## CBRMarslandPEm Resource

**From:** CBRMarsland Resource
**Sent:** Tuesday, August 27, 2013 1:07 PM
**To:** CBRMarsland Resource
**Subject:** FW: Cameco Responses to NRC Environmental Report RAIs
**Attachments:** ER RAIs 8-9.pdf

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**From:** John Schmuck [mailto:John_Schmuck@Cameco.com]
**Sent:** Friday, August 09, 2013 5:20 PM
**To:** Shoemaker, Mirabelle
**Cc:** Josh Leftwich; Sabrina Fox; Michelle Shellhart
**Subject:** Cameco Responses to NRC Environmental Report RAIs

Mirabelle - I am preparing a box for overnight delivery containing Cameco's responses to NRC ER RAIs and associated page changes. The page changes include two copies of redline-strikeout text, two copies of tables, two copies of revised figures and two copies of revised appendices. Please note the appendices labeled "NRC Staff" do not include Appendix J. Appendix J is lab data and very large. I was hoping that NRC could have Appendix J entered into ADAMs and access it from there, given the 1000+ page length.

Thanks. Please call if you have questions.

.john

**Hearing Identifier:** CrowButte_Marsland_Public
**Email Number:** 47

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**Subject:** FW: Cameco Responses to NRC Environmental Report RAIs
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| **Land Use** | |
| RAI 1: With regard to land use, provide a more specific reference (e.g., the specific table within the 2007 Census of Agriculture) to explain the derivation in Section 3.1.2.1 (page 3-2) of the Crow Butte Resources, Inc. (CBR), Marsland Expansion Area (MEA) Environmental Report (ER) of the values of $14.10 per acre for non-livestock agricultural lands and $55.62 per acre for livestock and livestock products.<br>Basis: This information, called for in NUREG-1748, Sections 6.3.1 and 6.4.1, is necessary to allow the staff to evaluate projections consistent with the guidance in NUREG-1569,Section 2.2.3, item (1)(f). | A math error occurred in the calculation of the values. Section 3.1.2.1 has been revised in the updated MEA ER to correct this error, explain the derivation of the values, and to provide more specific references that were used. |
| **Geology and Soils** | |
| RAI 2: With regard to geology and soils, provide additional information related to the geology of the MEA project area:<br>(a) Provide information on the pre-mining exploratory boring program described in ER Section 3.3.1.1 (pages 3-14 through 3-15) and shown on Figure 3.3-2 (page 3-241) (e.g., the number of boreholes, logging methods, and abandonment procedures).<br>Basis: This information, called for in NUREG-1748, Sections 6.3.3 and 6.4.3, is necessary to allow the staff to understand the project's geologic setting and likely ability of the strata to isolate leach fluids consistent with the guidance in NUREG-1569, Sections 2.6.2 and 2.6.3, items (1) and (6). | Section 3.3.1.1 has been revised to address this request for additional information on pre-mining exploratory boring program. |
| (b) ER Section 3.3.1.3 (page 3-18) discusses the geophysical work that was performed to investigate the White River Fault located near Crawford. However, it does not mention the Niobrara River Fault or show it as a structural feature in Figure 3.3-12 (page 3-287). According to Stout et al. (1971, Figure 5, reproduced below as Figure 1 ), 1 this fault is located south of the MEA site. The Bureau of Reclamation also indicates that the Nebraska Geological Survey mapped this fault along the length of the river valley at the site of Box Butte Dam. Provide information pertaining to this fault and any other known faults | Discussions of the Niobrara River Fault are included in the updated MEA ER document. In addition, Figure 3.3-12 was updated to show the location of the proposed Niobrara River Fault, and a new Figure 3.3-13 (regional structure contour map for the top of Pierre Shale) was included in attempt for better definition of the proposed Niobrara Fault feature. |

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| in the vicinity of the MEA. | |
| (c) According to the Table of Contents, Figure 3.3-9 (page 3-281) should be an isopach map of the Basal Chadron Sandstone; instead, it is a potentiometric surface map. Provide an isopach map of the Basal Chadron Sandstone. | Figure 3.3-9 (potentiometric surface map) was replaced with the correct figure that is an isopach map of the basal sandstone of the Chadron Formation. |
| **Transportation** | |
| RAI 3: Provide the following information with regard to transportation aspects:<br>(a) Provide a figure that depicts all of the roads and features mentioned in Sections 3.2 (page 3-4) and 4.2.1 {page 4-4). Figure 1.4-1 (page 1-83) names many but not all and could be updated to be more comprehensive.<br>Basis: This information, called for in NUREG-1748, Sections 6.3.2 and 6.4.2, is necessary to allow the staff to understand the project's site location and layout, particularly in terms of transportation links, consistent with the guidance in NUREG-1569, Section 2.1.3, item (5), and Section 7.2.3, item (1). | Figure 1.4-1 was updated in the updated ER to provide a more comprehensive depiction of regional roads and railway line that are mentioned in Sections 3.2 and 4.2.1. |
| (b) Clarify the differentiation in ER Section 4.2.2.3 (page 4-5) between the primary and alternate access roads between the MEA and the Central Processing Facility (CPF) (i.e., the proportion of the trips that will be allocated to each route). | Section 4.2.2.3 was revised in the updated ER to better define proportion of trips that would be allocated to the primary access route versus the two alternative access routes. |
| (c) ER Section 5.2 (page 5-12) indicates that CBR has voluntarily assisted Dawes County with materials to maintain county roads at the current operation and that CBR will continue to support Dawes County to mitigate impacts from company operations. ER Section 5.5 (page 5-24) states that CBR has donated road surfacing materials to Dawes County for use on roads near residences that were adversely impacted by fugitive dust from CBR and public traffic. Does the description of these past activities mean that CBR is committing to do the same for the MEA project? | Section 5.2 has been revised in the updated ER to clarify that CBR will support Dawes County to mitigate any impacts from company operations associated with MEA operations. |
| **Water Resources** | |

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| RAI 4: Provide the following information with regard to water resources:<br>(a) Provide additional information on area water resources:<br>(i) To clarify ER Section 3.4.2.1 (pages 3-37 through 3-38}, provide information on surface water gradients, average-maximum, average-minimum, historical drought stages and discharges by month, the 7 -day once-in-1 0-year low flow, and important short-duration flow fluctuations.<br>Basis: This information, called for in NUREG-1748, Sections 6.3.4 and 6.4.4, is necessary to allow the staff to understand the surface and ground water hydrology of the project area, consistent with the guidance in NUREG-1569, Section 2.7.2, items (1), (2), (3), and (5). | Water flow and water quality information on sampling points on the Upper Niobrara River are presented in Sections 6.1.3.1, 6.1.3.2, and 6.1.3.4 of the ER. Tables 6.1-13 and 6.1-14 provide average, minimum and maximum flows for the upper Niobrara River, and Table 6.1-13 was updated to provide peak discharge and minimum discharge extremes for the upper Niobrara River (1999 – 2010). The fourth quarter flow records for 2010 were obtained from the NDNR and added to Table 6.1-14. These data have not been validated to ensure that appropriate quality assurance and quality control (QA/QC) procedures were followed. |
| (ii) According to the Table of Contents, Figure 6.1-4 (page 6-135) should be a potentiometric surface map of the Basal Chadron Sandstone; instead, it is the potentiometric surface map of the Brule formation. Provide a potentiometric surface map of the Basal Chadron Sandstone in a location of the EA as referenced by the Table of Contents and text. | Figure 6.1-4 (potentiometric surface map of the Brule Formation) was replaced by the correct Figure 6.1-4 (potentiometric surface map of the basal sandstone of the Chadron Formation). The revised figure is in the updated ER. |
| (iii) To clarify Section 3.4.3.3 (pages 3-43 through 3-45), provide ground water velocity calculations for both horizontal and vertical movement under ambient conditions. | As noted in the text, the mean hydraulic conductivity in the basal sandstone of the Chadron formation is 25 ft/day. Little vertical velocity is anticipated given the confining layers above and below.<br>In response to this and other comments received by Cameco, a coring program is underway to further characterize the hydrologic regime above the basal sandstone of the Chadron Formation. Cameco expects to update both the ER and TR with this data and analysis in early October 2013. |
| (iv) ER Section 6.1.2.1 (page 6-5) indicates that sampling of additional private wells will be initiated in the second quarter of 2012. Provide the results of any ground water sampling completed subsequent tothe data | An additional 47 private wells were sampled in 2012, resulting in a total of 57 monitor wells being sampled. Tables 6.1-4 (summary), 6.1-5 and 6.1-6 have been updated to include the 2012 data and are included in the updated ER. |

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| presented in the ER. | |
| (b) Provide updated information as requested below:<br>(i) ER Section 1.1.2 (page 1-2) discusses surface and mineral rights; clarify who holds water rights and any other legal restrictions in the vicinity of the MEA<br>Basis: This information, called for in NUREG-1748, Sections 6.3.4 and 6.4.4, is necessary to allow the staff to evaluate the use of the waters surrounding the proposed project facilities to assess the likely consequences of any impacts of operations on adjacent properties, consistent with the guidance in NUREG-1569, Section 2.7.2, item (5); Section 4.2.2, item (2); Section 4.2.3, item (7); Section 6.1.2, item (6); and Section 6.1.3, item (2). | Section 3.4.1.2 of the updated ER provides clarification as to who holds water rights in the vicinity of the MEA and pertinent legal issues. |
| (ii) Provide an update of the information found in ER Table 1.5-2 (page 1-51) regarding actions on environmental approvals to be taken in 2012, including providing a copy of the Aquifer exemption permit, Underground Injection Control Class I, Ill and V permits, and Industrial Groundwater Permit. | Table 1.5-2 was revised in the updated ER. The table updates actions regarding environmental approvals in 2012 and 2013. The MEA Aquifer Exemption Petition and the UIC Class I, III, and V permits, and the Industrial Groundwater Permit, have not been issued. Applications have been submitted to the NDEQ for the Class I and Class III UIC permits, and the agency review is underway. |
| (iii) ER Section 3.4.1.1 (page 3-35) provides estimates for ground water and surface water use from 2005 and water well information as of August 23, 2011. Provide more recent estimates for ground water and surface water use, as well as information on any new water wells that have been installed since the ER was submitted and that are within a 1-mile radius of the site. | Surface and groundwater use reported for the USGS for 2005 is the latest report of such information. A clarification of why more recent data are not currently available is presented in an updated paragraph in Section 3.4.1.1. The USGS typically updates their report every five years, with the latest one scheduled for 2010; however, the report has been delayed and the next update is not expected until 2014. The State of Nebraska depends upon on the USGS for this information, and does not carry out this task. Table 3.4-2 of the updated ER was updated to provide more recent information on the number and type of non-abandoned registered wells for Dawes County.<br>A review was made of the NDNR groundwater well retrieval database (http://dnrdata.dnr.ne.gov/wellscs/Menu.aspx) in July 2013 to identify any new water supply wells located within a 1-mile radius of the proposed MEA license boundary. No new wells were identified. In addition, the CBR site personnel do not have knowledge of any new |

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| | private water wells being installed in the vicinity of the MEA. |
| (c) Provide clarification/confirmation for the following:<br>(i) ER Section 1.3.2.6 (page 1-16) states that "injection pressure for the MEA will be limited to less than 0.53 psi per foot of well depth." However, ER Sections 3.11.1.2 (page 3-89) and 4.4.3.2 (page 4-1 0) mention hydrofracturing of the ore zone as a possible cause of ground water excursions. Please clarify that hydrofracturing will not occur at the MEA.<br>Basis: This information, called for in NUREG-1748, Sections 6.4.4 and 6.5, is necessary to allow the staff to understand aspects of the applicant's planned process that would affect water resources in the area, consistent with the guidance in NUREG-1569, Section 2.7.1, item (2); Section 3.1.3, item (5)(a); and Section 7.1.3, item (5): | Hydrofracturing is not conducted by Cameco at its ISR operations. The text has been revised accordingly. |
| (ii) The title of ER Section 5.4 (page 5-13) indicates that it discusses mitigation measures related to impacts on water resources, but it only contains Section 5.4.1 (pages 5-13 through 5-24) on mitigation measures related to ground water quality. Is there a section missing (i.e., Section 5.4.2)? Provide a consolidated discussion of any mitigation measures related to surface water quality, or clarify that no mitigation related to surface water quality is planned. | A new section was added to Section 5.4 of the updated ER; Section 5.4.2 discusses surface water mitigation measures. |
| (d) Clarify ER Section 4.4.3.1 (page 4-1 0) by comparing anticipated values at the MEA with those experienced at CBR. Specifically-<br>(i) Provide drawdown-distance estimates that are based on the estimated volumes of water that will be pumped during ground water sweep operations and compare to the information from existing operations provided in ER Section 4.4.3.1 (page 4-10).<br>Basis: This information, called for in NUREG-1748, Section 6.4.4, is necessary for the NRC staff to assess the environmental impacts of the | A simple hydrologic drawdown-distance analysis, using the Theis (1935) equation for confined aquifers, was conducted to estimate the drawdown at the MEA. The analysis used the water balance disposal estimate for the year 2024 which corresponds to the tenth year of operations. The year 2024 in the Marsland water balance is the year when the highest consumptive ground water is assumed. The analysis assumes that four mine units are in restoration with an estimated 250 gpm of consumptive water use, and that five mine units are in production with a bleed stream of 65 gpm. The total consumptive water use estimated for that year is 315 gpm. The 315 gpm |

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| proposed action as required by 10 CFR 51.30 and with regard to ground water quality restoration, consistent with the guidance in NUREG-1569, Section 6.1.2, items (3) and (4). It will enable to staff to assess the realism of CBR's estimates related to proposed operations at the MEA. | consumptive water use represents the worst case water use during the operation of the MEA.<br>The drawdown for the Crow Butte Project referenced in Section 4.4.3.1 of the ER states that based on the operating data, the available head over the formation has been reduced by 10 percent.<br>The drawdown analysis of the MEA estimates that the drawdown during worst case year of operation is approximately thirty feet in the areas where active restoration is occurring. The estimated drawdown is about 6% to 7% of the total head available. The static water level at Marsland is about 465 ft, and the expected water level during the tenth year of operations is estimated to be 435 ft. The draw down in the basal sandstone of the Chadron Formation, at the monitor well ring, is approximately 15 ft and the worst case drawdown at the edge of the 2.25 mile review area will be about 2 ft. As such, this analysis of the MEA is in reasonable agreement with the actual operating data from the CBR Mine.<br>The ER reviewed private wells within a 2.25 mile radius of the MEA and found that none the wells were completed in the basal sandstone of the Chadron Formation. All of the well completions are in the overlying Brule and Arikaree formations because the wells are much shallower (60' to 300') than the basal sandstone of the Chadron Formation (1000 ft +) and the water quality of the overlying formations is superior to the basal sandstone of the Chadron Sandstone. Further, the pumping test demonstrated the integrity of the confining layer that separates the aquifer in the basal sandstone of the Chadron Formation from the overlying aquifers.<br>The text in the ER has been revised with additional supporting detail. The TR will also be revised accordingly. |
| (ii) Compare the anticipated consumptive use of ground water during all phases of the proposed mining activities (e.g., active mining through restoration) at the MEA (ER Section 4.4.3.1, page 4-1 0) with those actually recorded at the currently operating Crow Butte facility. | Similar to RAI 9(e), a new Section 3.12.2.2 entitled "Water Balance" has been incorporated into the ER. Consumptive water use takes two forms: disposal of production bleed and disposal of brine from reverse osmosis . The trend in consumptive use at Marsland is now provided in detail in Table 3.12-4 and Appendix T. |

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| | Comparison to the operating Crow Butte facility is very difficult. Over the past several years Cameco has worked to implement additional infrastructure required for restoration. During 2011, Cameco brought a second deep disposal well online to increase disposal capacity. As an upgrade, Cameco is installing a booster pump on the second deep disposal well and anticipates an additional 30 to 40 gpm disposal capacity by the end of 2013. In addition, Cameco is completing the installation of restoration trunklines that are required so that all available RO capacity may be used for the first time.<br>In summary, at the Crow Butte facility Cameco disposed (consumptively used) 118 gpm (2008), 138 gpm (2009), 168 gpm (2010), 188 gpm (2011) and 201 gpm (2012). With the 2013 upgrades, Cameco anticipates that in 2014, it will consumptively use (dispose) up to 378 gpm, or as much as the deep disposal wells are able to handle. |
| (iii) Compare the anticipated remediation volumes and remediation times for the MEA (ER Section 4.4.3.1, page 4-10) against those observed at the operating Crow Butte facility. | As noted above, comparison between the Crow Butte facility and the proposed Marsland operation are difficult. Marsland will be constructed and operated so that infrastructure required for restoration is available, and restoration may proceed without delay. As noted above, Cameco will achieve a 280 gpm consumptive use in 2014; this compares well with the 315 gpm maximum consumptive use predicted for Marsland. Although Marsland has lower production flows, the restoration flows are higher, which will significantly shorten the remediation times. The shorter remediation times are evident on the water balance. |
| **Air Quality** | |
| RAI 5: Provide the following information with regard to meteorology and air quality:<br>(a) Clarify the information given in ER Figure 3.6-25 (page 3-207); in particular, provide the total monthly inches of rain measured on site during the baseline period. The figure indicates that the values are in millimeters, but the accompanying text (ER Section 3.6.3.4, page 3-69) implies | Figure 3.6-25 has been revised with y-axis labeled in inches and the title modified to “Marsland Expansion Area Total Monthly Precipitation”. |

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| that they are in inches; in addition, the figure does not state whether it depicts the total precipitation for the month or the highest daily precipitation for the month.<br>Basis: This information, called for in NUREG-1748, Sections 6.3.6 and 6.4.6, is necessary to allow the staff to understand the meteorology associated with the project area and the air quality impacts associated with related traffic on unpaved roads, consistent with the guidance in NUREG-1569, Section 2.5.3, item (1 ); and Section 7.4.2. | |
| (b) The NRC used information from the ER to conduct an independent analysis of fugitive emissions. Please confirm the following values taken from ER Section 4.6.2.1 (page 4-21) (except where noted) for the operations phase used for our calculations:<br>• 12 employees and 7 contractors (Crawford to MEA), 365 days per year (ER Section 4.1 0.2.2, page 4-27)<br>• 50 delivery and other trips per week (Crawford to MEA), 52 weeks per year<br>• 2 round trips per day for resin transfer (MEA to CPF), 365 days per year<br>• 10 round trips per day for intra-site personnel travel (MEA to CPF), 365 days per year<br>• 7.1 miles on unimproved roads per trip (Crawford to MEA)<br>• 11.6 miles on unimproved roads per trip (MEA to CPF)<br>• Roadway silt content: 40%<br>• Days of rainfall less than 0.01 inches: 85<br>• Weight for resin transfer trucks: 28,000 lb empty and 80,000 lb loaded<br>• (National Highway Traffic Safety Administration)<br>• Exclusive use of low or ultra-low sulfur diesel fuel (NRC assumption | The listed values taken from ER Section 4.6.2.1 are correct; however, the following corrections have been made in the updates to the ER:<br>• 5.97 miles on unimproved roads per trip (Crawford to MEA)<br>• 9.99 miles on unimproved roads per trip (MEA to CPF)<br>• Roadway silt content: 10 percent for unpaved “dirt” roads and 4.8 for unpaved gravel roads<br>The 40 percent for silt that was previously used is excessive and the origin of this value could not be found. According to the NDEQ, If a representative silt value is not know, use 10 percent for unpaved roads (NDEQ 2013).<br>Section 4.6 of the updates to the ER have been revised to address the recalculations of fugitive dust emissions. CBR utilized more current air emission equations from AP-42 to estimate particulate matter emissions for the MEA operations. In addition, tailpipe emissions were calculated for $PM_{10}$ emissions.<br><br>Reference: Nebraska Department of Environmental Quality (NDEQ). 2011. Guidance Documents. Potential Emission Calculation Spreadsheets; Calculate Potential Haul Road Emissions. September 9. [Web Page]. Located at: http://www.deq.state.ne.us/. Accessed on: July 31, 2013. |
| (c) ER Section 4.6.1 (page 4-20) states that the application of water to unpaved roads would reduce the amount of fugitive dust to levels equal to or less than the existing condition. ER | Water will be applied to unpaved roads as necessary to control dust and speed limits will be strictly enforced on the mine property. Dust control chemicals will not be used. The ER has been revised |

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| Section 4.6.2.1 (page 4-21) states that mitigation measures such as the application of water or dust control chemicals to unpaved roads will be implemented as necessary. However, ER Section 5.5 (page 5-24) states that fugitive dust emissions will be minimized on the mine property by strict enforcement of site speed limits. It also states that the implementation of dust mitigation measures (such as the application of water or dust control chemicals) to unpaved county roads are generally cost-prohibitive. Clarify whether or not CBR is intending to use the application of water or dust suppression chemicals to unpaved roads to reduce the amount of fugitive dust. | accordingly. |
| **Ecological Resources**<br>RAI 6: Provide the following information with regard to ecological resources:<br>(a) ER Section 3.5.10.1 (page 3-62) notes that three State-listed fish species are known to occur in the Niobrara and describes sampling performed as surveillance for these species; however, it was not clear whether CBR completed a professional consultation with the Nebraska Natural Heritage Program/Nebraska Game and Fish. If one has been performed, provide the details and results of this interaction.<br>Basis: This information, called for in NUREG-1748, Section 6.3.5, is necessary to allow the staff to evaluate the applicant's inventories of significant flora and fauna, consistent with the guidance in NUREG-1569, Section 2.8.3, items (1) and (3). | CBR's consulting firm Hayden-Wing Associates, Inc. received a consultation letter from the Nebraska Game and Parks Commission (NGPC) by letter dated January 24, 2011. This letter has been added as Appendix V to the ER. The details of the NGPC consultation are discussed in the referenced letter. |
| (b) Provide the missing references:<br>(i) Provide a copy of Hayden-Wing Associates (HWA) 2011, "Ecological Resources Summary: Technical Report for Cameco Resources- 2011. Proposed Marsland Expansion Area Uranium Project in Dawes County, Nebraska," July 2011, as cited in ER Section 3.5.6.2 (page 3-55) and elsewhere, and in the reference list on pages 9-11 and 9-13. | Copy of the requested 2011 ecological resources reports are attached to this submittal. |

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| (ii) Provide a copy of HWA 2012, "Ecological Resources Summary: Technical Report for Cameco Resources - 2011 Proposed Marsland Expansion Area Uranium Project Dawes County, Nebraska," February, as cited in ER Sections 3.4.2.2 (page 3-38) and elsewhere, and in the reference list on page 9-21. | Copy of the requested 2012 ecological resources reports are attached to this submittal. |
| **Cultural Resources** | |
| RAI 7: With regard to cultural resources, provide a copy of the letter dated May 19, 2011, granting concurrence of the Nebraska Deputy State Historic Preservation Officer with the Marsland Class Ill Cultural Resources Inventory Report, as cited in ER Section 3.8.1 (page 3-77).<br>Basis: This information, called for in Section 6.3.8, is necessary to allow the staff to evaluate the applicant's evidence of contact with the state historic preservation officer, consistent with the guidance in NUREG-1569, Section 2.4.3, items (4) and (6). | The Nebraska SHPO concurrence letter dated May 19, 2011, granting concurrence of the Nebraska Deputy State Historic Preservation Officer with the Marsland Class III Cultural Resources Inventory Report, is attached. Note that the SHPO's response is in the form a signed "concur" stamp on the ARCADIS cover letter of the report dated April 28, 2011. |
| **Public and Occupational Health** | |
| RAI 8: Provide the following information with regard to public and occupational health:<br>(a) ER Section 4.12.2 (page 4-31) states, "The concentration of radon in the production solution is calculated using methods found in RG 3.59, 'Methods for Estimating Radioactive and Toxic Airborne Source Terms for Uranium Milling Operations' (March 1987). The details of this calculation are found in Appendix N." Appendix N is the "Wellfield Decommissioning Plan for Crow Butte Uranium Project" and does not contain any information on the concentration of radon in the production solution. Appendix M contains the MILDOS analysis and would seem to be the likely place for information on the concentration of radon in the production solution. However, Appendix M makes no mention of Regulatory Guide (RG) 3.59. Operational data provided in Table 2 of Appendix Mare consistent with using the methodology in Appendix D to NUREG-1569, rather than the methodology inRG 3.59, for calculating radon concentrations | A revised Mildos estimate is being prepared and will be submitted with appropriate page changes under separate cover. The revisions will address RAI 8. |

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| and releases. In light of these observations, clarify the above statement regarding the concentration of radon in the production solution.<br>Basis: This information, called for in NUREG-1748, Section 6.4.12.2, is necessary to allow the staff to evaluate the applicant's information on exposures from air pathways, consistent with the guidance in NUREG-1569, Sections 7.3.1.2.2 and 7.3.1.2.3, item (5). | |
| (b) Table 2 of ER Appendix M gives the radium (Ra)-226 concentration in the ore as 620 picocuries per gram (pCi/g). Section 1.3.2.1 (page 1-7) states, "The ore body ranges in grade from 0.11 percent to 0.33 percent U3O8, with an average grade estimated at 0.17 percent U3O8." Ore grade may be converted to Ra-226 concentration by multiplying by 3.33x 105 (pCi U-238/g U) x 0.85 (g U/g U3O8) (RG 3.59, page 19). Using this relationship and the above MEA ore grades, the Ra-226 concentrations are 311 to 934 pCi/g, with an average of 481 pCi/g. Provide the basis for using a Ra-226 ore concentration of 620 pCi/g in the MILDOS analysis. | A revised Mildos estimate is being prepared and will be submitted with appropriate page changes under separate cover. The revisions will address RAI 8. |
| (c) The receptor radiation dose rates provided in ER Table 4.12-1 (page 4-55) do not agree with the radiation dose rates provided in Table 5 of Appendix M. When the NRC calculated the receptor dose rates from the Appendix M MILDOS printouts, our results agreed with Table 4.12-1. The 0.25/0.75 cases receptor radiation dose rates provided in Table 4.12-3 (page 4-59) do not agree with the radiation dose rates provided in Table 8 of Appendix M. When the NRC calculated the receptor dose rates from the Appendix M MILDOS printouts, our results agreed with Table 4.12-3. While the 0.10/0.90 cases receptor radiation dose rates provided in Table 4.12-3 do agree with the radiation dose rates provided in Table 8 of Appendix M, they do not agree with the NRC-calculated receptor dose rates from the Appendix M MILDOS printouts. Explain why the ER Section 4.12 receptor dose rates do not agree with those | A revised Mildos estimate is being prepared and will be submitted with appropriate page changes under separate cover. The revisions will address RAI 8. |

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| given in Appendix M. | |
| (d) ER Section 4.12.2.4 (page 4-33) and Appendix M (page 11) both indicate that the population dose rate is "0 person-rem/yr beyond the 50-mile (80-km) radius." MILDOS-AREA uses the Fraction of Radon Release Attributable to Each Site (FRADON) and the Population Adjustment (PAJUST) to calculate the population dose beyond the 50-miles radius. Identify what values were selected for those two parameters and provide justification for the selection of those values. | A revised Mildos estimate is being prepared and will be submitted with appropriate page changes under separate cover. The revisions will address RAI 8. |
| (e) In the table in ER Section 6.1.4 (page 6-16), confirm the accuracy of the conversion between uCi/kg and pCi/g. | A revised Mildos estimate is being prepared and will be submitted with appropriate page changes under separate cover. The revisions will address RAI 8. |
| **Waste Management** | |
| RAI 9: Provide the following information with regard to waste management:<br>(a) ER Section 3.12.3 (pages 3-97 through 3-99) lists solid waste types expected to be generated at the satellite facility but does not include waste generated from well drilling for the MEA project. Provide information on the method for disposal of the drill cuttings for all MEA project wells.<br>Basis: This information, called for in NUREG-1748, Section 6.4.13, is necessary to allow the staff to evaluate the applicant's operations in terms of generation and disposal of wastes, consistent with the guidance in NUREG-1569, Section 3.1.3, item (5)(e); and Section 4.2.3, items (1) and (6). | Well drilling fluid, (also known as well development water) is discussed in Section 3.12.2.1. Cameco has revised the discussion to provide additional detail. Specifically, “well development water” (generated during the under-reaming, air-lifting and well rehabilitation phases of well installation) and “well drilling fluid” (fluids used while drilling in order to lubricate and cool the drill bit, remove drill cuttings from the borehole, and to seal the borehole walls to minimize fluid loss into the surrounding formation), will be discharged into a cone bottom tank at the satellite plant. That tank will feed a belt filter or other separation equipment to separate solids from water. Filtered water will be discharged to the DDW tank. Once the well has been cased, any water generated during under-reaming, airlifting or other subsequent rig work that results in water being removed from the cased well will be treated as described above for the well development water and well drilling fluid<br>As a backup to this system, the well fluids would be transported to the existing evaporation ponds at Crow Butte. This option would only be used if there were equipment issues with the separation system.<br>Drill cuttings will be captured within earthen drill pits. Upon completion of the hole, the pits will be filled in and the dirt mounded |

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| | to allow for subsidence. Later, topsoil will be applied and the site and any surface disturbance will be leveled to conform with the surrounding area. Disposal of drilling cuttings in an approved disposal pit is allowed by Nebraska Administrative Code (NAC) Title 135, Chaper 5, paragraph 002.02E. |
| (b) The statement in ER Section 4.13.2 (page 4-44) that "The water will be discharged directly to the solar evaporation pond ... " is inconsistent with text in ER Section 2.3.1.3 (page 2-5) that indicates solar evaporation ponds will not be used. Clarify the method for disposal of the well development water. | CBR is proposing in the updated ER to initially operate the proposed MEA facility without the need for evaporation ponds or surge tanks. Section 3.12.3 has been revised to reflect this revised option, resulting in the deletion of this incorrect statement. See comment (g) of RAI 9. |
| (c) ER Section 6.2.2.1 (page 6-25) notes that for baseline sampling, the monitoring wells will be purged before sample collection; clarify the method for disposal of the purged water for baseline and monitoring well sampling during plant operations. | Baseline sampling is conducted on new wells installed as part of a new mine unit prior to mining activities. Purge water is released onto the ground surface near the well, but is not discharged directly to surface water (e.g., streams) or storm water drainages.<br>Purge water generated during normal operations is also typically discharged to the ground surface near the well. As with baseline sampling, purge water is not discharged directly to surface water (e.g., streams) or storm water drainages. In the event a monitoring well is located within an area with a known ongoing excursion, the purge water is collected and disposed in the wastewater disposal system (as described in RAI 9 (a)), or taken to the evaporation ponds at the CPF. Section 3.12.2.1 has been revised accordingly. |
| (d) To clarify ER Section 2.3.1.3 (page 2-6), provide an estimated volume of hazardous material by type that may require onsite burial at the time of decommissioning. | Consistent with Section 2.3.1.3, Cameco does not plan to dispose of hazardous materials by burial onsite. All solid wastes will be disposed of offsite at regulatory agency approved disposal facilities. |
| (e) To clarify ER Sections 3.12.2.1 (page 3-93) and 4.13.2 (page 4-44), provide estimates for the volume of wastewater expected to be generated during the ground water sweep and ground water treatment phases. | Consistent with the TR, a new Section 3.12.2.2 entitled “Water Balance” has been incorporated into the document. |
| (f) ER Section 3.12 (page 3-92) states that "Effluent controls for | Cameco will provide an NRC ML number when the NRC issues the |

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| yellowcake drying at the CBR CPF have been reviewed by NRC and approved in the current license." Provide the documents (or references) that describe the effluent controls and their NRC approval. | license renewal. |
| (g) ER Sections 1.3.2.11 (pages 1-24 and 1-25}, 2.2 (page 2-3}, and others note that the wastewater system will include the use of wastewater surge/equalization tanks that will be used to store process water but do not describe their use in detail. Provide additional information on the processes that will contribute to the liquid wastes stored in the surge/equalization tanks and how all of the wastes held by the tanks will be disposed. | The updated ER presents CBR's revised approach to initially manage wastewater at the MEA site without the need for evaporation ponds or surge tanks. The proposed method of liquid waste disposal at MEA will be DDW injection without the need for supporting surge/evaporation ponds or surge tanks. Based on the proposed project development schedule and the water balance of the MEA project, additional liquid waste disposal methods will be phased for the MEA operations. This approach is discussed in Sections 2.3.1.3, 3.12.2.1, and 3.12.2.2. |
| **Baseline Environmental Monitoring** | |
| RAI 10: Provide the final results and CBR analysis of the results of the preconstruction/preoperational environmental monitoring program, described in ER Section 6.1 (page 6-1) as begun in October 2011 and expected to be completed in December 2012.<br>Basis: The results of CBR's preconstruction/preoperational environmental monitoring program, called for in NUREG-17 48, Section 6.6, are needed to facilitate the NRC's review of the baseline characteristics of the project area, as described in NUREG-1569, Section 2.7.3, item (4); Section 2.9.3, items (1) and (2); and Section 5.7.8.3, item (1). | Pending environmental monitoring addressed in Section 6.1 has been completed. Section 6.1 of the updated ER has been revised to discuss what environmental monitoring data have been collected at the time of the submittal of the updated ER. Environmental monitoring data tables have been updated, with updated discussions of these data in the text of Section 6.1. Remaining PPMP tasks and timelines are identified in Figure 6.1-1. As discussed in Section 6.1, these consist of additional surface water sampling of ephemeral drainages (as available), sediment samples for the Niobrara River during the dry season, alternative soil sampling for vegetable food uptake calculations, forage sampling, and direct radiation sampling. Sediment samples of the Niobrara during the wet season were collected in March 2013 and the analytical data are pending. With the exception of remaining food sampling (livestock), sampling of the other tasks will be completed by the end of the third quarter 2013. |