July 3, 2013

Mr. Josh Leftwich Director of Safety, Health, Environment, and Quality Cameco Resources 2020 Carey Ave., Suite 600 Cheyenne, WY 82001

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION, LICENSE AMENDMENT FOR THE MARSLAND EXPANSION AREA, CROW BUTTE RESOURCES, INC., CRAWFORD, NEBRASKA, LICENSE SUA-1534 (TAC J00683)

Dear Mr. Leftwich:

By letter dated May 16, 2012, Crow Butte Resources, Inc., (CBR) submitted to the U.S. Nuclear Regulatory Commission (NRC) staff a request to amend license SUA-1534 to develop uranium resources at the Marsland Expansion Area (MEA). CBR intends to develop the MEA resources using uranium in-situ recovery (ISR) techniques, and loaded ion exchange resins from the ISR process will be transported to the central processing plant at the main Crawford, Nebraska, facility. By e-mail dated October 5, 2012, NRC staff informed CBR that its application was accepted and that we started the technical review.

NRC staff has completed its technical review of the MEA application. During our technical review, NRC staff identified certain areas of deficiency for which we are requesting additional information. The staff's request for additional information (RAI) is enclosed, herein. This RAI is organized according to the sections in the application. Please either respond to this RAI or provide a schedule for submitting your responses within 30 days of receipt of this letter. I will be calling shortly to schedule a conference call to discuss each of these issues.

If you have any questions, please contact me at 301-415-5356 or, by email, at <u>Thomas.Lancaster@nrc.gov</u>.

J. Leftwich

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

Sincerely,

/RA/

Thomas Lancaster, Project Manager Uranium Recovery Licensing Branch Decommissioning and Uranium Recovery Licensing Directorate Division of Waste Management and Environmental Protection Office of Federal and State Materials and Environmental Management Programs

Docket No.: 40-8943 License No.: SUA-1534

Enclosure: Request for Additional Information

- cc: J. Schmuck, Cameco Resources
 - D. Miesbach, NDEQ
 - D. Pavlick, CBR
 - L. Teahon, CBR

J. Leftwich

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U.S. Nuclear Regulatory Commission Requests for Additional Information Crow Butte Resources Inc. Marsland Expansion Area Project Technical Review of the Marsland Expansion Area License Amendment Application For Source Material License SUA-1534

The purpose of the following Requests for Additional Information (RAIs) is to provide the additional information and data that are necessary for the U.S. Nuclear Regulatory Commission (NRC) to fulfill the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 40. These RAIs were developed during the NRC staff's review of Crow Butte Resources (CBR) Marsland Expansion Area (MEA) Technical Report (TR), which was submitted to the NRC. When necessary, the staff's review also included portions of the Environmental Report (ER).

Section 2 – Site Characterization

RAI 1:

Description of Deficiency

Staff cannot confirm boundaries of restricted area and location of fences because of conflicting information.

Basis for Request

NUREG-1569, Acceptance Criterion 2.1.3(3), states that maps should be provided that show the exclusion area boundaries and fences. The staff identified the following conflicting information in the TR:

The inset in Figure 1.7-5 of the TR identifies a chain-link fence around a restricted area. However, this identification of the restricted area conflicts with the text in Section 5.6.2 of the TR where it states, "the security fence surrounding the satellite facility serves as a control for industrial/property protection purposes with the restricted area noted in red on Figures 1.7-5 and 5.7-2." As the legend for Figure 1.7-5 of the TR indicates the red markings are for the Proposed MEA, this statement appears incorrect. In addition, Figure 5.7-2 of the TR identifies the restricted area as only being portions of the building and does not appear to include the entire fenced in satellite area as identified in Figure 1.7-5 of the TR.

Section 2.1 of the TR states that Figure 1.7-5 of the TR shows the proposed location of fencing, among other items. Section 5.7-2 of the TR states, "the fencing around the well field will control access and protect industrial property," but no fencing around the well fields is identified in Figure 1.7-5 of the TR.

Request for Additional Information

The text and/or figures should be revised to clearly identify what is considered to be part of the restricted area and to correctly identify any fencing mentioned in the application. In addition, a description of the type of fencing, if not already identified, should be included.

Enclosure

RAI 2:

Description of Deficiency

Staff cannot complete its evaluation of NUREG-1569, Acceptance Criterion 2.1.3(4).

Basis for Request

NUREG-1569 in Section 2.1.2 states that the scale and clarity of the maps should be adequate to conduct the necessary environmental and safety reviews. Section 2.1 of the TR references Figure 1.3-1 as a primary reference to indicate topographical figures, drainage and surface water features; nearby population centers; political boundaries; and principal highways, railroads, transmission lines, and waterways. Because of lack of a complete legend and lack of contrast to allow identification of separate items in Figure 1.3-1, it is difficult to identify all roads, railroads, etc. In addition, the large pink gridlines obscure or completely hide some of these items (e.g, political boundaries, a road going directly through the Marsland site, etc.).

Request for Additional Information

Please provide an appropriate legend and more clearly mark the map with contrasting colors so that the items in NUREG-1569, Acceptance Criterion 2.1.3(4), can be readily identified. The use of separate maps to highlight these items may also help clarify their locations. A map without gridlines or another method of identifying gridline (e.g., hash line) should also be used to avoid obscuring underlying highlights. Other maps using gridlines should also be reviewed and revised, as necessary, to ensure the gridlines are not obscuring pertinent information.

RAI 3:

Description of Deficiency

Staff cannot complete its evaluation of NUREG-1569, Acceptance Criterion 2.2.3(1)(b).

Basis for Request

NUREG-1569, Acceptance Criterion 2.2.3(1)(b), states that projected life of facility water use should be provided. In Section 2.2.4 of the TR, the applicant states that "future water use within the MEA and AOR will likely be a continuation of present use" and that "it is unlikely that any irrigation will be developed within the license area." However, as the applicant appears to only lease the land and not own the land, there appears to be no controls over the installation of new wells in the MEA or AOR.

Request for Additional Information

Please provide information on if and how the development of new wells in the MEA or AOR during facility operations will be identified or prevented. Also, if new wells are installed by other than the applicant, please describe any actions that will be taken to protect those wells. If any new wells in or near the MEA have been identified since the survey the license application is

based on was completed (approximately August 23, 2011), please provide information about those wells.

RAI 4:

Description of Deficiency

The applicant did not provide complete private ground-water well information.

Basis for Request

NUREG-1569, Acceptance Criterion 2.2.3(1)(c), states that for existing ground-water wells, well depth, ground-water elevations, flow rates, drawdown, and description of the producing aquifer(s) should be provided. The applicant did not provide this information for all existing wells.

Request for Additional Information

Please provide flow rates, well depth elevations, well casing depth elevations, and static ground water elevations, drawdown elevations, and a further description of the producing aquifers (e.g., confined or unconfined) for all existing ground-water wells used as either a domestic drinking water supply or for agricultural purposes that lie within the MEA or within 1 kilometer of the MEA. Please describe the use of wells designated as "other" that are located in the MEA.

RAI 5:

Description of Deficiency

Staff cannot confirm the value of the MILDOS default mixing height of 100 m proposed by the applicant.

Basis for Request

The applicant defines the mixing height as the height of the atmosphere above the ground that is well mixed due either to mechanical turbulence or convective turbulence, noting that the layer above this height is stable. Staff observes that this definition is consistent with the definition given by Holzman (refer to page 3 of EPA, 1972¹).

On page 2-91 of the TR, the applicant stated that the MILDOS default mixing height is 100 m and used this default value in its dose calculations. However, on page 2.7 of NUREG/CR-2011, *MILDOS – A Computer Program for Calculating Environmental Radiation Doses from Uranium Recovery Operations*, US NRC1981, a default mixing height of 1000 m is recommended.

¹ EPA, 1972. Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States. EPA/AP-101, Document # 450R72102, U.S. Environmental Protection Agency, Washington, D.C.

Request for Additional Information

Please provide the following information:

- A. Provide the reference for the 100 m default mixing height value, or correct the statement in the TR regarding the default value of the mixing height; and
- B. Revise MILDOS calculations if the default value is different than what was originally used, or demonstrate that the calculations used are conservative.

RAI 6:

Description of Deficiency

Staff cannot complete its evaluation of NUREG-1569, Acceptance Criterion 2.5.3(1).

Basis for Request

NUREG-1569, Acceptance Criterion 2.5.3(1), states, in part: "The on-site program should be designed in accordance with Regulatory Guide (RG) 3.63, 'Onsite Meteorological Measurement Program for Uranium Recovery Facilities—Data Acquisition and Reporting' (NRC, 1988)." RG 3.63 provides guidance on the siting of meteorological instruments, including the effects from, and the location of, instruments in relationship to natural or man-made obstructions.

Staff has found no discussion on the characteristics of the site where the MEA meteorological instruments are, or were, located which would address the siting guidance in RG 3.63.

Request for Additional Information

Please provide a description of the location of the MEA meteorological instruments (topography, obstructions or lack thereof, etc.) consistent with RG 3.63.

RAI 7:

Description of Deficiency

Staff cannot complete its evaluation of NUREG-1569, Acceptance Criterion 2.5.3(2).

Basis for Request

NUREG-1569, Acceptance Criterion 2.5.3(2), states, in part: "The impacts of terrain and nearby bodies of water on local meteorology are assessed, and the occurrence of locally severe weather is described and its impact considered."

While staff found a discussion on severe thunderstorms in TR Section 2.5.1, staff found no discussion on any consideration of potential impacts of severe weather on MEA operations.

Request for Additional Information

Consistent with NUREG-1569, Acceptance Criterion 2.5.3(2), please provide a discussion on the occurrence of locally severe weather and a consideration of its impacts, or provide a location in the TR where this can be found.

RAI 8:

Description of Deficiency

Staff cannot complete its evaluation of NUREG-1569, Acceptance Criterion 2.5.3(3).

Basis for Request

NUREG-1569, Acceptance Criterion 2.5.3(3), states: "The meteorological data used for assessing impacts are substantiated as being representative of expected long-term conditions at and near the site." In addition, RG 3.63 provides guidance on determining the long-term representativeness of the onsite meteorological data collected over a minimum of 12 months. This includes various aspects of the National Weather Service meteorological station chosen for comparison.

In TR Section 2.5.1, the applicant indicated that the Scottsbluff meteorological station was chosen as the regional station to most represent MEA meteorology. This appears to be based mainly on distance (less than 50 miles) and the availability of hourly data for the last 15 years.

Request for Additional Information

Please address the following issues related to determining the long-term representativeness of the MEA meteorological data:

- A. Consistent with RG 3.63, please provide additional information on why the Scottsbluff station was chosen to represent the vicinity of the MEA site, including geographical and topographical descriptions, etc.
- B. The Scottsbluff station has only 15 years of data. This is not consistent with the RG 3.63 recommendation for long-term analysis (e.g., 30 years). Please provide justification for using only 15 years of data.
- C. TR Figures 2.5-30 and 2.5-31 provide a statistical analysis of the 15-yr and baseline-year wind speed and wind direction for the Scottsbluff meteorological station. Please provide the following information on these analyses:
 - NUREG-1475, Rev.1, Applying Statistics, US NRC 2011, describes linear regression as a model that relates a dependent variable to a single, or multiple, independent variable(s). Please explain the validity of the proposed linear regressions when there appears to be no independent variable and it is unclear to staff what the regression equations in Figures 2.5-30 and 2.5-31 represent.
 - 2. p-values for the linear regression equations presented in TR Figures 2.5-30 and 2.5-31.

RAI 9:

Description of Deficiency

The information provided in TR Section 2.6 does not meet the applicable requirements of 10 CFR Part 40, using the review procedures in Section 2.6.2 and acceptance criteria in Section 2.6.3 of NUREG-1569.

Basis for Request

Staff did not find information that is necessary to allow for an understanding of the project's geologic setting and likely ability of the strata to isolate production fluids consistent with Criteria 1 and 6 in Section 2.6.3 of NUREG-1569. Specifically,

- (a) TR Section 2.6 (page 2-216) describes the pre-mining exploratory drilling program, but does not provide the number of drill holes, logging methods, and drill hole abandonment/plugging procedures.
- (b) TR Section 2.6.1.3 (page 2-227) does not mention the Niobrara River structural feature in TR Figure 2.6-12 (page 2-313). According to Stout et al. (1971),² this structural feature is a fault located south of the MEA site along the Niobrara River. The Bureau of Reclamation³ indicates that the Nebraska Geological Survey mapped this fault along the length of the river valley at the site of Box Butte Dam.

Request for Additional Information

- (a) Please provide information on the pre-mining exploratory boring program (e.g., the number of drill holes, logging methods, and abandonment/plugging procedures).
- (b) Please provide information pertaining to Niobrara River structural feature and any other known geological structural features in the vicinity of the MEA.

RAI 10:

Description of Deficiency

The information provided in TR Section 2.6 does not meet the applicable requirements of 10 CFR Part 40, using the review procedures in Section 2.6.2 and using acceptance criteria in Section 2.6.3 of NUREG-1569.

² Stout, T.M, DeGraw, H.M., Tanner, L.G., Stanley, K.O., Wayne, W.J., and Swinehart, J.B. 1971. *Guidebook to the Late Pliocene and Early Pleistocene of Nebraska*. The University of Nebraska Conservation and Survey Division, Lincoln Nebraska Geological Survey.

³ <u>http://www.usbr.gov/projects/Facility.jsp?fac_Name=Box+Butte+Dam.</u>

Basis for Request

CBR provides geologic information from borings collected from the MEA. However, CBR presents mineralogical information that originates from the main facility. Please provide mineralogical information from the MEA or demonstrate that the mineralogy for the MEA is comparable to that of the main facility. This information is necessary for geochemical evaluations of the site and an assessment of CBR's ability to restore groundwater to baseline. It is particularly important to understand the quantity of the mineral phases (i.e., uraninite, pyrite, calcite, and goethite) that are commonly used in geochemical analysis to support remediation strategies and restoration time frames.

Request for Additional Information

Please provide mineralogical information from the MEA or demonstrate that the mineralogy for the MEA is comparable to that of the main facility.

RAI 11:

Description of Deficiency

The information provided in TR Section 2.9.3.2 does not meet the applicable requirements of 10 CFR Part 40, using the review procedures in Section 2.7.2 and acceptance criteria in Section 2.7.3 of NUREG 1569.

Basis for Request

NUREG-1569, Acceptance Criterion 2.7.3(5), states: "The applicant has provided an assessment of seasonal and the historical variability for potentiometric heads and hydraulic gradients in aquifers and water levels of surface-water bodies. This assessment should include water levels or water potentials measurements over at least one year and collected periodically to represent any seasonal variability."

The applicant indicated that water level measurement events were conducted at Brule and Basal Chadron monitoring wells on February 22, 2011, and on August 12, 2011. Potentiometric maps were provided for the February 22, 2011, water levels measurements. Consistent with NUREG-1569, Acceptance Criterion 2.7.3(5), staff did not find one year of seasonal water level data in the application.

Request for Additional Information

Please provide one year of seasonal water level data for the Brule and Basal Chadron monitoring wells. For each monitoring event, please provide potentiometric maps of the potentiometric surface. Additionally, please provide time period when irrigation wells near MEA are active and their rates of groundwater extraction.

RAI 12:

Description of Deficiency

Staff can't complete its evaluation of NUREG-1569, Acceptance Criterion 2.9.3(1).

Basis for Request

10 CFR Part 40, Appendix A, Criterion 7, requires: "At least one full year prior to any major site construction, a preoperational monitoring program must be conducted to provide complete baseline data on a milling site and its environs. Throughout the construction and operating phases of the mill, an operational monitoring program must be conducted to measure or evaluate compliance with applicable standards and regulations; to evaluate performance of control systems and procedures; to evaluate environmental impacts of operation; and to detect potential long-term effects."

RG 4.14 provides guidance on preoperational environmental monitoring at uranium mills. NUREG-1569, Acceptance Criterion 2.9.3(1), states: "Monitoring programs to establish background radiological characteristics, including sampling frequency, sampling methods, and sampling location and density are established in accordance with pre-operational monitoring guidance provided in Regulatory Guide 4.14, Revision 1, Section 1.1 (NRC, 1980). Air monitoring stations are located in a manner consistent with the principal wind directions reviewed in Section 2.5 of the standard review plan."

During its review, staff found multiple examples of gaps in data presentation on the proposed preoperational effluent environmental monitoring program for the MEA. Staff requires additional information on, or clarification of, noted deficiencies in the background radiological section to draw its safety conclusions.

Request for Additional Information

Please address the following issues regarding the proposed preoperational environmental monitoring program for the MEA:

- A. Please provide criteria consistent with RG 4.14, Regulatory Position 1.1.1, used for determining air monitoring locations, or indicate where this information can be found in the application.
- B. Surface water and sediment sampling point N-2 appears to be over three miles from the south site boundary. This location does not appear to be consistent with RG 4.14 (i.e., not immediately downstream of the area of influence).

Please provide a surface water and sediment sampling location for N-2 that is consistent with Acceptance Criterion 2.9.3(1) or justification for an alternate program.

C. Please submit the results of the preoperational/preconstruction monitoring program described in TR Section 2.9, including the survey discussed in TR Section 2.9.5.2, or a revised schedule for these items.

- D. Please provide the calibration records for the air samplers used during the first year of monitoring.
- E. Please provide the laboratory reports for all radiological baseline monitoring results.
- F. In TR Section 2.9.6, the applicant stated that transects will be made across the MEA to collect surface and subsurface soil samples in areas of the proposed well field. While general guidance in RG 4.10 was followed in preparing the proposed baseline soil sampling program, staff cannot determine that the full extent of operations within the proposed MEA will have the necessary baseline soil sampling performed to meet 10 CFR Part 40, Appendix A, Criterion 7, requirements. Please provide a more detailed description of where surface and subsurface soil sampling will be performed.
- G. In TR Section 2.9.8, the applicant described its baseline direct radiation monitoring program. Please provide the following:
 - (1) As noted in staff's review of the baseline soil sampling program, staff cannot determine that the full extent of operations within the proposed MEA will have the necessary baseline direct radiation monitoring performed to meet 10 CFR Part 40, Appendix A, Criterion 7, requirements. Please provide a more detailed description of where direct radiation monitoring will be performed.
 - (2) In TR Section 2.9.8, the applicant stated: "The type of survey instrument and procedures would be as described below..." However, there is no text provided that addresses these issues. Please provide the type of survey instrument used for performing baseline direct radiation monitoring and the procedures used, as indicated in TR Section 2.9.8.
- H. RG 4.14 provides recommended values for the lower limit of detection (LLD) for radionuclides in various environmental media. The applicant provided a description of its laboratory measurements in regards to significant figures reported for environmental media measurements in TR Appendix Q. Several reported LLD values are not within RG 4.14 recommended values, even after taking into account the applicant's rationale described in TR Appendix Q (i.e., reporting LLD values with one significant figure, consistent with RG 4.14). The following examples are not consistent with RG 4.14 recommended LLD values:

Table 2.9-5 – Radiological Analysis for Private Water Supply Wells

	Recommended	Reported
March 2011 Well 723, Pb-210 (pCi/L) (dissolved)	1	1.6

10

Table 2.9-26 – Niobrara River Dissolved Radiological Water Quality

	Recommended	Reported
March 2011 sample at N1 for Th-230 (pCi/L)	0.2	0.3
April 2011 sample at N1 for Pb-210 (pCi/L)	1	1.6
July 2011 sample at N2 for Th-230 (pCi/L)	0.2	0.4
October 2011 sample at N1 for Th-230 (pCi/L)	0.2	0.3

Table 2.9-27 - Niobrara River Suspended Radiological Water Quality

	Recommended	Reported
June 2011 sample at N1 for Pb-210 (pCi/L)	1	9

Table 2.9-33 – Total Radionuclides and Metals in Tissue of Northern Pike

	Recommended	Reported
Ra-226 (microCi/kg)	5 x 10 ⁻⁸	2 x 10 ⁻⁷
Th-230 (microCi/kg)	2 x 10 ⁻⁷	8 x 10 ⁻⁶

Please provide all environmental media samples with measured values that have an LLD consistent with RG 4.14 or justification for an alternate program.

RAI 13:

Description of Deficiency

Staff cannot complete its evaluation of NUREG-1569, Acceptance Criterion 2.9.3(2).

Basis for Request

10 CFR Part 40, Appendix A, Criterion 7, requires: "At least one full year prior to any major site construction, a preoperational monitoring program must be conducted to provide complete baseline data on a milling site and its environs. Throughout the construction and operating phases of the mill, an operational monitoring program must be conducted to measure or evaluate compliance with applicable standards and regulations; to evaluate performance of control systems and procedures; to evaluate environmental impacts of operation; and to detect potential long-term effects."

RG 4.14 provides guidance on the preoperational and operational aspects of effluent and environmental monitoring at uranium mills. NUREG-1569, Acceptance Criterion 2.9.3(2), states: "Soil sampling is conducted at both a 5-cm [2-inch] depth as described in Regulatory Guide 4.14, Section 1.1.4 (NRC, 1980) and 15 cm [6 in] for background decommissioning data."

During its review, NRC staff found no 15-cm soil samples proposed in the TR.

Request for Additional Information

Please provide justification for not performing soil samples at 15-cm depths, or indicate where this can be found in the TR.

RAI 14:

Description of Deficiency

The information provided in TR Section 2.9.3 does not meet the applicable requirements of 10 CFR Part 40, using the review procedures in Section 2.9.2 and acceptance criteria in Section 2.9.3 of NUREG 1569, and using Regulatory Guide 4.14.

Basis for Request

TR Section 2.9.3 (p. 2-394) states: "Water quality analyses for private water wells provided in this section is for March 25 to December 20, 2012. Groundwater samples for the CBR monitor wells were collected from March 4 to May 3, 2011 for the Brule monitor wells and March 12 to April 11, 2011 for CBR Chadron monitor wells. Quarterly groundwater sampling will continue until 1 year of data have been obtained and reported to the NRC."

Staff has not received the above-referenced quarterly groundwater sampling results for private wells consistent with RG 4.14.

Request for Additional Information

Please provide one year of quarterly sampling results for private wells consistent with RG 4.14. For private wells located at or within 2 km of the MEA that have not been included in this sampling program, please sample these wells quarterly for one year or provide justification for not sampling these wells.

Section 3 – Description of Proposed Facility

<u>RAI 15</u>

Description of Deficiency

The information provided in TR does not meet the applicable requirements of 10 CFR Part 40, using the review procedures in Section 3.1.2 and acceptance criteria in Section 3.1.3 of NUREG 1569.

Basis for Request

In accordance with NUREG 1569, Section 3.1.3 Criterion (5)(f), the application did not provide an acceptable analysis of the ground water hydraulic effects of nearby agricultural wells. Specifically,

- (a) Considering the possible occurrence of regulated material releases to the overlying aquifer (e.g., from a potential surface spill or a potential well casing failure) within the MEA, the application does not provide an analysis of the possible ground water hydraulic effects that nearby agricultural wells (well locations are shown in TR Figure 2.7-6 as indicated by TR Table 2.2-11 and TR Appendix A) may have on the migration of potential MEA regulated material releases in the overlying ground water zone toward these wells. Thus, staff cannot confirm whether the applicant's monitoring, containment, corrective action programs for potential MEA regulated material releases into the overlying aquifer will be protective of the agricultural wells and other private wells (located between MEA operations and the agricultural wells).
- (b) staff is uncertain whether active agricultural wells (locations shown in Figure 2.7-6 as indicated by TR Table 2.2-11 and TR Appendix A) tap an unconfined or confined aquifer. Staff observes that if confining conditions exist, the application will need to demonstrate that the downward hydraulic influence of active agricultural wells (e.g., private well 732 shown in TR Figure 2.7-6) will not have an adverse effect of hydraulic containment of MEA production fluids in the Basal Chadron Formation beneath the MEA.

Request for Addition Information

- (a) Please provide an analysis of the hydraulic effects that nearby agricultural wells may have on the migration of potential MEA regulated material releases in the overlying ground water zone toward these wells. This analysis should further define the hydrostratigraphy within the Arikaree and Brule formations and should be centered on the protection of agricultural wells and other private wells (located between MEA operations and the agricultural wells) from potential MEA regulated material releases to the overlying aquifer. Results of this analysis should be used to demonstrate the effectiveness of the applicant's proposed monitoring, containment, and corrective action programs for addressing possible MEA regulated material releases into the overlying groundwater zone.
- (b) Please further demonstrate that the ground water hydraulic influence of nearby agricultural wells will not have an adverse effect on the hydraulic containment of MEA production fluids within the Basal Chadron Formation beneath the MEA.

RAI 16:

Description of Deficiency

The information provided in TR Section 3.1 does not meet the applicable requirements of 10 CFR Part 40, using the review procedures in 3.1.2, and acceptance criteria in Section 3.1.3 of NUREG-1569.

Basis for Request

The erosion and drainage characterization in TR Section 3.1.3.3 (p. 3-14) and TR Appendix K do not provide peak flows for surface drainage (e.g., during potential flooding events) at MEA.

This missing information is necessary for staff to perform an independent review of floods and surface water velocities at the MEA consistent with Section 3.1.3 of NUREG-1569.

Request for Additional Information

Please provide peak flows for surface drainage at the MEA.

RAI 17:

Description of Deficiency

The information provided in TR Section 3.1 and 6.1 does not meet the applicable requirements of 10 CFR Part 40, using the review procedures in Section 3.1.2 and acceptance criteria in Section 3.1.3 of NUREG-1569.

Basis for Request

Staff cannot confirm drawdown-distance estimates that are based on the estimated volumes of water that will be pumped during ground water sweep operations. This information is necessary to determine the impact of operations on ground-water flow patterns and aquifer levels consistent with NUREG-1569, Section 3.1.3.

Request for Additional Information

Please 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.

RAI 18:

Description of Deficiency

Staff cannot complete its evaluation of NUREG-1569, Acceptance Criterion 3.2.3(3).

Basis for Request

NUREG-1569, Acceptance Criterion 3.2.3(3), states that the description of the satellite processing facility should include size, type, and location of ventilation and filtration equipment. Although the description of the ventilation systems is discussed in broad terms in Section 4 of the TR including approximate locations, no details are provided (e.g., diagrams or information about flow rates, etc.) are provided.

Request for Additional Information

Please provide detailed descriptions, including figures or diagrams, of the ventilation system to allow the adequacy of the system to be evaluated, or identify where this information is already provided.

RAI 19:

Description of Deficiency

Staff cannot complete its evaluation of NUREG-1569, Acceptance Criterion 3.3.3.

Basis for Request

NUREG-1569, Acceptance Criterion 3.3.3, requires descriptions of instrumentation and control. Although applicant provides a general overview of instrumentation and control in Section 3.3 of the TR, little specifics are provided. The applicant states that detailed information about the instrumentation and controls will be developed as part of the final design activities prior to construction and made available to NRC for review prior to any construction activities.

Request for Additional Information

Please provide a description of the instrumentation and control systems.

Section 4 - Effluent Control Systems

RAI 20:

Description of Deficiency

Elevated radon progeny levels experienced at the main facility are not addressed in the Marsland application.

Basis for Request

NUREG-1569, Acceptance Criterion 4.1.3(3), states, in part: "The application provides a demonstration that adequate ventilation systems are planned for process buildings to avoid radon gas buildup..." Consistent with NUREG-1569, Appendix A, staff examined the historical operations at the main facility relevant to effluent control systems. As documented in the 2011 inspection report (ML11216A179), the applicant experienced elevated radon progeny levels in the Central Processing Plant.

Request for Additional Information

Please provide a description of efforts to determine the cause of, and mitigation efforts to reduce the elevated levels, radon progeny in the main facility as they may relate to the construction of the Marsland satellite facility. In particular, please discuss any additional efforts to maintain airborne radon progeny levels as low as is reasonably achievable (ALARA) within the Marsland satellite facility.

RAI 21:

Description of Deficiency

The applicant did not provide specific information regarding accident conditions related to the ventilation systems. In addition, it did not provide safety impacts of system failures or identify contingencies for such occurrences related to the ventilation systems.

Basis for Request

NUREG-1569, Acceptance Criterion 4.1.3(4), states: "The application demonstrates that the effluent control systems will limit exposures under both normal and accident conditions. The application also provides information on the health and safety impacts of system failures and identifies contingencies for such occurrences."

In TR Section 4.1.3, the applicant refers to its SHEQMS, Volume VIII, Emergency Manual, for responses to emergency situations that could occur at the site in the event of effluent system failures, but neither provides details on the safety impacts from these failures nor identifies contingencies for such occurrences.

Request for Additional Information

Consistent with NUREG-1569, Acceptance Criterion 4.1.3(4), please provide details on accident conditions related to the ventilation systems. Specifically, please provide information on the health and safety impacts of ventilation system failures and identify contingencies for such occurrences for staff to evaluate NUREG-1569, Acceptance Criterion 4.1.3(4), or indicate where this information can be found in the application.

RAI 22:

Description of Deficiency

The information provided in TR Sections 3.1 and 4.2 does not meet the applicable requirements of 10 CFR Part 40, using the review procedures in Sections 3.1.2 and 4.2.2 and acceptance criteria in Section 3.1.3 and 4.2.3 of NUREG-1569.

Basis for Request

Staff cannot confirm the following information, which 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).

- (a) Estimates for the volume of wastewater expected to be generated during the ground water sweep and ground water treatment phases.
- (b) The method for disposal of the drill cuttings for all MEA project wells.

(c) The method for disposal of the purged water for baseline and monitoring well sampling during plant operations.

Request for Additional Information

Please provide:

- (a) Estimates for the volume of wastewater expected to be generated during the ground water sweep and ground water treatment phases.
- (b) The method for disposal of the drill cuttings for all MEA project wells.
- (c) The method for disposal of the purged water for baseline and monitoring well sampling during plant operations.

RAI 23:

Description of Deficiency

The application did not contain 10 CFR 20.2002 analysis of the deep disposal well consistent with NUREG-1569, Acceptance Criterion 6.1.3(13).

Basis for Request

NUREG-1569, Acceptance Criterion 6.1.3(13), states, in part: "Proposals for disposal of liquid waste from process water by injection in deep wells must meet the regulatory provisions in 10 CFR 20.2002 and demonstrate that doses are ALARA and within the dose limits in 10 CFR 20.1301. The injection facility should be described in sufficient detail to satisfy the NRC need to assess environmental impacts. Specifically, proposals must include: (i) a description of the waste, including its physical and chemical properties important to risk evaluation; (ii) the proposed manner and conditions of waste disposal; (iii) an analysis and evaluation of pertinent information on the nature of the environment; (iv) information on the nature and location of other potentially affected facilities; and (v) analyses and procedures to ensure that doses are ALARA, and within the dose limits in 10 CFR 20.1301."

Request for Additional Information

Please provide 10 CFR 20.2002 analysis of the deep disposal well that is consistent with NUREG-1569, Acceptance Criterion 6.1.3(13).

RAI 24:

Description of Deficiency

The information provided in TR Section 4.2 does not meet the applicable requirements of 10 CFR Part 40 that will be protective of human health and the environment.

Basis for Request

The application indicates that surface impoundments (i.e., ponds) will not be constructed at the MEA and a series of six storage tanks (each 50,000 gallons in capacity) will be used to provide surge capacity between the satellite plant and the MEA deep disposal well (DDW). The applicant also identified trucking contaminated wastewater off-site for disposal in an emergency situation. Considering that page 3-10 of the application identifies an annual DDW flow rate of 35,500,000 gallons per year (approximately 67.5 gallons per minute) and Figure 3.1-5 identifies a 120 gpm flow rate to the DDW, the 300,000 gallons of surge capacity would provide between 1.5 and 3 days of backup. It is not clear to the staff whether the proposed volume of the tank storage (300,000 gallons) will provide adequate surge capacity. Based on the above-referenced conflicting DDW flow rates, staff is also unclear on the DDW disposal rate estimated for MEA.

Additionally, the application does not provide engineering and design aspects of the surge tanks and associated infrastructure (tank construction, secondary containment and any radiation protection implications). This information is necessary to determine if CBR's MEA operation will be protective of human health and the environment.

Request for Additional Information

Please provide:

- (a) better clarity of the anticipated DDW disposal.
- (b) additional information that demonstrates that the tanks provide adequate surge capacity.
- (c) a further discussion of other options for disposal of wastewater if the DDW suddenly is not available for an extended period of time.
- (d) additional information concerning the engineering and design aspects of the tanks and associated infrastructure (e.g., tank construction, secondary containment, and any radiation protection implications).

Section 5 – Operations

RAI 25

Description of Deficiency

The applicant did not show integration between construction and plant management as part of the organizational structure.

Basis for Request

NUREG-1569, Acceptance Criterion 5.1.3(2), states that the organization structure should show integration among groups that support the operation and maintenance of the facility, and if the facility is new, the integration between plant construction and plant management should be

detailed. Although there will be construction of a new satellite facility and well fields, the applicant did not describe the integration between plant construction and plant management.

Request for Additional Information

Please describe in the text or include in the organizational charts how construction will interface with plant management or indicate where this information can be found.

RAI 26:

Description of Deficiency

Staff cannot complete its evaluation of NUREG-1569, Acceptance Criterion 5.5.3(2)

Basis for Request

NUREG-1569, Acceptance Criterion 5.5.3(2), states: "The training program is acceptable if it meets the following criteria: It is consistent with Regulatory Guide 8.13, "Instruction Concerning Prenatal Radiation Exposure, Revision 3" (NRC, 1999). This guide provides guidance for protection of the fetus." RG 8.13, Regulatory Position C.2, provides guidance on the content of instruction concerning prenatal radiation exposure.

In TR Section 5.5.1.3, the applicant discusses instructions regarding prenatal exposure risks in general, but does not provide specifics on these instructions for staff to evaluate their consistency with RG 8.13.

RG 8.13, Regulatory Position C.3, provides guidance on a licensee's policy on declared pregnant women.

The applicant did not provide its policy on declared pregnant women.

Request for Additional Information

Consistent with NUREG-1569, Acceptance Criterion 5.5.3(2), please provide the following information:

- 1. the content of instruction concerning prenatal radiation exposure, and
- 2. the applicant's policy on declared pregnant women

RAI 27:

Description of Deficiency

The applicant did not provide details on its ventilation equipment related to minimum performance specifications and frequencies of tests and inspections.

Basis for Request

NUREG-1569, Acceptance Criterion 5.7.1.3 (4), states, in part: "The applicant describes minimum performance specifications for the operation of the effluent controls and the frequencies of tests and inspections to ensure proper performance to specifications..."

The applicant stated in TR Section 5.7.1.1 that ventilation equipment will be inspected for proper operation as recommended in RG 3.56 and that this equipment will be inspected during radiation safety inspections as discussed in TR Section 5.3.1.

Staff observes that RG 3.56 does not specifically address ventilation systems and only provides a general description of maintenance and testing, relying on manufacturer's recommendations and minimum timeframes. In addition, the applicant does not address ventilation systems operations in its radiation safety inspections discussed in TR Section 5.3.1.

Request for Additional Information

Please provide details on the applicant's testing, maintenance, and inspection program for ventilation systems at the Marsland satellite facility, including wellhouse ventilation units. Specifically, please provide minimum performance specifications and frequencies of tests, inspections, and maintenance activities for these ventilation systems or indicate where this information can be found in the application.

Consistent with RG 3.56, please also describe any specialized training for those performing inspections on the ventilation systems.

RAI 28:

Description of Deficiency

The applicant did not provide information on beta survey instruments.

Basis for Request

NUREG-1569, Acceptance Criterion 5.7.2.3(3), states: "Monitoring equipment is identified by type, sensitivity, calibration methods and frequency, availability, and planned use to protect health and safety. The ranges of sensitivity for the proposed external radiation monitors are consistent with those appropriate to the facility operation."

In TR Section 3.3, the applicant discusses various survey equipment but does not address equipment for performing beta surveys. In TR Section 5.7.2, the applicant discusses beta surveys, but does not discuss instruments for performing these surveys.

Request for Additional Information

Consistent with NUREG-1569, Acceptance Criterion 5.7.2.3(3), please provide a description of beta monitoring equipment for the applicant's external radiation monitoring program identified by

type, sensitivity, calibration methods and frequency, availability, and planned use to protect health and safety, or indicate where this information can be found in the application.

RAI 29:

Description of Deficiency

The applicant did not provide any specifics on its ALARA policy.

Basis for Request

NUREG-1569, Acceptance Criterion 5.7.2.3(7), states: "Radiation doses will be kept as low as is reasonably achievable by following Regulatory Guide 8.10 (NRC, 1977) and Regulatory Guide 8.31 (NRC, 2002b)." RG 8.10, Regulatory Position C.1.a, recommends that plant personnel should be made aware of management's commitment to keep occupational exposures ALARA and that the commitment should appear in policy statements, instructions to personnel, and similar documents.

In TR Section 4.1.4, the applicant stated that it maintains a strict ALARA policy to keep exposures to all radioactive materials as low as possible as defined in SHEQMS, Volume IV, Health Physics Manual. However, the applicant did not provide any specifics from this reference or others, such as ALARA exposure goals and action levels associated with exposures to radioactive materials.

Request for Additional Information

Consistent with NUREG-1569, Acceptance Criterion 5.7.2.3(7), please provide specific information on the applicant's ALARA policy statements, instructions, or other similar documents, including goals and action levels, as it relates to exposures to radioactive materials.

RAI 30:

Description of Deficiency

Staff cannot complete its evaluation of NUREG-1569, Acceptance Criterion 5.7.2.3(5).

Basis for Request

NUREG-1569, Acceptance Criterion 5.7.2.3(5), states: "Plans for documentation of radiation exposures are consistent with the approach in Regulatory Guide 8.7, "Instructions for Recording and Reporting Occupational Radiation Exposure Data, Revision 1" (NRC, 1992b)."

In TR Section 5.7.2, the applicant discusses its external radiation exposure monitoring program, but does not provide information on its documentation for external radiation exposure monitoring.

Request for Additional Information

Consistent with NUREG-1569, Acceptance Criterion 5.7.2.3(5), please provide information on the applicant's documentation for external radiation exposure monitoring.

RAI 31:

Description of Deficiency

The applicant did not provide a drawing with proposed airborne uranium particulate sampling locations.

Basis for Request

NUREG-1569, Acceptance Criterion 5.7.3.3(1), states: "The applicant provides one or more drawings that depict the facility layout and the location of samplers for airborne radiation. Locations are based, in part, on a determination of airflow patterns in areas where monitoring is needed, and determination of monitoring locations is consistent with Regulatory Guide 8.30, "Health Physics Surveys in Uranium Recovery Facilities," (NRC, 2002a)."

In TR Section 5.7.3.1, the applicant stated that one location near the resin transfer station will be sampled monthly for airborne uranium particulates. However, on Figure 5.7-2, there is no indication of an airborne uranium particulate sampling location.

Request for Additional Information

Please provide, or update (e.g., Figure 5.7-2), a drawing with the proposed airborne uranium particulate sampling location or indicate where this can be found in the application.

RAI 32:

Description of Deficiency

The applicant did not provide information on beta survey instruments.

Basis for Request

NUREG-1569, Acceptance Criterion 5.7.3.3(3), states: "Monitoring equipment is identified by type, sensitivity, calibration methods and frequency, availability, and planned use to protect health and safety. The ranges of sensitivity for the proposed external radiation monitors are consistent with those appropriate to the facility operation."

In TR Section 3.3, the applicant discusses various survey equipment but does not address equipment for performing beta surveys.

Request for Additional Information

Consistent with NUREG-1569, Acceptance Criterion 5.7.3.3(3), please provide a description of beta monitoring equipment for the applicant's airborne radiation monitoring program identified by type, sensitivity, calibration methods and frequency, availability, and planned use to protect health and safety, or indicate where this information can be found in the application.

<u>RAI 33</u>

Description of Deficiency

Staff cannot complete its evaluation of NUREG-1569, Acceptance Criterion 5.7.6.3(4).

Basis for Request

NUREG-1569, Acceptance Criterion 5.7.6.3(4), states: "Monitoring equipment by type, specification of the range, sensitivity, calibration methods and frequency, availability, and planned use is adequately described. The application demonstrates that the ranges of sensitivity for monitoring equipment will be appropriate to expected facility operation."

In TR Section 5.7.6, the applicant provides a description of survey equipment to be used in its contamination control program. However, it does not address the issues related to NUREG-1569, Acceptance Criterion 5.7.6.3(4).

Request for Additional Information

Please address the following issues related to the proposed survey equipment described in TR Section 5.7.6:

- A. Please provide the information requested in NUREG-1569, Acceptance Criterion 5.7.6.3(4).
- B. Staff observes that the proposed Ludlum Model 44-38 probe is rated with a beta cutoff energy of 200 keV (refer to ADAMS accession No. ML13086A183). Some of the uranium decay products have beta energies that are below this cutoff energy. Please provide information on how surface contamination with beta-emitting radionuclides will be evaluated.
- C. Please state whether the practice of washing the soles of shoes prior to exiting the restricted area will be used at the MEA. If this practice will be used, please demonstrate the minimum detectable concentration for contamination surveyed on the wet soles of shoes.

RAI 34:

Description of Deficiency

The applicant did not address NUREG-1569, Acceptance Criterion 5.7.6.3(6).

Basis for Request

NUREG-1569, Acceptance Criterion 5.7.6.3(6), states: "The licensee will ensure that radioactivity on equipment or surfaces is not covered by paint, plating, or other covering material unless contamination levels, as determined by a survey and documented, are below the limits specified in Table 5.7.6.3-1 of this standard review plan before application of the covering. A reasonable effort will be made to minimize the contamination before the use of any covering."

Request for Additional Information

Please address NUREG-1569, Acceptance Criterion 5.7.6.3(6), for operations or indicate where this can be found in the application.

RAI 35:

Description of Deficiency

The applicant did not address NUREG-1569, Acceptance Criterion 5.7.6.3(7).

Basis for Request

NUREG-1569, Acceptance Criterion 5.7.6.3(7), states: "The radioactivity of the interior surfaces of pipes, drain lines, or duct work will be determined by making measurements at all traps and other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or duct work."

Request for Additional Information

Please address NUREG-1569, Acceptance Criterion 5.7.6.3(7), for operations or indicate where this can be found in the application.

RAI 36:

Description of Deficiency

The applicant did not address NUREG-1569, Acceptance Criterion 5.7.6.3(9).

Basis for Request

NUREG-1569, Acceptance Criterion 5.7.6.3(9), states: "Appropriate criteria are established to relinquish possession or control of equipment or scrap having surfaces contaminated with material in excess of the limits specified in Table 5.7.6.3-1:

(a) The applicant will provide detailed information describing the equipment, or scrap; the radioactive contaminants; and the nature, extent, and degree of residual surface contamination.

- (b) The applicant will provide a detailed health and safety analysis that reflects that the residual amounts of contaminated materials on surface areas, together with other considerations such as prospective use of the equipment, or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.
- (c) The applicant includes materials created by special circumstances including, but not limited to, the razing of buildings, transfer of structures or equipment, or conversion of facilities to a long-term storage facility or to standby status."

Request for Additional Information

Please address NUREG-1569, Acceptance Criterion 5.7.6.3(9), for operations or indicate where this can be found in the application.

RAI 37:

Description of Deficiency

Staff cannot verify the applicant's MILDOS calculations for the maximally exposed individual and its basis for not collecting vegetation, food, and fish samples during operations for the environmental monitoring program.

Basis for Request

10 CFR Part 40, Appendix A, Criterion 7, requires, in part: "...Throughout the construction and operating phases of the mill, an operational monitoring program must be conducted to measure or evaluate compliance with applicable standards and regulations; to evaluate performance of control systems and procedures; to evaluate environmental impacts of operation; and to detect potential long-term effects."

10 CFR 20.1301(a) requires, in part: "(a) Each licensee shall conduct operations so that – (1) The total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem (1 mSv) in a year, exclusive of the dose contributions from background radiation, from any administration the individual has received, from exposure to individuals administered radioactive material and released under § 35.75, from voluntary participation in medical research programs, and from the licensee's disposal of radioactive material into sanitary sewerage in accordance with § 20.2003..."

10 CFR 20.1302(b) requires, in part: "A licensee shall show compliance with the annual dose limit in § 20.1301 by — (1) Demonstrating by measurement or calculation that the total effective dose equivalent to the individual likely to receive the highest dose from the licensed operation does not exceed the annual dose limit..."

NUREG-1569, Acceptance Criterion 5.7.7.3(1), states: "The proposed airborne effluent and environmental monitoring program is consistent with Regulatory Guide 4.14, Sections 1.1 and 2.1 (NRC, 1980) and as low as is reasonably achievable requirements as described in Regulatory Guide 8.37, Section 3 (NRC, 1993)".

RG 4.14, Section 2.1, provides guidance for conducting an operational environmental monitoring program including the collection of vegetation, food, and fish samples. Furthermore, RG 4.14 provides guidance that these media are relevant when a significant pathway to man is identified in individual licensing cases. A significant pathway is defined in RG 4.14, Footnote (o) to Tables 1 and 2, when a predicted dose to an individual would exceed 5 percent of the applicable radiation protection standard.

RG 3.51, Calculational Models for Estimating Radiation Doses to Man from Airborne Radioactive Materials Resulting from Uranium Milling Operations, provides guidance on calculating dose for individuals including ingestion of vegetables, milk and meat.

Request for Additional Information

- A. In TR Sections 5.7.7.5 and 5.7.7.6, the applicant stated that it will not collect vegetation, livestock, crop, or vegetable garden samples as part of its operational environmental monitoring program based on the results of its MILDOS calculations presented in TR Appendix M. In order for staff to verify the technical bases for this approach, please address the following issues:
 - In Appendix M1, page 7 of the report by Noel Savignac, the applicant describes the MILDOS operational input data. In addition to the assumed values of one percent for the radon venting rate of the wellfields (refer to NUREG-1569, Appendix D, and TR Appendix M, Table 2 of the report by Noel Savignac) and 20 percent of the radon released from the purge water, the applicant appears to further reduce the radon effluent by applying a 25 percent (radon venting from header houses) and 75 percent (radon venting from satellite plant) proportion factor in one scenario, and a 10 percent (radon venting from header houses) and 90 percent (radon venting from satellite plant) proportion factor in another scenario.

Please provide additional clarification and justification for this apparent additional reduction in radon effluent concentration over and above the MILDOS-assumed value for wellfield venting and the applicant-assumed value for purge water venting.

- 2. In Appendix M2, the applicant calculates the maximum dose to man from the vegetation pathway. Please address the following issues regarding the vegetation pathway analysis:
 - a. The applicant stated that it used the food production rate for Colorado from RG 3.51, Table 7, page 35, as Nebraska was not listed in this table. Staff observes that this tabulated data is from 1973 and that guidance on page 24 of RG 3.51 states that if other means are not available, it is acceptable to assume that regional agricultural productivity will remain in constant proportion to the U.S. population.

Consistent with RG 3.51, please provide a discussion on efforts to derive site-specific (e.g., State, regional) agricultural productivity data

and comparison of the tabulated agricultural productivity data with the U.S. population to derive an appropriate proportion factor.

b. The applicant calculated the maximum dose to an individual using the ratios of population exposures to vegetation, milk, and meat pathway to the total population exposure times the maximum resident dose at the Marsland operation. This approach does appear to address the requirements of 10 CFR 20.1302(b), dose to an individual, or be consistent with RG 3.51, Regulatory Position C.2, which provides guidance for dose calculations for individuals.

Please provide justification for applying a population exposure ratio to derive a maximum individual exposure.

c. Staff observes that the maximum resident dose at the Marsland operation was calculated assuming the highest radon air concentrations during operations. For maximum total individual dose, this approach appears consistent with RG 3.51, Regulatory Position C.2 which states that the 1-yr exposure period is taken to be the year when environmental concentrations resulting from plant operations are expected to be at their highest level.

However, the applicant stated that the dose from the vegetation pathway was calculated from the consumption of vegetables, meat, and/or milk that may have been impacted by the release of radon and its decay products on vegetation or forage from uranium in situ operations. Staff observes that the maximum vegetation concentrations will not necessarily occur during the same timeframe as the maximum radon air concentrations.

Consistent with RG 3.51, please provide the exposure period resulting in the maximum radiation dose from the vegetation pathway and reanalyze the maximum individual dose from the vegetation pathway if necessary.

B. In TR Section 5.7.7.6, the applicant stated that it will not collect fish samples as part of its operational environmental monitoring program based on the results of the MILDOS analysis for vegetation uptake.

Staff observes that the correlation between vegetation uptake and the potential for a significant fish pathway is unclear. Consistent with RG 4.14, Section 2.1, please provide a direct dose analysis for the fish pathway to enable staff to determine if a significant pathway to man from fish exists or not.

C. In Appendix M1, page 15 of the report by Noel Savignac, the applicant provides the maximum occupational dose using 1500 hours onsite for a full time worker.

Staff observes that a normal work week is 40 hours, resulting in a more typical 2000 hours onsite during the year. This is also the number of hours assumed for a working year in the DAC and ALI values given in 10 CFR Part 20, Appendix B (refer to the Introduction to Appendix B to Part 20).

Please provide a justification for assuming 1500 hours onsite for a full time worker.

RAI 38:

Description of Deficiency

The applicant did not provide the criteria used for determining the proposed locations for the airborne effluent monitoring stations.

Basis for Request

NUREG-1569, Acceptance Criterion 5.7.7.3(2), states: "The proposed locations of the airborne effluent monitoring stations are consistent with guidance in Regulatory Guide 4.14, Sections 1.1.1 and 2.1.2 (NRC, 1980). The license applicant adequately considers site-specific aspects of climate and topography in determining the number and locations of off-site airborne monitoring stations and environmental sampling areas. The criteria used in selecting sampling locations should be given. All sampling locations should be clearly shown relative to the proposed facility, nearest residences, and population centers on topographic maps of the appropriate scale."

Request for Additional Information

Consistent with NUREG-1569, Acceptance Criterion 5.7.7.3(2), please provide the criteria used for determining the proposed locations for the airborne effluent monitoring stations.

<u>Section 6 – Ground-water Quality Restoration, Surface Reclamation, and Facility</u> <u>Decommissioning</u>

RAI 39:

Description of Deficiency

The information provided in TR Section 6.1 does not meet the applicable requirements of 10 CFR Part 40, using the review procedures in Section 6.1.2 and acceptance criteria in Section 6.1.3 of NUREG-1569.

Basis for Request

CBR's technical basis for the proposed MEA flare factor (20%) is operational experience and hydrological modeling at nearby commercial ISR operation. Consistent with NUREG-1569, Section 6.1.3(2), the applicant did not propose a vertical and horizontal flare factors for the MEA, nor did it provide a technical basis that is specific to MEA.

Request for Additional Information

Please propose vertical and horizontal flare factors or justification for proposing one flare factor for MEA. Also, provide a technical basis for the proposed flare factor(s).

RAI 40:

Description of Deficiency

The applicant did not provide a commitment to implement pre-reclamation survey programs for diversion ditches, surface impoundments, and transportation routes.

Basis for Request

NUREG-1569, Acceptance Criterion 6.2.3(2), states that the pre-reclamation radiological survey program survey areas should include diversion ditches, surface impoundments, and transportation routes. Although in Section 6.2 of the TR, the third bullet states that the applicant will do radiological survey of all facilities, equipment, and materials on the site to identify the potential for personnel exposure during decommissioning, the list does not include the areas identified as missing. Although Section 6.4.5 of the TR states the applicant will adopt survey and sample protocols on a case by case basis, this appears to only apply to temporary ditches and impoundments and appears to only address confirmation of restoration rather than pre-reclamation surveys.

Request for Additional Information

Please provide a commitment to implement pre-reclamation survey programs for diversion ditches, surface impoundments, and transportation routes, or identify where this commitment is already discussed.

RAI 41:

Description of Deficiency

In TR Section 6.4, the applicant refers to its RESRAD calculations in TR Appendix N for Marsland site-specific cleanup criteria. However, staff can't verify that the applicant utilized Marsland site-specific input data (e.g., soil type, wind speed, precipitation, etc.) for RESRAD appropriate for the site.

Basis for Request

NUREG-1569, Acceptance Criterion 6.4.3(1), states: "The cleanup criteria for radium in soils are met as provided in 10 CFR Part 40, Appendix A, Criterion 6(6)." This criterion states that the design requirements for longevity and control of radon releases apply to any portion of a licensed and/or disposal site unless such portion contains a concentration of radium in land, averaged over areas of 100 m², which as a result of byproduct material, does not exceed the background level by more than:

- (i) 5 picocuries per gram (pCi/g) of radium-226, or, in the case of thorium byproduct material, radium-228, averaged over the first 15 cm [5.9 in.] below the surface,
- (ii) 15 pCi/g of radium-226, or, in the case of thorium byproduct material, radium-228, averaged over 15-cm [5.9-in.] thick layers more than 15 cm [5.9 in.] below the surface."

NUREG-1569, Acceptance Criterion 6.4.3(3), states: "Acceptable cleanup criteria for uranium in soil, such as those in Appendix E of this standard review plan, are proposed by the applicant. This is the radium benchmark dose approach of 10 CFR Part 40, Appendix A, Criterion 6(6)."

NUREG-1569, Acceptance Criterion 6.4.3(4), states: "For areas that already meet the radium cleanup criteria, but that still have elevated thorium levels, the applicant proposes an acceptable cleanup criterion for thorium-230. One acceptable criterion is a concentration that, combined with the residual concentration of radium-226, would result in the radium concentration (residual and from thorium decay) that would be present in 1,000 years meeting the radium cleanup standard."

NUREG-1569, Acceptance Criterion E2.1.3(2), states, in part: "...The code/calculation input data are appropriate for the site and represent current or long-term conditions, whichever is more applicable to the time of maximum dose. When code default values are used, they are justified as appropriate (representative) for the site..."

Request for Additional Information

Please address the following issues related to the soil cleanup criteria for the MEA:

- A. In TR Section 6.4.1, the applicant stated that the ALARA goal for natural uranium in the top 15 cm soil layer is 150 pCi/g averaged over *more than* 100 m². The averaging of radionuclides over more than 100 m² is not consistent with the requirements of 10 CFR Part 40, Appendix A, Criterion 6(6) or NUREG-1569, Acceptance Criterion 6.4.3(1). Please provide a justification for averaging the natural uranium concentration over more than 100 m².
- B. Consistent with NUREG-1569, Acceptance Criteria 6.4.3(3) and E2.1.3(2), please confirm that site-specific parameters relevant to the MEA (e.g., soil type, wind speed, precipitation, etc.) were used for the RESRAD analysis and thus deriving the radium benchmark dose. If the MEA site-specific parameters are different from what was analyzed, please provide a relevant RESRAD and radium benchmark dose analysis.
- C. In TR Section 6.4, the applicant refers to its analysis of Th-230 at its main facility for the Marsland analysis without assessing if this analysis is applicable to the MEA. Consistent with NUREG-1569, Acceptance Criterion 6.4.3(4), please provide a MEA site-specific discussion on Th-230, or indicate where this information can be found.

RAI 42:

Description of Deficiency

In TR Section 6.4.2, the applicant provided a gamma action level of 17,900 cpm as the level corresponding to the Marsland soil cleanup criterion. In TR Appendix N, the applicant described its derivation of the gamma action level of 17,900 cpm. However, the gamma action level was derived from data at the main facility (i.e., background levels, etc.) and there is no justification addressing why this data can be applied to Marsland, an unrelated land area.

Basis for Request

NUREG-1569, Acceptance Criterion 6.4.3(5), states: "The survey method for verification of soil cleanup is designed to provide 95-percent confidence that the survey units meet the cleanup guidelines. Appropriate statistical tests for analysis of survey data are described in NUREG–1575, 'Multi-Agency Radiation Survey and Site Investigation Manual' (NRC, 2000)."

Request for Additional Information

Consistent with NUREG-1569, Acceptance Criterion 6.4.3(5), please provide a technical justification for applying a gamma action level of 17,900 cpm to the Marsland facility when data used to derive this action level is based on site-specific data for the main facility, an unrelated land area.

ADMINISTRATIVE ISSUES

Section 1 – Proposed Activities

1. In Figure 1.7-5, the inset map identifies the road passing the site as Squaw Mountain Road. The main map identifies the road as Squaw Mound Road. The road's name should be corrected as appropriate.

Section 2 – Site Characterization

- 1. In Section 2.1, the application states that Figure 1.7-2 shows the Restricted Areas for the current license area. This is not readily identified in Figure 1.7-2. It appears that this reference may have been intended for Figure 1.1-1 of the ER. This statement should be removed from the text or the restricted area should be identified in Figure 1.7-2 or the proper figure should be included in the TR.
- In Section 2.2.2.5, the second paragraph states that there are four abandoned wells in the AOR. Figure 2.2-3 shows that there are five (Porter 1, Royal 1, Chicoine 1, Chicoine 1A, and Smith 1-A). The text in Section 2.2.2.5 should be corrected.
- 3. In Table 2.2-10, no units are provided. These should be added to the table. In addition, the table identifies the average well depth as 530.21, whereas the text in Section 2.2.4 indicates that the primary water supply is between 50 to 350 feet bgs. Similarly, the table identifies the average static level as 174.90, but the text in Section 2.2.4 indicates it

ranges from 50 to 150 feet bgs. These inconsistencies should be corrected or explained.

- 4. Figure 3.2-1 provides a diagram showing the satellite facility equipment layout; however, certain equipment shown in the diagram are not listed in the table legend (e.g., P-101 to P-120, RO-100, and F-100). In addition, T-114 is identified in the table legend, but cannot be located on the diagram. Missing items should be added to the legend and T-114 should be added to the diagram or corrected.
- TR Table 2.5-2 indicates that the source for hourly temperature data for Scottsbluff Airport is from 1961 through 2011. This data appears identical to temperature data in Figure 2.5-2 that is from hourly data from 1996 through 2011. Please confirm the dates which were used for deriving Table 2.5-2 and Figure 2.5-2.
- 6. TR Section 2.5-2 refers to Table 2.5-3 for temperatures for the Scottsbluff Airport site. The correct reference appears to be Table 2.5-2. Please change reference as appropriate.
- The summer wind rose (Figure 2.5-21) appears to be composed of two separate timeframes from 2010 and 2011. Please clarify the timeframe for the summer wind rose in Figure 2.5-21.
- 8. TR Section 2.5.3-4 (Precipitation) reports precipitation in inches. TR Figure 2.5-25 reports precipitation in millimeters. The values appear identical. Please clarify what the correct precipitation units are.
- TR Table 2.5-7 appears to be a tabulation of site-specific meteorological data (wind) from August 2010 to August 2011. However, the reference at the bottom of the table credits the National Climatic Data Center (1996 – 2011) as the source of the information. Please clarify the source and timeframe of the meteorological data in Table 2.5-7.
- 10. For TR Table 2.5-8, Marsland Expansion Area Wind Summary, please provide units for the columns "Average", "Maximum", and "Minimum" under the wind direction portion of the table.
- 11. Section 2.5.1 of the TR indicates that the MEA site-specific meteorological station coordinates and period of operation can be found in Table 2.5-1. NRC staff cannot locate this information in Table 2.5-1.
- 12. Please confirm the TR table where the MEA site-specific meteorological station coordinates and period of operation can be found.
- 13. Cross-sections provided in Figures 2.6-3a to 2.6-3n are incorrectly labeled with repeating elevations of 3400 and 3500. Please provide these figures with correct elevations.

- 14. The legend of the Structure Map provided in Figure 2.6-10 is incorrectly labeled with "groundwater elevation" and "groundwater potentiometric surface." Please revise this figure.
- 15. In TR Section 2.9.2.1, the applicant stated that the local wind direction is predominantly from south-southwest direction approximately 45 percent of the time. This statement appears inconsistent with the previous statement in TR 2.5.3.3 regarding the north-northwesterly and northwesterly winds and TR Figure 2.5-20 and Table 2.5-7 that indicates the south-southwest winds occur with a relative frequency of 5.3 percent of the time. Please provide clarification on the predominant wind direction.
- 16. TR Section 2.9.2.1 indicates that the local meteorological station was operated from August 28 through August 29, 2011. Please confirm the year that the MEA meteorological station initiated data collection.
- 17. Please provide a consistent description of the preoperational and operational environmental surface water monitoring plan consistent with RG 4.14.
 - (a) TR Section 2.9.4.3 and Tables 2.9-26 and 2.9-27 indicate that surface waters will be sampled on a monthly basis. However TR Table 2.9-35 indicates that surface water samples will be performed on a quarterly and semiannual basis.
 - (b) TR Section 5.7.8.3 indicates that operational samples will include Po-210. TR Table 5.7-1 does not include Po-210 as an analyte.
 - (c) TR Table 5.7-1 indicates two samples will be collected from designated ephemeral drainages. This appears inconsistent with "Note a" in TR Table 2.9-35 and sample collection points in TR Figure 2.7-4.

Section 5 – Operations

- Section 5.1.3 of the TR identifies the "General Manager of Nebraska" being responsible for all uranium production activity at the MEA. Elsewhere the application uses the term "General Manager of Operations" and Figure 5.1-1 uses the term "Crow Butte Resource, Inc. General Manager." If these positions all refer to the same position, the same term should be used for clarity; otherwise, these positions should be identified in Figure 5.1-1 and described, as appropriate.
- 2. Section 5.1.5 of the TR identifies the SHEQ manager as having a secondary reporting requirement to the President. Figure 5.1-1 indicates that the secondary reporting is to the Director of SHEQ. The figure or text should be corrected, as appropriate.
- 3. The applicant did not provide details of its qualification program for designees approving Radiation Work Permits (RWPs) and Standing Radiation Work Permits (SRWPs) in the absence of the RSO. In TR Section 5.2.1.2, the applicant stated that qualified designees will review and approve RWPs and SRWPs in the absence of the RSO, but did not provide any description of its qualification program for such designees. Please provide a

description of the qualifications of the designees that will be allowed to review and approve RWPs and SRWPs in the absence of the RSO.

- 4. The applicant did not provide minimum amount of specialized training required for the RSO qualifications. License Condition 9.12 of the applicant's current license (Amendment No. 26, ADAMS accession No. ML110320358) requires the applicant to follow the guidance set forth in Regulatory Guide 8.31. NUREG-1569, Acceptance Criterion 5.4.3(1), states, in part: "The personnel meet minimum qualifications and experience for radiation safety staff that are consistent with Regulatory Guide 8.31, Section 2.4 (NRC, 2002)." In TR Section 5.4.1, the applicant discusses specialized training in general but does not specify a minimum amount of this training for the RSO qualifications. Consistent with RG 8.31, please provide a minimum amount of specialized training required for the RSO qualifications.
- 5. In TR Section 5.7.3, the applicant refers to Figure 2.9-2 for the proposed airborne sampling location for the satellite facility. However, Figure 2.9-2 is title Location of Environmental Air Sampling Stations at the MEA. The correct figure appears to be Figure 5.7-2, titled Proposed Operational Radiological Monitoring Locations for Satellite Facility. Please provide the correct reference for the figure with the proposed airborne sampling locations.
- In TR Section 5.7.4.2, the applicant refers to TR Section 5.7.3.2, CBR Site-Specific DAC, for the radon daughter concentration surveys. However, TR Section 5.7.3.2 discusses the CBR site-specific DAC. The correct reference appears to be TR Section 5.7.3.3, Radon Daughter Concentration Monitoring. Please confirm the correct reference for the discussion on the radon daughter concentration surveys.

Section 6 - Ground-Water Quality Restoration, Surface Reclamation, and Facility Decommissioning

- In Section 6.2 of the TR, it states: "CBR will, prior to final decommissioning of an area, submit to the NRC and NDEQ a detailed decommissioning plan for their review and approval at least 12 months before final decommissioning." The term "before final decommissioning" is unclear as to whether it means onset or completion of decommissioning. This statement should be revised to make it clear that it means before the onset of final decommissioning which is consistent with Section 6.2.3(7) of the SRP and License Condition 12.5.
- 2. In TR Section 6.4.3, the applicant cited an outdated guidance document. NUREG-1569, Acceptance Criterion 6.4.3(5), states: "The survey method for verification of soil cleanup is designed to provide 95-percent confidence that the survey units meet the cleanup guidelines. Appropriate statistical tests for analysis of survey data are described in NUREG–1575, "Multi-Agency Radiation Survey and Site Investigation Manual" (NRC, 2000)." NUREG-1757, Consolidated NMSS Decommissioning Guidance, Volume 2, Table 1.5, lists NUREG/CR-5849 as a superseded document. In TR Section 6.4.3, the applicant refers to draft NUREG/CR-5849 for its statistical tests related to its surface soil cleanup and sampling plan. Consistent with NUREG-1569, Acceptance Criterion

6.4.3(5), please provide a relevant reference for the statistical tests related to the Marsland surface soil cleanup and sampling plan.

Appendix A - Water User Survey Information

The value for the casing depth is the same as the value for the well depth within data presented for Wells 736 and 737 and the units of measure for some of the Appendix A data is not provided. Please clarify or revised.