipeline around a locality.

3. Determine the need for field survey or other mitigation efforts. On-the-ground field surveys, on-site monitoring, spot-checking at key times during construction, or locality avoidance are all possible mitigation approaches to lessen adverse impacts.

- If the PFYC class for the impacted area is Class 1 or 2, and there are no known localities within the area, no further assessment is typically needed.
- If a Class 3a (Moderate Potential) unit underlies the area, the local geologic conditions should be considered, as well as any known localities in the region. It may be necessary to consult with the Regional Paleontologist or other qualified paleontologist to assess the local conditions.
- If a Class 3b (Unknown Potential) unit underlies the area, it may be appropriate to require an on-site preliminary assessment by a qualified paleontologist.
- If the area is a Class 4b (buried bedrock with High Potential) or Class 5b (buried bedrock with Very High Potential), an assessment of the possible impacts to bedrock units must be made. If the proposed action will not penetrate the protective soil or alluvial layer, a pre-work survey or monitoring during the activity may not be necessary. If the potential exists to remove the protective layer and impact the bedrock unit below, it may be prudent to require a pre-work field survey and/or on-site monitoring during disturbance or spot-checks at key times. Because the bedrock unit is typically buried for much of the area in question, a pre-work survey may not always be necessary, as the fossil material may not be visible. However, it may then be more important to have an on-site monitor during disturbance or spot-checks at key times.
- If it is a Class 4a (exposed bedrock with High Potential) or Class 5a (exposed bedrock with Very High Potential) area, it will be necessary in most (Class 4a) or almost all (Class 5a) situations to require a pre-activity field survey of the areas directly and indirectly impacted.

Larger projects may impact multiple geologic units with differing PFYC Classes. In those cases, field survey and monitoring may be applied at differing levels. For example, surveys may be appropriate only on the Class 4 and 5 formations and not the Class 2 formations along a pipeline project. Careful mapping and detailed field notes should reflect the differing survey/monitoring intensities, and should be included in the consultant's report to BLM.

4. Conduct Pre-work Field Survey. Field surveys are almost always needed for Class 4 and 5 units, especially exposed bedrock areas (Class 4a and 5a). Class 3 units may or may not require a survey. Local conditions, such as vegetated areas or pockets of bedrock exposure, may affect the need and intensity of field surveys.

The consultant is required to submit a report of findings after completion of the field survey. In addition to standard reporting information, the report should contain the consultants' recommendations for further mitigation, and this recommendation should be considered when determining the need for and type of on-site monitoring or locality avoidance.

5. Monitor during disturbance activities. Those areas that have been determined to have a Very High potential (Class 5) for adverse impacts should typically be monitored at all times when surface-disturbing activities are occurring. If the area has a High potential (Class 4), it may be appropriate to examine the exposed unit, including the spoil or storage piles, only at key times. These times are dependent on the activity, but typically are: when bedrock is initially exposed, occasionally during active excavation, and when the maximum exposure is reached and before backfilling has begun. This monitoring and spot-checking must be performed by a permitted paleontologist or their BLM-approved representative. The monitor has the authority to briefly pause any activity to inspect a possible find. These pauses are intended to allow for identification of possible fossil resources and should only last a few minutes to a couple hours.

6. Evaluate significant finds. If significant paleontological resources are discovered during surface disturbing actions or at any other time, the proponent or any of his agents must: (a) stop work immediately at that site; (b) contact the appropriate BLM representative, typically the project inspector or Authorized Officer, as soon as possible; and (c) make every effort to protect the site from further impacts, including looting, erosion, or other human or natural damage. The BLM or designated paleontologist will evaluate the discovery and take action to protect or remove the resource within 10 working days. Work may not resume at that location until approved by the official BLM representative. In some cases, such as recovery of a dinosaur, further activity at that site may be delayed until the discovered fossils are recovered, or until the project is modified to avoid impacting the find. Because of the potential for lengthy delays, the BLM should assure that the project proponent understands this possibility prior to approval to begin work.

These steps are included here to provide general guidance, and it may be appropriate to modify or skip them for various situations. However, a brief discussion of the background and reason for modification should be placed in the project file.

For all surface-disturbing activities occurring within Class 3 or higher units, a stipulation should be included in the permitting document.

Further Information

Detailed information on the geologic units and paleontological resources within a State can often be obtained from State geological surveys, geological or paleontological museums, geology departments at universities or colleges, paleontological permittees or other researchers or within the BLM from Regional Paleontologists or knowledgeable Geologists.

Scientific publications, such as professional journals or State geological survey reports, often contain general and detailed information about paleontological and geological resources relevant to fossil potential and occurrences for specific areas. Current and past paleontological permittee reports usually include precise locality data and maps, and often contain discussions of findings and their significance.

Appendix H

Special Status Species

Appendix H Special Status Species Identified for the Cameco Gas Hills EIS

Common Name	Scientific Name	Status[1]	Habitat Association	Potential for Occurrence Within the Project area	Eliminated From Detailed Analysis (Yes/No)	References
Mammals						
Black-footed ferret	*Mustela nigripes*	FE	This species inhabits prairie dog colonies within semi-arid grasslands and mountain basins. Primarily a nocturnal species that is solitary except during the breeding season. The only known populations are in captivity or have been reintroduced. Efforts are being made throughout the Great Plains, western U.S., and Mexico to reintroduce this species into suitable habitats.	None. The USFWS has block-cleared all white-tailed prairie dog colonies within the project area. The nearest re-introduced population is approximately 60 miles southeast of the project area in the Shirley Basin.	Yes. Due to the project area occurring entirely within USFWS block-cleared areas and the large geographic distance to the nearest reintroduced population.	BLM 2007a; Fitzgerald et al. 1994; USFWS 2004.
Long-eared myotis	*Myotis evotis*	BLM	This species occupies coniferous forest. It is most common in ponderosa pine woodlands but also occurs in pinyon-juniper woodlands and subalpine forests.	None. No suitable nesting or foraging habitat occurs within the project area.	Yes. Occurrence would be limited to migrating or dispersing individuals.	BLM 2007a; Fitzgerald et al. 1994; WGFD 2010.
Pygmy rabbit	*Brachylagus idahoensis*	BLM	This species requires dense sagebrush for cover as well as appropriate deep soils for burrowing (i.e., high clay content). Often found in drainages with taller sagebrush present.	Low. Marginal sagebrush habitat occurs in the project area and this species has not been found during recent surveys within the project area.	No.	BLM 2004; HWA 2011; WGFD 2010.
Spotted bat	*Euderma maculatum*	BLM	The spotted bat is known to occur in montane forests, pinyon-juniper woodlands, and open semi-desert shrublands. This species occupies ponderosa pine forests during the breeding season and lower elevations during other times of the year.	High. Breeding habitat does not occur within the project area; however suitable foraging habitat occurs within the project area.	No.	Fitzgerald et al. 1994; WGFD 2010a,b.
Swift fox	*Vulpes velox*	BLM	The swift fox inhabits short-grass and mid-grass prairie and may be associated with prairie dog colonies. Dens typically occur on small hills and ridges.	None. This species is not known to occur within the project area.	Yes. The project area is outside the known distribution of this species in Wyoming.	BLM 2007a; Fitzgerald et al. 1994; WGFD 2010.

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Common Name	Scientific Name	Status[1]	Habitat Association	Potential for Occurrence Within the Project area	Eliminated From Detailed Analysis (Yes/No)	References
Townsend's big-eared bat	*Corynorhinus townsendii*	BLM	This species occupies semi-desert shrublands, pinyon-juniper woodlands, and open montane forests. It is frequently associated with caves and abandoned mines but will also utilize abandoned buildings and rock crevices for refuge.	High. Suitable roosting and foraging habitat occurs within the project area.	No.	BLM 2007a; Fitzgerald et al. 1994; WGFD 2010.
White-tailed prairie dog	*Cynomys leucurus*	BLM	Colonies of this species occur primarily in mountain basins, semi-desert grasslands, and open shrublands. This species is typically distributed in relatively large, sparsely populated complexes and live in loosely knit clans.	High. This species occurs within the project area. Surveys in 2009, 2010, and 2011 documented 6 colonies within the project area.	No.	BLM 2007a; Fitzgerald et al. 1994; HWA 2011; WGFD 2010.
Birds						
Bald eagle	*Haliaeetus leucocephalus*	BLM	This species typically occurs near large perennial waterbodies that support suitable roosting and foraging habitat. Nests are commonly built in large cottonwoods or conifers along lakes or rivers. During the winter, this species tends to concentrate in areas with abundant food sources such as wounded waterfowl, carrion, and fish.	None. No suitable nesting or foraging habitat occurs within the project area. This species has not been documented during recent surveys within the project area.	Yes. Occurrence would be limited to migrating or dispersing individuals.	BLM 2007a; Johnsgard 1990; WGFD 2010.
Brewer's sparrow	*Spizella breweri*	BLM	This species typically occurs in basin-prairie and mountain-foothills shrublands, especially sagebrush and woodland chaparral. Nests typically occur in shrubs.	High. This species is known to occupy suitable habitats within the project area and has been documented during recent surveys within the project area.	No.	BLM 2007a; HWA 2011; WGFD 2010.
Burrowing owl	*Athene cunicularia hypugea*	BLM	This species is found in non-riparian habitats including abandoned burrows of prairie dogs, ground squirrels, foxes, and badgers in grassland and open shrubland communities.	High. Suitable habitat for this species (i.e., white-tailed prairie dog colonies) occurs within the project area. However, this species has not been documented during recent surveys in the project area.	No.	BLM 2007a; HWA 2011; Johnsgard 1988; WGFD 2010.

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Common Name	Scientific Name	Status[1]	Habitat Association	Potential for Occurrence Within the Project area	Eliminated From Detailed Analysis (Yes/No)	References
Ferruginous hawk	*Buteo regalis*	BLM	This species occurs in open semi-arid habitats including basin-prairie shrubland, mountain-foothills, and badlands. Nest sites include short trees, ledges, and rock outcrops in sagebrush valleys and rolling grassland habitat.	High. While no active nests have been identified within 1-mile of the project area, one active nest occurs outside the 1-mile survey buffer occur near the project area. Suitable nesting and foraging habitat occurs within the project area.	No.	BLM 2007a; HWA 2011; Johnsgard 1990; WGFD 2010.
Greater sage-grouse	*Centrocercus urophasianus*	FC; BLM	This species inhabits sagebrush shrublands and grasslands. Breeding grounds (leks) are generally located in open areas such as broad ridges, grassy areas, and disturbed sites, adjacent to suitable nesting habitat. Most nesting occurs in sagebrush stands with adequate canopy cover and an understory of forbs and grasses. Winter habitat typically consists of south- and east-facing slopes with minimal snow cover.	High. This species is known to occur in suitable sagebrush habitat within the project area. No lek sites are known to occur within the project area. Four active leks occur within 2 miles of the project area. Suitable nesting and brooding habitat occurs within the project area.	No.	BLM 2007a; Connelly et al. 2004, 2000; HWA 2011; WGFD 2010.
Loggerhead shrike	*Lanius ludovicianus*	BLM	The loggerhead shrike typically inhabits open riparian areas, agricultural areas, grasslands, and shrublands (especially semi-desert shrublands). Nest sites usually occur in isolated trees or large shrubs.	High. This species is known to occupy suitable habitats within the project area and has been documented during recent surveys within the project area.	No.	BLM 2007a; HWA 2011; WGFD 2010.
Long-billed curlew	*Numenius americanus*	BLM	This species typically inhabits grasslands and wet meadows.	None. The project area is not within the know distribution of this species in Wyoming.	Yes. Occurrence would be limited to migrating or dispersing individuals.	BLM 2007a; WGFD 2010.
Mountain plover	*Charadrius montanus*	BLM	This species inhabits flat, short-grass prairie in areas recently burned, overgrazed by livestock, or occupied by prairie dog colonies.	High. This species is a late spring/summer resident within the project area and has been documented within the project area. Approximately 141 acres of potentially suitable habitat occurs within 0.25 mile of the project area,	No.	BLM 2007a; HWA 2011; WGFD 2010; WYNDD 2011.

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Common Name	Scientific Name	Status[1]	Habitat Association	Potential for Occurrence Within the Project area	Eliminated From Detailed Analysis (Yes/No)	References
Northern goshawk	*Accipiter gentilis*	BLM	This species occupies mature, close-canopied coniferous and aspen forests. The northern goshawk typically selects open, older-aged class coniferous forests and aspen stands for nesting.	None. Habitats typically associated with this species do not occur within the project area.	Yes. Occurrence would be limited to migrating or dispersing individuals.	BLM 2007a; Johnsgard 1990.
Peregrine falcon	*Falco peregrinus*	BLM	This species typically breeds in foothills and mountain areas. Nest sites are often located on ledges of high, steep-walled cliffs. Preferred foraging habitat includes marshes, lakes, rivers, and wet meadows.	None. Suitable nesting habitat does not occur within the project area.	Yes. Occurrence would be limited to migrating or dispersing individuals.	BLM 2007a; Johnsgard 1990.
Sage sparrow	*Amphispiza belli*	BLM	This species inhabits basin-prairie and mountain-foothills shrublands. Nesting typically occurs in or beneath sagebrush.	High. This species occurs in suitable habitats found within the project area but has not been documented during recent surveys within the project area.	No.	BLM 2007a; HWA 2011; WGFD 2010.
Sage thrasher	*Oreoscoptes montanus*	BLM	This species inhabits basin-prairie and mountain-foothills shrublands. Nesting typically occurs in or beneath sagebrush.	High. This species occurs in suitable habitats found within the project area but has not been documented during recent surveys within the project area.	No.	BLM 2007a; HWA 2011; WGFD 2010.
Trumpeter swan	*Cygnus buccinators*	BLM	This species inhabits lakes, ponds, marshes, and wetlands. Nests often occur on muskrat dens or small islands. Most of the North American population winters in Idaho.	None. This species is not known to nest within the project area.	Yes. Occurrence would be limited to migrating or dispersing individuals.	BLM 2007a; WGFD 2010.
White-faced ibis	*Plegadis chihi*	BLM	The white-faced ibis inhabits marshes, wetlands, wet meadows, and streams. Nesting habitat usually consists of dense vegetated islands surrounded by water >18 inches in depth.	None. This species is not known to nest within the project area.	Yes. Occurrence would be limited to migrating or dispersing individuals.	BLM 2007a; WGFD 2010.
Yellow-billed cuckoo	*Coccyzus americanus*	BLM	This species inhabits lowland deciduous woodlands, willow, and alder thickets, mature cotton-wood-riparian woodlands, deserted farmlands, and orchards. Breeding typically occurs in dense, mature riparian woodlands.	None. Suitable breeding habitat does not occur within the project area.	Yes. Occurrence would be limited to migrating or dispersing individuals.	BLM 2007a; Stokes and Stokes 1996; WGFD 2010.

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Common Name	Scientific Name	Status[1]	Habitat Association	Potential for Occurrence Within the Project area	Eliminated From Detailed Analysis (Yes/No)	References
Amphibians						
Boreal Toad	*Bufo boreas boreas*	BLM	Inhabits wet areas in foothills, montane, and subalpine zones from 6,500 to 12,000 feet in elevation.	None. This species range in Wyoming is west of the project area.	Yes. No records of occurrence exist for this species within the project area.	Baxter and Stone 1980; WGFD 2010.
Columbia spotted frog	*Rana luteiventris*	BLM	Found in sub-alpine forests, grasslands, and sagebrush habitats at elevations from 1,700 feet to 6,400 feet.	None. This species range in Wyoming is west of the project area.	Yes. No records of occurrence exist for this species within the project area.	Baxter and Stone 1980; WGFD 2010.
Great Basin spadefoot	*Spea intermontana*	BLM	Prefer sagebrush communities below 6,000 feet in elevation, although they have been found at elevations of 9,200 feet. This species require loose soil to burrow.	High. Suitable habitat occurs within the project area along the drainages and near wetland/riparian habitats.	No.	Baxter and Stone 1980; HWA 2011; WGFD 2010.
Northern leopard frog	*Rana pipiens*	BLM	Typical habitats include wet meadows and the banks and shallows of marshes, ponds, glacial kettle ponds, beaver ponds, lakes, reservoirs, streams, and irrigation ditches. Breeding season is generally May 1 - August 15.	High. Suitable habitat occurs within the project area along the drainages and near wetland/riparian habitats.	No.	Baxter and Stone 1980; BLM 2007a; HWA 2011; WGFD 2010.
Fish						
Yellowstone cutthroat trout	*Oncorhynchus clarkii bouvieri*	BLM	The Yellowstone cutthroat lives in lakes, large rivers, and small tributary streams. Native to the Yellowstone River drainage downstream to the Tongue River, including the Big Horn and Clarks Fork River drainages, this trout is also found in Pacific Creek and other Snake River tributaries.	None. This species range in Wyoming is west of the project area.	Yes. No records of occurrence exist for this species within the project area.	WGFD 2010.
Plants						
Barneby's clover	*Trifolium barnebyi*	BLM	Found on ledges, crevices, and seams, mainly on reddish-cream Nugget Sandstone, secondarily on Frontier Sandstone. Elevation range from 5,500 to 6,780 feet amsl. Flowering May to July.	None. Local endemic, that is known from five extant occurrences in the southeastern foothills of the Wind River and southern Beaver Rim area in Fremont County, Wyoming.	Yes. Based on the limited distribution and geographic range of the species, habitat for the species is not found in the Permit Area.	WYNDD 2011b.

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Common Name	Scientific Name	Status[1]	Habitat Association	Potential for Occurrence Within the Project area	Eliminated From Detailed Analysis (Yes/No)	References
Beaver Rim phlox	*Phlox pungens*	BLM	Sparsely vegetated slopes on sandstone, siltstone, or limestone (in the Wind River Basin) and on cays and shales (in the Green River Basin). Elevation range 6,000 to 7,400 feet amsl. Flowering May-June.	High. Patches of suitable habitat for the species was identified in the Permit Area during field surveys conducted by Hayden-Wing.	No.	HWA 2010; WYNDD 2011b.
Blowout penstemon	*Penstemon haydenii*	FE	Substrate of eroding and shifting sand with low vegetation cover, typically found in “blowouts” (i.e., depressions in the topography caused by wind erosion) with less than 10 percent basal ground cover. In Wyoming, blowout penstemon is found primarily on the rim and lee slopes of blowouts, and associated steep slopes deposited at the base of foothills. Elevation range is unknown, but typically found at elevations of 5,860 to 7,440 feet. Flowering mid May to late June.	Low. Known within the Sandhills region of Nebraska and the northeastern Great Divide Basin in Carbon County,	Yes. Based on field surveys conducted by Hayden-Wing, there is no suitable habitat for the species with the Permit Area.	Fritz 1992; WYNDD 2011b; USFWS 1999, Stubbendieck, et al. 1989.
Cedar Rim thistle	*Cirsium aridum*	BLM	Sparsely vegetated openings in Wyoming big sagebrush grasslands on barren chalky hills, gravelly slopes, fans and fine-textured sandy-shaley draws. Typically found on whitish-gray sandstone, chalk, tufaceous colluvium or clay substrates derived from the Split Rock, White River, Wagon Bed, Wind River, Green River, and Wasatch formations. Elevation range 5,800 to 7,500 feet amsl. Flowering June to July.	High. The species has been observed in the vicinity of project area. Suitable habitat for the species was identified in the Permit Area during field surveys conducted by Hayden-Wing.	No.	NatureServe 2010; WYNDD 2011b. HWA 2010.
Desert yellowhead	*Yermo xanthocephalus*	FT	Sparsely vegetated cushion plant communities on low slopes, rims, colluvial fans, and bottoms found in shallow deflation hollows shaped by wind and erosion. Typically found on outcrops of sandstone in the Split Rock Formation. Elevation range 6,720 to 6,760 feet amsl. Flowering June to July.	Low. The species is known from one occurrence in the Sweetwater River Plateau in Fremont County, Wyoming.	Yes. Based on field surveys conducted by Hayden-Wing, suitable habitat for the species is not located within the Permit Area.	HWA 2010; WGFD 2004.

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Common Name	Scientific Name	Status[1]	Habitat Association	Potential for Occurrence Within the Project area	Eliminated From Detailed Analysis (Yes/No)	References
Dubois milkvetch	*Astragalus gilviflorus* var. *purpureus*	BLM	Sparsely vegetated cushion plant and bunchgrass communities which may have scattered individuals of Wyoming big sagebrush, mountain big sagebrush, or black sagebrush. Typically found on mid to upper slopes near the crest of badland ridges or low knolls on sandy-clay soils with abundant surface gravel derived from the Tertiary Wind River or Indian Meadows formations, although some populations occur on deposits of the Cretaceous Cody Shale, Triassic Chugwater and Dinwoody formations, Paleozoic limestones, or gravelly moraines. Elevation range 6,400 to 8,800 feet amsl. Flowering late May to early July.	None. Local endemic of the Dubois Badlands in the northwestern Wind River Basin and adjacent foothills of the northeastern Wind River and southern Absaroka ranges in Fremont County, Wyoming.	Yes. Based on the limited distribution and known occurrences of the species, it is unlikely the species would be found in the Permit Area.	WYNDD 2011b.
Fremont's bladderpod	*Lesquerella fremontii*	BLM	Cushion plant communities in meadows, slopes, ridges, and benches on rocky, mesic, limestone derived soils, primarily in arid foothills and desert ridges, but may also occasionally occur in cushion plant communities near timberline. Elevation to 6,800 to 11,100 feet amsl. Flowering May-July.	Low. Local endemic of the east slope of the Wind River Range and Sweetwater Plateau in Fremont County.	Yes. Based on the limited range of the species, it is unlikely the species would be found in the Permit Area.	WYNDD 2011b.
Laramie columbine	*Aquilegia laramiensis*	BLM	Found on shady, level microsites on crevices and ledges in granite boulders, outcrops, ledges, or cliffs within the Laramie Mountains in Albany and Converse counties. Elevation range from 5,400 to 10,100 feet amsl. Flowering June-August.	None. The species range is located south of the Permit Area in Albany and Converse counties.	Yes. Based on the limited distribution and geographic range of the species, suitable habitat for the species is not located in the Permit Area.	BLM 2007a, Marriott and Pokorny 2006.

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Common Name	Scientific Name	Status[1]	Habitat Association	Potential for Occurrence Within the Project area	Eliminated From Detailed Analysis (Yes/No)	References
Laramie false sagebrush	*Sphaeromeria simplex*	BLM	In cushion plant communities on rocky limestone soils on gentle slopes or rims of dry, rocky limestone-sandstone "pebble plains" in wind scoured openings. Surrounding vegetation communities typically are densely vegetated forest or shrubland communities. Elevation range 7,200 to 8,760 feet amsl. Flowering May to August.	None. Endemic to southeast Wyoming in the western foothills of the Laramie Range, Shirley Basin, and Shirley Mountains (Albany, Carbon, Converse, and Natrona counties).	Yes. Based on the limited distribution, and elevation range, it is unlikely the species would be found in the Permit Area.	BLM 2007a, NatureServe 2011; WYNDD 2011b.
Limber pine	*Pinus flexilis*	BLM	Dry, rocky sites in forested regions on mesic sites in low density, open area. In Wyoming, it is typically found with Rocky Mountain lodgepole pine, Engelmann spruce, whitebark pine, Rocky Mountain Douglas-fir, subalpine fire, Rocky Mountain juniper, and common juniper. General elevation range 4,000 to 12,500 feet amsl; specific elevation ranges for Wyoming are not available. Buds burst late April to late June, while pine cones ripen from August to September, and seeds are dispersed from September to October	High. Stands of limber pine have been observed in the Permit Area during biological surveys conducted by Hayden-Wing.	No.	Johnson 2001; HWA 2010; NatureServe 2010.
Many-stemmed spider flower	*Cleome multicaulis*	BLM	Whitish, alkali playa wetlands with soils that have a strong scent of hydrogen sulfide. Typically found with alkali cordgrass, saltgrass, Baltic Rush, Nuttall's alkaligrass, Nevada bulrush, and seaside arrowgrass. Elevation range 5,860 feet amsl. Flowering June-August.	None. In Wyoming, populations are restricted to the Sweetwater River Valley in southern Natrona County.	Yes. Based on the limited distribution and known occurrences of the species, it is unlikely the species would be found in the Permit Area.	BLM 2007a
Meadow pussytoes	*Antennaria arcuata*	BLM	Primarily found in subirrigated meadows within broad stream channels. Typically associated species include tufted hairgrass, Baltic rush, Kentucky bluegrass, Sandberg bluegrass on hummocks, level ground or shallow depressions on alkaline, clayey soils high in organic matter. Elevation range 4,950 to 7,900 feet amsl. Flowering July to September.	Low. The species is known from 23 occurrences primarily along broad stream channels in the South Pass area of the southern Wind River Range southwest of the Permit Area.	Yes. While the species is found in Fremont County, suitable habitat for the species is not located in the Permit Area.	BLM 2011b; WYNDD 2011b.

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Common Name	Scientific Name	Status[1]	Habitat Association	Potential for Occurrence Within the Project area	Eliminated From Detailed Analysis (Yes/No)	References
Owl Creek Miner's candle	*Cryptantha subcapitata*	BLM	Sparsely vegetated cushion plant communities on sandy-gravelly slopes and desert ridges. Typically found in areas dominated by rock tansy, or black sagebrush. Restricted to sandstones and conglomerates derived from the Eocene Wind River Formation, but has been reported on limestone. Elevation range 4,700 to 6,000 feet amsl. Flowering May-June.	Low. Narrow endemic of the Owl Creek and Bridger Mountains in the vicinity of Boysen Reservoir and the northern Wind River Basin in Fremont County, Wyoming.	Yes. Based on the limited range of the species, it is unlikely the species would be found in the Permit Area.	WYNDD 2011b.
Persistent sepal yellowcress	*Rorippa calycina*	BLM	Moist sandy to muddy banks of streams, stock ponds, and man-made reservoirs near the high water line, high plain swales that evaporate, and along creeks. Elevation range 3,660 to 6,800 feet amsl. Flowering late May to August (extending into October).	Moderate. Suitable habitat for the species was identified in the GHPA during field surveys conducted by Hayden-Wing.	No.	HWA 2010; WYNDD 2011b.
Porter's sagebrush	*Artemisia porteri*	BLM	Sparsely vegetated badlands of ashy or tufaceous mudstones and clay slopes. In the northern Wind River Basin, this species is found in semi-barren, low desert shrub communities dominated by birdfoot sagebrush, Porter's wormwood, or longleaf wormwood, Substrates are dry, whitish, ashyclay hills, gravelly-clay flats, and shaley erosional gullies of the Wind River, Wagon Bed, and Frontier formations. Elevation range 5,300 to 6,500 feet amsl. Flowering June-July.	Low. State endemic restricted to the Wind River Basin and Powder River Basin in Fremont, Johnson, and Natrona counties.	Yes. Based on agency consultation, and elevation range of the species, it is unlikely that the species would be found in the Permit Area.	BLM 2007a; WYNDD 2011b.
Rocky Mountain twinpod	*Physaria saximontana* var. *saximontana*	BLM	Sparsely vegetated slopes on sandy, gravelly soils, or talus of limestone, red sandstone, or clay. Elevation range 5,200 to 8,300 feet. Flowering May to late-June; mature fruits present late-June to August.	High. Suitable habitat for the species was identified in the Permit Area during field surveys conducted by Hayden-Wing.	No.	HWA 2010; WYNDD 2011b.

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Common Name	Scientific Name	Status[1]	Habitat Association	Potential for Occurrence Within the Project area	Eliminated From Detailed Analysis (Yes/No)	References
Shoshonea	*Shoshonea pulvinata*	BLM	Shallow, stony, calcareous soils of exposed limestone outcrops, ridge tops, and talus slopes. Associated with other low growing forbs and cushion plants on sites with sparse cover. Elevation range 5,800 to 9,200 feet amsl. Flowering Mid-May to Mid-July.	None. Regional endemic of northwest Wyoming and south-central Montana. In Wyoming, known only from the eastern Absaroka and Owl Creek mountains in Fremont, Hot Springs, and Park counties.	Yes. Based on the limited species range, it is unlikely the species would be found in the Permit Area.	WYNDD 2011b.
Ute's ladies'-tresses orchid	*Spiranthes diluvialis*	FT	An aquatic or wetland-dependent occupying moist to very wet, somewhat alkaline or calcareous native meadows near streams, springs, seeps, lake shores, or in abandoned stream meanders that still retain ample ground water. Typically in Wyoming found on gravel bars, wet meadow terraces, oxbows, seeps; sometimes found in springs, fens, lakes and excavations within suitable settings, including ditches and quarries. In Wyoming, the elevation range is typically from 4,750 to 5,400 feet amsl. Flowering July to August.	Low. In Wyoming, the species occurs at four locations on the Western Great Plains in Converse, Goshen, Laramie, and Niobrara counties.	Yes. Based on field surveys conducted by Hayden-Wing, there is no suitable habitat for the species with the Permit Area.	WYNDD 2011b.
Williams' Wafer parsnip	*Cymopterus williamsii*	BLM	Endemic to limestone habitats in the Bighorn Mountains. Found on open, south or east-facing ridgetops and upper slopes with exposed limestone outcrops or talus on thin, sandy soils. Often restricted to small cracks or pockets in limestone bedrock, Common associates include curl-leaf mountain mahogany and Ponderosa pine. Elevation range 6,000 to 8,300 feet amsl. Flowering May to mid-June.	None. State endemic restricted to the Bighorn Mountains of north-central Wyoming in Bighorn, Johnson, Natrona, and Washakie counties.	Yes. Based on the limited range of the species, it is unlikely the species would be found in the Permit Area.	BLM 2007a; WYNDD 2011b.

[1] FE = Federally listed as endangered.
FT = Federally listed as threatened.
FC = Federal candidate.
FP = Federally proposed.
BLM = BLM Sensitive Species.

Appendix I

Migratory Birds Occurring in the GHPA

Appendix I Migratory Bird Species on the USFWS Birds of Conservation Concern List and Wyoming Partners in Flight High Priority Bird Species List Potentially Occurring within the Study Area

Common Name	Scientific Name	USFWS Birds of Conservation Concern	Wyoming Partners in Flight High-Priority Bird Species	Primary Breeding Habitat	Secondary Breeding Habitat	Winter Habitat
American bittern	*Botaurus lentiginosus*		X	Wetland	Wet meadow	Migrant
Bald eagle	*Haliaeetus leucocephalus*	X	X	Riparian	Agriculture	Riparian
Burrowing owl	*Speotyto cunicularia*		X	Grassland	Sagebrush shrubland	Migrant
Brewer's sparrow	*Spizella breweri*	X	X	Sagebrush shrubland	Grassland	Migrant
Ferruginous hawk	*Buteo regalis*	X	X	Sagebrush shrubland	Grassland	Grassland
Greater sage-grouse	*Centrocercus urophasianus*		X	Sagebrush shrubland	Grassland	Sagebrush shrubland
Loggerhead shrike	*Lanius ludovicianus*	X		Grassland	Sagebrush shrubland	Migrant
Long-billed curlew	*Numenius americanus*	X	X	Playa	Grassland	Migrant
Mountain plover	*Charadrius montanus*		X	Grassland	Sagebrush shrubland	Migrant
Peregrine falcon	*Falco peregrinus*	X	X	Cliff	Lowland Riparian	Wetland
Sage sparrow	*Amphispiza belli*	X	X	Sagebrush shrubland	Grassland	Migrant
Sage thrasher	*Oreoscoptes montanus*	X		Sagebrush shrubland	Grassland	Migrant
Short-eared owl	*Asio flammeus*		X	Sagebrush shrubland	Grassland	Migrant
Swainson's hawk	*Buteo swainsoni*	X	X	Agriculture	Grassland	Migrant
Upland sandpiper	*Bartramia longicauda*	X	X	Grassland	Grassland	Migrant
Wilson's phalarope	*Phalaropus tricolor*		X	Wetland	Playa	Migrant
Willow flycatcher	*Empidonax traillii*	X		Riparian	Wetland	Migrant

Source: Nicholoff 2003; USFWS 2008.

Appendix J

Mitigation Table

Table J-1 Summary of Mitigation Measures

Resource	Applicant Committed Mitigation Measures	BLM Proposed Mitigation Measures
Air	Construction/Operation • Site speed limits of 40 mph on primary roads, 30 mph on secondary roads, and 10 mph on 2 track roads would be implemented to reduce wildlife/vehicle collisions and generation of dust. • Watering for dust control will be used as necessary, and water shall be from an approved and permitted source. Construction • All areas disturbed for mine unit well, pipeline, and utility trenches would be reclaimed and revegetated as soon as possible after construction was completed.	No measures are proposed.
Cultural Resources and Native American Concerns	Construction Cameco has a standard policy that if any cultural resources, fossils, or remains are found during the excavation process that work would immediately cease at that location and the proper personnel would be notified. This language will be added to a Standard Operating Procedure for inclusion. If the findings are determined to be significant, mitigation methods would be commenced.	**CR-1:** To minimize unauthorized collecting of archaeological material or vandalism to known archaeological sites, Cameco and their contractors, and all construction personnel, will attend mandatory training and be educated on the significance of cultural resources and the relevant federal regulations intended to protect them. **CR-2:** The recommended distance for avoidance of sites of traditional religious and cultural importance to Native American tribes will be determined through consultation with interested tribes. If any sites of traditional religious and cultural importance cannot be avoided by the recommended distance, mitigation measures will be developed in consultation with interested tribes and incorporated into a historic properties treatment plan. **CR-3**: Construction would not proceed for any phase of the Project until the Section 106 process has been completed for that phase in accordance with the PA, and a Notice to Proceed, including any necessary additional stipulations, has been issued by the BLM Authorized Officer. This includes determining the need for monitoring during construction, negotiating appropriate mitigation measures on a site-by-site basis, developing historic properties treatment plans, and incorporating tribal concerns throughout the Section 106 process.

Table J-1 Summary of Mitigation Measures

Resource	Applicant Committed Mitigation Measures	BLM Proposed Mitigation Measures
Geology	Construction Cameco has no plans to implement any major construction on slopes greater than 25 percent; however, well installation could occur in areas where there are slopes at this grade. The hazard from landslides would be reduced by avoiding construction on steep slopes and existing landslides, or by stabilizing the slopes. Stability increases when ground water is prevented from rising in the landslide mass by (1) covering the landslide with an impermeable membrane, (2) directing surface water away from the landslide, (3) draining ground water away from the landslide, and (4) minimizing surface irrigation. Slope stability also increased when a retaining structure and/ or the weight of a soil/rock berm are placed at the toe of the landslide or when mass is removed from the top of the slope. A Standard Operating Procedure will be adopted to meet this requirement.	No measures are proposed.
Land Use	No measures are proposed.	No measures are proposed.
Livestock Grazing	Operation Fences surrounding evaporation ponds would be constructed in compliance with U.S. NRC regulations and BLM Handbook H 1741-1 standards to prevent both livestock and wildlife from accessing the ponds. Long-term fencing would be constructed around the mine unit production facilities and processing satellites that would prevent access by sheep and cattle but still would allow wildlife access to forage (Section 2.3.2.5, Interim Reclamation).	**GRA-1:** Cameco will coordinate annually or more often when necessary with affected livestock operators to discuss: 1) problems, if any, encountered during the past grazing season; 2) any applicable agreed-upon corrective actions; and 3) planned development and operations during the next grazing season. This meeting would need to occur on a date early enough to allow grazing permittees sufficient time to make decisions and allocate their resources for the upcoming grazing season. **GRA-2:** Damage to livestock and range improvements will be reported as quickly as possible to the BLM and affected livestock operators and corrective action will be taken by Cameco.
Noise	No measures are proposed.	No measures are proposed.
Paleontological Resources	If suspected fossil materials were uncovered during construction or mud pit excavation, work would stop immediately and the findings would be evaluated by an onsite geologist to determine their significance. If the findings were determined to be significant, additional mitigation measures would be undertaken. Mitigation could include consultation with a certified paleontologist, additional field surveys and possible salvage of any paleontological resources. A standard operating procedure would be put into place to cover the specific handling and requirements of paleontological resources.	**PAL-1:** Construction and drilling personnel will be instructed about the types of fossils they could encounter and the steps to follow if fossils were uncovered during mine facility construction. Instructions will stress the nonrenewable nature of paleontological resources and that collection or excavation of fossil materials from federal land without a federal permit is illegal.

Table J-1 Summary of Mitigation Measures

Resource	Applicant Committed Mitigation Measures	BLM Proposed Mitigation Measures
Paleontological Resources (Cont)	In areas that have not been identified in the Paleontological Resource Survey, Cameco staff would be advised to spot check excavated material for bedrock disturbance.	**PAL–2:** If suspected fossil materials were uncovered during construction or mud pit excavation, work will stop immediately to allow the AO to assess the situation and determine if additional mitigation measures will be undertaken before further construction or operations could continue. **PAL-3:** During construction and installation of well fields and related facilities, spot checks of spoil piles will be conducted by a qualified paleontological resources monitor. Spot check inspection will involve visually examining any excavated material for bedrock disturbed during excavation. Where bedrock was identified, it would be visually inspected for fossils of any kind. Where no bedrock was identified, no additional inspection would be recommended. If spot checking indicated the presence of important fossils, a representative sample of these fossils would be collected and the data (including standard geologic descriptions) recorded for each locality. In addition, the BLM will require monitoring of certain high potential areas during active construction (not just spot checks). **PAL4:** Fossil specimens recovered on BLM lands during monitoring or spot inspections considered of scientific value will be curated into the collections of a museum repository acceptable to the BLM. Specimens will be prepared to the point of identification, identified, and catalogued into the permanent collections of an established institution. Specimens will not be taken from private properties except upon permission of the landowner. A final technical report will be prepared and submitted following completion of construction. The final report will be prepared according to BLM standards. **PAL-5:** Prior to the commencement of ground disturbing activities, a high-value locality identified by the recent ARCADIS (2011) surveys (Section 3.7, Paleontological Resources) will be salvaged to assure that the fossils present could be documented and curated.
Public Health and Safety	<u>Operation</u> Mine unit fluid spills that could contaminate surface soils would be minimized through the use of proper construction and operational procedures, detection devices and alarms, and proper training of personnel.	**HAZ-1:** No fuel or other hazardous material will be stored within 500 feet of a riparian area during construction or operation of the Project. Design features involving proper handling and storage of hazardous materials will be used to minimize accidental spills.

Table J-1 Summary of Mitigation Measures

Resource	Applicant Committed Mitigation Measures	BLM Proposed Mitigation Measures
Public Health and Safety (Cont)	During final reclamation buildings, structures, well, pump stations, overhead and buried power lines, evaporation ponds, and buried piping would be removed. If deep disposal wells meet all regulatory requirements and are determined to be technically feasible, disposal wells would be completed and equipped at 2 of the 3 test well locations to receive wastewater for disposal. This would enable the construction of a reduced number of evaporation ponds which would be installed as back-up to the deep disposal wells. Decommissioning Buildings and structures would be dismantled and removed from the Project and would be salvaged or disposed of at an appropriately licensed solid waste facility. Radiological surveys would be conducted following any radiological decontamination to verify that areas affected by the Project meet U.S. NRC decommissioning criteria.	
Recreation	No measures are proposed.	No measures are proposed.
Socioeconomics	No measures are proposed.	No measures are proposed.
Soils	Construction Topsoil would be placed in a single lift to avoid compaction. On slopes of 4:1 (horizontal to vertical) or steeper, topsoil would be placed along the contour. Topsoil would not be placed under excessive wet, dry, or frozen ground conditions which would cause excessive clod or frost chunks to form. Topsoil thicknesses would reflect the approximate thicknesses of topsoil originally available at the locality being reclaimed. All salvaged topsoil would be utilized for reclamation purposes. Topsoil information would be provided to WDEQ-LQD, together with proposed stripping depths, as part of the Hydrological Test Proposal for each mine unit. In those cases where topsoil stripping would be necessary, such as a major road or building site, site-specific topsoil thickness and suitability evaluations would be performed utilizing either drill borings or backhoe excavations. Topsoil stripping depths would be based on visual observation and the results of chemical analyses, and would be field staked prior to salvage operations. Topsoil depth and suitability determinations would be made by persons qualified by education and/or training to make such	**SOL-1:** Surface disturbance on slopes over 25 percent will require a site-specific development/reclamation plan for Mine Unit #3 (Peach Deposit) for approval by the AO prior to initiation of surface-disturbing activities. The plan will address each of the reclamation requirements detailed in BLM IM No. WY-2009-022 (**Appendix F**). **SOL-2:** Topsoil will be stripped from areas used for subsoil storage piles. **SOL-3:** Limited Reclamation Potential (LRP) areas will require site-specific measures in the reclamation plan to address the critical characteristics associated with these sites. These critical characteristics include but are not limited to soil erosivity, chemical and physical soil restrictive characteristics, steep slopes, and inadequate affective precipitation. Site-specific measures may consist of biodegradable or photodegradable erosion control blankets, waddles, special seed mixes, mulch, etc.

Table J-1 Summary of Mitigation Measures

Resource	Applicant Committed Mitigation Measures	BLM Proposed Mitigation Measures
Soils (Cont)	determinations. The maximum stripping depth would be 12 inches for all excavations, except for mud pits and evaporation pond sites, which would have all suitable material salvaged and stockpiled. Typical long-term topsoil stockpiles would be large, contain topsoil for more than 1 year and result from the excavation of building sites, evaporation ponds, culvert crossings, and primary and secondary access roads. These stockpiles would be constructed with 3:1 or flatter side slopes and would be seeded on the contour as soon as possible after construction using only the grass species of the BLM and WDEQ-LQD approved permanent seed mix. All long-term stockpiles would be bermed along the bottom to control sediment runoff and would be identified with highly visible signs containing the word "TOPSOIL" in letters at least 6 inches high. The signs would be placed on stockpile approach roads not more than 150 feet from the stockpile. Locations of long-term stockpiles and their volumes would be included in each LQD Annual Report. • The need to conduct nutrient analyses of topsoil that has been stockpiled for more than one year would be assessed prior to redistribution of the topsoil. The size and depth of the stockpile, the amount of vegetation growth present, and the length of time the topsoil was stored would be taken into consideration. Nutrient analyses would not be performed on stockpiles that were less than 5 feet thick as the microbial activity within the soil would be maintained because of the limited thickness and resultant compaction. If after two growing seasons following topsoil application and seeding, revegetation problems are identified, nutrient analyses would be performed. Should the analyses indicate a nutrient deficiency, the area would be fertilized and reseeded. Typical short-term topsoil stockpiles result from excavation of drill hole and well mud pits. Typically, topsoil would remain in short-term stockpiles for no more than 6 months. This would allow for direct replacement of "live topsoil" on the disturbed surface. Except for small short-term stockpiles which would be constructed with gentle side slopes, the perimeter of long-term topsoil stockpiles would be bermed to control sediment runoff. Additionally, large topsoil stockpiles, such as those that would result from the excavation of large building sites and the evaporation ponds, would be constructed with 3:1 or flatter side slopes and would be seeded on the contour.	**SOL-4:** The monitoring and maintenance of 2-track roads used for Project activities will be consistent with Section 3.7 of the Operations Plain in the Mine Permit Application (PRI 2009). Mud holes and washouts that develop in any road, including non-constructed 2-track well field roads, will be repaired in a timely manner to prevent topsoil resource damage resulting from vehicles being driven around damaged road features on to adjacent land surfaces. In the event of inclement weather conditions that cause poor road conditions, unnecessary travel on the 2-track roads will be prevented to avoid potential negative impacts to soils. **SOL-5:** During interim and final reclamation, compacted areas (typically any area that received repeated traffic or 3 or more passes by heavy equipment) will be decompacted, to the depth of compaction, by subsoiling (method for deep decompaction of soils, using a subsoiler, that does not result in soil mixing) or ripping to the depth of compaction. Additionally, scarifying or disking may be utilized for decompaction of shallow soils that are less than 20 inches in depth to bedrock. This will help prepare the seed bed, encourage infiltration and help to prevent accelerated runoff and erosion. Scarification will only be used on shallow soils. This mitigation measure also will apply to decommissioning activities. **SOL-6:** A monitoring plan will be developed and submitted to the BLM for approval. The plan may be submitted as part of Cameco's annual report to WDEQ-LQD, and will address the following: • Soil erosion/movement; • Vegetation: density, diversity (species composition) and age class (e.g., seeding, mature plant, decadent plant); • Weeds: density, species composition; • Photo reference points; • Compliance with reclamation plan; • Documenting/monitoring protocols; • Timing of monitoring during the year; and • Identification of sites needing additional work or more reclamation activities outlining a site-specific prescription for actions to be implemented, including: – Re-seeding of areas not attaining reclamation success, – Soil stabilization, – Weed control, and – Mulching/fertilization or other cultural practices.

Table J-1 Summary of Mitigation Measures

Resource	Applicant Committed Mitigation Measures	BLM Proposed Mitigation Measures
Soils (Cont)	Mine Unit Construction Topsoil would be separately stockpiled within the mine unit disturbance area and replaced after well construction completion. Pre-construction contours would be restored and reclaimed after a well was constructed. All areas disturbed for mine unit well, pipeline, and utility trenches would be reclaimed and revegetated as soon as possible after construction was completed. Cameco would mark the entrance to well fields with signs advising traffic to stay on established 2-tract access routes. In addition, Cameco employees would be trained to follow the mine site transportation policy of “one way in, one way out” to minimize disturbance. Storm Water Management All long-term topsoil stockpiles (e.g., soil removed from building areas, access roads, etc.) would be fully contained and vegetated. A containment ditch and berm would be constructed at the base of each stockpile to prevent any loss of topsoil before new vegetation could be established. All available disturbed areas, including topsoil piles, road cuts, etc. would be seeded with the approved seed mix at the first appropriate season, spring or fall, to control erosion and protect the topsoil resource. Should weather or other conditions prohibit disturbed areas from being seeded for more than 3 months, the area would be scarified with a disc, chisel plow, or similar apparatus, or mulched with a straw mulch crimped at a rate of 2 tons per acre, to assist in conserving the topsoil resource until seeding can be accomplished. The establishment of a temporary cover crop, such as barley, winter wheat, millet, or rye seeded at 30 pounds per acre also could be utilized to assist in protecting the topsoil resource. Areas with slopes greater than 25 percent would be mulched with straw mulch crimped at a rate of 2 tons per acre or planted with a temporary cover crop as soon as possible to assist in preventing erosion. Geotextile "mulched matting" and select erosion control products would be utilized on areas where erosion control and vegetation establishment is particularly difficult. BMPs would be utilized to control sediment loss from stripped and or recently topsoiled and seeded areas.	

Table J-1 Summary of Mitigation Measures

Resource	Applicant Committed Mitigation Measures	BLM Proposed Mitigation Measures
Soils (Cont)	For exposed soil areas where construction activities were temporarily ceased for a period of 28 days or more, temporary stabilization measures would be implemented. These measures could include surface roughening, cover crop plantings, mulching or erosion control blankets. Temporary erosion protection would be especially important for areas containing graded slopes, ditches, berms, and soil stockpiles. The primary method of revegetation would be the pitting and seeding method. To the extent possible, crossing perennial and intermittent drainages with drill equipment and vehicles would be avoided. If it became necessary to cross a drainage to reach a drilling site, a temporary stream crossing would be constructed at right angles to the channel with adequate embankment protection and installation of properly sized culverts. Once the drill location was reclaimed and seeded, the stream crossing would be removed and any surface damage reclaimed and seeded. Mobilization of the drill rig from hole to hole would be restricted to dry or frozen ground conditions. <u>Reclamation</u> Following the completion of any construction activity (six months to one year), the disturbed areas surrounding the facility, individual wells, pipelines, and roads would be reclaimed. Large disturbed areas would be reclaimed before new areas are disturbed. Following cleanup of the site and removal of contaminated materials, the evaporation ponds would be graded to their approximate original contour. Grading would include the replacement of approximately 56,400 cubic yards of material excavated during the construction of the evaporation ponds. Topsoil would be replaced and the area seeded. Following decontamination, the roads would be ripped and/or disked to relieve compaction. Excess imported gravel would be removed. Culverts would be removed and pre-mine drainages reestablished. All roads and ditches to be reclaimed would be graded and contoured to blend with the surrounding terrain. All disturbed surfaces would be scarified and contoured, if necessary, followed by topsoil placement and seeding with the approved seed mix. Areas which were compacted would be scarified, ripped, and/or disked as necessary to relieve the compaction and prepare the sub grade for topsoil placement. Where needed, the surface would be graded and contoured to approximate original contours and to blend with the surrounding topography.	

Table J-1 Summary of Mitigation Measures

Resource	Applicant Committed Mitigation Measures	BLM Proposed Mitigation Measures
Soils (Cont)	In areas that were stripped of topsoil, the salvaged topsoil would be re applied in a single lift to avoid compaction. If necessary, the replaced topsoil would be disked to create a proper seed bed. Seed bed preparation would only be performed under appropriate soil and climatic conditions. Final reclamation of mine units would be performed as soon as practicable after ground water restoration has been completed and approved by the regulatory agencies. Wells would be plugged and all surface structures and power lines removed. Compacted areas would be scarified, ripped, and/or disked as necessary to relieve the compaction and prepare the sub grade for topsoil placement. Where needed, the surface would be graded and contoured to approximate original contours to blend with the surrounding topography. In areas stripped of topsoil, the salvaged topsoil would be re-applied. If necessary, the replaced topsoil would be disked to create a proper seed bed. Seed bed preparation would only be performed under appropriate soil and climatic conditions. The reclamation goal at the Project would be to return the land to a condition that will sustain the pre-mining land use of livestock grazing and wildlife habitat.	
Transportation	Operation/Construction Cameco intends to maintain the Dry Creek Road to ensure the safety of the employees and contractors onsite. Maintenance includes ensuring the road is graded to minimize ruts, keeping a crowned surface for proper drainage and the ditch line free of debris. If additional gravel is needed Cameco will work with Fremont County and the BLM to secure a material that is acceptable to all parties.	**TRA-1**: Cameco will notify the BLM of any maintenance or snow removal activity on the Dry Creek Road or on other roads used for access outside the GHPA that are not maintained by other entities such as the State of Wyoming or counties.
Vegetation	General Construction Following completion of delineation drilling, wellfield design would locate injection and recovery wells outside the boundary of wetlands. Under the Proposed Action, wetlands temporarily could be disturbed for construction of roads. Cameco would work with the WDEQ and U.S. Army Corps of Engineers (USACE) to define jurisdictional wetlands, and comply with the Section 404 or Section 401 permitting process, as appropriate. These processes would include development of a mitigation plan. Cedar Rim Thistle surveys will be completed 1 year prior to development of each mine unit and associated access roads within the modeled habitat boundary.	**VEG-1**: Project disturbances will avoid wetlands as identified in the Mine Permit Application and the vegetation surveys conducted by HWA (HWA 2011a). Surface disturbance will not occur within the wetlands along WCC. Erosion and sediment BMPs as described in the SWPPP (PRI 2009), will be implemented within 500 feet of wetlands located within the vicinity of surface disturbance associated with the Project. **VEG-2:** In areas of LRP due to saline and/or alkaline soils, the saline and alkaline tolerant seed mix in **Table 4.13-3**, or an alternative seed mix approved by BLM, will be used.

Table J-1 Summary of Mitigation Measures

Resource	Applicant Committed Mitigation Measures	BLM Proposed Mitigation Measures
Vegetation (Cont)	Mine Unit Construction All fencing installed at the Project would be of a temporary nature to protect the wellfield areas during operations and to protect vegetated areas following reclamation. Fence design and specifications would follow the BLM specifications as they are the dominant land owner within the permit area. Operations Cameco would comply with Operations Plan requirements for noxious weeds. During operations and following surface reclamation, noxious weeds would be controlled by annual spraying, on an as needed basis. This procedure would continue until final bond release is obtained Noxious Weed Control would be performed only by individuals that have appropriate state and BLM pesticide certifications. Reclamation The seed mixture used would be comparable to mixes used on other reclamation mines in the area, and was approved by the WDEQ-LQD and the BLM in 2008. This mix was designed to establish a vegetative cover consistent with the pre-mining land use of livestock grazing and wildlife habitat. Should any approved seed varieties become unavailable or cost prohibitive, or more locally adapted species become available, reasonable substitutions could be made after prior consultation with and approved by the BLM and WDEQ-LQD. The success of revegetation in meeting the land use goal would be assessed prior to application for bond release by utilizing the COMA method as described in WDEQ-LQD Rules and Regulations Chapter 3, Section 2(d)(vi)(C) and LQD Guideline No.2-Vegetation (November 1997). At the time of bond release on all areas, including previously disturbed and reclaimed areas, the actual methodology to be used for evaluating vegetation success would be submitted to WDEQ LQD at least 6 months prior to field sampling. Revegetation would be considered successful when, at the end of the bonding period, the following has been demonstrated: The vegetation species of the reclaimed land are self-renewing under natural conditions prevailing at the site; The total vegetation cover of perennial species (excluding noxious weed species) and any species in the approved seed mix is at least equal to the total vegetation cover of perennial species (excluding noxious weed species) on the area before mining:	**NOX–1:** Cameco will develop a noxious weed management plan that includes pre-construction surveys, education of construction and operation personnel during construction and operation activities, the washing of vehicles and equipment before entering and leaving the GHPA, herbicide spraying, pre-construction weed control methods, and annual monitoring. Survey information collected during pre-construction surveys will include species name, GPS location of weed infestations, percent cover, and approximate size of weed infestations. Control of noxious and invasive species will be consistent with the Vegetation Treatments on Public Lands Administered by the BLM in the Western U.S. (BLM 2007b), and could include chemical, mechanical, and biological methods. Herbicide treatment methods also will be consistent with BLM (2007c) guidance including the filing of a Pesticide Use Proposal (PUP) with the Lander and Casper BLM FOs to track and approve pesticide use prior to spraying. It is recommended that the Fremont County Weed and Pest be consulted in the development of the noxious weed management plan. **NOX-2:** Cheatgrass control methods on BLM-administered lands will be determined in consultation with the BLM and will focus on preventing the further spread of cheatgrass into areas disturbed by the Project. **SSP-1:** Cameco will perform pre-construction surveys for persistent sepal yellowcress, Cedar Rim thistle, and Rocky Mountain twinpod in identified habitat (HWA 2011a,b) 1 year prior to development of each mine unit and associated access roads within the modeled habitat boundary. Locations of any populations or individuals of Persistent sepal yellowcress, Cedar Rim thistle or Rocky Mountain twinpod identified during pre-construction surveys will temporarily be flagged during construction. Surface disturbance will not occur within 100 feet of any identified individuals or populations.

Table J-1 Summary of Mitigation Measures

Resource	Applicant Committed Mitigation Measures	BLM Proposed Mitigation Measures
Vegetation (Cont)	The species composition and diversity are suitable for the approved post-mining land use; and The above are achieved during one growing season, no earlier than the fifth full growing season on the reclaimed lands. In the unlikely event that any trees must be removed, Cameco would inventory such trees prior to removal and include that information and replacement cost in the appropriate annual report and surety revision submitted to WDEQ-LQD. In those areas where there were few or no noxious weeds prior to being affected by the ISR operations, Cameco would control and minimize the introduction of noxious weeds into the revegetated areas for at least 5 years after the initial seeding had taken place. The primary method of revegetation would be the pitting and seeding method. In limited areas where pitting and seeding would potentially interrupt surface water flow, such as incised drainage channels, areas with slopes steeper than 3:1 (horizontal to vertical) and permanent topsoil stockpiles, drill or broadcast seeding would be utilized. Storm intensity may affect the success of revegetation within a mine unit. Should a major event destroy a revegetation effort, Cameco would reseed and revegetate the disturbed area at the next available seeding window. <u>Decommissioning</u> All reclaimed areas would remain fenced for a period of at least 2 years, or until the vegetation is capable of renewing itself with properly managed grazing and without supplemental irrigation or fertilization: The fencing would not be removed until the BLM and WDEQ agreed that the revegetated areas are ready for livestock grazing.	
Visual	<u>General Construction</u> Aboveground facilities would be painted with low-reflectivity paints in colors that would blend with the natural environment. The BLM color chart would be consulted in selecting an appropriate paint color or colors.	**VRM-1:** Pursuant to the VRM Class IV management objective indicating that visual effects should be minimized to the extent possible, aboveground facilities will be painted with low-reflectivity paints in colors that blend with the natural environment. The BLM color chart provides a tool for use in selecting an appropriate paint color or colors.

Table J-1 Summary of Mitigation Measures

Resource	Applicant Committed Mitigation Measures	BLM Proposed Mitigation Measures
Water Resources	General Construction Both primary and secondary access roads would use culvert crossings at drainages. Operation Cameco would continue to work with the Nuclear Regulatory Commission and Wyoming Department of Environmental Quality to apply spill leak/detector monitoring devices that are acceptable to both agencies. The present accepted NRC and WDEQ-LQD fluid spill detection practice includes a catchment basin with a conductivity probe or level transducer for each injection and production well connected to a header house PLC. Storm Water Management Sedimentation would be controlled through the use of erosion control and channel stabilizing measures such as: • ditches and berms; • conveyance channels; • rock/rip rap; • outlet protection; • sediment traps or basins; • straw bale barriers; • silt fence; and • check dams. Fuel storage areas would be managed to prevent off-site drainage to or from the area. All petroleum products stored at the site would be contained in approved and appropriately labeled aboveground containers. Secondary containment would be accomplished by berming and/or ditching the perimeter of the entire fuel storage area. During active construction, qualified personnel would inspect disturbed areas, control measures, and locations where vehicles entered or exited the site, at least once every 14 calendar days and within 24 hours of the end of any precipitation and/or snow melt event which exceeds 0.5 inches. During seasonal shutdowns qualified personnel would inspect the site at least once every month, unless snow cover or frozen ground conditions exist over the entire site for an extended period with no melting conditions.	No measures are proposed.
Wild Horses	No measures are proposed.	No measures are proposed.

Table J-1 Summary of Mitigation Measures

Resource	Applicant Committed Mitigation Measures	BLM Proposed Mitigation Measures
Wildlife	Mine Unit Construction The drilling mud pits would be fenced using 4 feet high by 16 feet wide rigid wire grid fence panels wired to steel T-posts (hog panels) protect from human and animal intrusion until the contained fluid was removed or evaporated, at which time the pits would be refilled and the fencing removed. Primary and secondary power distribution lines would be built to the latest approved methods. All of the distribution power in the well fields would be buried rather than be constructed overhead. To reduce potential electrocution and collision impacts to migrating and foraging migratory bird species, and to eliminate new perches for raptor and corvid species, thus reducing the potential for predation on greater sage-grouse, overhead power lines would employ anti-perching and anti-roosting devices. Cameco will follow and abide by the Sage-grouse Executive Order (SGEO). Cameco would work with the Wyoming Game and Fish Department as the lead agency when dealing with sage-grouse issues, as they have the management authority over greater sage-grouse. Cameco would also work collaboratively with U.S. Fish and Wildlife Service and BLM to ensure a uniform and consistent application of the SGEO is followed. To protect breeding raptor species, Cameco commits to conducting annual surveys in suitable habitat to identify active raptor nesting sites prior to construction and to avoid beginning construction in active raptor nest sites by implementing seasonal protection buffers zones(as established by U.S. Fish and Wildlife Service). Operation In order to minimize potential adverse impacts from the evaporation ponds to terrestrial wildlife and special status species, Cameco will coordinate with the Wyoming Department of Environmental Quality, BLM, the Wyoming Game and Fish Department and the U.S. Fish and Wildlife Service in developing mitigation action plans for the ponds and implement measures to remove, exclude, or deter wildlife use. Proposed mitigation for raptor nests could include construction of alternate nest sites on natural features, or the erection of appropriately sized nesting platforms. Site speed limits of 40 mph on primary roads, 30 mph on secondary roads, and 10 mph on 2 track roads would be implemented to reduce wildlife/vehicle collisions and generation of dust.	**WFM-1:** To protect breeding migratory bird species, surface disturbing activities during construction will be restricted within the GHPA between May 15 and July 15. To protect greater sage-grouse, surface disturbing activities during construction will be restricted on previously undisturbed lands with greater sage-grouse habitat (lands mapped as bottomland big sagebrush and mixed sagebrush grassland on Figure 3.13-1) between March 15 and June 30 within 2 miles of an occupied lek for lekking, nesting, and brooding greater sage-grouse. Should removal of habitat be required between these dates, Cameco will coordinate with the BLM and USFWS to conduct breeding migratory bird and greater sage-grouse surveys and implement appropriate mitigation, such as buffer zones around occupied nests, as needed. Any additional ground disturbing activities required during operation and maintenance activities between May 1 and July 15 for nesting migratory birds and between March 15 and June 30 within 2 miles of an occupied lek for lekking, nesting, and brooding greater sage-grouse will be coordinated with the BLM and USFWS to protect breeding migratory bird species and greater sage-grouse. **WFM-2:** To protect breeding raptor species, Cameco will avoid all existing raptor nest sites and surface-disturbing activities during the breeding season (February 1 to July 31 for golden eagles, April 1 to September 15 for burrowing owls, and February 1 to July 31 for all other raptors) within applicable nest protection buffers (i.e., 1 mile for ferruginous hawk and golden eagle or 0.75 mile for all other raptors, unless site-specific, species-specific distances are determined and approved by the BLM). If construction were to extend into the raptor breeding season, Cameco will conduct aerial and/or pedestrian nesting raptor surveys, as applicable, through areas of suitable habitat to identify active nest sites within the GHPA, prior to construction. Since a number of variables (e.g., nest location, species' sensitivity, breeding, phenology, topographical shielding) will determine the level of impact to a breeding pair, appropriate protection measures, such as seasonal constraints and establishment of buffer areas, will be implemented at active nest sites on a species-specific and site-specific basis, in coordination with the BLM. **WFM-3:** To protect bat species and migratory bird species, including raptors and waterfowl, Cameco will, in coordination with the appropriate

Table J-1 Summary of Mitigation Measures

Resource	Applicant Committed Mitigation Measures	BLM Proposed Mitigation Measures
Wildlife (Cont)	Signage would be posted in the GHPA to notify Project personnel that wildlife and livestock may be encountered along the road. To protect bat species and migratory bird species, including raptors and waterfowl, Cameco would monitor storage ponds to ensure ponds are not used by bird species. If significant use is observed, Cameco would consult with the Wyoming Department of Environmental Quality, BLM, the Wyoming Game and Fish Department and the U.S. Fish and Wildlife Service in developing mitigation action plans for the ponds. Such actions may include propane cannons, brightly colored pennants and predator silhouettes/decoys.	state and federal agencies (DEQ, USFWS, WGFD, and BLM) develop a deterrent system prior to construction of the ponds. Cameco will then monitor ponds to ensure the effectiveness of the deterrents and will further consult and apply adaptive management to the deterrents as needed. Any bird mortalities will be reported to the USFWS immediately. **WFM-4:** To reduce potential collision impacts to migratory bird species, all existing power lines will be retrofitted to comply with APLIC (2006) guidelines. In areas identified as having high bird use (e.g., wetlands) existing power line also will be fitted with high visibility markers. In addition, to minimize electrocution to raptor species, power lines in high raptor use areas (e.g., within 0.75 of a nest site and within 0.25 mile of a white-tailed prairie dog colony) will be fitted with anti-perching devices. **WFM-5:** To limit West Nile virus and other insect-borne diseases, Cameco will consult with appropriate state and federal agencies to determine and implement insect control methods for water impoundments, which could include larvicides or other approved control methods. **WFM-6:** To prevent migratory birds and other small wildlife species from entering open pipes and posts, Cameco will permanently cap or fill pipes which may be necessary for fencing or other Project components. Cameco also will cap or fill any previously existing hollow pipes or posts encountered within the GHPA during construction or operation. **SSS-1:** To limit raptor and corvid predation on greater sage-grouse, new power lines within 2 miles of occupied greater sage-grouse leks (Black Mountain, West Canyon Creek, and Leighi Point) will be fitted with anti-perching devices (e.g., spikes, triangles, inverted "Y's", etc.). **SSS-2:** To protect nesting mountain plovers, nest surveys will be conducted if construction were to occur during the breeding season (April 10 to July 10). If a nest is located, a 0.25 mile protection buffer will be implemented around the active nest until the birds fledge. Cameco will follow the requirements of the Gas Hills Wildlife Monitoring Plan (**Appendix C**), which will be updated as needed. **SSS-3:** Noise mitigation for greater sage-grouse leks will be applied on a site-specific basis, in coordination with WGFD.

Appendix K

Air Quality Analysis Support Document

Air Quality Analysis Support Document for Gas Hills ISR Uranium Project EIS

List of Acronyms

°F	degrees Fahrenheit
$\mu g/m^3$	micrograms per cubic meter
AQCR	Air Quality Control Region
AQRV	air quality related value
CAA	Clean Air Act
CFR	Code of Federal Register
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
GHG	greenhouse gas
HAP	Hazardous Air Pollutants
IPCC	Intergovernmental Panel on Climate Change
kg/gal	kilograms per gallon
kWh	kilowatt hour
MACT	Maximum Achievable Control Technology
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NH_3	ammonia
NH_4	ammonium
NO_2	nitrogen dioxide
NO_X	Nitrogen oxides
NP	National Park
NPS	National Park Service
NSPS	New Source Performance Standards
NSR	New Source Review
OEL	Occupational Exposure Level
PM	particulate matter
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 microns or less
PM_{10}	particulate matter with an aerodynamic diameter of 10 microns or less
ppm	parts per million
PSD	Prevention of Significant Deterioration
REL	Reference Exposure Level

RfC	Reference concentrations
SO_2	sulfur dioxide
tpy	tons per year
TSL	toxic screening level
TSP	total suspended particulates
USEPA	United States Environmental Protection Agency
VOC	volatile organic compounds

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1.0 Introduction

AECOM Technical Services, Inc. (AECOM) developed this air quality analysis support document on behalf of the Bureau of Land Management (BLM) to document the methods used in the analysis of air quality impacts resulting from the Gas Hills In-situ Recovery (ISR) Uranium Mine Project (Gas Hills Project or Project) located in Fremont and Natrona counties, Wyoming, proposed by Power Resources, Inc., doing business as Cameco Resources (Cameco).

The purpose of the Project is to explore for and identify ore reserves and extract approximately 1 million to 2.5 million pounds of uranium per year over an anticipated project life of 25 years. The Gas Hills Project would use ISR methods and would be operated as a satellite facility to the Cameco Smith Ranch-Highland uranium ISR facility currently operating in Converse County Wyoming. One existing large building and one new structure would house the site's central processing facilities. The surface disturbance would be limited to the construction of water wells, buried water pipelines, single-lane gravel access roads, power infrastructure, and small buildings for well-head manifold control equipment known as header houses.

The ISR recovery method uses chemical removal of the uranium mineral from the host rock in place, and does not require physically removing and crushing ore-bearing rock. Unlike conventional mining practices, ISR methods do not use large earth-moving equipment or blasting, and require no waste rock or tailings disposal. The ISR methodology utilizes a solution consisting of oxygen and carbon dioxide or bicarbonate which is injected via conventional water wells into uranium ore-bearing rock formations in the subsurface. The solution dissolves the uranium ore from the rock formations into the circulating groundwater and the resultant uranium-bearing groundwater is recovered by pumping wells located adjacent to the injection wells. The groundwater containing uranium is then processed through an ion exchange facility where the uranium is precipitated onto a resin bead media. For this Project, the resin beads containing uranium would then be transported to the Smith Ranch-Highland facility (approximately 140 road miles) for processing into uranium yellowcake. After stripping the uranium from the resin bead media, it would be returned to the Project site for re-use.

The Gas Hills Project Area (GHPA) is defined by the mine permit boundary and covers approximately 8,500 surface acres (approximately 13 square miles). Project activities would occur both within the GHPA and within individual mine units (potential uranium recovery areas). Activities that would occur within the mine units would include the drilling of exploratory boreholes; installation of monitoring wells, injection wells, and production wells; construction of distribution and gathering pipelines and header houses, and construction of roads to the header houses. Activities that would occur within GHPA but outside the mine units would include construction of uranium processing and waste water treatment facilities and development of new and improvement of existing access roads, pipelines, and electrical lines.

Surface disturbance within mine units would not occur all at once but would be phased over several years, depending on the uranium production rate and the availability of construction equipment and personnel. Cameco estimates that of the approximately 1,500 acres that would be disturbed over the 25 year life of the Project. Final surface reclamation would be required by regulatory agencies and assured by bonds. Final reclamation would include plugging and abandoning all wells, removing header houses and buried piping, and re-grading and seeding the disturbed surface.

Air pollutant emissions associated with the construction, operation, reclamation, and decommissioning activities at the Gas Hills Project site includes emissions from fuel combustion and fugitive dust emissions from the following sources:

- Construction equipment and vehicles for site preparation, reclamation, and decommissioning of surface facilities;

- Well-drilling equipment and vehicles for drilling production and monitor wells;
- Natural gas-or propane-fired heating units for the satellite facility;
- Trucks for transporting construction materials as well as the product of the Gas Hills Project (uranium-laden ion exchange resin);
- Trips to disposal sites;
- Truck deliveries and other operational activities; and
- Light-duty vehicles for commuting by construction crew and employees.

Based on preliminary estimates of emissions including construction of new facilities, improvement of some roads, and other production and delineation drilling activities (NRC 2004), the Project could increase emissions of nitrogen oxides (NO_X), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter (PM) including PM with an aerodynamic diameter less than 10 micrometers (PM_{10}), and PM with an aerodynamic diameter less than 2.5 micrometers ($PM_{2.5}$).

Air toxics emissions are also considered in the analysis. According to USEPA, modeling of air toxics is generally only warranted for sources that pose the greatest health threat in urban areas, or when the emissions approach levels of 10 tons per year individually or 25 tpy in the aggregate, or is one of the listed NESHAP sources. The emissions of air toxics from the proposed Project would be less than the levels generally required to warrant air toxics modeling.

Ozone is not a primary air pollutant directly that would be emitted by the proposed Project, or by most other air pollution sources. Instead, it is principally created from the chemical reaction of NO_X and volatile organic compounds (VOCs) in the air under direct exposure to sunlight. The project would be a small source of NO_X and VOCs, not at the magnitude that would justify regional ozone modeling. Modeling for ozone formation and transport is a highly complex and resource intensive exercise, and is typically conducted only to guide the choice of strategies to correct a monitored ozone problem in an area not attaining the NAAQS for ozone. The emissions from this project would not be expected to lead to ozone impacts.

The nearest Class I area to the GHPA site is the Bridger National Wilderness Area (NWA), which is about ***128*** kilometers (km), or ***80*** miles, from the GHPA. The modeling methods used provide conservative estimates of ambient concentrations that potentially may result from the proposed facility emissions in combination with existing sources in the region. The air quality modeling was conducted in accordance with guidance provided by the United States Environmental Protection Agency (USEPA); Guideline on Air Quality Models (published as 40 Code of Federal Regulations [CFR] 51, Appendix W) (USEPA 2005) (hereafter referred to as the Modeling Guideline).

2.0 Analysis Approach

The Project must demonstrate compliance with the Federal and state regulatory framework as outlined below. The Federal Clean Air Act (CAA) provides states with the authority to regulate air quality within state boundaries. The following subsections provide a summary of the regulatory framework associated with air quality in the Project and vicinity, as well as a description of the modeling and analysis approach for estimating air quality impacts from the Project.

2.1 Air Quality Regulatory Framework

The CAA of 1970 (42 USC 7401 et seq.) as amended in 1977 and 1990 is the basic federal statute governing air pollution. Provisions of the CAA of 1970 that potentially are relevant to the Project are listed below.

- National Ambient Air Quality Standards (NAAQS);
- Prevention of Significant Deterioration (PSD);
- New Source Performance Standards (NSPS);
- Maximum Achievable Control Technology (MACT) Standards;
- Conformity Requirements;
- Greenhouse Gas (GHG) Reporting Rule; and
- Federal Operating Permits Program.

Each of these provisions are discussed in more detail in the following subsections.

2.1.1 National and State Ambient Air Quality Standards

The Federal CAA amendments of the 1990s require all states to control air pollution emission sources so that NAAQS are met and maintained. The CAA directs the USEPA to delegate primary responsibility for air pollution control to state governments. The State of Wyoming adopted the NAAQS as state air quality standards and has added more stringent ambient air quality standards applicable only to Wyoming. In addition to these requirements, the National Park Service (NPS) Organic Act requires the NPS to protect the natural resources of the lands it manages from the adverse effects of air pollution.

The NAAQS establishes maximum acceptable concentrations for NO_2, CO, SO_2, PM_{10}, $PM_{2.5}$, O_3, and lead. Given the extremely low levels of lead emissions anticipated from Project sources, the lead standards are not further addressed in this analysis. These pollutants are known as criteria pollutants. These standards represent the maximum allowable atmospheric concentrations that may occur to protect public health and welfare, and include a reasonable margin of safety to protect the more sensitive individuals in the population. The air quality impacts in the air quality study area must meet the NAAQS, which apply nationwide and the WAAQS. Together these standards are referred to as the AAQS. An area that does not meet the AAQS is designated as a nonattainment area on a pollutant-by-pollutant basis. Applicable national and state AAQS are presented in **Table 2-1**.

2.1.2 Prevention of Significant Deterioration

New or modified large emissions sources in an attainment area are required to follow PSD regulations. PSD regulations restrict the degree of ambient air quality deterioration allowed and apply to proposed new or modified major stationary sources located in an attainment area that have the potential to emit

Table 2-1 State *and National Ambient Air Quality Standards*

Pollutant	Averaging Period	***Wyoming Standards (µg/m³)[a]***	**National Standards**	
			Primary	**Secondary**
PM_{10}	***24-hour***	***150[c] µg/m³***	150[c] µg/m³	Same as primary
	Annual	***50 µg/m³***	None	None
$PM_{2.5}$[b]	***24-hour***	***35 µg/m³***	35 µg/m³	Same as primary
	Annual	***15 µg/m³***	12 µg/m³	15 µg/m³
SO_2	***1-hour***	196 µg/m³ *(0.075 ppm)*	*196 µg/m³ (0.075 ppm)*	None
	3-hour	***1,300[c] µg/m³ (0.5 parts per million [ppm])***	None	1,300[c] µg/m³ (0.5 ppm)
NO_2	***1-hour***	188 ***µg/m³*** (0.100 ppm)	188 µg/m³ (0.100 ppm)	None
	Annual	***100 µg/m³ (0.053*** ppm*)*	100 µg/m³ (0.053 ppm)	Same as primary
CO	1-hour	***40,000[c] µg/m³ (35*** ppm*)*	40,000[c] µg/m³ (35 ppm)	None
	8-hour	***10,000[c,d] µg/m³ (9 ppm)***	10,000[c] µg/m³ (9 ppm)	None
O_3	***8-hour (2008 standard)[d]***	147 ***µg/m³*** (0.075 ppm)	***147 µg/m³ (0.075 ppm)***	***Same as primary***
	8 hours (1997 standard)[e]	***157 µg/m³ (0.08 ppm)***	***157 µg/m³ (0.08 ppm)***	***Same as primary***
Pb	***Rolling 3-month Average***	***0.15 µg/m³***	***0.15 µg/m³***	***Same as primary***

[a] µg/m³ = micrograms per cubic meter.

[b] $PM_{2.5}$ particulate matter with an aerodynamic diameter of 2.5 microns or less.

[c] Must not be exceeded more than once per year.

[d] To attain this standard, the 3-year average of the 4th highest daily maximum 8-hour average O_3 concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008).

[e] (i) To attain this standard, the 3-year average of the 4th highest daily maximum 8-hour average O_3 concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

(ii) The 1997 standard, and the implementation rules for that standard, would remain in place for implementation purposes as USEPA undertakes rulemaking to address the transition from the 1997 O_3 standard to the 2008 O_3 standard.

Sources: USEPA 2011d; WDEQ-AQD 2012.

pollutants in excess of predetermined de minimis values (40 CFR Part 51) and the Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule (Tailoring Rule). As defined in 40 CFR 51 and the Tailoring Rule, a new source is considered a major stationary source if it:

1. Can be classified in one of the 28 named source categories listed in Section 169 of the CAA, and it emits or has the potential to emit 100 tons per year (tpy) or more of any criteria pollutant regulated by the CAA (USEPA 1990);
2. Is any other stationary source that emits or has the potential to emit 250 tpy or more of any criteria pollutants regulated by the CAA (USEPA 1990); or
3. Is any other stationary source constructed that emits or has the potential to emit 100,000 tpy or more of CO_2e.

The Project would be expected be a minor source for all pollutants including CO_2-equivalent (CO_2e); therefore, PSD would not apply to the Project.

Class I areas are protected by Federal Land Managers (FLMs) who manage air quality related values (AQRVs) such as visibility and atmospheric deposition. Though not a regulatory program under PSD, FLMs review the issuance of a PSD permit for any impacts that exceed guideline thresholds for these parameters. In addition to analysis of the visibility and atmospheric deposition, the change in the acid neutralizing capacity (ANC) of sensitive lakes is assessed by FLMs. The FLMs consider a source located greater than 50 km from a Class I area to have negligible impacts with respect to Class I AQRVs if its total SO_2, NO_X, PM_{10}, and H_2SO_4 annual emissions (in tons per year, based on 24-hour maximum allowable emissions), divided by the distance (in km) from the Class I area (Q/D) is 10 or less. The Agencies would not request any further Class I AQRV impact analyses from such sources. In general, FLAG recommends that an applicant apply the Q/D test (FLAG 2010) for proposed sources greater than 50 km from a Class I area to determine whether or not any further visibility analysis is necessary. Results of the analysis (impacts) are provided in Section 4 of this document.

2.1.3 New Source Performance Standards

The regulation of new sources, through the development of standards applicable to a specific category of sources, was an important step taken by the CAA. NSPS apply to all new, modified, or reconstructed sources within a given category, regardless of geographic location or the existing ambient air quality. The standards define emission limitations that would be applicable to a particular source group. No NSPS are applicable to the Project since the mine would not be one of the listed source groups.

2.1.4 Carbon Dioxide and Other Greenhouse Gases

CO_2 and other GHGs are naturally occurring gases in the atmosphere whose status as a pollutant is not related to their toxicity, but is related to the added long-term impacts they may have on climate because of their increased incremental levels in the earth's atmosphere. Because they are non-toxic and non-hazardous at normal ambient concentrations, CO_2 and other naturally occurring GHGs do not have applicable ambient standards or emission limits under the major environmental regulatory programs.

On October 30, 2009, the USEPA issued the final mandatory reporting rule for major sources of GHG emissions (40 CFR Part 98). The rule requires a wide range of sources and source groups to record and report selected GHG emissions, including CO_2, methane (CH_4), nitrous oxide (N_2O), and some halogenated compounds. The USEPA delayed a comparable rule for GHG emissions for various petroleum and natural gas industry groups.

On June 3, 2010, the USEPA issued the Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule. The rule tailors the applicability criteria that determine which stationary sources become subject to permitting requirements for GHG emissions under the PSD and Title V programs of the CAA. Under the rule new facilities with GHG emissions of at least 100,000 tons per year (tpy) CO_2e

and existing facilities with at least 100,000 tpy CO_2e making changes that would increase GHG emissions by at least 75,000 tpy CO_2e are required to obtain PSD permits. Facilities that must obtain a PSD permit to cover other regulated pollutants must also address GHG emissions increases of 75,000 tpy CO_2e or more. New and existing sources with GHG emissions above 100,000 tpy CO_2e must also obtain operating permits. The USEPA rules do not require any controls or establish any standards related to GHG emissions or impacts.

2.1.5 National Emission Standards for Air Pollutants

The CAA requires USEPA to regulate toxic air pollutants from large industrial facilities and to develop standards for controlling the emissions of air toxics from sources in an industry group (or in source categories). Under the National Emission Standards for Hazardous Air Pollutants (HAPs), the USEPA promulgated standards pursuant to Section 112 of the 1990 CAA Amendments. The rules are provided in 40 CFR 63. The standards for these sources are known as Maximum Achievable Control Technology (MACT) standards, and are based on emissions levels that are already being achieved by the better-controlled and lower-emitting sources in an industry.

USEPA is required to identify categories of industrial sources that emit one or more of the listed 187 toxic air pollutants. These industrial categories include both major and area sources, including those listed below:

- Major sources of air toxics that emit 10 tons per year (tpy) of a single air toxic or 25 tpy of a combination of air toxics.
- Area sources release smaller amounts of toxic pollutants into the air—less than 10 tpy of a single air toxic, or less than 25 tpy of a combination of air toxics. Although emissions from individual area sources are often relatively small, cumulatively their emissions can be of concern (USEPA 2009).
- In the Integrated Urban Air Toxics Strategy, the USEPA identifies the toxic air pollutants that pose a health threat in the largest number of urban areas and regulates sufficient area source categories to ensure that the emissions of these “urban” air toxics are reduced.

The Project is anticipated to be a minor source of HAPs, and there are currently no applicable area source MACT standards that apply to the Project. Emissions of HAPs are discussed in Section 3 of this document.

2.1.6 Conformity for General Federal Actions

According to Section 176I of the CAA (40 CFR 51.853), a federal agency must make a conformity determination in the approval of a project having air emissions that exceed specified thresholds in nonattainment and/or maintenance areas. The Project is not located in a nonattainment or maintenance area; therefore, a general conformity analysis is not required.

2.1.7 Federal Operating Permits Program

All major stationary sources (primarily industrial facilities and large commercial operations) emitting certain air pollutants are required to obtain Title V operating permits under the Federal Operating Permits Program outlined in 40 CFR Part 70 of the CAA. Whether a source meets the definition of “major” depends on the type and amount of air pollutants it emits and, to some degree, on the overall air quality in its vicinity. Generally, major sources include stationary facilities that emit 100 tons or more per year of a regulated air pollutant including compounds such as CO, PM_{10}, $PM_{2.5}$, volatile organics, SO_2, and NO_X. Major sources of toxic air pollutants (i.e., any source that emits more than 10 tpy of an individual toxic air pollutant or more than 25 tpy of any combination of toxic air pollutants) are also covered under the Federal Operating Permits Program. The Project would be a minor source with respect to the Federal

Operating Permits Program; therefore, a Title V operating permit would not be required. Results of emissions calculations are shown in Section 3 of this document.

2.2 Fugitive Dust

2.2.1 General Construction Activities

General construction activities were assessed in a very conservative manner by assuming that all construction activities would result in emissions of 1.2 tons per acre of disturbed land per month in accordance with guidance from USEPA as described below.

Heavy construction is a source of dust emissions that may have substantial temporary impact on local air quality. Facility and road construction are two examples of construction activities with high emissions potential. Emissions during the construction of a building or road can be associated with land clearing, drilling and blasting, ground excavation, cut and fill operations (i.e., earth moving), and construction of a particular facility itself. Dust emissions often vary substantially from day to day, depending on the level of activity, the specific operations, and the prevailing meteorological conditions. A large portion of the emissions result from equipment traffic over temporary roads at the construction site.

The temporary nature of construction differentiates it from other fugitive dust sources as to estimation and control of emissions. Construction consists of a series of different operations, each with its own duration and potential for dust generation. In other words, emissions from any single construction site can be expected to 1) to have a definable beginning and an end, and 2) vary substantially over different phases of the construction process. This is in contrast to most other fugitive dust sources, where emissions are either relatively steady or follow a discernible annual cycle. Furthermore, there is often a need to estimate area wide construction emissions, without regard to the actual plans of any individual construction project. For these reasons, following are methods by which either area wide or site-specific emissions may be estimated.

The quantity of dust emissions from construction operations is proportional to the area of land being worked and to the level of construction activity. By analogy to the parameter dependence observed for other similar fugitive dust sources, one can expect emissions from heavy construction operations to be positively correlated with the silt content of the soil (that is, particles smaller than 75 micrometers [µm] in diameter), as well as with the speed and weight of the average vehicle, and to be negatively correlated with the soil moisture content.

Based on field measurements of total suspended particulate (TSP) concentrations surrounding apartment and shopping center construction projects, the approximate emission factors for construction activity operations are 1.2 tons/acre/month of activity.

These values are most useful for developing estimates of overall emissions from construction scattered throughout a geographical area. The value is most applicable to construction operations with:

1. Medium activity level;
2. Moderate silt contents; and
3. Semiarid climate.

Because the above emission factor is referenced to TSP, use of this factor to estimate PM no greater than 10 µm in aerodynamic diameter (PM_{10}) emissions will result in conservatively high estimates. Also, because derivation of the factor assumes that construction activity occurs 30 days per month, the above estimate is somewhat conservatively high for TSP as well (USEPA 1995).

Screening dispersion modeling was performed to assess potential PM_{10} impacts of fugitive dust from disturbed areas during construction. Fugitive dust emissions from operation and reclamation of the

Project would be equivalent to or less than construction emissions; hence, only construction emissions were modeled. Air modeling was performed using the USEPA screening model, SCREEN3, which is a single source Gaussian plume model and provides maximum ground-level concentrations for point, area, flare, and volume sources. SCREEN3 is a screening version of the Industrial Source Complex 3 model (ISC3). The GHPA was modeled as an area source using full meteorology as well as regulatory model default values for mixing heights and anemometer heights. Impacts that would be representative of activities in the analysis area were assessed at a distance of 50 meters from the disturbance. Results of the analysis (impacts) are provided in Chapter 4 of this document.

2.2.2 Roadway Fugitive Dust

To estimate the maximum quantity of dust generated from any single vehicle on unpaved and paved roads, calculations using USEPA methods were used. Results are expressed in pounds (lb) of size-specific particulate emissions from a road per vehicle mile traveled (VMT).

For heavy vehicles traveling on unpaved surfaces at industrial sites including sites such as the Project, emissions were estimated from the following equation:

$$E = k\,(s/12)^{a}\,(W/3)^{b} \qquad \text{(Equation 1a)}$$

and, for vehicles traveling on publicly accessible roads, dominated by light duty vehicles, emissions were estimated from the following equation:

$$E = [k\,(s/12)^{a}\,(S/30)^{d}]/(M/0.5)^{c} - C \qquad \text{(Equation 1b)}$$

Where:

k, a, b, c and d are empirical constants (USEPA 2006) given below in **Table 2-2** and

- E = size-specific emission factor (lb/VMT)
- s = surface material silt content (%)
- W = mean vehicle weight (tons)
- M = surface material moisture content (%)
- S = mean vehicle speed (mph)
- C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear.

Table 2-2 Constants for Equations 1a AND 1b

	Industrial Roads (Equation 1a)			**Public Roads (Equation 1b)**		
	$PM_{2.5}$	**PM_{10}**	**PM_{30}***	**$PM_{2.5}$**	**PM_{10}**	**PM_{30}***
k (lb/VMT)	0.15	1.5	4.9	0.18	1.8	6.0
a	0.9	0.9	0.7	1	1	1
b	0.45	0.45	0.45	-	-	-
c	-	-	-	0.2	0.2	0.3
d	**-**	**-**	**-**	0.5	0.5	0.3
C (lb/VMT)				0.00036	0.00047	0.00047

Long term average emissions are inversely proportional to the frequency of measurable (> 0.254 mm [0.01 inch]) precipitation, so to account for rainfall a correction term is applied as expressed in the following equation:

$$E_{ext} = E[(365-P)/N] \qquad \text{(Equation 2)}$$

Where:

- E_{ext} = annual size specific emission factor extrapolated for natural mitigation (lb/VMY);
- E = size-specific emission factor (lb/VMT);
- *P* = number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period; and
- N = number of days in the averaging period (e.g., 365 for annual, 91 for seasonal, 30 for monthly).

For paved roads, the quantity of particulate emissions from re-suspension of loose material on the road surface due to vehicle travel on a dry paved road was estimated using the following empirical expression:

$$E_p = k\,(sL)^{0.91} \times (W)^{1.02} \qquad \text{(Equation 3)}$$

Where:

- E_p = particulate emission factor (having units matching the units of k);
- k = particle size multiplier for particle size range and units of interest (see below);
- sL = road surface silt loading (grams per square meter) (g/m2); and
- W = average weight (tons) of the vehicles traveling the road.

Applying the precipitation correction term results in the following equation:

$$E_{pc} = [k\,(sL)^{0.91} \times (W)^{1.02}]\,(1 - P/4N) \qquad \text{(Equation 4)}$$

Where k , sL , W, and S are as defined in Equation 3 and:

- E_{pc} = annual or other long-term average emission factor in the same units as k;
- P = number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period; and
- N = number of days in the averaging period (e.g., 365 for annual, 91 for seasonal, 30 for monthly).

The assumption leading to Equation 2 is based on analogy with the approach used to develop long-term average unpaved road emission factors; however, Equation 4 above incorporates an additional factor of "4" in the denominator to account for the fact that paved roads dry more quickly than unpaved roads and that the precipitation may not occur over the complete 24-hour day.

Other Assumptions

- Light vehicles such as pickup trucks weigh 2 tons.
- Heavy trucks weigh 10 tons unloaded and 38 tons loaded.
- Speeds on roads are restricted by BMP.

Best Management Practices for Air Quality

- All disturbed mine unit well, pipeline and utility trench acreage would be reclaimed and revegetated as soon as possible after construction has been completed. (PoO/Section 7.8, Cameco ***2012***).
- Site speed limits of 40 mph on primary roads, 30 mph on secondary roads, and 10 mph on two track roads would be implemented to reduce wildlife/vehicle collisions and generation of dust. (PoO/Section 7.6 and Operations Plan Section 3.1.9 and Plate OP-4, Cameco ***2012***, 1996).
- Disturbed surfaces would be scarified and contoured, if necessary, followed by topsoil placement and seeding with a BLM-approved seed mix. Areas which have been compacted would be scarified, ripped, and/or disked as necessary to relieve the compaction and prepare the subgrade for topsoil placement (PoO/Section 7.3, Cameco ***2012***):
  - Topsoil would be placed in a single lift to avoid compaction. On slopes of 4:1 (horizontal to vertical) or steeper, topsoil would be placed along the contour. (PoO/Section 7.3, Cameco ***2012***).
- All reclaimed areas would remain fenced for a period of at least two years, or until the vegetation is capable of renewing itself with properly managed grazing and without supplemental irrigation or fertilization:
  - The fencing would not be removed until BLM and DEQ agree that the revegetated areas are ready for livestock grazing. (PoO/Section 7.11, Cameco ***2012***).

Trucks were modeled as volume sources using full meteorology and regulatory model default values for mixing heights and anemometer heights. Impacts were assessed at a distance of 10 meters to 5,000 meters from roads in the analysis area. Results of the analysis (impacts) are provided in Section 4 of this document.

2.3 Combustion Emissions and Hazardous Air Pollutants

2.3.1 Criteria Pollutants

Emissions of criterion pollutants from internal combustion engines were calculated from emissions factors based on engine rated horsepower. Drill rig engines were assumed to have the same horsepower rating as heavy truck engines; therefore, emission rates from both types of engines were assumed to be the same. **Table 2-3** shows the criteria pollutant emission factors used to calculate emissions.

Table 2-3 Criteria Pollutant Emission Factors

Pollutant Emission Factor (lb/hp-hr)					
CO	**NO_X**	**SO_2**	**VOC**	**PM_{10}**	**CO_2**
6.68×10^{-03}	3.10×10^{-02}	2.05×10^{-03}	2.47×10^{-03}	2.20×10^{-03}	1.15

Conversion factors:
454 g/lb
2,000 lb/ton

2.3.2 Hazardous Air Pollutants

HAPs are those pollutants known or suspected to cause cancer or other serious health effects, such as damage to reproduction, birth defects, or adverse environmental impacts. The USEPA has classified 187 air pollutants as HAPs, including formaldehyde, benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds, and normal hexane (n-hexane).

Emissions of HAPs from internal combustion engines were calculated from emissions factors based on engine rated horsepower. Drill rig engines were assumed to have the same horsepower rating as heavy truck engines; therefore, emission rates of HAPs from both types of engines were assumed to be the same. **Table 2-4** shows the HAPs emission factors used to calculate emissions.

Table 2-4 HAPs Pollutant Emission Factors

Pollutant Emission Factor (lb/hp-hr)					
Benzene	**Toluene**	**Xylenes**	**Aceteldahyde**	**Formaldehyde**	**Propylene**
6.53×10^{-06}	2.86×10^{-06}	2×10^{-06}	5.37×10^{-06}	8.26×10^{-06}	1.81×10^{-05}

2.3.3 Greenhouse Gases

NEPA requires informed, realistic governmental decision making. CEQ provided the most recent draft guidance document in 2010 to advise federal agencies to consider, in scoping their NEPA analyses, whether analysis of the direct and indirect GHG emissions from their proposed actions may provide meaningful information to decision makers and the public. Specifically, if a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of CO_2e GHG emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public. For long-term actions that have annual direct emissions of less than 25,000 metric tons of CO_2, CEQ encourages Federal agencies to consider whether the action's long-term emissions should receive similar analysis. CEQ does not propose this as an indicator of a threshold of significant effects, but rather as an indicator of a minimum level of GHG emissions that may warrant some description in the appropriate NEPA analysis for agency actions involving direct emissions of GHGs (CEQ 2010).

The GHG analysis discloses the GHG direct and indirect emissions (power purchased from the grid) of CO_2e and provides a qualitative discussion regarding two distinct viewpoints:

1. The net impact of the Project to climate; and
2. Potential impacts to air quality and other resources due to climate change.

Project GHG emissions are presented in Section 3.3 of this document. GHGs include CO_2, CH_4, N_2O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfurhexaflourides (SF_6).

2.4 Modeling and Analysis Methods

2.4.1 SCREEN3

AECOM used USEPA-approved SCREEN3 for screening level analysis for the Project sources. The capacity and number of equipment and machines, and frequency and duration of operation for each of these emission sources are listed in that table.

Fugitive dust would be generated from construction sites and stockpiles of topsoil, as well as from unpaved road surfaces, especially during dry periods and under windy conditions. The SCREEN3 analysis is intended to produce estimates of regulatory design concentrations without the need for

meteorological data and is designed to produce concentrations that are equal to or greater than (e.g., conservative) the estimates produced by AERMOD with a fully developed set of meteorological and terrain data.

For $PM_{2.5}$, AECOM used the recent March 23, 2010 USEPA guidance for $PM_{2.5}$ modeling. In order to demonstrate that it is appropriate to use PM_{10} as a surrogate for $PM_{2.5}$ ambient air quality impact assessment, dispersion modeling analysis demonstrates compliance with the PM_{10} NAAQS, including an analysis of annual PM_{10} impacts. A simple example illustrating when a PM_{10} modeling analysis might serve as a surrogate for $PM_{2.5}$ modeling is to make a clearly conservative assumption that all PM_{10} emissions are $PM_{2.5}$ and the modeled PM_{10} impacts are taken as a direct surrogate for $PM_{2.5}$ impacts and compared to the $PM_{2.5}$ NAAQS (USEPA 2010). This conservative approach (i.e., all PM_{10} emissions are $PM_{2.5}$) is used for combustion sources. For fugitive dust, source specific $PM_{2.5}/PM_{10}$ emission factor ratios also may support the assumption of a more realistic yet conservative approach for taking a ratio of modeled PM_{10} ambient impacts to provide conservative estimates of $PM_{2.5}$ impacts (USEPA 2010).

To estimate the concentration of dust resulting from traffic on unpaved and paved roads, calculations using USEPA SCREEN3 model were used. Results of the analysis (impacts) are provided in Section 4 of this document.

2.4.2 Class I Visibility Analysis

Class I visibility analysis for Bridger NWA was performed using Federal Land Managers' Air Quality Related Values Work Group (FLAG) recommended analyses. The screening analysis is meant to provide a worst-case maximum impact estimate. If the results of the screening analysis show compliance with existing regulatory requirements, then no further modeling for compliance with standards are required. The screening level analysis involves dividing the emissions from the facility by the distance to the Class I area. If the resultant ratio is below 10, then no further analysis is needed. Results of the analysis (impacts) are provided in Chapter 4.0 of this document.

3.0 Emissions Inventory

Criteria pollutant emissions due to construction, operation, traffic maintenance, and reclamation of the Project would occur from drilling wells, building roads and other Project facilities, hauling product, reclamation of surface disturbance, as well as commuter traffic, and activities along the paved and unpaved roads. Emissions would include exhaust from semi-trucks, maintenance vehicles and equipment, as well as fugitive dust from maintenance activities, wind erosion, and other vehicular traffic. Emissions of GHG would result from fuel combustion. The following sections present the estimated emissions from sources associated with Project activities.

3.1 Fugitive Dust

A generally accepted method of estimating fugitive dust emissions is to use a typical construction project. The average daily fugitive dust emissions for a typical construction project are estimated to be 1.2 tons PM_{10} per acre per month for construction activities (USEPA 1995). Use of this value is a generally accepted approach for impact analysis and is conservative, since Project construction would not involve demolition of existing structures and other activities with the potential to result in high short-term fugitive dust emissions. **Table 3-1** shows emissions rate for general construction activities. For modeling purposes, emissions are converted to grams per second per square meter.

Table 3-1 Emissions Rate for General Construction Activities

Description	Disturbed acres	Duration (mos)	Total PM_{10} (tons)	Uncontrolled (g/s)	Controlled (g/s)	Area Emission Rate ($g/s/m^2$)
No Action Alternative	26.7	1	32.0	***11.***2	***5.61***	***5.1938x10^{-05}***
Proposed Action Construction	1,341.7	2	***805.0***	***564.0***	***282.0***	***5.1938x10^{-05}***
Proposed Action Operations	260	12	***156.0***	***109.0***	***54.6***	***5.1938x10^{-05}***
No Action Alternative Exploration	5	12	72.0	***25.2***	***12.6***	***5.1938x10^{-05}***
Maximum Annual Year 3	521	2	312.6	219.0	110.0	5.1938x10^{-05}

Factors used:

1.2	***Tons per acre per month***
2,000	***lbs/ton***
454	***g/lb***
3,600	***sec/hr***
720	***hr/mo***
50	***percent control***
4046.825	***m^2/acre***

Table 3-2 shows annual emissions for general construction activities assuming ***40 new wells*** per ***year,*** and **Table 3-3** shows emissions factors and assumptions used to calculate fugitive dust from roadways.

Table 3-2 Estimated Annual *Tailpipe PM* Emissions

Annual Emission Rate (tpy)[1]			
Pollutant	**Construction**	**Operations**	**Decommissioning/ Reclamation**
PM	9.0	4.5	1.5

[1] Annual emissions (tpy) is based on the potential to emit at the highest hourly rates and assumes 8,760 hours per year.

Table 3-3 Emission Factors and Assumptions used to Calculate Fugitive Dust from Roadways

Silt Content %	Moisture Content %	Control Efficiency %	PM_{10} Emission Factor (lb/VMT) 0.08	$PM_{2.5}$ Emission Factor (lb/VMT) 0.02
5.1	2.4	0.50	0.74	0.07

3.2 Combustion Sources

Facility sources at the GHPA would include stationary as well as mobile sources on the property including drill rigs used to install production, injection, and monitoring wells. Drill rigs also would be used for ore body delineation. Since the Project would be an ISR facility, no crushing would occur at the GHPA.

Emissions inventory includes the sources identified in **Table 3-4** and also includes mobile sources such as light and heavy duty vehicles used for commuting and product transport. Each source category includes the project phase (construction, operation, reclamation) number of units, the schedule of operations and expected duration. The emissions inventory includes criteria pollutants and hazardous air pollutants, estimated using standard emissions factors such as those available in USEPA AP-42 (USEPA 2009). Emissions are used in the SCREEN3 model and in the FLAG screening analysis to determine impacts from the Project.

3.2.1 Combustion Source Emissions

Project emissions for the types of equipment listed in **Table 3-4** are shown in **Table 3-5**. The hourly emission rates for the off-road equipment and machines during various phases of the Gas Hills Project are listed in **Table 3-6**. Hours shown in **Table 3-5** are based in the quantity of each type of equipment as shown in **Table 3-4**.

Combustion source emissions include gaseous pollutants, NO_X, VOC, CO, and SO_2 emissions, associated with the equipment used in construction, operation, reclamation, and decommissioning activities at the Gas Hills Project. Air pollutant emissions due to construction and operation of the Project would occur from drilling wells, hauling product, commuter traffic, and traffic maintenance activities along the paved and unpaved roads.

Table 3-4 *Combustion* Emissions Sources

Period	Stage/Purpose	Equipment Name	Model #/ Capacity	No. of Units	Freq. of Operation	Duration of Operation
Construction	Initial Construction/Well Field Road Construction	Scraper	CAT 651	1	8 hrs/day, 5 days/wk	2 months
		Bulldozer	CAT D9	1	8 hrs/day, 5 days/wk	2 months
		Motor Grader	JD 570B	1	8 hrs/day, 5 days/wk	2 months
	Well Preparation	Truck-mounted Rotary Drilling Rig, Semi-type Diesel Tractor Truck	GD1500	***14***	8 hrs/day, 5 days/wk	12 mo/yr
		Pump Pulling Vehicle	1-ton gas or diesel	2	8 hrs/day, 5 days/wk	12 mo/yr
		Motor Grader	JD 570B	1	8 hrs/day, 5 days/wk	3 mo/yr
		Backhoe	JD 710D	3	8 hrs/day, 5 days/wk	12 mo/yr
		Forklift	Case 586D	2	8 hrs/day, 5 days/wk	12 mo/yr
		Cementer	6 Cylinder Gas.	4	8 hrs/day, 5 days/wk	12 mo/yr
		Light-duty Truck		8 - 10	8 hrs/day, 7 days/wk	12 mo/yr
	Const. Material Transport	Heavy-duty Water Truck	1500 gal	4 - 8	8 hrs/day, 7 days/wk	12 mo/yr
	Commuting	Heavy-duty Truck – Material Transport	Diesel	1	1 trip/day	2 mo/yr
		Light-duty Vehicle from Riverton	Pickup/pass. car	15	1 trip/day	6 mo/yr
		Light-duty Vehicle from Casper	Pickup/pass.car	15	1 trip/day	6 mo/yr
Operation	Satellite Facility	Natural Gas- or Propane-fired Heater	$0.4\text{-}0.5 \times 10^6$ Btu/hr	6	24 hrs/day	6 mo/yr
	Product Transport	Truck to Highland Uranium Project site via Riverton	Diesel Semi-Tractor and Trailer	2	1 trip/day	12 mo/yr
	Commuting	Light-duty Vehicle from Riverton	Pickup/pass.car	15-18	1 trip/day	12 mo/yr
		Light-duty Vehicle from Casper	Pickup/pass.car	10-12	1 trip/day	12 mo/yr

Table 3-4 *Combustion* Emissions Sources

Period	Stage/Purpose	Equipment Name	Model #/ Capacity	No. of Units	Freq. of Operation	Duration of Operation
Year 5	Waste Hauling	Truck to Blanding, Utah	Diesel Semi Tractor and Trailer	221	Annual	1 yr
Year 6 – 20	***Waste Hauling***	***Truck to Blanding, Utah***	***Diesel Semi Tractor and Trailer***	***441***	***Annual***	***15 yrs***
Year 21	***Waste Hauling***	***Truck to Blanding, Utah***	***Diesel Semi Tractor and Trailer***	***789***	***Annual***	***1 yr***
Decomm./ Reclamation	Reclamation	Scraper	CAT 651	1	2 x 8 hr shift/day*	2 – 3 yrs
		Motor Grader	JD 570B	1	2 x 8 hr shift/day*	2 – 3 yrs
		Backhoe	CAT 245	2	2 x 8 hr shift/day*	2 – 3 yrs
		Heavy-duty Truck	Diesel	3	2 x 8 hr shift/day*	2 – 3 yrs
		Light-duty Truck	Pickup	15	1 trip/day	2 – 3 yrs
	Commuting	Light-duty Vehicle from Riverton	Pickup/pass. car	10	1 trip/day	2 – 3 yrs
		Light-duty Vehicle from Casper	Pickup/pass. car	10	1 trip/day	2 – 3 yrs

Table 3-5 Engine Emissions During Project Activities (tpy)

Equipment	HP	*Hours*[a]	CO	NO_X	SO_2	VOC	PM_{10}	CO_2
Drill Rigs	350	25,699	$3.00x10^{+01}$	$1.39x10^{+02}$	$9.22x10^{+00}$	$1.11x10^{+01}$	$9.89x10^{+00}$	$5.17x10^{+03}$
Heavy Trucks	350	887.5	$1.04\ x10^{+00}$	$4.81x10^{+00}$	$3.18x10^{-01}$	$3.84x10^{-01}$	$3.42x10^{-01}$	$1.79x10^{+02}$
Pickups	260	1,575	$1.37\ x10^{+00}$	$6.35x10^{+00}$	$4.20x10^{-01}$	$5.06x10^{-01}$	$4.50x10^{-01}$	$2.35x10^{+02}$
Scraper	250	1,000	$8.35\ x10^{-01}$	$3.88x10^{+00}$	$2.56x10^{-01}$	$3.09x10^{-01}$	$2.75x10^{-01}$	$1.44x10^{+02}$
Dozer	300	1,000	$1.00\ x10^{+00}$	$4.65x10^{+00}$	$3.08x10^{-01}$	$3.71x10^{-01}$	$3.30x10^{-01}$	$1.73x10^{+02}$
Grader	300	1,000	$1.00\ x10^{+00}$	$4.65x10^{+00}$	$3.08x10^{-01}$	$3.71x10^{-01}$	$3.30x10^{-01}$	$1.73x10^{+02}$
Pump Pulling Vehicle	260	2,000	$1.74\ x10^{+00}$	$8.06x10^{+00}$	$5.33x10^{-01}$	$6.42x10^{-01}$	$5.72x10^{-01}$	$2.99x10^{+02}$
Backhoe	200	3,000	$2.00x10^{+00}$	$9.30x10^{+00}$	$6.15x10^{-01}$	$7.41x10^{-01}$	$6.60x10^{-01}$	$3.45x10^{+02}$
Forklift	100	2,000	$6.68x10^{-01}$	$3.10x10^{+00}$	$2.05x10^{-01}$	$2.47x10^{-01}$	$2.20x10^{-01}$	$1.15x10^{+02}$
Cementer	100	4,000	$1.34x10^{+00}$	$6.20x10^{+00}$	$4.10x10^{-01}$	$4.94x10^{-01}$	$4.40x10^{-01}$	$2.30x10^{+02}$
Water truck	340	4,000	$4.54x10^{+00}$	$2.11x10^{+01}$	$1.39x10^{+00}$	$1.68x10^{+00}$	$1.50x10^{+00}$	$7.82x10^{+02}$

Table 3-5 Engine Emissions During Project Activities (tpy)

Equipment	HP	*Hours*[a]	CO	NO_X	SO_2	VOC	PM_{10}	CO_2
Waste Hauling Year 5	***350***	***4,420***	***5.17***	***24.0***	***1.59***	***1.91***	***1.70***	***890***
Waste Hauling Year 6 – 20	***350***	***8,820***	***10.3***	***47.8***	***3.16***	***3.81***	***3.40***	***1,780***
Waste Hauling Year 21	***350***	***15,780***	***18.4***	***85.6***	***5.66***	***6.82***	***6.08***	***3,180***
Total[b]			6.40^{x10}	2.97^{x10}	1.97^{x10}	2.37^{x10}	2.11^{x10}	$1.0x10^4$

[a] ***Hours are based on the type, capacity, and number of equipment and machines shown in Table 3-4.***

[b] ***Highest Year (21).***

Table 3-6 *Maximum* Hourly Criteria Pollutant Emissions from Engines for Each Phase (lb/hr)[a]

Pollutant	Total	Construction	Operation	Reclamation
SO_2	***12.9***	***7.3***	***1.8***	***3.9***
NO_X	***195.3***	***110.1***	***27.0***	***58.3***
VOC	***15.6***	***8.8***	***2.1***	***4.6***
PM_{10}	***13.9***	***7.8***	***1.9***	***4.1***
CO	***42.1***	***23.7***	***5.8***	***12.6***
CO_2	***7,245.0***	***4,082.5***	***1,000.5***	***2,162.0***

[a] ***See Table 3-5 for emissions due to hauling waste to Blanding, Utah.***

3.2.2 Hazardous Air Pollutants

HAPs are air toxics that pose the greatest threat to human health. HAPs emissions rates for the most common HAPs associated with fuel combustion are based on the following factors shown in **Table 2-4**.

HAP emission rates for each pollutant are below 1 ton per year, and the aggregate levels of all HAPs emissions are also less than 1 tons per year (tpy). **Table 3-7** lists the HAPs emitted from drill rigs, trucks, and pickups and **Table 3-8** shows annual HAPs emissions for each phase of the Project.

Table 3-7 HAP Emissions (tpy)

Equipment	Benzene	Toluene	Xylenes	Aceteldahyde	Formaldehyde	Propylene
Drill Rigs	$2.1x10^{-02}$	$9.2x10^{-03}$	$6.4x10^{-03}$	$1.7x10^{-02}$	$2.7x10^{-02}$	$5.8x10^{-02}$
Heavy Trucks	$8.2x10^{-04}$	$3.6x10^{-04}$	$2.5x10^{-04}$	$6.7x10^{-04}$	$1.0x10^{-03}$	$2.3x10^{-03}$
Pickups	$2.0x10^{-03}$	$8.6x10^{-04}$	$6.0x10^{-04}$	$1.6x10^{-03}$	$2.5x10^{-03}$	$5.4x10^{-03}$
Waste Hauling [a]	***$1.8x10^{-02}$***	***$7.9x10^{-03}$***	***$5.5x10^{-03}$***	***$1.5x10^{-02}$***	***$2.3x10^{-2}$***	***$5.0x10^{-02}$***

[a] ***Highest Year (21).***

Table 3-8 Hazardous Air Pollutant Emissions by Phase (tpy)

Pollutant	Construction	Operation	Reclamation
Benzene	***$4.77x10^{-02}$***	***$1.94x10^{-02}$***	***$1.07x10^{-02}$***
Toluene	***$2.09x10^{-02}$***	***$8.50x10^{-03}$***	***$4.70x10^{-03}$***
Xylenes	***$1.46x10^{-02}$***	***$5.92x10^{-03}$***	***$3.28x10^{-03}$***
Aceteldahyde	***$3.92x10^{-02}$***	***$1.59x10^{-02}$***	***$8.82x10^{-03}$***
Formaldehyde	***$6.03x10^{-02}$***	***$2.45x10^{-02}$***	***$1.36x10^{-02}$***
Propylene	***$1.32x10^{-01}$***	***$5.36x10^{-02}$***	***$2.97x10^{-02}$***

3.3 Greenhouse Gases

Project GHG emissions were assessed as part of the air quality analysis. GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfurhexaflourides (SF_6).

Annual emissions of GHGs (CO_2 equivalents, or CO_2e, which include CO_2, methane, and N_2O) from construction and operations sources are directly related to the consumption of fuels (combustion). Purchased power also contributes to GHG emissions at the power plants that furnish power to the grid supplying power to the Project. **Table 3-9** shows the estimated GHG emissions for the Project from direct combustion of fossil fuels, dominated by diesel, but also including natural gas used for process heating and from indirect GHG emissions associated with electrical power consumption.

Table 3-9 Greenhouse Gas Production under the Proposed Action

Case	Diesel Consumption (gallons)	Natural Gas Usage (therms)	Power Consumption (MW-hours/year)	Diesel-related GHG (tpy) CO_2e	Natural Gas-related GHG (tpy) CO_2e	Indirect Power-related GHG (tpy) CO_2e	Total GHG (tpy) CO_2e
Proposed Action[1] (Stationary Sources)	0	546,942	9,746	0	3,014	4,207	7,221
Proposed Action (Mobile Sources)	***19,936,935***	--	0	***220,971***	--	0	***220,971***
Proposed Action Total	***19,936,935***	**546,942**	**9,746**	***220,971***	**3,014**	**4,207**	***228,192***

4.0 Air Quality Impacts

Impacts to air quality were analyzed by determining compliance with the AAQS for all criteria pollutants using SCREEN3. All pollutants were determined to have impacts less than AAQS and are deemed to not cause or contribute to a violation of the AAQS, and as such, no further refined modeling analysis was performed.

The AAQS are the maximum concentrations allowed in terms of total pollutant levels in ambient air. Compliance with the AAQS was based on the total estimated air quality concentrations, which is the sum of the following:

- Modeled impacts resulting from all project sources modeled at their proposed potential emission rates; and
- Background concentrations.

Although southwestern Wyoming experiences high levels of winter-time ozone, the region in the vicinity of the Gas Hills project is not expected to have ozone levels of concern, so ozone modeling was not conducted. The Project is a very minor source of NO_X, VOCs, or other ozone precursors. The Project is expected to be connected to grid-supplied electrical power to operate the injection and pumping wells required for the ISR processes.

4.1 Fugitive Dust

A generally accepted method of estimating fugitive dust emissions is to use a typical construction project. The average daily fugitive dust emissions for a typical construction project are estimated to be 1.2 tons PM_{10} per acre per month for construction activities (USEPA 1995). Use of this value is a generally accepted approach for impact analysis and is conservative, since Project construction would not involve demolition of existing structures and other activities with the potential to result in high short-term fugitive dust emissions.

Each truck was modeled as a volume source. The source of emissions is the truck wheel, but for the purposes of modeling, dimensions of 5.6 meters lateral and 1.5 meter vertical were set. This is a very conservative approach since all of the emissions start in a relatively small volume. The generic road segment used estimated a silt content of 5.1 percent and moisture content of 2.4 percent.

AECOM performed screening level dispersion modeling for each criteria pollutant. Since the screening modeling shows low impacts, well below National Ambient Air Quality Standards (NAAQS) levels, more refined modeling was not deemed necessary to demonstrate compliance with both the NAAQS and Wyoming Ambient Air Quality Standards, collectively referred to as AAQS.

Concentrations of PM_{10} estimated based on the conservative screening level dispersion modeling analysis for the Proposed Action are shown in **Table 4-1** and indicate that impacts due to fugitive dust emissions from roads and disturbed acres during Project construction would represent less than one percent of impacts allowable under National and State (AAQS).

Results of the conservative screening level dispersion modeling analysis for roads during the life of the Project for the Proposed Action are shown in **Table 4-2**, and indicate that the impacts from engines and road traffic would be well within the National and State AAQS.

Table 4-1 SCREEN3 Model Results for Construction Fugitive Dust from Construction

Pollutant	Averaging Time	Impact (µg/m^3)	Background (µg/m^3)	Total Impact (µg/m^3)	National AAQS (µg/m^3)	Percent of National AAQS
PM_{10}	24-hour	***116.5***	10.2	***125.7***	150	***84***
	Annual	***28.9***	9	***37.9***	--[a]	—[a]
$PM_{2.5}$	24-hour	***11.6***	6.9	***18.5***	35	***53***
	Annual	***2.9***	2.6	***5.5***	***12***	***46***

[a] No NAAQS limit. Wyoming NAQS is 50 ***µg/m^3***.

Table 4-2 SCREEN3 Model Results for Fugitive Dust from Roadway Traffic

Pollutant	Averaging Time	Impact (µg/m^3)	Background (µg/m^3)	Total Impact (µg/m^3)	National AAQS (µg/m^3)	Percent of National AAQS
PM_{10}	24-hour	39.9	10.2	50.1	150	33.4
$PM_{2.5}$	24-hour	4.0	6.9	10.9	35	31.2
	Annual	0.4	2.6	3.0	12	25.0

Modeling results indicate that these activities would result in impacts that are well within allowable concentrations under National AAQS.

Emissions of $PM_{2.5}$ in fugitive dust were assumed to be a fraction (10 percent) of the emissions of PM_{10}. For internal combustion engines all particulate emissions were assumed to be $PM_{2.5}$.

4.2 *Fuel* Combustion Impacts

Project construction would generate criteria pollutant emissions from fuel combustion during construction, operation, reclamation, and decommissioning activities. The primary pollutants emitted would be PM_{10}, $PM_{2.5}$, oxides of nitrogen (NO_X), CO, and sulfur dioxide (SO_2). These emissions potentially would impact air quality in the GHPA.

Air pollutant emissions due to Project operation would occur from hauling product, commuter traffic, and maintenance traffic activities along the project roads over the lifetime of the Project. Estimated maximum hourly air pollutant emissions from equipment used for project activities are shown in **Table 4-3**. Short term rates are used in the modeling to determine short term hourly and daily impacts.

Screening dispersion modeling using SCREEN3 also was performed to assess combustion emissions from truck and drill rig engines. Engines were modeled as volume sources using full meteorology and default values for mixing heights and anemometer heights. Impacts were assessed at a distance of 10 meters to 5,000 meters from the source in the analysis area.

Table 4-3 Estimated *Annual* Air Pollutant Emissions from Project Activities

Maximum Hourly Emission Rate (*tpy*)			
Pollutant [a]	**Construction**	**Operations**	**Decommissioning/ Reclamation**
SO_2	***27.4***	***0.8***	***6.2***
NO_X	***414.7***	***11.7***	***93.4***
VOC	***33.0***	***0.9***	***7.4***
PM[b]	***402.0***	***158.5***	***288.5/6.6***
CO	***89.4***	***2.5***	***20.1***

[a] Emission estimates do not include commuter vehicle emissions. Emissions are estimated based on the type, capacity, and number of equipment and machines listed in **Table 3-4**.

[b] Emissions of particulate matter from combustion sources are estimated to be identical for PM_{10} and $PM_{2.5}$.

Results of the conservative screening level dispersion modeling analysis for engines are shown in **Table 4-4**, and indicate that the impacts from engines and road traffic would be well within the National and State AAQS.

Emissions would result in minor, short-term impacts on local air quality that would be restricted to the construction period. The construction impacts would diminish as a result of reclamation activities that would continue for two to three years after construction was completed and disturbed areas were reclaimed. Best management practices would be used to minimize impacts. Vehicular exhaust and crank case emissions from gasoline and diesel drivers would comply with applicable USEPA mobile emission regulations (40 CFR 85).

Table 4-4 SCREEN3 Model Results for Combustion *Tailpipe* Emissions from Engines

Pollutant	Averaging Time	Impact ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	National AAQS ($\mu g/m^3$)	Percent of National AAQS
SO_2	1-hour	1.1	NA	1.1	196	0.6
	3-hour	1.1	NA	1.1	700	0.2
NO_2	1-hour	12.1	NA	12.1	188	6.4
	Annual	0.5	NA	0.5	100	0.5
PM_{10}	24-hr	0.5	10.2	10.7	150	7.1
	annual	0.0	9.0	9.0	50	18.0
$PM_{2.5}$	24-hr	0.1	6.9	7.1	35	20.1
	annual	0.0	2.6	2.6	12	21.7
CO	1-hour	3.5	NA	3.5	40,000	0.0
	8-hour	2.5	NA	2.5	10,000	0.0

4.3 Hazardous Air Pollutants

A discussion of HAPs emissions is included in Section 3.2.2 of this document. The primary sources of HAPs are internal combustion engines used to power construction equipment and vehicles. No HAPs modeling was performed for this project. No single HAP emission rate for the Project is near 10 tpy, nor are the aggregate levels near 25 tpy. Furthermore, mining is not one of the 70 listed NESHAP source categories which identify likely sources of HAPs.

4.4 Air Quality Related Values (AQRV)

Federal land managers responsible for managing Class I areas, such as wilderness areas and national parks, are concerned with potential impacts from nearby activities on air quality related values (AQRVs) such as visibility impairment, ozone effects on vegetation, and effects of pollutant deposition on soils and surface waters. For each of these areas of concern, Federal land managers' air quality guidance recommends that a screening test be applied for proposed sources greater than 50 km from a Class I area to determine whether or not any further analysis is necessary. No Class I areas are located less than 50 km from the GHPA. The screening test considers a source located greater than 50 km from a Class I area to have negligible impacts with respect to Class I AQRVs if its total SO_2, NO_X, PM_{10}, and H_2SO_4 annual emissions (in tons per year, based on 24-hour maximum allowable emissions), divided by the distance (in km) from the Class I area (Q/D) is 10 or less. Based on their guidance, Federal land managers would not request any further Class I AQRV impact analyses from such sources as impacts are anticipated to be negligible (USFS 2010).

The Project would not emit H_2SO_4; project annual emissions of SO_2, NO_X, and PM_{10} are used to derive the potential AQRV impacts as shown in **Table 4-5**. This approach provides a conservative analysis of potential impacts to Class I areas since it includes the pollutants of interest to the FLM, and is calculated using the highest 24-hour emission rates as if those highest emissions occurred every hour of the day for a full year.

Table 4-5 Estimated Annual Air Pollutant Emissions from Project Activities

Annual Emission Rate (tpy)[a]			
Pollutant	**Construction**	**Operations**	**Decommissioning/ Reclamation**
SO_2	***33.0***	***0.9***	***7.4***
NO_X	***414.7***	***11.7***	***93.4***
PM	***402.0***	***158.5***	***288.5***
Total	***849.8***	***171.2***	***389.3***

[a] Annual emissions (tpy) is based on the potential to emit at the highest hourly rates.

Class I AQRV analysis for Bridger NWA was performed using FLAG recommended analyses. The screening analysis is meant to provide a worst-case maximum impact estimate. The results of the screening analysis show compliance with existing regulatory requirements, so no further modeling for compliance with FLM standards is required.

The nearest Class I area is the Bridger Wilderness located about 80 miles (128 km) west of the project area. The Q/D test is calculated based on ***1,021*** tpy total emissions ***from construction and operations*** divided by ***128*** km resulting in a ratio of ***8.0*** which is below 10; therefore, impacts to AQRVs from the Project are anticipated to be negligible and no further AQRV analysis is required.

4.5 Greenhouse Gasses

The scope of climate change is global, and is linked globally to the burning of fossil fuels for electricity, manufacturing, and transportation; deforestation and land surface change; agricultural and livestock operations; and fugitive methane emissions associated with pipelines and coal/oil/natural gas production.

The cumulative effects generally attributed to increased atmospheric greenhouse gas levels include, but are not limited to, melting permafrost, sea level rise, changing global climate patterns, redistribution of plant and animal species, redistribution of disease vectors, and altered precipitation regimes both spatially and temporally. Current state of the science does not have the ability to link any particular instance of greenhouse gas emissions or sequestration to any specific climate-related environmental effects.

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Appendix L

Smith Ranch-Highland SPCCP

TETRA TECH

Cameco Resources
Smith Ranch – Highland Uranium Operations

Spill Prevention Control and Countermeasures Plan

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March 31, 2010

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Appendix B: Tank Inventory and Secondary Containment Calculations
Appendix C: Contact Information and Phone Lists
Appendix D: Inspection and Reporting Forms

Table 1. Cross Reference Matrix for Non-Production Facilities

Regulation	Description	Page
§ 112.3(d)	Professional Engineer (PE) certification with five elements	2
§ 112.5(a)	Amendment of SPCC Plan	3
§ 112.5(b)	Review of Plan at least every 5 years with documentation (i.e. a log)	3
§ 112.3(g)	Qualified Facilities: meets qualification criteria	N/A
§ 112.6(a)	Self Certification with 8 elements	N/A
§ 112.6(b), (c), (d)	PE certification for deviations from Plan requirements	N/A
§ 112.6(c)(3)	Security if not complying with 112.7(g)	N/A
§ 112.6(c)(4)	Bulk storage container inspections if not complying with 112.8(c)(6) or 112.12(c)(6)	N/A
§ 112.7	General requirements for SPCC Plans for all facilities & all oil types	5
§ 112.7	Management approval of Plan	1
§ 112.7	Discussion of facilities, procedures, methods or equipment not yet fully operational with details of installation and operational start-up	5
§ 112.7(a)(1)	General requirements; discussion of facility's conformance with rule requirements	5
§ 112.7(a)(2)	Deviations from Plan requirements	5
§ 112.7(a)(3)	Facility description and diagram, type of oil and capacity of each container, transfer stations and piping, buried containers on diagram	5, App B
§ 112.7(a)(3)(ii)	Discharge prevention measures	5
§ 112.7(a)(3)(iii)	Discharge drainage controls	5
§ 112.7(a)(3)(iv)	Countermeasures for discharge discovery, response and cleanup	6
§ 112.7(a)(3)(v)	Methods of disposal of recovered materials in accordance with legal requirements	6
§ 112.7(a)(3)(vi)	Contact list and phone numbers for facility response coordinator, National Response Center, cleanup contractors, all Federal, State, and local agencies who must be contacted in case of a discharge	6, App C
§ 112.7(a)(4)	Spill reporting information	7
§ 112.7(a)(5)	Discharge procedures	7, App C
§ 112.7(b)	Failure prediction (sources, quantities, rates, and directions)	8, App A
§ 112.7(c)	Secondary containment for all areas from which a discharge of oil could occur (i.e. mobile refuelers, loading/unloading areas, transformers, oil filled operational equipment, etc.) other than bulk containers	8, App B
§ 112.7(d)	Explanation of impracticability of secondary containment	N/A
§ 112.7(d)(1)	Oil spill contingency plan per part 109	N/A
§ 112.7(d)(2)	Commitment of manpower, equipment & materials to remove a discharge	N/A
§ 112.7(e)	Written procedures for inspections and tests	8, App D
§ 112.7(e)	Records of inspections and tests signed and kept 3 years	8
§ 112.7(f)(1)	Employee training	8

Table 1. Cross Reference Matrix for Non-Production Facilities

Regulation	Description	Page
§ 112.7(f)(2)	Designated individual accountable for discharge prevention	1
§ 112.7(f)(3)	Discharge prevention briefings scheduled and conducted annually	8
§ 112.7(g)(1)	Facility fully fenced with locking entrance gates	8
§ 112.7(g)(2)	Master flow and drain valves of containers have security measures	8
§ 112.7(g)(3)	Starter controls on pumps locked in “off” position	8
§ 112.7(g)(4)	Piping capped/blank flanged when in standby status	8
§ 112.7(g)(5)	Facility lighting	8
§ 112.7(h)	Loading/unloading rack (excluding offshore facilities)	N/A
§ 112.7(h)(1)	Containment for contents of largest compartment	N/A
§ 112.7(h)(2)	Warning light/sign, barrier system, wheel chocks, or break interlock system to prevent departure with connected lines	N/A
§ 112.7(h)(3)	Inspect drains and outlets of vehicles	N/A
§ 112.7(j)	Conformance with State requirements	N/A
§ 112.3(k)(1)	Qualified Oil-Filled Operational Equipment: meets criteria	N/A
§ 112.7(k)(2)(i)	Inspection procedures or monitoring program	N/A
§ 112.7(k)(2)(ii)(A)	Oil spill contingency plan per part 109	N/A
§ 112.7(k)(2)(ii)(B)	Written commitment of resources	N/A
§ 112.8(a),	Meet general and specific requirements	10
§ 112.8(b),	Facility drainage:	10
§ 112.8(b)(1),	Restrain drainage from diked areas; inspect accumulation	10
§ 112.8(b)(2),	Manual valves to drain diked areas, inspect before discharging into watercourse	10
§ 112.8(b)(3),	Undiked drainage with a potential for a discharge designed to flow to ponds, lagoons, or catchment basins	10
§ 112.8(b)(4),	Final discharge of ditch drainage controlled	N/A
§ 112.8(b)(5),	Where pump transfer is needed, two lift pumps installed with one installed permanently	N/A
§ 112.8(c),	Bulk storage containers:	10
§ 112.8(c)(1),	Containers compatible with material and conditions of storage	10
§ 112.8(c)(2),	Secondary containment for capacity of largest container & sufficient freeboard for precipitation	10
§ 112.8(c)(3),	Not allow drainage of rainwater from diked areas unless inspected, records kept of drainage events	10
§ 112.8(c)(4),	Completely buried metallic containers corrosion protected, leak testing conducted	N/A
§ 112.8(c)(5),	Partially buried containers corrosion protected	N/A
§ 112.8(c)(6),	Integrity testing, visual plus non-destructive shell testing, comparison records kept	11
§ 112.8(c)(7),	Internal heating coils monitored	N/A
§ 112.8(c)(8),	Containers engineered to prevent discharges	11
§ 112.8(c)(8)(v),	Liquid level sensing devices tested to ensure proper operation	11
§ 112.8(c)(9),	Observe effluent treatment facilities to detect system upsets	N/A
§ 112.8(c)(10),	Correct visible leaks and remove accumulations of oil	10

Table 1. Cross Reference Matrix for Non-Production Facilities

Regulation	Description	Page
§ 112.8(c)(11),	Secondary containment for mobile/portable containers with capacity of largest container & sufficient freeboard for precipitation	N/A
§ 112.8(d),	Facility transfer operations, pumping and facility process:	N/A
§ 112.8(d)(1),	Buried piping installed or replaced after 8/16/02 corrosion protected	N/A
§ 112.8(d)(2),	Terminal connections capped/blank flanged when not in service or in standby service for an extended time	N/A
§ 112.8(d)(3),	Pipe supports properly designed	N/A
§ 112.8(d)(4),	Inspect aboveground piping, integrity and leak test buried piping	N/A
§ 112.8(d)(5),	Warn vehicles of aboveground piping	N/A
§ 112.20(e)	Complete and maintain the certification of substantial harm form in Appendix C	12

1.0 GENERAL INFORMATION

1.1 Facility and Operator General Information

Name of Facility: **Smith Ranch Highland Operation**

Type of Facility: **Uranium In-Situ Leach Mine**

Facility Location: **The main office and central processing plant are located in NE/NW, Section 36, T36N, R74W. Satellite SR-2 is located in NW/NE, Section 17 T36N, R74W. Satellite 2 is located in SW/NE, Section 14 T36N, R73W. Satellite 3 is located in SE/SE, Section 20 T36N, R73W. All tank locations are shown on the attached maps in Appendix A.**

Name and Address of Owner or Operator

Name: **Cameco Resources**

Address: **P.O. Box 1210**
Glenrock, Wyoming 82637

1.2 Designated Person Accountable for Oil Spill Prevention (40 CFR 112.7 (f)(2))

The following person reports to Management and is accountable for discharge prevention at the subject facilities:

Name:

Title: **Safety, Health, Environment and Quality Manager**

1.3 Management Approval

Cameco Resources is committed to the prevention of discharges of oil to the environment, including navigable waters, and maintains the highest standards for spill prevention control through regular review, updating and implementation of this SPCC plan. With the signature below, I certify that this Spill Prevention, Control and Countermeasures plan will be implemented as herein described.

Signature:_____ Date: _____

Name: Tom Cannon
Title: General Manager

1.4 Professional Engineer's Certification

By Means of this Professional Engineer Certification, I hereby attest that:

1) I am familiar with the Provisions of 40 CFR Part 112
2) I, or my agent, have visited and examined the facilities
3) This SPCC has been prepared in accordance with good engineering practice, including consideration of applicable industry standards, and with the requirements of 40 CFR 112
4) Procedures or required inspections and testing have been established, and
5) This plan is adequate for the subject facilities

Jason M. Stratton
Registered Professional Engineer

Date _____

_____.
Signature of Registered Professional Engineer
Registration No. 8182; State Wyoming

1.5 Plan History

This plan supersedes all plans listed in the following table:

Plan Name	Date Created
1. Power Resources Smith Ranch – Highland Operation Spill Prevention Control and Countermeasure Plan	October 30, 2006
2.	
3.	
4.	

1.6 Plan Review and Amendments (40 CFR 112.5)

In accordance with 40 CFR 112.5(b), a review and evaluation of this SPCC plan is conducted at least once every five years. As a result of this review and evaluation, Cameco Resources will amend the plan to include more effective spill prevention and control technology if:

1) Such technology will significantly reduce the likelihood of a spill event from the facilities, and
2) If such technology has been field-proven at the time of the review.

Technical amendments to this SPCC plan shall be certified by a Registered Professional Engineer within six months if modifications to the facility materially affect the potential for discharges of oil into or upon navigable waters. Modifications which may require plan amendments and certification include:

1) Commissioning or decommissioning of containers;
2) Replacement, reconstruction, or movement of containers;
3) Reconstruction, replacement or installation of piping systems;
4) Construction or demolition actions that may alter secondary containment structures;
5) Changes in products or type of equipment service; or
6) Changes in operating and maintenance procedures.

Administrative or non-technical amendments do not require the certification of a Registered Professional Engineer. Examples of administrative changes include, but are not limited to, phone numbers, name changes, or any non-technical text revisions.

1.6.1 Plan Review

By my signature below, I attest that I have completed a review and evaluation of this SPCC plan for the Smith Ranch – Highland Operation.

Review Date	Signature	Printed Name	Title	Plan Amended (Yes/No)
1.				
2.				
3.				
4.				
5.				

1.6.2 Amendment Summary

Amendments to this plan are required whenever there is a change in facility design, construction, operation or maintenance which materially affects the facility's potential for the discharge of oil into or upon navigable waters of the United States. Such amendments shall be

implemented as soon as possible, but no later than six months after such changes occur. The engineer's signature below certifies the amendments,

This SPCC plan for the Smith Ranch – Highland Operation has been amended as follows.

Amendment Date	Purpose and Description of Amendment	Amendment Type (Administrative or Technical)	Amendment Certified by P.E. (Yes/No)
1.			
2.			
3.			

Note: P. E. certification is not required for administrative amendments.

1.6.3 Amendment Certification

By Means of this Professional Engineer Certification, I hereby attest that:

1) I am familiar with the Provisions of 40 CFR Part 112
2) I, or my agent, have visited and examined the facilities
3) This SPCC has been prepared in accordance with good engineering practice, including consideration of applicable industry standards, and with the requirements of 40 CFR 112
4) Procedures or required inspections and testing have been established, and
5) This plan is adequate for the subject facilities

Registered Professional Engineer

Date:_____

_____.
Signature of Registered Professional Engineer
Registration No. ; State

2.0 DISCHARGE PREVENTION – GENERAL PROVISIONS (40 CFR 112.7)

This section covers regulation requirements which apply to all facilities on-shore and off-shore, production and non-production.

2.1 Discussion of Facilities, Procedures, Methods, and Equipment Not Yet Fully Operational (40 CFR 112.7)

No parts of this facility fall under this category at this time.

2.2 Facility Conformance (40 CFR 112.7 (a) (1) & (j))

The Smith Ranch Highland Operation facility is a uranium in-situ leach mining operation. Oil, as defined by 40 CFR 112.2, stored at this facility is in the form of diesel, gasoline, lubricants, and waste oil used for heating. The purpose of this plan is to establish methods, procedures, and engineering controls for the prevention of discharges of these petroleum products, and to provide adequate countermeasures in the event of a discharge. This SPCC plan was written in conformance with 40 CFR 112. Passive secondary containment is provided for all bulk storage and active containment is provided for all loading and unloading areas not provided with constructed berms.

The State of Wyoming regulates oil only at commercial facilities such as gas stations and oil after it has been spilled.

2.3 Plan Deviations and Equivalent Environmental Protection (40 CFR 112.7 (a) (2))

This facility maintains conformance with all regulation. There are no deviations from the plan requirements and no equivalent environmental protection is used or proposed.

2.4 Physical Layout of Facility and Tank Inventory (40 CFR 112.7 (a) (3) & (3) (i))

This facility consists of an in-situ uranium leaching mine. There are four main areas where oil is stored, transferred and used: a central processing plant, and three satellite areas (Sat 2, Sat 3, and SR-2). Attached in Appendix A is a facility wide map showing the satellite stations in relation to the central processing plant. Site specific diagrams of each area with tanks, containments and loading/unloading areas are also included in Appendix A. A complete inventory of tanks and their contents grouped by area is included in Appendix B.

2.5 Discharge Prevention Measures and Drainage Controls (40 CFR 112.7 (a) (3) (ii & iii))

Loading and unloading areas consist of locations where fuel and oil is transferred to and from tanks. Each fuel tank installation at the facility has a loading/unloading area. Additionally the diesel tank located in the fire suppression building at the central processing plant has a loading/unloading area. Active containment is provided for all loading and unloading areas. The active containment consists of continual visual observation during the transfer process combined with sorbent materials available for use in the case of a discharge.

All bulk storage (including drums of 55 gallons or more) is kept within secondary containment. This facility has no piping which requires containment under 40 CFR 112. Secondary containments are constructed so that the sides and base are impervious to oil. Any area where bulk storage is contained or loading/unloading occurs is graded to ensure that incidental discharges do not reach waterways or natural drainages which may lead to navigable waters.

All secondary containment constructed with an outlet is built with manual valves of an open and close design. (112.8 (3)(i) The valves are kept closed and not accessible to the general public when not in use.

2.6 Countermeasures for Discovery, Response and Cleanup (40 CFR 112.7 (a) (3) (iv))

Each tank installation is inspected for evidence of discharge, leaks, or accumulation of liquids as part of daily operations. Documentation of this is stored onsite at the Central Processing Plant office.

If evidence of a leak or discharge is present within the containment, it is determined whether or not the source is still emitting fluid. If the leak is ongoing it is neutralized by removing the source; either by closing valves, tightening fittings or removing liquid from the tank.

Liquids found within the containment having oil present will not be allowed to accumulate but will be removed manually and stored in containers constructed of material compatible with the contents stored until it can disposed of in manner consistent with state and federal regulations.

If the liquid within the containment is the result of precipitation it is either drained via the process discussed in section 3.3 below or allowed to evaporate; except in the case of Satellite 3 secondary containment, which will have all accumulated precipitation removed upon discovery to maintain an adequate containment volume.

If a spill occurs outside of the secondary containment such as in the loading or unloading area, spill containment materials are readily available near all tank installations. Spills will be contained with sorbent materials such as mats, booms, pads, pillows, and loose granular sorbent. Used sorbent materials will be containerized for later disposal in accordance with state and federal regulations.

2.7 Methods of Disposal (40 CFR 112.7 (a) (3) (v))

All materials will be properly disposed of in accordance with state and federal regulations. Petroleum contaminated soils will be disposed of at the nearest landfill which accepts petroleum contaminated soils. All sorbent materials and liquid wastes will be disposed of through an approved oil recycler or disposal facility. Any materials which are stored on-site until removal is possible, will be stored so that release or contamination of waters of the state does not occur. Contaminated soils will be stored so that oil is contained and does not run-off or infiltrate. Used sorbents and liquid wastes will be stored in containers that are constructed of a material compatible with their contents.

2.8 Contact List and Reporting Procedures (40 CFR 112.7 (a) (3) (vi) & (4))

All spills, leaks or discharges shall be immediately reported to Cameco staff responsible for spill response. A list of these individuals can be found in Appendix C. The response coordinator will then be responsible for determining whether the spill requires reporting to state and federal

agencies. The contact numbers for state and federal agencies are found in Appendix C. Also, listed are the numbers for local emergency and medical responders.

Any release that enters, or threatens to enter waters of the state shall be reported. Releases of 25 gallons or less of the following; refined crude oil products, including but not limited to, gasoline, diesel motor fuel, aviation fuel, asphalt, road oil, kerosene, fuel oil, new and used lubricating oils are not required to be reported to the Department of Environmental Quality provided the release does not physically enter, or threaten to enter waters of the state.

Releases which enter or threaten to enter waters of the state and meet any one of the following criteria must be reported to the National Response Hotline:

- Violates state water quality standards
- Causes a sheen or film on the waters surface
- Leaves a sludge or emulsion below the waters surface

The National Response Hotline number is listed on the contact sheet in Appendix C.

If a reportable spill occurs, the spill response coordinator for Cameco Resources will complete and use the Reportable Spills Information form in Appendix D to ensure complete and consistent reporting to all pertinent agencies.

2.9 Spill Response Procedures (40 CFR 112.7 (a) (5))

Upon discovery of a release, the following actions will be taken:

2.9.1 Report the Spill

The spill response coordinator will be contacted by radio or phone at (307) 358-6541 Extension 474 with the following information:

1. The location of the spill
2. Any damages or injuries caused by the discharge
3. Whether an evacuation may be needed
4. Actions being used to stop, remove, and mitigate the effects of the discharge
5. The type of material discharged
6. Estimates of the total quantity discharged
7. The source of the discharge
8. A description of all affected media (air, soil, water)
9. The cause of the discharge

2.9.2 Contain the Spill

1. If the release site is safe to work in, contain the spill with sorbent materials available at each satellite and the central processing plant.
2. Remove accumulated fluids using vacuum truck available on-site

3. Containerize all used sorbent materials and fluids in drums compatible with the contents being stored
4. If necessary, excavate contaminated soils.
5. Dispose of all materials as described in section 2.6

2.10 Potential Equipment Failures (40 CFR 112.7 (b))

Potential failures at this facility include:

1. Overfilling tanks
2. Tank rupture
3. Leaking nozzles or hoses

Prediction of direction of flow for individual tank installations can be found on the detailed location maps in Appendix A. The rate of flow will not exceed the instantaneous release of the full tank. The quantity will not exceed the volume of the tank.

2.11 Secondary Containment (40 CFR 112.7 (c) (i))

This facility has two pieces of qualified oil filled operational equipment; this is in the dryer. These two pieces of equipment are each capable of holding 350 gallons of oil and are located in sufficient secondary containment (see Appendix B). There All motive power containers are exempt from regulation under the December 2006 SPCC amendment. All loading and unloading areas are provided with appropriate containment in compliance with 40 CFR 112.7 (c) (1) (vii) through the utilization of sorbent materials and active secondary containment. This compliance is achieved by constant supervision by personnel during all loading and unloading activities. Secondary containment for bulk storage is addressed under section 3.3.

2.12 Inspections, Tests, and Records (40 CFR 112.7 (e))

Daily visual inspections are conducted by employees for evidence of leaks or spills. Periodic inspections will be conducted annually at a minimum. These inspections will use the Facility Inspection Form in Appendix D. All records of inspections will be retained on-site at the central processing plant for no less than 3 years.

2.13 Training (40 CFR 112.7 (f))

Annual training will be conducted under the instruction of the designated personnel in charge of discharge prevention listed in section 1.2. All employees will receive annual training. Training will include the contents of this SPCC, safe oil handling procedures, standard operating procedures for loading and unloading from fuel tanks, and any new procedures enacted. All newly hired employees will receive full spill prevention training prior to working alone on-site. Training records will be maintained by SHEQ on-site

2.14 Security (40 CFR 112.7 (g) (1-5))

The security at this facility is compliant with all required regulation. The facility is encompassed by fencing and maintains gates at the entry points to the facility. All visitors are escorted by Cameco staff until required training is completed. All nozzles and valves allowing discharge from the tanks are manually operated; all tank installations have lighting to adequately identify spills at night and deter vandalism. All discharge valves from containment areas are closed and inaccessible to the public unless the containment is being emptied in accordance with this plan.

3.0 SPILL PREVENTION – ONSHORE FACILITIES EXCLUDING PRODUCTION (40 CFR 112.8)

This section deals with spill prevention, control, and countermeasure requirements for all onshore facilities which qualify for coverage under the SPCC rule with the exception of on-shore production facilities.

3.1 General and Specific Requirements (40 CFR 112.8 (a))

This facility meets all requirements listed in 112.7 with the exception of the items discussed in section 2.3.

3.2 Facility Drainage(40 CFR 112.8 (b))

All secondary containments and diked areas have either no discharge openings or are equipped with manually operated valves of open and closed design. No transfers of oil occur outside of loading areas, and the plant maintains no piping or qualified tanks outside of secondary containment.

All diked areas which have drains, have manual drain valves which, when not in use are kept in a closed and inaccessible to the public. All accumulated precipitation will be inspected for contamination prior to discharge from any diked area. Records of any rainwater discharges and accompanying inspections will be retained by SHEQ as part of the Wyoming Pollution Discharge Elimination System Storm Water Discharge permit.

3.3 Bulk Storage (40 CFR 112.8 (c) (1-3))

All bulk storage containers are constructed of suitable material and designed to be compatible with their contents and conditions of storage. All tanks are marked with signage appropriate to their contents and “NO SMOKING”.

All secondary containment for bulk storage are constructed with walls and floors impervious to oil, and are of adequate size to contain the volume of the largest vessel within the containment plus the volume of precipitation from a 25 year/24 hour storm event except for the secondary containment found at the fuel island at Satellite 3. All secondary containment calculations can be found in Appendix B.

Satellite 3 is constructed to hold greater than 110% of the volume of the largest vessel within the containment. Since this is an existing structure in an area graded to prevent the escape of spills it has been determined that 110% containment will be adequate given the following provisions:

- Precipitation will not be allowed to accumulate within this containment, but will be removed upon discovery.
- The containment will be visually checked no less then every two days and after every storm event for accumulated precipitation.

3.4 Integrity Testing (40 CFR 112.8 (c) (6))

All storage tanks located at this facility will be visually inspected annually at a minimum. The inspection will include the tank body, all vents, openings, valves, and fittings. All tanks located at

this facility are elevated; therefore all supports, piers, and anchors will be inspected. Any signs of leaks, deterioration, corrosion, discharges, or accumulation of oil will be recorded on the Facility Inspection Form in Appendix D.

Non-destructive shell testing will be conducted every five years and after any repairs are completed. The integrity testing records will be retained for comparison at the central processing plant. Records will be kept for the life of the tank.

3.5 Containers Engineered to Prevent Discharge (40 CFR 112.8 (c) (8))

The two 8,000 gallon tanks located at the central processing plant are equipped with audible vents for the prevention of overflow during filling and have their fluid level checked twice per week. All other tanks are equipped with visible level indicators and internal floats. Liquid level detection devices will be checked annually to ensure they are working properly.

3.6 Prompt Correction for Leaks (40 CFR 112.8 (c) (10))

Any observation of a leak or accumulation of oil indicating a leak will be reported to the Spill Response Coordinator immediately upon discovery. The tank will be emptied of contents and repaired or replaced. Any escaped oil will be dealt with in a manner consistent with methods and procedures within this plan.

4.0 CERTIFICATION OF SUBSTANTIAL HARM (40 CFR 112.20 (E))

In compliance with 40 CFR 112.20 (e) the Cameco Resources has included this form as required for exemption from the Facility Response Plan requirements.

ATTACHMENT C-II
CERTIFICATION OF THE APPLICABILITY OF THE SUBSTANTIAL HARM CRITERIA

Facility Name: Smith Ranch Highland Operation
Facility Address: 762 Ross Road Douglas, WY 82633

1. Does the facility transfer oil over water to or from vessels and does the facility have a total oil storage capacity greater than or equal to 42,000 gallons?
   Yes ___ No_X___

2. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and does the facility lack secondary containment that is sufficiently large to contain the capacity of the largest aboveground oil storage tank plus sufficient freeboard to allow for precipitation within any aboveground oil storage tank area?
   Yes ___ No_X___

3. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the appropriate formula in Attachment C-III to this appendix or a comparable formula [1]) such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments? For further description of fish and wildlife and sensitive environments, see Appendices I, II, and III to DOC/NOAA's "Guidance for Facility and Vessel Response Plans: Fish and Wildlife and Sensitive Environments" (see Appendix E to this part, section 13, for availability) and the applicable Area Contingency Plan.
   Yes ___ No_X___

4. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the appropriate formula in Attachment C-III to this appendix or a comparable formula [1]) such that a discharge from the facility would shut down a public drinking water intake [2] ?
   Yes ___ No_X___

5. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and has the facility experienced a reportable oil discharge in an amount greater than or equal to 10,000 gallons within the last 5 years?
   Yes ___ No _X___

Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document, and that based on my inquiry of those individuals responsible for obtaining this information, I believe that the submitted information is true, accurate, and complete.

Signature	Title
Name (please type or print)	Date

[1] If a comparable formula is used, documentation of the reliability and analytical soundness of the comparable formula must be attached to this form.

[2]For the purposes of 40 CFR part 112, public drinking water intakes are analogous to public water systems as described at 40 CFR 143.2(c).

REFERENCES

Consultant Reports

Power Resources Smith Ranch – Highland Operation

Spill Prevention Control and Countermeasure Plan. Prepared for Power Resources. Report Dated October 30, 2006.

Agency Documents

U.S.EPA. *SPCC.Guidance for Regional Inspectors,* Version 1.1. March 30, 2006.

The following documents will be appended to the site-specific SPCCP:

Appendix A: Facility Maps and Detailed Location Maps

Appendix B: Tank Inventory and Secondary Containment Calculations

Appendix C: Contact Information and Phone Lists

Appendix D: Inspection and Reporting Forms

Appendix M

Gas Hills Transportation Plan

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The following is a description of the transportation requirements needed for startup, operation, and decommissioning of the Gas Hills in-situ uranium mine to be operated by Cameco Resources, Inc. (Cameco). The plan covers a 25 year mine life expectancy. It is important to note, that the detailed design work has not been completed for the Gas Hills facility at this time. As a result, certain aspects of the design are presently unknown and cannot be detailed.

1. Transportation of Operating Personnel

For operation of the Gas Hills Satellite Facility; technical, operational, and management personnel will be necessary. Cameco anticipates that 80% of the staff will be traveling from the Riverton, Wyoming area while the remaining 20% will travel from the Casper, Wyoming area. The Gas Hills Satellite Facility is estimated to require an average of 46 personnel daily throughout the life of mine.

Transportation to and from the facility will be provided by the employees. Cameco assumes that several vehicle types will be utilized, including cars, sport utility vehicles and/or pickups. The percentage of cars, sport utility vehicles and/or pickups is unknown. The occupancy for each vehicle is estimated to be 1.6 persons per vehicle.

The transportation route to Riverton, Wyoming is:

- Gas Hills Facility to Gas Hills Road (unpaved road) 9 miles
- Gas Hills Road to Riverton, Wyoming (paved road) 46 miles

The transportation route to Casper, Wyoming is:

- Gas Hills Facility to Gas Hills Road (unpaved road) 7 miles
- Gas Hills Road to US 20-26 (unpaved road) 25 miles
- US 20-26 to Casper, Wyoming (paved road) 47 miles

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The annual mileage and traffic data for this section is provided on Table 1 below.

Table 1. Transportation of Operations Personnel

Route	Average Employees / Day	Pickup Truck Vehicles / Year	Unpaved Mileage / Round Trip	Paved Mileage / Round Trip	Total Unpaved Mileage	Total Paved Mileage
[1]Riverton, Wyoming to/from Gas Hills Facility	37	8,440	18	92	151,920	776,480
[2]Casper, Wyoming to/from Gas Hills Facility	9	2,053	64	94	131,392	192,982

1 - Assumes that 80% of staff based out of Riverton, Wyoming

2 - Assumes that 20% of staff based in Casper, Wyoming

2. Drilling Contractors Supporting the Mine Operations

The mine operation will require contract drilling support. Cameco anticipates an average of 14 drill rigs annually will be on-site, for the life of the mine. Quarterly maintenance in Riverton, Wyoming is also accounted for in the estimate. The drill rig will be supported by a water truck, a pipe truck, and a transport truck for the drill crew. Occasionally a mechanic's truck may be needed.

It is anticipated that the drilling operations will be supported from the Riverton, Wyoming area. Once on-site, it is estimated that the drill rig and pipe truck will accumulate an average of 5 miles per day on unpaved roadway within the permitted boundary. The water truck will accumulate about 20 miles daily on unpaved roadways within the permitted boundary. Each drilling rig will have a transport truck which the crew will travel to and from the mine site each day.

The vehicle traffic associated with this section is provided in Table 2 below.

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Table 2. Drilling Supporting the Operating Plan

Vehicle Type	Number of Vehicles / Day	Average Annual Unpaved Mileage	Average Annual Paved Mileage
[1]Drill Rig	14	5,255	10,511
[1]Pipe Truck	14	5,255	10,511
[2]Water Truck	14	39,415	10,511
[3]Transport Truck	14	49,925	241,743
Miscellaneous	N/A	2,000	5,000

1 -5 miles per day per vehicle plus additional mileage for quarterly maintenance

2 - 15 miles per day per vehicle plus additional mileage for quarterly maintenance
3 - Each crew traveling from Riverton, Wyoming to the mine site and back to Riverton, Wyoming daily. Additional trips included for unforeseen rig breakdown
Assume on average 16 drilling days per month.

3. Construction Traffic

Initial construction of the mining infrastructure, process buildings, and evaporation ponds will take place beginning in 2014 and will be completed within a year. Additional construction to bring online added throughput capacity will occur in 2018. This construction effort is anticipated to be complete within one year. There will be no 'construction season' for work as construction is anticipated through every month of the year. It is expected that there will be short term deliveries of heavy equipment, concrete, piping, and a pre-fabricated administration building associated (within existing disturbed areas) with initial construction. For the duration of construction, it is anticipated an average daily crew size of 12 people will be transported from Riverton, Wyoming to the facility. This average accounts for peak construction periods anticipated to be on the order of about 40 people (for a short duration), as well as minimum size construction crews (possibly as few as 4 people). The following table outlines the anticipated traffic during the construction phase of the project for years 2014 and 2018 only.

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Table 3. Construction Personnel and Deliveries

Vehicle Type	Number of Vehicles / Day	Average Annual Unpaved Mileage	Average Annual Paved Mileage
[1]Equipment and Product Deliveries	1	6,000	27,600
[2]Transport Truck	4	18,000	110,400

1 -20 miles per day unpaved mileage per delivery. Included concrete trucks; heavy equipment deliveries, pre-fabricated building delivery; piping deliver; and other equipment deliveries.

2 - Each crew traveling from Riverton, Wyoming to facility daily. 46 paved mileage per day for each crew and 15 miles unpaved.

Assumes 300 days per year construction window.

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4. Operations Support

Personnel will be required for water sampling, well casing, wellfield services, wellfield construction, maintenance, safety, and geology. Crew travel to the facility is covered under Section 1 of this plan. Once on-site, the crews will travel within the permit boundary with company vehicles to perform necessary tasks. The roadways within the permit boundary are primary and secondary roadways or two-tracks. The Revised Plan of Operations, Section 6.0 '*Description of Operations*' should be referenced for details.

In addition to the above operations support for processing through to resin, the facility will require deliveries of sodium bicarbonate, carbon-dioxide, oxygen, hydrochloric acid and propane. It is estimated to support resin operation that on an annual basis, approximately 50 deliveries of these materials will be needed. To support processing from resin through to slurry, the facility will also require deliveries of sodium carbonate, sodium chloride, caustic soda and sulfuric acid. It is estimated that to support slurry operation, an additional 60 deliveries of materials will be needed. Additionally, a commercial delivery service (FedEx,UPS), on the order of three deliveries per week, will be required to support the operations as well as waste transportation (landfill) on the order of one shipment per week. The following table provides annual traffic for the operations supply support personnel and deliveries.

Table 4. Operation Supply Support	
Average Annual Unpaved Mileage (RESIN ONLY)	15,269
Average Annual Paved Mileage (RESIN ONLY)	88,315
Average Annual Unpaved Mileage (SLURRY OPTION – INCLUDES MILEAGE FOR RESIN)	19,109
Average Annual Paved Mileage (SLURRY OPTION – INCLUDES MILEAGE FOR RESIN)	93,955

5. Slurry Transport

Current plans indicate that uranium could be processed at Gas Hills to slurry. Slurry will be trucked from Gas Hills and be delivered to the licensed Highland Resin Transfer System (Highland). Once the slurry is received at the Highland facility, the slurry is dried and packaged for shipping. Empty slurry transport trucks will be returned to the Gas Hills site.

The average annual production for the Gas Hills facility is anticipated to be about 1,100,000 pounds. Based on the average annual production it will require about 122 truckloads per year of slurry to be transported from the Gas Hills facility to Highland.

The transportation route for slurry will be:

- Gas Hills Facility to Gas Hills Road (unpaved road) 7 miles
- Gas Hills Road to US 20-26 (unpaved road) 25 miles
- US 20-26 to Casper, Wyoming (paved road) 47 miles
- Casper, Wyoming to Glenrock, Wyoming (paved road) 27 miles
- Glenrock, Wyoming to JCT HWY 95/93 (paved road) 22 miles
- JCT 95/93 to Highland Loop Road (paved road) 9 miles
- Highland Loop Road to Highland facility (gravel road) 5 miles

The following table provides the annual estimated vehicular traffic and mileage anticipated for this process.

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Table 5. Slurry Transport

Annual Round-Trips	Average Unpaved Vehicle Mileage	Paved Vehicle Mileage
122	12,810	25,620

Slurry transport has previously been analyzed by the Nuclear Regulatory Commission. In the event that road passage is impossible with heavy equipment, storage capability will be built into the Carol Shop Satellite facility capable of storing up to 7 days of slurry. Should roads remain impassable by heavy trucks beyond that, road maintenance crews will be contracted to open roads and provide safe passage to the Highland Facility.

6. Resin Transport

Current plans indicate that uranium could be processed at Gas Hills to resin. Resin will be trucked from Gas Hills and delivered to the licensed Highland Resin Transfer System (Highland). Once received at the Highland facility the resin is processed into slurry; dried and packaged for shipping. Empty resin transport trucks will be returned to the Gas Hills site.

The average annual production for the Gas Hills facility is anticipated to be about 1,100,000 pounds. Based on the average annual production it will require about 325 truckloads per year of resin to be transported from the Gas Hills facility to Highland.

The transportation route for resin will be:

- Gas Hills Facility to Gas Hills Road (unpaved road) 7 miles
- Gas Hills Road to US 20-26 (unpaved road) 25 miles
- US 20-26 to Casper, Wyoming (paved road) 47 miles
- Casper, Wyoming to Glenrock, Wyoming (paved road) 27 miles
- Glenrock, Wyoming to JCT HWY 95/93 (paved road) 22 miles
- JCT 95/93 to Highland Loop Road (paved road) 9 miles
- Highland Loop Road to Highland facility (gravel road) 5 miles

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The following table provides the annual estimated vehicular traffic and mileage anticipated for this process.

Table 6. Resin Transport

Annual Round-Trips	Average Unpaved Vehicle Mileage	Paved Vehicle Mileage
325	34,125	68,250

Resin transport has previously been analyzed by the Nuclear Regulatory Commission. In the event that road passage is impossible with heavy equipment, storage capability will be built into the Carol Shop Satellite facility capable of storing up to 7 days of resin. Should roads remain impassable by heavy trucks beyond that, road maintenance crews will be contracted to open roads and provide safe passage to the Highland Facility.

7. 11e2 Waste Transport

During the first 5 years of operation Cameco anticipates approximately 6 loads a year of 11e2 byproduct to be transferred to an approved Nuclear Regulatory Commission licensed facility. Beginning in the 6th year Cameco anticipates an increase in byproduct waste during the restoration process. It is expected that Cameco will need approximately 1.2 truckloads a day to dispose of 11e2 byproduct waste. All transported waste is packaged and transported in accordance with Department of Transportation regulations.

8. Emergency Snow Removal

Cameco will be purchasing a motorgrader as part of its mobile equipment fleet. The motorgrader will be used to maintain roads during periods of inclement weather, including removing snow. As previously discussed, the detail design engineering of the facility has not been completed. If there are emergency stores of chemicals or fuels, they will be within the existing disturbance limits of the facility (or potentially within the Carol Shop building itself).

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9. Crew Shift

Shift work is currently planned to be on a 7:30 a.m. to 7:30 p.m. basis for operators every day of the week, 52 weeks a year. Professional and support staff will generally be on site Monday thru Friday from 7:30 a.m. to 4:00 p.m.

10. Vehicle Storage

There will be a parking lot at the Carol Shop facility for employee vehicles, company vehicles, and transport trucks. The definitive parking plans has not been developed, however there will be storage areas at the Carol Shop facility for slurry trucks, chemical trucks, delivery trucks, fuel trucks, ect., within existing disturbance limits.

11. Vehicle Traffic Pattern Within Mine Units

Cameco does not intend to build any main access roads to the individual well heads. Traffic to these sites will be minimal and will only incur for periodic maintenance (approximately once every 3 to 6 months). Maintenance to these sites will be performed during dry weather to deter damage (rutting). Cameco has established a plan that all roads and access follow a one way in/one way out policy. Each header house will have one established two-track road for entering and exiting the site.

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Appendix N

Visual Contrast Rating Form

Form 8400-4
(September 1985)

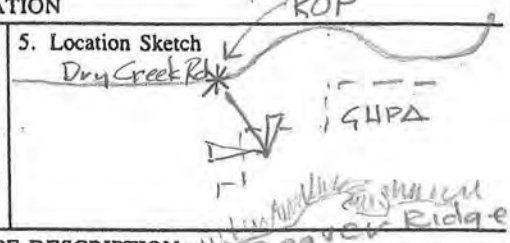
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 12/22/11
District High Plains
Resource Area Lander/Casper
Activity (program) In Situ Uranium Mine

SECTION A. PROJECT INFORMATION

1. Project Name: Gas Hills Uranium Project
2. Key Observation Point: Dry Creek Road
3. VRM Class: IV
4. Location: Township 32,33N; Range 89,90W; Section Multiple
5. Location Sketch:



SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat to gently rolling, rising to rounded, irregular ridge (Beaver Div.)	Complex, irregular patterns of grasses & shrubs	Simple, large, rectangular w/gable roof.
LINE	Relatively simple, horizontal, inclined to ridge	Generally diffuse, irregular; limited 2-track bands	Horizontal, curved, linear roads
COLOR	Light gray-beige soils, muted browns on slopes	Bright greens; blue greens, tans & beiges	Cream yellow; gray-beige unpaved roads
TEXTURE	Fine grained, regular	Fine to medium, uneven random	Fine to very fine

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	N.A.	Regular, grass & shrub forms in reclaimed areas	Rectangular & cylindrical
LINE	Simple, horizontal, banded irregular	Butt edged patterns becoming diffuse over time	Horizontal, mostly straight roads, t-lines, strong vertical t-line poles
COLOR	Gray-beige while disturbed	Bright spring greens, blue greens, tans, beiges	Desert tan; gray-beige roads
TEXTURE	Fine while disturbed	Fine to medium, ordered	Medium, even, ordered

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				X			X				X	
Line			X			X				X		
Color			X				X			X		
Texture			X				X			X		

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: B. Strom
Date: 12/28/11

SECTION D. (Continued)

Comments from item 2.

Well heads, roads, T-lines, etc. would attract attention, but would not dominate views. Line, color + textural contrast would be weak to moderate.

Additional Mitigating Measures (See item 3)