


United States Nuclear Regulatory Commission Official Hearing Exhibit	
In the Matter of: POWERTECH USA, INC. (Dewey-Burdock In Situ Uranium Recovery Facility)	
	ASLBP #: 10-898-02-MLA-BD01
	Docket #: 04009075
	Exhibit #: NRC-077-00-BD01
	Admitted: 8/19/2014
	Rejected:
	Identified: 8/19/2014
	Withdrawn:
	Stricken:
	Other:

NRC-077
Submitted: June 20, 2014

May 28, 2010

Mr. Richard E. Blubaugh
Vice President of Environmental Health
and Safety Resources
Powertech (USA), Inc.
5575 DTC Parkway, Suite 140
Greenwood Village, CO 80111

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION, POWERTECH (USA), INC.,
PROPOSED DEWEY-BURDOCK IN SITU RECOVERY FACILITY
(TAC NO. J00606)

Dear Mr. Blubaugh:

By letter dated August 10, 2009, Powertech (USA) Inc. (Powertech) resubmitted a Source Materials License application to the U.S. Nuclear Regulatory Commission (NRC) staff for the Dewey-Burdock Uranium Project, a proposed uranium in situ recovery (ISR) facility. By letter dated October 2, 2009, NRC staff informed Powertech that its application was accepted for further detailed technical review.

NRC staff has completed its technical review of the license application. During this 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, and is organized according to the sections in the application.

This RAI, combined with those technical issues discussed with Powertech during the March 8, 2010, public teleconference and transmitted to it by letter dated May 19, 2010 (ADAMS accession # ML101120080), represent a complete RAI package. The staff is therefore curtailing any further work until we receive Powertech's response to the complete RAI package. Please either respond to the complete RAI package, or provide a schedule for submitting Powertech's response, within 30 days of receipt of this letter. With Powertech's RAI response, please submit all appropriate page changes that incorporate the response.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," 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/

Ronald A. Burrows, 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. 40-9075

Enclosure:
Request for Additional Information

cc: Amy Thurkill, Powertech (USA)
John Mays, Powertech (USA)
Bob Townsend, SD DENR
Mike Cepak, SD DENR
Marian Atkins, BLM
Mike McNeil, FS
Lynn Kolund, FS
Valois Shea, US EPA, Region 8

R. Blubaugh

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**U.S. Nuclear Regulatory Commission Request for Additional Information
Powertech (USA) Inc. Dewey-Burdock Uranium Project
Application for a Source Materials License**

By letter dated August 10, 2009, Powertech (USA) Inc. (the applicant) resubmitted a Source Materials License application to the U.S. Nuclear Regulatory Commission (NRC) staff for the Dewey-Burdock Uranium Project, a proposed uranium in situ recovery (ISR) facility. NRC staff has completed its technical review of this application and offers the following Request for Additional Information (RAI). In this RAI, staff refers to the Dewey-Burdock Uranium Project, which consists of the Dewey Unit and the Burdock Unit. In various sections of the RAI, the staff may request information for the entire Dewey-Burdock Uranium Project or for the Dewey Unit and Burdock Unit individually. Individual information requests are organized by the section in which the subject matter is found in the application. A basis for requesting the information is provided for each section of the RAI.

SECTION 2.0 SITE CHARACTERIZATION

Section 2.5 Meteorology

The applicant has not provided sufficient information regarding meteorological characterization of the site in Section 2.5 to enable staff to fully understand this topic and to support other reviews dependent on that understanding, such as, radiation doses to the members of the public. Specifically, the staff is requesting the following information.

1. Regulatory Guide 3.63 recommends comparing a concurrent period of meteorological data from a National Weather Service (NWS) station with the long-term meteorological data from that NWS station. The NWS station selected for this comparison should be in a similar geographical and topographical location and be reasonably close (preferably within 50 miles) to the site. Regarding the long-term representativeness of the data collected onsite, please address the following issues.
 - a. In Section 2.5 of the Technical Report (TR), the applicant compared weather data from the NWS site at Chadron, Nebraska. Consistent with Regulatory Guides 3.63, 3.46 and NUREG-1569, Acceptance Criterion 2.5.3(3), explain why the applicant chose the NWS site at Chadron, Nebraska, over other potential NWS sites as a representative location for the purpose of comparing meteorological data.
 - b. On page 2-58 of the TR, the applicant states that the years 1978–2007 were used for comparison of the NWS site data. On page 2-59 of the TR, the applicant states that January 1, 1978 to July 17, 2008 were used for long-term meteorological comparison. Please clarify what years were used for determining long-term representativeness of meteorological conditions.

Enclosure

- c. NRC staff notes that the applicant has provided an analysis of meteorological data from the NWS site in Chadron for temperature and wind speed, but not wind direction. Consistent with Regulatory Guides 3.63, 3.46 and NUREG-1569, Acceptance Criterion 2.5.3(3), demonstrate that the wind direction data obtained onsite are representative of the long-term meteorological conditions in the site vicinity.
2. Regulatory Guide 3.63 recommends the basic reduced wind direction, wind speed, and atmospheric stability data should be averaged over a period of 1 hour. At least 15 consecutive minutes of continuous data during each hour should be used to represent a 1-hour average data. Please demonstrate that this data is consistent with the recommendations in Regulatory Guide 3.63 or provide justification for an alternate methodology.
 3. Regulatory Guide 3.63 recommends that quarterly and annual wind direction, wind speed, and atmospheric stability data be compiled in joint frequency and joint relative frequency (i.e., decimal frequency) form for heights representative of effluent releases. In addition, stability categories should be established to conform as closely as possible with those of Pasquill. Please provide this data consistent with Regulatory Guide 3.63 or provide justification for an alternate methodology.
 4. Consistent with Regulatory Guide 3.63, please provide an annual wind rose summary for the 16 compass directions for the project site.
 5. The following questions refer to Section 2.5.3.2 (Wind Patterns) regarding the applicant's discussion of wind at the project site.
 - a. On page 2-83, the applicant discusses wind speed in units of miles per hour when referring to Table 2.5-7. However, the data in Table 2.5-7 (and Figures 2.5-22 and 2.5-23) are presented in units of knots. Please make units of wind speed consistent.
 - b. Also on page 2-83, the applicant discusses wind data for the months of May and December. However, this data cannot be confirmed because the data in Table 2.5-7 appears to be a yearly tabulation while the data in Figures 2.5-22 and 2.5-23 are seasonal. Please provide data to confirm the applicant's statements for wind data.
 6. Figures 2.5-22 and 2.5-23 summarize seasonal wind patterns on wind roses. Please specify the location and months included in each seasonal wind rose on the legend and/or titles of the figures.
 7. Regulatory Guide 3.63 recommends that an indication of the atmospheric stability can be obtained by a method such as isolation-cloud cover and wind speed (Pasquill-Gifford and similar methods), temperature lapse rate method, wind fluctuation method, split-sigma method, or Richardson Number. Please explain the method by which the applicant obtained the atmospheric stability.

8. Consistent with Regulatory Guides 3.63, 3.46 and NUREG-1569, Acceptance Criterion 2.5.3(1), please provide a discussion of wind stability class and average inversion height in the description of the local meteorological conditions.
9. Consistent with Regulatory Guide 3.63, please provide threshold values for the meteorological instruments measuring wind direction and wind speed.
10. Regulatory Guide 3.63 recommends that meteorological systems should be inspected at least once every 15 days and serviced at a frequency that will minimize extended periods of outage and ensure an annual data recovery of at least 90% for each individual parameter measured (at least an annual 75% joint data recovery for wind speed, wind direction, and atmospheric stability). Please demonstrate that the applicant's system maintenance and servicing schedule during the onsite data collection period is consistent with Regulatory Guide 3.63 or provide justification for an alternate methodology.
11. Regulatory Guide 3.63 recommends that meteorological systems be calibrated at least semiannually to ensure that the system accuracies in this guide are met. Please demonstrate that the applicant's calibration program during the onsite data collection period is consistent with Regulatory Guide 3.63 or provide justification for an alternate methodology.

Section 2.6 Geology and Seismology

The following information is necessary for staff to understand the manner in which the Dewey-Burdock operations will be protective of human health and the environment.

1. Figure 2.2-3 in the TR indicates that the Newcastle Sandstone may be 0 to 150 feet thick in the Black Hills area. Sections 2.6.2.2 and 2.7.2.2.6 of the TR provide conflicting site information concerning the presence of the Newcastle Sandstone within the overlying confining unit (Graneros Group). NRC staff requests that the application clarify the presence or absence of the Newcastle Sandstone at the project site.
2. NRC staff notes that the U.S. Geological Survey's Burdock Quadrangle (Schnable, 1963) shows the presence of the Minnewaste Limestone where it outcrops east of the license area. The application indicates that the Minnewaste unit is not present at the site. Please further clarify where the Minnewaste Limestone may be present within the license area (i.e., using logs and other site data). If present, please provide a description of the unit and any anticipated affects the unit may have on the proposed operations.
3. NRC staff notes that the description of the geochemistry of the ore zones is limited. The applicant's description did not sufficiently describe site-specific minerals in the clays, silts, and carbonaceous media that are present in the ore zones of the two sub-aquifers of the Inyan Kara. Also, the applicant did not provide a sufficient description of the geochemistry associated with site specific mineralogy, common ions present, and oxidation-reduction conditions. NRC staff requests a further

description of the mineralogy and associated geochemistry of the mineralized zones consistent with NUREG 1569, which states, "A geologic and geochemical description of the mineralized zone and the geologic units immediately surrounding the mineralized zone is provided."

4. Page 2-15 of the TR states, "Twenty-six wells in the vicinity of the project site were deemed abandoned because of the condition and inactivity of the well; these wells termed abandoned are not considered properly plugged and abandoned." Figure 2 in Appendix 2.2-A indicates that abandoned wells 606, 636, 659, 690 are at or near proposed wellfield areas. NRC staff notes that the application does not contain well abandonment and plugging records for the above-referenced wells and other Appendix 2.2A abandoned wells within the license area. Consistent with Section 2.6.3 of NUREG 1569, please provide abandonment records for abandoned water wells within the license area. For abandoned water wells that cannot be documented with abandonment records, please clarify whether such wells that are located at or near wellfields may potentially impact the containment of process fluids (i.e., improper well construction or poor well condition that may potentially lead to an excursion).

Section 2.7 Hydrology

The following information is necessary for staff to understand the manner in which the Dewey-Burdock operations will be protective of human health and the environment.

1. NRC staff found the proposed satellite plant location in Figure 2.7-1 of the TR abuts the northern license boundary, where surface drainage appears to flow to the north directly outside of the license boundary. Staff notes that Exhibit 3.2-1 of the TR Supplement does not show the satellite plant to be near the proposed license boundary. Staff requests clarification of the proposed satellite plant location shown in Figure 2.7-1.
2. Exhibit 3.2-1 of the TR Supplement indicated that the horizontal excursion monitoring well ring for Dewey Wellfield #1 is traversed by a set of railroad tracks. Staff was uncertain of the surface drainage in the topographic low areas on the northeast side of the tracks and whether the construction of the tracks includes any type of drainage system you might see for a double track construction (i.e., surface and/or subsurface drainage system). Staff is uncertain if standing water in poorly drained areas will hamper access to wells and potentially facilitate well leakage. Please clarify the surface drainage of this area.
3. Consistent with criteria of Section 2.7.3 of NUREG-1569, please provide appropriate estimates of peak flood discharges and water levels produced by large floods on Pass Creek, Beaver Creek, and local small drainage areas. Please also provide an appropriate estimate of the aerial extent of significant peak flow during flooding of Beaver Creek and Pass Creek in the areas where Dewey Wellfields I and III and Burdock Wellfields III and V. Furthermore, please

discuss the safety measures to be undertaken for wellfields and monitoring wells located in areas that may be subject to erosion or inundation.

4. NRC staff notes that ephemeral stream tributaries flow through all the proposed wellfields shown in Exhibit 3.1-4 of the TR Supplement. NRC also notes that the plant-to-plant pipeline and Burdock Wellfield V-to-plant pipeline crosses several ephemeral drainage channels including Pass Creek. Please provide an estimate of high water marks of significant channel flow and provide specific plans for the protection of infrastructure (e.g., well heads and header houses) within the high water marks of significant channel flow. This information is necessary to assess erosion risks to wellfield infrastructure and pipelines.
5. NRC Staff notes that the location of several of the potentiometric contour lines in Figures 2.7-14 and 2.7-15 of the TR conflicts with water level data posted at several of the well points. Please explain the cause of this error.
6. NRC Staff found that the description of the methods used to measure the groundwater levels or water potential measurements and the subsequent method of calculation used to establish groundwater elevations at each well in Section 2.7.2.2.8 of the TR were incomplete. Please provide a complete description of the method used to determine potentiometric head for the artesian wells.
7. The Fall River isopach map of Dewey Wellfield I (Supplemental Exhibit 3.2-9) and Dewey Wellfield I Cross Section (Supplement Exhibit 2.1-3) show ore zones proposed for uranium recovery within a plausible channel deposit. This scenario is also seen in the detailed information for Burdock Wellfield I (Supplemental Exhibit 3.2-12 and Supplement Exhibit 2.1-4). Staff notes that these data illustrations do not provide sufficient information concerning these plausible channel deposits. Staff requests structure maps of the base of the Chilson aquifer for Burdock Wellfield I and the base of the Fall River aquifer for Dewey Wellfield I. Also, please modify Exhibits 2.1-3 and 2.1-4 to show all interbedded sandstones and shales within the Chilson and Fall River aquifers as well as the perimeter, overlying, and underlying monitoring wells and their screened intervals. Noting that Section 3.2 of the TR Supplement states, "location of any flow problems caused by clay stringers," please further discuss the effects of channel deposits and interbedded shales on the containment of production fluids and the adequacy of groundwater monitoring layout.
8. Considering the uncertainty of the flow regime close to the Dewey Fault and the size and potential complexity of the rest of the project site, NRC staff found amount of well points used to represent the potentiometric maps of the Fall River, Lakota, and Unkpapa water bearing units to be insufficient. Staff noted an unusual potentiometric surface in the Dewey portion and was unable to determine the source of the anomaly. Staff also noted that well points used in Figures 2.7-14 and 2.7-15 of the TR did not include available wells provided in Appendix 2.2-A (e.g., Fall River Wells 7, 8, 17, 18, and 20; and Lakota Wells 1, 2, 13, 14, 16, 42, 51, 96, 115, 147, 510, 620, 696, 697, and 7002). Staff notes

that Section 2.7.2.2.8 of the TR indicated that some of the additional wells listed in Appendix 2.2-A are difficult to access for water level measurements. However, staff is uncertain if the wells can be reasonably accessed with additional efforts. Staff requests potentiometric maps of the Fall River, Lakota, and Unkpapa water bearing units that include all wells that are reasonably accessible for water level measurements.

9. NRC staff notes that the potentiometric groundwater surfaces of the Fall River and the Lakota are above ground surface within the southern portion of Wellfield Dewey I, the western portion of Wellfield Dewey III, and Wellfield Burdock V. These areas are within alluvium along Beaver Creek and Pass Creek. NRC staff notes that unplugged exploration test holes recognized in Section 2.7.2.2.16 of the TR (i.e., Section 2.7.2.2.16 of the TR states, "Locally unidentified structural features or more likely old, unplugged exploration holes enhance this interaquifer connection.") may be a pathway for production zone groundwater to be discharged via artesian flow to alluvial aquifers and plausibly be discharged from alluvial aquifers to Beaver Creek and/or Pass Creek. Please provide additional information regarding the potential for whether groundwater is discharging to alluvial aquifers as referenced above.
10. The application states that springs are not present within the license area. NRC staff is uncertain if the statement includes potential springs that may directly feed wetlands and/or surface impoundments in the license area. Staff is uncertain if unplugged exploratory drill holes (discussed in the above-referenced RAI 12) may have potentially created a spring(s) that feeds a wetlands and/or surface impoundment with production zone groundwater in areas of flowing artesian conditions and the unconfined Fall River aquifer. Please provide a discussion to clarify whether wetlands, surface impoundments, and open mine pits at or downgradient of all proposed production are potentially spring fed with production zone groundwater.
11. The TR Supplement stated "Any such water which falls within an area to be mined by POWERTECH shall be removed." NRC staff notes that the applicant may have intended to say "water well" instead of "water." This discrepancy should be corrected or clarified. Please also identify wells to be removed.
12. The application stated "if any water well on the Property outside of a mining area or well field is materially and substantially diminished in quantity or quality due to POWERTECH's exploration, development or mining activities, POWERTECH will provide LESSOR with such additional water well or wells as may be necessary to provide water in a quantity equal to the original well and of a quality which was suitable for all uses the diminished well served." This statement appears to imply that the applicant will wait until a water well experiences diminished water quality before acting. Please state those measures to be used to detect and inform potential human receptors of a water quality impact.

13. Below are comments and associated requests for information from NRC's review of water wells located at or near the project site.
- a. Non-verified wells in Appendix 2.2-A of the TR are described as wells that were not located at the site and may or may not still exist. If any of these wells or other wells are discovered prior to the closure of the project site, please describe those procedures to be used to protect public health.
 - b. Appendix 2.2- A of the TR indicates that stock wells 618 and 628 tap an unknown water-bearing zone and the Inyan Kara water-bearing zone, respectively. *According to Figure 11 in Appendix A, these stock wells appear to be located within a proposed wellfield area.* NRC staff notes that the construction and condition of these wells are unknown. Appendix 2.2- A of the Technical Report indicates that stock wells 618 and 628 tap an unknown water-bearing zone and the Inyan Kara water-bearing zone, respectively. *According to Figure 11 in Appendix A, these stock wells appear to be located within a proposed wellfield area.* NRC staff notes that the construction and condition of these wells are unknown. Please describe the applicant's plans to address these wells if they are located in a wellfield, completed in the ore zone, and to protect public health.
 - c. Appendix 2.2- A of the TR indicates that TVA wells 605, 609, 637, and 668 appear to be *within proposed wellfield areas*. NRC staff notes that the condition of these monitoring wells is unknown.
 - d. Figure 8 in Appendix 2.2- A of the TR appears to show that domestic well 16 is within or immediately adjacent to a proposed wellfield area. Staff is uncertain if production at this wellfield is proposed in the Lakota water bearing zone that the domestic well taps.
 - e. Appendix 2.2- A of the TR indicated that Lakota domestic wells 13 and 42 are within the license boundary and Inyan Kara domestic wells 2, 7, 8, 18, 20, 96, 115, and 135, 4002 are outside of the license boundary in the vicinity of the site.
 - f. Appendix 2.2- A of the TR indicated that stock wells 17, 49, 38, and 61 tap either the Fall River or Lakota water-bearing zones. These stock wells appear to be located at, or immediately adjacent to, possible production zones.
 - g. Appendix 2.2- A of the TR indicated that Lakota stock wells 12, 51, 510, 619, 620, and 650 are located within the license boundary.

For each of the wells above, please provide the applicant's plans for protecting public health, determining when well replacement is necessary, the means of notifying the affected parties and the NRC staff when such a replacement is necessary, and the manner in which the potential for contamination migration is precluded.

14. Referring to Appendix 2.2- A of the TR, please determine and provide the “Type Use” of Lakota wells 51 and 14, which are located within the license boundary. Once their use is determined, provide additional discussion, as needed, of the water quality risk to the well(s) from the project and any measures that will assure environmental and humans receptors of water from a well are not subjected to any potential diminished water quality from project operations.
15. Consistent with Section 2.7.4 of NUREG-1569, please provide a table listing the data on a parameter-by-parameter, well-by-well or surface-water-location by surface-water-location basis using appropriate statistical methods. Include results of all field-measured parameters including elevations and/or depth to water. For sampling locations that were dry or ice, please note that information in the appropriate column rather than omitting the data altogether from the table. For concentrations below the minimum detection level, please report the data as “less than” and the PQL. Based on the data presented in the application, the staff cannot reconstruct this information with any degree of certainty to perform an independent, statistically valid basis. Furthermore, duplicate samples should be used only for QA/QC evaluations and should not be used for statistically evaluations.
16. Please provide the rationale or justification for only one location to establish the pre-operational groundwater quality of the Sundance/Unkpapa water-bearing zone. The staff notes that several wells are completed in the Sundance/Unkpapa aquifer; however, no samples were collected by the applicant. Spatial variations in water quality should be determined to establish a conceptual model for the aquifer. This information is especially important if the applicant proposes not to monitor the Sundance/Unkpapa aquifer as the lower aquifer. Is the Sundance/Unkpapa the underlying aquifer?
17. The heading in Table 2.7-3 implies that a parameter concentration exceeds a Maximum Contaminant Level even for those parameters that do not have an MCL. Please explain whether or not the applicant was referring to standards other than MCLs.
18. The applicant identified 48 subimpoundments in the application. The applicant did not provide summary data on the eight subimpoundments (Sub12 through Sub19). The staff cannot determine whether or not the subset of impoundments is representative of the 48 impoundments without that information. Please address this comment.
19. The analytical data includes results for the dissolved, suspended and total analyzed fractions of a constituent at one or more sampling events at a single location. The applicant did not discuss differences/relationships between the various fractions and at times appears to include more than one fraction in a statistical analysis. Please clarify the analytical results as discussed above.

20. The applicant includes surface impoundment Sub05 in the surface water monitoring program. However, sampling results for surface impoundment Sub05 are not presented in the application nor is the lack of results discussed. Please explain this lack of data.
21. On Page 2-195, the applicant indicates that water quality data were collected during the 2008 pumping test at additional wells listed in a table entitled "Additional Well Data"; however, the data are not presented in the application in either Appendix 2.7-G (Groundwater Quality Data), a table entitled "Additional Water Quality Data and Statistics by Well" in Appendix 2.7-I, or Appendix 2.7-B 2008 (Pumping Tests: Results and Analyses). Please address this discrepancy.
22. Please address discrepancies in the following data.
- Data for Well 2 in Appendix 2.7-G differ from the data for Well 2 in Appendix 2.7-I.
 - Data for Well 7 in Appendix 2.7-I list an additional sampling event from the data for Well 7 in Appendix 2.7-G.
23. The mean value for radon for well #18 is 5 pCi/L in Appendix 2.7-I; however, this mean is not consistent with the listed range in data values (762-1210 pCi/L). Please explain this apparent discrepancy.

Section 2.9 Background Radiological Characteristics

The applicant has not provided sufficient information regarding background radiological characteristics. Background radiological characterization is necessary to determine whether the applicant's future operations will affect human health and the environment. Specifically, the staff is requesting the following information.

1. Regulatory Guide 4.14 provides criteria for determining air particulate sampling locations. NRC staff cannot locate the applicant's criteria for determining air particulate sampling locations in section 2.9 of the TR. Consistent with Regulatory Guide 4.14 and NUREG-1569, Acceptance Criterion 2.9.3(1), provide the criteria used to establish air particulate sampling locations or indicate where this information can be found in the TR.
2. Regulatory Guide 4.14 recommends that filters for continuous air samples be changed weekly or more often as required by dust loading. In Section 2.9.6.1 of the TR, the applicant stated that filters were collected approximately bi-weekly, prior to saturation. Please provide information (e.g., operating procedures, test results, etc.) on how the applicant determined filter saturation.
3. Regulatory Guide 4.14 recommends that individual procedures should be prepared and used for specific methods of calibrating all sampling and measuring equipment to ensure that the equipment will operate with adequate accuracy and stability over

the range of intended use. For all air sampling equipment, please describe the procedures used by the applicant for the calibration of air sampling and measuring equipment consistent with Regulatory Guide 4.14 or indicate where this information can be found in the TR.

4. 10 CFR 40, Appendix A, Criterion 7, requires that a preoperational monitoring program be conducted at least one full year prior to any major site construction. The applicant stated in Appendix 2.9-A of the TR that air particulate sampling was performed for 351 days. Consistent with 10 CFR 40, Appendix A, Criterion 7, and Regulatory Guide 4.14 provide justification for not sampling air particulates for one full year.
5. Table 2.9-12 (Radionuclide Concentrations in Air) of the TR presents lower limit of detection LLD values for U-nat that are higher than what is recommended by Regulatory Guide 4.14. For those U-nat LLD values that are higher than the Regulatory Guide 4.14, value, please provide an analysis that the reported values are consistent with Regulatory Guide 4.14 or justification for providing alternate values.
6. In Section 2.9.6.1 of the TR, the applicant describes how laboratory data for air particulate monitoring results were converted from picocuries per filter composite to units of microcuries per milliliter. However, natural uranium (U-nat) results are reported as milligram per filter composite. Please demonstrate how the U-nat concentration in microcuries per milliliter was derived from the value in milligram per filter composite.
7. NRC staff notes that the air particulate monitoring collection time periods are not consistent in the main body of the TR (p. 2-358) and Appendix 2.9-A (P. 16) of the same report. Specifically, the beginning dates for period 1 and ending dates for period 2 are not the same. Please address this discrepancy in the collection dates.
8. NRC staff notes inconsistent language regarding the description of the monitoring duration. In the main body of the TR (p. 2-358) the applicant indicates "nearly continuously" while Appendix 2.9-A (page 16) of the same report indicates "continuously" and "nearly continuously." Please address these inconsistencies in the description of the monitoring duration.
9. On page 2-359 of the TR, the value listed for Th-230 is that of the derived airborne concentration from 10 CFR 20 Appendix B, Table 1, not the effluent concentration value as indicated. Please address this discrepancy.
10. Please clarify whether the "HV" designator in lab reports in Appendix 2.9-A of the TR (and Plate 2.5-1) are the same as "AMS" designators in Table 2.9-11 of the TR.
11. 10 CFR 40, Appendix A, Criterion 7, requires that a preoperational monitoring program be conducted to provide complete baseline data on a milling site and its environs. Regulatory Guide 4.14 recommends collecting food samples 3 km from mill site. NUREG-1569, Section 2.2.2, recommends assessing land use 3.3 km

from the site boundary. The applicant did not appear to assess land use at these distances in regards to food sampling. Consistent with Regulatory Guide 4.14 and NUREG-1569, Acceptance Criteria 2.2.3(1)(f) and 2.9.3(1), please provide an assessment of land use for food sampling.

12. Regulatory Guide 4.14 provides recommendations for the collection and analysis of crop samples raised within 3 km of the mill site. In Section 2.2.2 of the TR, the applicant only addressed crop production within the Permit Area. Consistent with Regulatory Guides 4.14 and 3.46, please provide the results of crop sample analyses or a justification for not collecting crop samples. In this response, please describe actions taken by the applicant to determine the agricultural use of adjacent lands, including vegetable gardens.
13. In Section 2.2.2 of the TR, the applicant has identified livestock, poultry, and their products but did not analyze and sample them as recommended in Regulatory Guide 4.14 Section 1.1.3, "Vegetation, Food and Fish Samples." Consistent with Regulatory Guides 4.14 and 3.46, please analyze and provide results for appropriate food samples. In this response, please describe actions taken by the applicant to determine the agricultural use of adjacent lands.
14. In Section 2.2.2 and 2.8.5.4.2 (pages 2-267) of the TR, the applicant identified game animals (pronghorn, wild turkey, etc) but these were not analyzed as recommended in Regulatory Guide 4.14. Consistent with Regulatory Guide 4.14, please provide results of game animal sample analyses or a justification for not collecting them.
15. In Section 2.2.2 of the TR, the applicant stated that hunting is currently open to the public on 5,689 acres within the Permit Area. The applicant also stated that prior to commencement of operations all hunting will be prohibited within the Permit Boundary. However, the applicant has not addressed how the applicant will prohibit hunting on public lands. Please provide this information.
16. The applicant collected three tissue samples, one liver and two meat samples, from one cow instead of one sample each from three different cows as recommended in Regulatory Guide 4.14. The applicant should provide the sample results of cows consistent with Regulatory Guide 4.14 or justification for not providing them.
17. Please address the following issues regarding Table 2.9-19 (page 2-378) of the TR and Table 10-1 in Appendix 2.9-A of the TR:
 - a. Reporting format is not consistent with Regulatory Guide 4.14, Section 7.5.
 - b. Lower Levels of Detection (LLD) are significantly higher than Regulatory Guide 4.14, Section 5, Recommendations.
 - c. The LLDs for meat are substantially different from each other.

18. Please clarify what types of vegetation were included in the vegetation sampling and state whether this includes forage samples.
19. In section 2.8.5.6.1.2.1 of the TR, the applicant has identified grazing areas within the Permit Area, but it is not clear that they were analyzed as recommended by Regulatory Guide 4.14. Please clarify if identified grazing areas were analyzed as recommended by Regulatory Guide 4.14.
20. On page 2-280 of the TR, the applicant states that fish sampling sites BVC04 and CHR05 can be identified on Plate 2.5-1. NRC staff could not locate these sites on Plate 2.5-1. However, these sites can be found on Figure 2.9-11 of the TR. Please correct this discrepancy in the TR.
21. Section 1.1.3 of Regulatory Guide 4.14 recommends that fish (if any) samples should be collected semiannually from any bodies of water that may be subject to seepage or surface drainage from potentially contaminated areas. Please confirm whether the applicant ruled out the presence of fish in all impoundments, and, if not, please provide the results of fish samples from those impoundments.
22. In Section 2.9.2.1.1 GPS based gamma survey transects were spaced at approximately 500 m intervals in the main project area and 100 m in the surface mine area (Page 2-308). The 500 m spacing does not appear to comport with RG 4.14 or with recently published data by Whicker, et. al (2008). According to this study, 100 m spacing represents approximately 14% ground coverage. It is also recommended that areas of interest receive 25%-100% ground coverage. The typical vehicle spacing for this is reported as 20-30 m (35%-45% coverage). Please provide technical justification for the 500 m spacing used by the applicant.
23. Consistent with Regulatory Guide 4.14, please describe the criteria, and basis for the criteria, used to determine the acceptability of the daily function tests performed on the sodium iodide detectors provided in Appendix 2.9-A of the TR. Using these criteria, please comment on the following specific examples and provide missing data where necessary.

Date	4410 Serial #	Efficiencies
9/14/07	PR118372	0.5% (6:50 am), 0.3% (8:20 pm, different configuration)
9/14/07	PR198936	0.64% (6:50 am, reported as 0.7%), 0.57% (8:30 pm)
7/18/08	PR198936	2 nd daily function check not recorded

24. Regulatory Guide 4.14 recommends that direct radiation measurements be made at sites chosen for air particulate samples. As discussed in RAI # 1 in this section, the applicant has not provided sufficient information to demonstrate that the placement of the air monitoring stations is consistent with RG 4.14. Therefore, there is not sufficient information to determine if the placement of TLDs at air monitoring stations is consistent with RG 4.14. Consistent with Regulatory Guide 4.14 and NUREG-1569, Acceptance Criterion 2.9.3(1), provide the criteria used to establish TLD monitoring locations or indicate where this information can be found in the TR.
25. NRC staff could not locate the laboratory reports for TLD results in the TR. Please provide this information or indicate where these can be found in the application.
26. Section 2.9.5.2.1 of the TR states that AMS-01 was monitored for 303 days. However, Table 2.9-10 in the TR and Table 9-1 in Appendix 2.9-A of the TR indicate that this station was monitored for only approximately 164 days. Please clarify and provide documentation for the monitoring period for AMS-01.
27. As the examples in the table below demonstrate, the ambient gamma dose rates provided in Table 2.9-10 in the TR indicate a significantly higher dose rate during the third time period (5/17/08 – 7/17/08) compared to the other measuring periods.

Station	Dose Rates (mrem/day)	
	2 nd Measurement Period	3 rd Measurement Period
AMS-01	0.36	0.96
AMS-06	0.35	0.85
AMS-BKG	0.39	0.975

- a. Please provide justification that a TLD monitoring period for less than one full year is consistent with 10 CFR 40, Appendix A, Criterion 7. Specifically, please demonstrate that complete baseline data, including expected variations in gamma dose rates, has been provided in accordance with 10 CFR 40, Appendix A, Criterion 7, and as recommended by Regulatory Guide 4.14.
- b. Referring to the above table, please update the discussion on ambient gamma dose rate monitoring, taking into account the variability of the data and the lack of data collected over an entire year.

- c. In Section 2.9.2.1.1 of the TR, it is stated that the applicant collected GPS-based gamma dose rate data during two different time periods: September 2007 and July 2008. Additional data was collected for the land application area from July 17-19, 2008. These time periods appear to have potentially significantly different background gamma dose rate attributes. It appears that the applicant combined the data from these different time periods without accounting for the variations in background. Please address the following:
- i) It is not clear which areas were surveyed during the July 14-16, 2008 timeframe. Please provide information on precisely which locations were surveyed and the corresponding dates.
 - ii) Considering the variations in expected gamma dose rates during different times of the year, please explain how the statistics for the GPS-based gamma ray surveys are affected by combining these different time periods. In your response, address the test for normality (and other types of distributions) of the data, transformations of the data, the identification of outliers, and the test for variance of the main permit area, the anomalous north area and the surface mine area.
 - iii) Considering the variations in expected gamma dose rates during the year, please explain how these variations will be taken into account when performing post reclamation and decommissioning radiological surveys to ensure appropriate action levels are established (e.g., that contamination above regulatory limits is detected).
28. In Section 2.9.5.2.1 of the TR, the applicant excludes AMS-02 when discussing exposure rates. Please provide justification for excluding this data point.
29. In Section 2.9.5.2.1 of the TR, the applicant presents the projected dose for AMS-03. It appears that the reported dose underestimates the true dose due to the fact that data was only collected during what appears to be the minimum dose rate time period. Provide technical justification that the projected dose for AMS-03 is a valid estimate of the actual dose at this monitoring station.
30. In Section 2.9.2.2.1 of the TR and Section 3.2 of Appendix 2.9-A of the TR, the applicant discusses outliers in the gamma-ray count rate data. Regarding the identification of outliers, NRC staff has consulted the statistical reference cited by the applicant (Ott and Longnecker 2001) and has not found justification for using the interquartile range (IQR) method as a sole means of proving outliers. According to Ott and Longnecker (2001, p. 86), "...the IQR does not provide sufficient useful information about a single set of measurements, but can be quite useful when comparing the variabilities of two or more data sets." This approach is consistent with other statistical sources (e.g., NIST 2006). Further, in their discussion of boxplots, Ott and Longnecker (2001, p. 100) recommend carefully examining and checking the extreme values of the measurement. Lastly, NIST (2006) discusses

nonnormal distributions that may be expected to have extreme values at larger rates than for a normal distribution. One example is the Cauchy distribution.

Please provide the following:

- a. Documentation for all statistical analyses (histograms, data transformations, etc.) performed on the GPS-based gamma surveys, including outputs from statistical software packages, or indicate where these can be found in the application.
 - b. Justification for utilizing the IQR as the sole means of proving outliers.
31. In Section 2.9.2.2.1 of the TR and Section 3.2 of Appendix 2.9-A of the TR, the applicant discusses outliers in the gamma-ray count rate data. Please provide the following information:
- a. Discuss how these outliers were treated in the statistical analysis of gamma-ray count rates.
 - b. If outliers were rejected from the final data set, please describe any investigations performed by the applicant to determine the cause of the outlying observations. Specifically, the applicant should demonstrate that the outlying data is either an extreme manifestation of the random variability inherent in the data or that it is the result of gross deviation from prescribed experimental procedure or error in calculating or recording the numerical value (ASTM 2002).
32. Please provide the following information related to the predicted site-wide exposure rates discussed in Section 2.9.2.2.2 of the TR:
- a. Input parameters to, and results obtained from, ArcView GIS.
 - b. A description of the ArcView GIS interpolation scheme used, including the parameters to control how the scheme is applied.
 - c. Error estimates of the data presented in Figure 2.9-6, Predicted Site-Wide Exposure Rates, Grid Block Averages, in the TR.
33. Regulatory Guide 4.14 recommends an LLD of $2\text{E-}7$ $\mu\text{Ci/g}$ for Pb-210 in soil. However, in Sections 2.9.3.2.1 of the TR and 4.6.2 of Appendix 2.9-A of the TR, the applicant reported that the LLD for Pb-210 in the LAN (land application area north (Dewey)) and LAS (land application south (Burdock)) soil samples ranged from $1.9\text{E-}6$ to $3.8\text{E-}6$ $\mu\text{Ci/g}$. The applicant also reported that all values were below their LLDs. The applicant recognized that guidance was not followed but did not provide a justification for the different LLDs. Please demonstrate that the reported data is consistent with Regulatory Guide 4.14 or justification for a higher LLD for Pb-210 in soil.

34. Regarding soil sample collection, the applicant stated in Section 2.9.3.1.1 of the TR that NUREG-1569 suggests the collection of samples at 0 to 15 cm. The applicant recognized the 0 to 5 cm collection depth specified in Regulatory Guide 4.14 and chose to collect surface soil samples at 0 to 15 cm. However, NUREG-1569 (Acceptance Criterion 2.9.3(2)) recommends that soil sampling be conducted at both a 5-cm (2-inch) depth as described in Regulatory Guide 4.14 and 15-cm (6-inch) for background decommissioning data. Please provide data that is consistent with Regulatory Guide 4.14 and NUREG-1569 or justification for an alternate methodology.
35. Regarding the Ra-226 soil sampling results, please provide the following information:
- a. Documentation for all statistical analyses (histograms, data transformations, calculated p-values, etc.) performed on the Ra-226 soil sampling results, including outputs from statistical software packages, or indicate where these can be found in the application.
 - b. Justification for utilizing the IQR as the sole means of proving outliers. See related RAI regarding Direct Radiation given above for further explanation.
 - c. For outliers that were rejected from the final data set, please describe any investigations performed by the applicant to determine the cause of the outlying observations. Specifically, the applicant should demonstrate that the outlying data is either an extreme manifestation of the random variability inherent in the data, or that it is the result of gross deviation from prescribed experimental procedure or error in calculating or recording the numerical value (ASTM 2002).
36. Regarding the soil sampling strategy described in section 2.9.3.1.1 of the TR, please provide input parameters to, and results obtained from, Visual Sampling Plan.
37. The following questions pertain to the analytical methods described in 2.9.3.1.1 of the TR:
- a. Consistent with Regulatory Guide 4.14, please provide the references for procedures used to convert the soil samples to a water matrix in order for the Environmental Protection Agency (EPA) drinking water testing methods to be used.
 - b. NRC staff cannot verify that analytical method 909.0M is included in the EPA document Prescribed Procedures for Measurement of Radioactivity in Drinking Water (EPA-600/4-80-032), 1980. Consistent with Regulatory Guide 4.14, please indicate where this analytical method can be found in the EPA document and a justification for its use.

- c. The applicant indicates that Method 6020A of EPA Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods (SW-846) was used for analyzing natural uranium in soil samples. Section 1.2 of Method 6020A of SW-846 does not specifically list uranium as an acceptable analyte for inductively coupled plasma-mass spectrometry (ICP-MS). Consistent with Regulatory Guide 4.14, please provide the demonstration of performance discussed in Section 1.3 of Method 6020A of SW-846 as it applies to uranium in the matrix evaluated.
 - d. Laboratory analytical reports for Ra-226 soil sample analyses are located in Appendix 2.9-A of the TR. It is not clear what type of gamma analysis was performed on the soil samples to determine the Ra-226 concentration. For example, the testing method for sample R07100004-003 (SMA-B03) is annotated as "Gross Gamma" on the Analytical Summary Report, but the results are listed as "Ra-226 Gamma" on the Laboratory Analytical Report. Consistent with Regulatory Guide 4.14, please provide laboratory documentation that specifies the photopeak energies used to determine the Ra-226 activity of the soil samples as reported in the Laboratory Analytical Report.
38. The following questions pertain to deriving the gamma-ray count rate-soil Ra-226 correlation:
- a. Considering the variations in expected gamma dose rates during different times of the year, please explain how combining gamma surveys performed at different times during the year affect the statistics for deriving the gamma-ray count rate-soil Ra-226 correlation and the predicted Ra-226 concentrations over the Permit Area.
 - b. In Section 2.9.2.2.3, the applicant stated that the linear regression formula for the gamma-ray count rate-soil Ra-226 correlation, after removing five outliers, is $\text{Radium-226} = 1.9 \times 10^{-4} \times \text{Gamma-Ray Count Rate} - 1.04$, where the radium-226 concentration is in pCi/g and the gamma-ray count rate is in gross cpm. The applicant also stated in Section 5 of Appendix 2.9-A of the TR that this model has an R^2 (coefficient of determination) value of 0.43, denoting a poor fit. NRC staff agrees with this assessment. In addition, work done by the authors previously cited by the applicant (Ott and Longnecker 2001) indicate that, based on this model, the gamma count rate is not a good indicator of Ra-226 concentration in soil. Please provide justification for utilizing a regression model that exhibits such a "poor fit" to predict Ra-226 concentrations in the Permit Area.
39. The following questions pertain to the gamma/Ra-226 correlation grids discussed in Section 2.9.2.1.3 of the TR:
- a. Please provide input parameters and results obtained from ArcView GIS.

- b. Please provide a description of the ArcView GIS interpolation scheme used, including the parameters to control how the scheme is applied.
 - c. Please provide error estimates of the data presented in Figure 2.9-7, Predicted Site-Wide Radium-226 Concentrations, Grid Block Averages, in the TR. In the response, include a discussion of the various sources of error (e.g., seasonal variability in gamma dose rates, using a regression model with an R^2 (coefficient of determination) value of 0.43, etc.)
40. In Section 2.9.3 of the TR, the applicant describes its soil sampling program. Figures 2.9-9 and 2.9-10 of the TR provide sampling locations from the main Permit Area and land application areas respectively. Table 2.9-5 of the TR provides radionuclide concentrations for all soil samples. Comparing the aforementioned soil sampling data with Supplemental Exhibit 3.1-2, Proposed Facilities and Well Fields Land Application Option, NRC staff has the following questions to understand site-wide radiological variations in areas expected to be impacted by operations and evaluating compliance with 10 CFR 40, Appendix A, Criterion 7.
- a. Please demonstrate that a sufficient number of samples have been obtained in the Dewey area. It appears that very few radium samples have been obtained in the proposed area of the satellite processing plant and wellfield that could be impacted by operations. It also appears that no uranium or Th-230 samples were obtained in areas that could be impacted by operations.
 - b. Please demonstrate that a sufficient number of samples have been obtained in the Burdock area. While the applicant took more total samples in this area, it is not clear how many are in the area expected to be impacted by the central processing plant and the wellfield. In addition, it appears that very few uranium and Th-230 samples were obtained in these areas.
 - c. There appears to be no soil sampling data for the area between Dewey and Burdock. Please demonstrate that sufficient information has been obtained on the background soil levels to characterize expected transportation routes between these areas.
41. NRC staff notes that in section 2.9.4.3 (page 2-349) the applicant refers to PSC02 as the downstream location of Pass Creek. This is not consistent with Table 2.7-20 (page. 2-185) that refers to PSC02 as the upstream location of Pass Creek. Please address this inconsistency.
42. The staff could not locate laboratory reports for sediment samples. Please provide these reports or specify where these can be found in the application.
43. 10 CFR 40, Appendix A, Criterion 7, requires a preoperational monitoring program to provide complete baseline data on a milling site and its environs. RG 4.14 provides guidance on surface water sampling, including impoundments and surface waters passing through the mill site. Regarding the applicant's preoperational surface water monitoring program, please address the following issues.

- a. In Section 2.7.3.1 of the TR, the applicant identified 48 surface water impoundments. In Section 2.7.3.1 of the TR the applicant stated that it chose surface water sampling locations based on Regulatory Guide 4.14. However, the applicant only sampled a “representative” number of impoundments resulting in including only 11 impoundments in its preoperational surface water monitoring program as shown on Table 2.7-20 of the TR.
- b. It appears that the applicant also used this “representative” approach with other surface water features as well. For example, grid 14 on Plate 2.5-1 appears to have three separate drainages exiting the Permit Area, yet they were not sampled.

For these issues, the applicant should analyze all surface water features in accordance with Regulatory Guide 4.14 criteria, including offsite water features that could be impacted from operations, or provide a justification for an alternate methodology that complies with 10 CFR 40, Appendix A, Criterion 7.

- 44. The NRC staff could not locate BVC04, CHR05, and BEN01 on Plate 2.5-1 of the TR as stated by the applicant, but they are listed in Table 2.7-20. Please provide the locations of the above monitoring stations on Plate 2.5-1 of the TR or correct the text to incorporate the correct reference.
- 45. The staff could not locate PSC01 on Plate 2.5-1 of the TR. However there is a PS-1 sampling location. Please verify whether these two monitoring stations are the same or not.
- 46. Regulatory Guide 4.14 recommends sampling at the site boundary or at a location immediately downstream of the area of potential influence. BVC01 (Beaver Creek downstream) and UNT01 (Unnamed Tributary) do not appear to comport with this recommendation. Please demonstrate that these sampling sites are consistent with Regulatory Guide 4.14.
- 47. The NRC staff did not find data for Pb-210 and Po-210 (Appendix 2.7-F) for sampling locations PSC01 and UNT01. Please provide the data or a justification of why the current data set is consistent with Regulatory Guide 4.14.
- 48. The NRC staff noted missing monthly data for Ra-226, Th-230 and uranium for sampling location BVC01. Please provide the data or a justification of why the current data set is consistent with Regulatory Guide 4.14.
- 49. NRC staff could not locate quarterly or semiannual sample results for several of the impoundments. Examples by impoundment locations are given below.
 - SUB01 – missing quarterly samples for Ra-226, Th-230 and uranium, missing semiannual samples for Pb-210, Po-210.

- SUB03 - missing quarterly samples for Ra-226, Th-230 and uranium.
- SUB04 - missing quarterly samples for Ra-226, Th-230 and uranium.
- SUB05 – missing all sampling data.
- SUB06 - missing quarterly sample for Ra-226 (dissolved).
- SUB08 - missing quarterly samples for Ra-226 (dissolved).
- SUB09 - missing quarterly samples for Ra-226, Th-230 and uranium, missing semiannual data for Po-21, Pb-210.
- SUB10 - missing quarterly samples for Ra-226, Th-230 and uranium, missing semiannual data for Po-21, Pb-210.
- SUB11 - missing quarterly samples for Ra-226 (dissolved).

Please review all data submitted for impoundments and provide missing data or a justification of why the current data set is consistent with Regulatory Guide 4.14.

50. Consistent with Regulatory Guide 4.14, provide the value of the Lower Limit of Detection (LLD) along with a description of the calculation of the LLD for surface water measurements.

References for Section 2

Whicker, R, et. al., Radiological Site Characterizations: Gamma Surveys, Gamma/Ra-226 Correlations, and Related Spatial Analysis Techniques, Operational Radiation Safety, Vol. 95, No. 5, November 2008.

Ott, R.E., Longnecker, M., An Introduction to Statistical Methods and Data Analysis, 5th ed., M. Duxbury Learning, Pacific Grove, CA 2001.

NIST/SEMATECH e-Handbook of Statistical Methods,
<http://www.itl.nist.gov/div898/handbook/5/1/2006>.

ASTM Standard E 178 – 02, Standard Practice for Dealing With Outlying Observations, published July 2002.

Section 3.1 ISR Process and Equipment

1. The applicant provides only a general commitment to have instrumentation, alarms and controls to monitor production, injection and waste flows. Description of the instrumentation, alarms and controls are inadequate to allow the staff to understand how the applicant will ensure safe operations and timely detection of releases or spills. Please provide a more in-depth description of the instrumentation, alarms and controls to ensure timely detection of any unanticipated release or spill, and frequency of inspection of these and other items included in spill prevention SOP(s).
2. The applicant reports that the depth to mineralized zones primarily in the eastern portions of the proposed licensed area may be less than 100 feet with a saturated thickness significantly less. Operations performed under unconfined conditions and/or limited potentiometric head differ from those performed under confined conditions. The applicant has not provided sufficient information to allow the staff to

assess the manner in which ISR under unconfined conditions or limited potentiometric head will affect operations. Please provide information that demonstrates the effects of such hydraulic conditions on the proposed operations.

3. The applicant's general schedule did not provide a timetable for restoration of individual wellfields. This detailed information as well as other information such as the requirement for NRC notification of the termination of principal activities or an alternate schedule, needs to be included in the TR consistent with Section 3.1.1(4) of NUREG-1569 and in accordance with requirements of 10 CFR 40.42. Please address this comment.
4. Experience with existing ISR facilities has shown that a facility may delay restoration after the end of production. However, during any restoration delay, the hydraulic control for a wellfield must be maintained. Therefore, please include information regarding the manner in which hydraulic control will be maintained throughout the life of a wellfield, from the first injection of lixiviant to the end of restoration.
5. On Page 3-14, the applicant uses the term "leachate" in lieu of "lixiviant." Please include a definition of leachate if it is to be used in the TR.
6. On Supplemental Exhibit 3.1-1, it is difficult to distinguish several features including the black lines (Fault or PAA Boundary) or blue Lines (Perennial and Ephemeral Streams). Please modify the exhibit accordingly.
7. The total pond area, as shown on Supplemental Exhibit 3.1-2, is 84 acres and the total land application area is 720 acres. The pond area is similar in extent to that discussed in the narrative; however, the land application area differs from the 875 acres discussed in the narrative. Please clarify this apparent discrepancy.
8. On Supplemental Exhibit 3.1-4, various land application areas overlap outlines of two future mine units. Please confirm the location of the land application areas. If the land application areas overlap proposed wellfields, please provide further information regarding the manner in which both the wellfield and land application areas will be operated.
9. The application did not include a water balance diagram consistent with the guidance in Section 3.1.2 of NUREG-1569. Please provide a water balance diagram.

Section 4.0 EFFLUENT CONTROL SYSTEMS

The applicant did not provide sufficient information to assess the effluent control systems for the proposed facilities. Information regarding the workplace ventilation, radiation monitoring, effluent composition, liquid and solid wastes is necessary to allow the staff to assess the manner in which the applicant is protecting public health and the environment. Please provide the following information:

Section 4.1 Gaseous and Airborne Particulates

The applicant has not provided sufficient information regarding gaseous and airborne particulate effluent control systems. Specifically, the following information should be provided.

1. In Section 4.1.1, the applicant states that exhausting radon gas outside the plant minimizes employee airborne exposure. Please evaluate the following scenarios under your As Low As Is Reasonably Achievable (ALARA) program that will address the requirements of 10 CFR 40, Appendix A, Criterion 8, and 10 CFR 20.1101(b) and the recommendations in NUREG-1569, Acceptance Criterion 4.1.3(5).
 - a. Please provide an analysis that includes exposure to employees in areas outside the plant.
 - b. During favorable weather conditions, how will open doorways and convection vents affect radon effluent airflow and employee exposure both inside and outside the plant?
2. In Section 4.1.2.2 of the TR, the applicant describes the discharge for the yellowcake drying and packaging system but does not specify where this effluent will discharge. Please specify the discharge location(s) for the yellowcake drying and packaging system.
3. Regulatory Guide 8.30 recommends performing ventilation surveys on a routine basis. Please provide details of a ventilation survey program consistent with Regulatory Guide 8.30 or justification for an alternate program.
4. Consistent with Regulatory Guide 8.31 and NUREG-1569, Acceptance Criterion 4.1.3(5), demonstrate that radon exhaust vents will be located in a way that ensures compliance with the requirements of 10 CFR 20.1302.
5. Consistent with NUREG-1569, Acceptance Criterion 4.1.3(4), evaluate the applicant's effluent control systems under accident conditions and identify any health and safety impacts of system failures and identify contingencies for such occurrences.

SECTION 5.0 OPERATIONS

The applicant has not provided sufficient information to assess all the necessary organizational and safety aspects of the operations. Additional information regarding the organization, training and radiation safety is requested to allow staff to adequately understand and assess the applicant's operations. Please provide the following information:

Section 5.2 Management Control Program

1. In Section 5.2.6 of the TR, the applicant discusses its reporting program to satisfy 10 CFR 20.2202. However, it does not appear that the applicant addressed other reporting requirements in 10 CFR 20, Subpart M, as recommended in NUREG-1569, Acceptance Criterion 5.2.3(1). For example, 10 CFR 20.2203(a)(2) addresses reporting requirements for doses found to be in excess of regulatory limits. In addition, 10 CFR 40.60(b)(3) addresses medical treatment at a “medical” facility, not “outside” facility as stated in Section 5.2.6 of the TR. Please provide a reporting program that is consistent with NUREG-1569, Acceptance Criterion 5.2.3(1).
2. Consistent with NUREG-1569, Acceptance Criteria 5.2.3(13), please include a Land Use Survey in your discussion of the information required to be submitted annually to NRC.
3. Consistent with NUREG-1569, Acceptance Criteria 5.2.3(6), please include a commitment to administer a cultural resources inventory before engaging in any development activity not previously assessed by NRC, and that any disturbances associated with such development will be completed in compliance with the National Historic Preservation Act, the Archeological Resources Protection Act, and their implementing regulations.
4. On page 5-7 of the TR it is stated that “Records of inspections of tailings piles and waste retention systems” will be maintained. Please clarify if there will be tailings piles on the site.

Section 5.3 Management and Audit Program

1. ALARA requirements relevant to ISR facilities are codified in 10 CFR 20.1101 and 10 CFR 40, Appendix A, Criterion 8. Please address the following issues related to the applicant’s ALARA program.
 - a. 10 CFR 20.1101(b) specifically addresses dose to members of the public. In Section 5.3.4 of the TR, the applicant does not discuss ALARA measures as it apply to members of the public. Consistent with the regulatory citations above and Regulatory Guide 8.37, please provide additional discussion on the applicant’s ALARA program. This discussion should address ALARA goals and reviews related to members of the public.
 - b. Consistent with Regulatory Guides 8.10 and 8.31, please provide additional information on the applicant’s occupational exposure ALARA program. The discussion should evaluate its proposed management and audit program and specifically address those items in Section 1.1, Licensee Management, of Regulatory Guide 8.31 and regulatory position C(1) of Regulatory Guide 8.10 that are not currently addressed in the application.

Section 5.5 Radiation Safety Training

1. Consistent with Regulatory Guide 8.13 and NUREG-1569, Acceptance Criteria 5.5.3(2), please provide the applicant's specific policy on declared pregnant women.
2. Consistent with Regulatory Guide 8.31 and NUREG-1569, Acceptance Criteria 5.5.3(1), please provide a proposed training program that includes nonradiological hazards for workers.
3. Consistent with Regulatory Guide 3.46, please provide a copy of the proposed written radiological safety instructions in conformance with 10 CFR 19.12.

Section 5.7.2 External Radiation Exposure Monitoring Program

1. 10 CFR 20.1501(a)(2)(i) states that the licensee shall make or cause to be made surveys that are reasonable under the circumstances to evaluate the magnitude and extent of radiation levels. In section 5.7.2 of the TR, the applicant has not discussed the potential situation when the dose exceeds 5 mrem in 1 hour at 30 cm from a radiation source, or any surface that the radiation penetrates, and whether it will have sufficient instrumentation to measure gamma dose rates in excess of 5 mrem per hour. Consistent with Regulatory Guide 3.46 and NUREG-1569, Acceptance Criterion 5.7.2.3(3), provide a description of survey instrumentation sufficient to measure expected gamma dose rates during operation.
2. Regulatory Guide 8.30 recommends establishing action levels for gamma dose rates and dosimeter results. Consistent with Regulatory Guide 8.30, please provide these action levels or justification for an alternate program.
3. Consistent with NUREG-1569, Acceptance Criterion 5.7.2.3(2) and Regulatory Guide 8.34, discuss the applicant's employee monitoring program as it relates to individuals entering a high radiation area.
4. Regulatory Guide 3.46 recommends indicating the number and category of personnel that will be included in the external radiation monitoring program. Please provide this information or justification for not including it in the application.
5. Section 5.7.2.1 refers to Figure 5.7-1 for the locations of fixed radiation exposure measurements at the Dewey-Burdock facility. However, Figure 5.7-1 depicts the proposed operational environmental monitoring sites. Please provide the correct figure reference(s).

Section 5.7.3 In-Plant Airborne Radiation Monitoring Program

1. In Section 5.7.3.1 of the TR, the applicant described proposed radon monitoring locations based upon expected radon decay product concentrations. Figures 5.7-6 to 5.7-9 show these locations at the satellite and central processing facilities. However, it is not clear if/how the applicant will evaluate if these proposed locations remain appropriate once operations have started and throughout the operational

lifetime of the facilities. Regulatory guides 3.46, 8.25, and 8.30 provide recommendations regarding the location of air samplers. Please address the following in regards to radon decay product monitoring:

- a. Consistent with Regulatory Guide 8.25, please describe how airflow patterns will be established within the facilities and will they be verified throughout the operational lifetime of the facilities.
 - b. Consistent with Regulatory Guide 8.25, please describe how air sampling locations will be evaluated over time to confirm that their locations are still appropriate.
 - c. Consistent with Regulatory Guide 8.30, please provide a description of your air sampling program during the first year of operations to ensure that the proposed program adequately provides measurements of the concentrations representative of the concentrations to which workers are exposed.
2. Consistent with NUREG-1569, Acceptance Criterion 5.7.3.3(2) and Regulatory Guide 8.30, specify the LLD for radon daughter measurements.
3. In Section 5.7.3.2 of the TR, the applicant described the proposed airborne particulate monitoring program. Regulatory Guides 3.46, 8.25, and 8.30 provide recommendations regarding the location of air samplers. Please address the following in regards to airborne particulate monitoring:
 - a. Consistent with NUREG-1569, Acceptance Criterion 5.7.3(1), please provide facility drawings that depict the facility layout and the location of samplers for airborne particulates.
 - b. Consistent with Regulatory Guide 8.25, please describe how airflow patterns will be established within the facilities and will they be verified throughout the operational lifetime of the facilities?
 - c. Consistent with Regulatory Guide 8.25, please describe how air sampling locations will be evaluated over time to confirm that their locations are still appropriate.
 - d. Consistent with Regulatory Guide 8.30, please provide a description of the applicant's air sampling program during the first year of operations to ensure that the proposed program adequately provides measurements of the concentrations representative of the concentrations to which workers are exposed.
 - e. Consistent with Regulatory Guide 8.30, please provide a description of the applicant's air sampling program for areas not designated as airborne radioactivity areas.

4. In Section 5.7.3.2 of the TR, the applicant proposed a formula for calculating the lower limit of detection (LLD) for particulate air samples based on the formula for minimum detectable activity (MDA) in Regulatory Guide 8.25. However, recommendations for LLD are specified in Regulatory Guide 8.30 and are based on a different formula (see Appendix B of Regulatory Guide 8.30). Please provide an LLD formula that is consistent with Regulatory Guide 8.30 or a technical justification for an alternate methodology.
5. Regulatory Guide 8.30 recommends establishing an action level for each sampling location that will result in an investigation of the cause of the elevated concentration. Consistent with Regulatory Guide 8.30, please provide action for each sampling location or justification for an alternate program.
6. In Sections 4.1.2 and 5.7.3.2 of the TR, the applicant states that yellowcake produced at the facility should be considered “soluble” with respect to occupational radiation exposure based on footnotes in 10 CFR 20, Appendix B. NRC staff is unaware of any footnotes making this statement. This terminology is outdated and is no longer relevant to 10 CFR 20, Appendix B, occupational radiation exposure limits. It also appears to be inconsistent with NRC guidance given at the November 2009 uranium recovery workshop held in Denver, CO (ML093510162). In regards to the applicant’s airborne particulate monitoring program, please provide the following information:
 - a. Provide a specific reference in 10 CFR 20 that describes hydrogen peroxide precipitated yellowcake as “soluble” for radiation protection purposes.
 - b. Regarding the determination of the inhalation classification of yellowcake produced at the Dewey-Burdock facility, provide an air particulate monitoring program consistent with guidance given at the November 2009 uranium recovery workshop held in Denver, CO (ML093510162) or a technical justification for an alternate methodology.
7. In Section 5.7.3.2 of the TR, the applicant described its monitoring program for determining compliance with 10 CFR 20.1201(e) (weekly soluble uranium intake). However, it is not clear how the applicant’s ALARA program will be applied to this limit. Please provide the ALARA goal for uranium intake.
8. The applicant did not demonstrate that respiratory protection will be routinely used for operations within drying and packaging areas and did not identify the criteria for determining when respirators will be required for special jobs emergency or situations. Consistent with NUREG-1569, Acceptance Criterion 5.7.3(6), please evaluate the applicant’s respiratory program and provide this information.

Section 5.7.4 Exposure Calculations

1. In Section 5.7.4.2 of the TR, the applicant has not provided sufficient information regarding the internal dose calculation. Please provide the following information:

- a. Consistent with Regulatory Guide 3.46 and NUREG-1569, Acceptance Criterion 5.7.4.3(1), provide methodologies to calculate the intake of natural uranium by personnel in work areas where airborne radioactive materials could exist.
 - b. Consistent with Regulatory Guide 3.46 and NUREG-1569, Acceptance Criterion 5.7.4.3(5), provide exposure calculations for natural uranium for routine operations, non-routine operations, maintenance, and cleanup activities that are consistent with NRC Regulatory Guides 8.30 and 8.34.
 - c. Consistent with NUREG-1569, Acceptance Criterion 5.7.4.3(6), discuss parameters used in exposure calculations for radon daughters and natural uranium to ensure they are representative of conditions at the site by taking in to account the maximum production capacity.
2. In Section 5.7.4.2 of the TR, the applicant did not appear to address the possibility of various radionuclides that may be present in air. According to 10 CFR 20.1204(f), if the identity of each radionuclide in a mixture is known, but the concentration of one or more of the radionuclides in the mixture is not known, the DAC for the mixture must be the most restrictive DAC of any radionuclide in the mixture. Please demonstrate how exposure calculations will take into account the possibility of a mixture of radionuclides in air.
 3. According to 10 CFR 20.1201(e), in addition to the annual dose limits the licensee shall limit the soluble uranium intake by an individual to 10 milligrams in a week in consideration of chemical toxicity. The applicant has mentioned this in the TR but still needs to describe how it will monitor and keep records of this requirement.
 4. NUREG-1569, Acceptance Criterion 5.7.4.3(4) recommends that guidance for prenatal radiation exposure be consistent with Regulatory Guide 8.13. Please provide a description of the applicant's prenatal radiation exposure program that is consistent with Regulatory Guide 8.13.
 5. NUREG-1569, Acceptance Criterion 5.7.4.3(8) recommends that all reporting and record keeping of worker doses is done in conformance with Regulatory Guide 8.7 and 10 CFR 20.2103. Please provide a description of the applicant's reporting and record keeping of worker doses that is consistent with Regulatory Guide 8.7 and in conformance with 10 CFR 20.2103 or provide the location for this information in the TR.
 6. NUREG-1569, Acceptance Criterion 5.7.4.3(7) recommends providing an estimate of airborne uranium concentrations that addresses the maximum production capacity requested in the application and the anticipated efficiencies of airborne particulate control systems discussed in the TR. The staff is unable able to locate this information within the TR; therefore, please provide it to the staff.

Section 5.7.5 Bioassay Program

1. In Section 5.7.5 of the TR, the applicant has not specified the inhalation class for airborne uranium that will be used to evaluate the bioassay program. Regulatory Guide 8.22 recommends that for exposures to Class W or Y materials alone, in vivo lung counts or alternate sampling times and action levels should be considered. Without a technical justification of the inhalation class for the uranium that could be encountered during operations, NRC staff cannot conclude that performing urinalysis alone is consistent with Regulatory Guide 8.22. Please provide a technical justification for relying on urinalysis as a primary bioassay technique.
2. Consistent with Regulatory Guide 8.9 and NUREG-1569, Acceptance Criterion 5.7.5.3(1), please demonstrate the manner in which an uptake will be converted to a dose assigned to the individual for compliance with 10 CFR 20 Subpart C.
3. Consistent with NUREG-1569, Acceptance Criterion 5.7.5.3(2), and Regulatory Guide 3.46, the number and category of personnel involved in the bioassay program should be identified in the application. Please provide this information or indicate where it can be found in the application.
4. Consistent with Regulatory Guide 8.22 and NUREG-1569, Acceptance Criterion 5.7.5.3(1), the applicant should specify the actions that will be taken when positive bioassay results are confirmed.
5. NUREG-1569, Acceptance Criterion 5.7.5.3(5) recommends that all reporting and record keeping be done in conformance with 10 CFR 20, Subpart L and Subpart M. Please provide a description of the applicant's reporting and record keeping that is in conformance with 10 CFR Subpart L and Subpart M or provide the location in the TR where this can be found.

Section 5.7.6 Contamination Control Program

1. In Sections 5.7.2.3 and 5.7.6.3 of the TR, the applicant addressed beta-gamma monitoring but did not address beta-gamma contamination monitoring for personnel. Please provide details on limits and action levels for personnel with beta-gamma contamination.
2. In Section 5.7.6.2 of the TR, the applicant refers to personnel contamination as "surface" contamination. Please clarify that personnel will be monitored for skin and clothing contamination.
3. In Section 5.7.6.2 of the TR, the applicant states those actions to be followed for personnel with skin and clothing contamination levels detected above background. Please provide information on who will conduct skin decontaminations and who will verify that background levels have been achieved after contamination has been detected.

4. In Section 5.7.6 of the TR, the applicant states that work will be restricted in areas where "uranium work" is performed with surface contamination levels above those specified. Please clarify whether areas will be classified as restricted based on surface contamination levels alone or if certain types of work will dictate what constitutes a restricted area. If it is the type of work, please specify what constitutes "uranium work."
5. The applicant addressed beta-gamma contamination monitoring for equipment but did not address beta-gamma contamination monitoring for area surveys. Please provide details on limits and action levels for areas with beta-gamma contamination.
6. Consistent with Regulatory Guide 8.31, specify the staff that will perform the surveys of items leaving the restricted areas.
7. Consistent with NUREG-1569, Acceptance Criterion 5.7.6.3(5), please describe the applicant's reporting and record keeping program related to its contamination control program or indicate where this can be found in the application.
8. Consistent with NUREG-1569, Acceptance Criterion 5.7.6.3(6), please describe the applicant's approach for applying covering material to contaminated surfaces.
9. Consistent with NUREG-1569, Acceptance Criterion 5.7.6.3(7), please describe the applicant's procedures for determining the radioactivity of interior surfaces of pipes, drain lines, duct work or similar items.

Section 5.7.7 Airborne Effluent and Environmental Monitoring Program

1. In its discussion of radon stacks in Section 4.1.1 of the TR, the applicant stated that it will routinely sample potential release points for radon daughters to assure that concentrations of radon and daughters are maintained ALARA. Please address the following issues related to this statement.
 - a. Please describe the frequency of sampling of radon stacks.
 - b. Consistent with Regulatory Guides 8.31 and 8.37 and NUREG-1569, Acceptance Criterion 4.1.3(5), please discuss the manner in which concentrations of radon and daughters will be determined to be ALARA under the applicant's radiation protection program.
2. The applicant shows the air particulate sampling locations in Figure 5.7-10 of the TR. As discussed in previous comments (See Sections 2.5 and 2.9), the applicant did not provide an annual wind rose or address the criteria in Regulatory Guide 4.14 relating to air sampling locations. Please provide sufficient data for NRC staff to evaluate the placement of operational air particulate and radon sampling stations.
3. In Section 5.7.7.1 of the TR, the applicant stated that the filters from air samplers operating continuously will be analyzed quarterly for natural uranium, thorium-230,

radium-226, and lead-210. Regulatory Guide 4.14 recommends a weekly filter change, or more frequently as required by dust loading and analysis of quarterly composite of the weekly sample. Please explain the manner in which the applicant's air sampling procedures are consistent with Regulatory Guide 4.14 and NUREG-1569, Acceptance Criterion 5.7.7.3(1).

4. Consistent with Regulatory Guide 4.14, operational air sampling locations should be the same as those for preoperational air samples. Please provide information that confirms that placement of operational air sampling locations is consistent with Regulatory Guide 4.14 or justification for an alternate methodology.
5. Regulatory Guide 4.14, Table 2, suggests that radon sampling be conducted at five or more locations using the same locations as stated for air particulate sampling. Please provide information that confirms that placement of operational air sampling locations is consistent with Regulatory Guide 4.14 or justification for an alternate methodology.
6. In Section 5.7.7.1 of the TR, the applicant stated passive track-etch detectors will be deployed at each station for monitoring radon-222 on a quarterly basis. Regulatory Guide 4.14 recommends analysis for Rn-222 on a monthly basis. Please explain the manner in which the applicant's radon sampling procedures are consistent with Regulatory Guide 4.14 and NUREG-1569, Acceptance Criterion 5.7.7.3(1) .
7. Figure 5.7-10 does not indicate locations of radon monitors. Consistent with Regulatory Guide 4.14 and NUREG-1569, Acceptance Criterion 5.7.7.3(2), please provide this information.
8. As discussed above, NRC staff does not have enough data to fully evaluate the placement of the air particulate samplers consistent with Regulatory Guide 4.14. Since Regulatory Guide 4.14 recommends annual soil sampling at the air monitoring station locations, staff is requesting additional information to evaluate the proposed soil sampling locations described in 5.7.7.3 of the TR. Please provide information that confirms that placement of operational air sampling locations is consistent with Regulatory Guide 4.14 or justification for an alternate methodology.
9. Regulatory Guide 4.14 provides recommendations for collecting and analyzing sediment samples during operations. The applicant did not discuss sediment sampling during operations in Section 5.7.7 of the TR. Consistent with Regulatory Guide 4.14 and NUREG-1569, Acceptance Criterion 5.7.7.3(1), provide an operational sediment sampling program or justification of an alternate methodology.
10. Regulatory Guide 4.14 provides recommendations for collecting and analyzing food samples during operations. Consistent with Regulatory Guide 4.14 and NUREG-1569, Acceptance Criterion 5.7.7.3(1), the applicant should evaluate baseline radionuclide concentrations in local food within 3 km of the site. See related issues in Section 2.9 of this RAI. Please address the following issues.

- a. The applicant has identified fish, livestock, poultry, and their products, but has not adequately analyzed the need for collecting and analyzing these food sources.
 - b. The applicant has identified game animals (pronghorn, wild turkey, etc.) but has not adequately analyzed the need for collecting and analyzing these food sources.
 - c. The applicant has not adequately analyzed the need for collecting and analyzing crops ,including local vegetable gardens.
11. In Section 5.7.7.2 of the TR, the applicant stated that samples of vegetation will be collected three times during the grazing season at each air monitoring station presented on Figure 5.7-10. Regulatory Guide 4.14 provides recommendations on where to sample for vegetation. Consistent with Regulatory Guide 4.14 and NUREG-1569, Acceptance Criterion 5.7.7.3(1), provide sufficient information for NRC staff to evaluate the adequacy of vegetation sampling locations.
 12. Regulatory Guide 4.14 provides recommendations for an operational direct radiation monitoring program. The applicant did not address an operational direct radiation monitoring program in section 5.7.7 of the TR. Consistent with Regulatory Guide 4.14 and NUREG-1569, Acceptance Criterion 5.7.7.3(1), provide an operational direct radiation monitoring program or provide justification for an alternate methodology.
 13. It is not clear from the applicant's description of its airborne effluent and environmental monitoring program the manner in which it will account for and verify, by surveys and/or monitoring, the occupational dose (gaseous and particulate) received throughout the entire Permit Area. Please provide an airborne effluent and environmental monitoring program that complies with 10 CFR 20.1501.
 14. Consistent with 10 CFR 20.1302 and NUREG-1736, it is not clear that the applicant has evaluated the member(s) of the public likely to receive the highest exposure from licensed operations. Please provide an airborne effluent and environmental monitoring program that complies with 10 CFR 20.1302.
 15. The applicant did not discuss how radon progeny will be factored into analyzing potential public dose from operations. Concentration values given in 10 CFR 20, Appendix B, Table 2, are based on radionuclide concentrations inhaled or ingested. The radon progeny, if present, will be the principal contributor to radiation dose in most practical radon exposure situations and need to be considered in any dose assessment. Please provide a description of the applicant's monitoring program that will account for public exposure to radon daughters.
 16. 10 CFR 40.65 requires a report that specifies the quantity of each of the principal radionuclides released to unrestricted areas. It is not clear from the applicant's description of its airborne effluent and environmental monitoring program how it will account for and verify, by surveys and/or monitoring, the quantity of these

radionuclides from all point and diffuse sources (e.g., uranium escaping the central processing plant) from its operations.

17. The applicant stated that the LLD for biota and surface soil monitoring will be consistent with the recommendations in Regulatory Guide 4.14 unless matrix interferences prohibit attainment of these values. Regulatory Guide 4.14 allows for alternate proposals to the preoperational and operational monitoring programs, as long as the two programs remain compatible. Please provide more information regarding the proposed LLD for biota and surface soil monitoring that demonstrate that these values will be consistent with Regulatory Guide 4.14 and that the preoperational and operational monitoring programs will remain compatible.

Section 5.7.8 Ground-Water and Surface-Water Monitoring Programs

1. Regulatory Guide 4.14 recommends the surface water samples be analyzed for dissolved and suspended natural uranium, Ra-226, Th-230, Pb-210 and Po-210. Consistent with Regulatory Guide 4.14 and NUREG-1569, Acceptance Criterion 5.7.7.3(1), provide an operational surface water sampling and analysis program that addresses these analyses or technical justification for an alternate program.
2. In 10 CFR 40, Appendix A, Criterion 7, NRC requires an operational monitoring program that can be used to evaluate environmental impacts of operation and to detect potential long-term effects, among other things. Regulatory Guide 4.14 provides guidance on surface water sampling, including impoundments and surface waters passing through the mill site. In Section 2.7.3.1 of the TR the applicant identified 48 surface water impoundments.

However, in Section 5.7.8 of the TR, the applicant identified only 11 impoundments in its operational surface water monitoring program as shown on Figure 5.7-10 of the TR. In addition, the applicant has not identified sampling locations for Beaver Creek which passes through the mill site. The applicant should analyze all surface water features in accordance with Regulatory Guide 4.14 criteria, including offsite water features that could be impacted from operations, or provide a justification for an alternate methodology that complies with 10 CFR 40, Appendix A, Criterion 7.

3. Table 2.7.3-1 in NUREG 1569 provides a list of acceptable constituents for monitoring at in situ recovery facilities. Alternatively, applicants may propose a list of constituents that is tailored to a particular location. In such cases, sufficient technical bases must be provided to demonstrate the acceptability of the selected constituent list.” With respect to the list of RAls, the staff requests the following information.
 - a. Table 6.1.1 in the TR provided a proposed list of baseline water quality parameters for wellfields. NRC staff notes this list did not include constituents consistent with the above-referenced Table 2.7.3-1. Please provide justification for excluding constituents listed in Table 2.7.3-1 from the proposed baseline sampling, consistent with the guidelines in Section 5.7.8.3 of NUREG-1569.

- b. Consistent with Section 5.8.7.3 of NUREG-1569, the applicant did not include information on the statistic methods that would be employed to establish baseline or background levels. For example, the applicant did not define whether or not the baseline levels for the production zone will be based on a wellfield average or well-by-well basis, methods to identify and exclude outliers, or other methods that may be appropriate for establishing background levels in all aquifers. The staff cannot determine if the applicant will be able to appropriately define baseline levels for a wellfield without this information. Please provide the above-referenced information.
- 4. In addition to the uncertainty that staff noted in the last RAI within the Hydrology Section, NRC staff is uncertain of the potential for operations to create or enhance a potential migration of constituents of concern from mine pit areas at or near wellfields in the license area to the underlying Fall River aquifer. Please demonstrate whether this scenario may potentially occur and if so, please clarify whether the wellfield groundwater monitor locations will provide satisfactory coverage of the Fall River water-bearing zone beneath appropriate areas at or near the mine pit areas. This information is necessary for staff to understand the potential impacts of the operations on water resources and to assess the manner in which the Dewey-Burdock operations will be protective of human health and the environment.
- 5. Section 5.7.8.3 of NUREG-1569 suggests that for large well fields, it may not be practical to sample one production/injection well per acre. However, baseline sampling should not occur at a density less than one per 4 acres." Section 3.2 of the TR Supplement states, "A minimum of eight baseline water quality wells will be installed in the ore zone in the planned well field area." The staff is not certain that this statement is consistent with current guidance. Please clarify that the sampling densities are consistent with the NRC's guidance or provide additional justification for an alternate density.
- 6. Section 5.7.8.3 of NUREG-1569 states, "Baseline sampling programs should provide enough data to adequately evaluate natural spatial and temporal variations in pre-operational water quality. At least four independent sets of samples should be collected, with adequate time between sets to represent any pre-operational temporal variations." Consistent with Section 5.7.8.3 of NUREG-1569, please specify the number of baseline sample sets that will be collected and the time between sets to represent any pre-operational temporal variations.
- 7. In Section 5.2.7 of the TR Supplement, the applicant states "Powertech's management has always used Chlorides, Sulfate and Uranium as Upper Control Limit Parameters. Sometimes Total Dissolved Solids is used. Powertech also uses pressure measurements in the monitor wells to detect the potential for excursions. These parameters were selected for the following reasons."
 - a. Please clearly specify excursion indicator constituents proposed for the Dewey-Burdock site.

- b. Section 5.2.7.2 of the TR Supplement states, "Since there is always pyrite (iron sulfide, a reduced mineral) present in uranium roll front deposits (it is the reason the uranium is there), an increase in sulfate means that there is oxygenated water moving in sufficient volume to change the sulfate levels." The staff notes that the oxygenated portion of the lixiviant tends to be consumed relatively quickly. Therefore, it is unclear if sulfate will sufficiently serve the early warning function that UCL parameters should.
 - c. Section 5.2.7.4 of the TR Supplement states, "Total Dissolved Solids (TDS) indicates the increase primarily in chlorides and sulfates when it is used as a UCL. ... Powertech's opinion that total dissolved solids is not sufficiently specific to be useful." The applicant's statement appears to imply that total dissolved solids may not be a good excursion indicator. Staff notes that conductivity, which is correlated to total dissolved solids, is generally considered to be a good excursion indicator (Staub, 1986; Deutsch, 1985). Please provide site-specific justification for the use of total dissolved solids or its related parameter, conductivity at the project site.
 - d. Section 5.2.7.3 of the TR Supplement states, "The uranium is selected because it is a uranium mine and this is the primary change that is made to the groundwater that is an adverse change. The uranium is not very mobile as it is insoluble in the reduced state and must be oxidized to be soluble and must have the correct pH at any oxidation level as well as sufficient carbonate ion in solution." The applicant's statement appears to imply that uranium may not be a good excursion indicator. Please further evaluate the use of uranium as an excursion indicator constituent. Consistent with Section 5.8.7.3 of NUREG 1569, this evaluation should consider that excursion indicator constituents are intended to provide early warning that leaching solutions are moving away from the well fields and that groundwater outside the monitor well ring may be threatened. Please provide information that addresses the above-referenced comments.
8. Section 2.7.8.3 of NUREG 1569 states, "Upper control limits for a specific excursion indicator should be determined on a statistical basis to account for likely spatial and temporal concentration variations within the mineralized zone. ..." NRC staff notes that the application does not provide this information. Consistent with Section 2.7.8.3 of NUREG 1569, please describe the method that will be used to establish upper control limits.
 9. On page 3-8 of the TR, the applicant states that the perimeter wells will be screened across the "entire mineralized zone" and for internal monitoring wells, across the overlying or underlying aquifers where the greatest potential for vertical excursions may occur. The proposed screening of the perimeter monitoring wells is consistent with guidance in NUREG-1569 (page 5-42); however, guidance in NUREG-1569 also indicates that the applicant should describe the process for determining the screened horizon. The staff is uncertain of the rationale and details that the applicant will use for determining screened horizon or well placement. For example,

the staff is unclear whether the entire mineralized zone means horizons within the Lakota or Fall River aquifers (e.g., F11, F12 or F13) or the entire aquifer. The applicant should provide justification for screening a monitor well across the entire overlying or underlying aquifer. Finally, the applicant does not define how the “greatest potential for an excursion” is to be determined. Please provide information that addresses the above-referenced comments.

10. On Page 3-14 of the Technical Report, the applicant proposes for the perimeter monitoring ring to be 400 feet from the production well field, with a minimum spacing of 400 feet between wells of a spacing that ensures a 70 degree angle. The applicant references three NUREG guidance documents on the proposed spacing but does not justify the spacing based on site-specific hydrogeological and geochemical conditions. Please provide the appropriate justification.
11. Exhibit 3.1-6 and Exhibit 3.1-7 of the TR Supplement show perimeter monitoring wells farther than 400 feet from several of the proposed production areas. For example, the perimeter monitoring wells shown in Exhibit 3.1-7 are approximately 400 feet from the proposed production in the L2 horizon, but up to approximately 1,400 feet from the proposed production at the L3 horizon. Please justify the variation in well spacings.
12. On Page 3-16 of the Technical Report, the applicant states that additional wells will be completed in any aquifers overlying the first aquifer overlying the production zone. However, the applicant does not provide the methods to be used to determine what constitutes an overlying aquifer. Please provide the methods to be used to determine what constitutes an overlying aquifer.
13. On Page 3-16 of the Technical Report, the applicant indicates that monitoring wells will be completed in the underlying aquifer at a minimum of one well per four acres, but further states that wells will not be completed below the Lakota Formation due to the thickness and relatively impermeable nature of the underlying Morrison Formation. These statements appear to be contradictory in nature, unless the Lakota is considered to be the lower aquifer for a specific wellfield. Please provide clarification of the proposed monitoring of the lower aquifer, in particular, areas in which the applicant does not propose any monitoring wells in the lower aquifer.
14. NRC staff notes that Section 3.1 of the TR and Section 3.0 of the TR Supplement provides limited information concerning wellfield test procedures. NUREG-1569, Section 5.7.8.3 states, “The applicant establishes well field test procedures. Once a well field is installed, it should be tested to establish that the production and injection wells are hydraulically connected to the perimeter horizontal excursion monitor wells and are hydraulically isolated from the vertical excursion monitor wells. Such testing will serve to confirm the performance of the monitoring system and will verify the validity of the site conceptual model reviewed in Section 2 of this standard review plan. The reviewer should verify that well field test approaches have sound technical bases. Test approaches typically consist of a pumping test that subjects the well field to a sustained maximum withdrawal rate while monitoring the perimeter and vertical excursion wells for drawdown. The test should continue

until the effects of pumping can be clearly seen via drawdown in the perimeter monitor wells. Typically, about 0.3 m [1 ft] of drawdown in the perimeter monitor wells will verify hydraulic connection, but the amount may vary because of the distance from the pumping wells, pumping rates, and hydraulic conductivity. To investigate vertical confinement or hydraulic isolation between the production zone and upper and lower aquifers, water levels in upper or lower aquifers may also be monitored during the pumping tests.” Consistent with NUREG 1569, Section 5.7.8.3, please further describe wellfield test procedures that will be used.

15. Consistent with NUREG-1569, NRC staff notes that the excursion monitoring program does not contain the monitoring frequency and the criteria for determining when an excursion has occurred. NUREG-1569 states, “The applicant defines operational approaches for the monitoring program. The monitoring program must indicate which wells will be monitored for excursion indicators, the monitoring frequency, and the criteria for determining when an excursion has occurred. An acceptable excursion monitoring program should indicate that all monitor wells will be sampled for excursion indicators at least every 2 weeks during in situ recovery operations. An excursion is deemed to have occurred if two or more excursion indicators in any monitor well exceed their upper control limits. A verification sample must be taken within 48 hours after results of the first analyses were received. If the second sample does not indicate that upper control limits were exceeded, a third sample must be taken within 48 hours after the second set of sampling data was acquired. If neither the second nor the third sample indicates that upper control limits are exceeded, the first sample is considered in error, and the well is removed from excursion status. If either the second or third sample contains indicators above upper control limits, an excursion is confirmed, the well is placed in excursion status, and corrective action must be initiated.” Please provide the above-referenced information.
16. NRC staff notes that corrective action and notification plans were not provided consistent with Section 5.7.8.3 of NUREG -569, which states, “The excursion monitoring operational procedures must also include corrective action and notification plans in the event of an excursion. ...” Please provide the above-referenced information.
17. Section 5.7.8 of the TR states, “Quarterly samples will be collected from drinking water and livestock wells, included in the groundwater sampling sites as shown in Figure 5.7-10.” This statement implies there are more proposed well sampling locations than what is shown in Figure 5.7-8. NRC staff notes that numerous Inyan Kara wells in Appendix 2.2-A are close to wellfields within the license boundary and are not included in Figure 5.7-10. Please specify all water well sampling locations.
18. Section 5.7.8.3 of NUREG 1569 states, “Any surface-water body that lies within the proposed license boundary should be sampled at upstream and downstream locations, both before and during operations. The pre-operational data should be collected on a seasonal basis for a minimum of 1 year before *in situ* leach operations.”

- a. NRC staff notes that surface water sampling locations indicated in Section 5.7.8 and Figure 5.7-10 of the TR do not include an upstream location for Beaver Creek and a downstream location for Pass Creek where it exits the site. Consistent with Section 5.7.8.3 of NUREG 1569, please include the above-referenced surface water sampling locations.
 - b. NRC staff notes that the application did not include a commitment to collecting pre-operational data on a seasonal basis for a minimum of 1 year before in situ recovery operations. Consistent with Section 5.7.8.3 of NUREG 1569, please commit to collecting pre-operational data on a seasonal basis for a minimum of 1 year before in situ recovery operations.
19. NRC staff notes that the application does not provide a description of proposed surface water and water well sampling methods and parameters that will be measured and analytically analyzed in surface water samples and water well samples. Please provide this information. This information is necessary for staff to assess the manner in which the Dewey-Burdock project activities will be protective of human health and the environment.

5.7.9 Quality Assurance

The applicant stated that it will establish a quality assurance program at the facility consistent with the recommendations contained in Regulatory Guide 4.15. However, the applicant did not provide sufficient details of its proposed quality assurance program to allow NRC staff to evaluate the applicant's program. Consistent with Regulatory Guides 3.46, 4.14 and 4.15, and NUREG-1569, Acceptance Criteria 5.7.9.3(1) and 5.7.9.3(2), provide adequate details of the applicant's quality assurance program to allow NRC staff to evaluate the applicant's quality assurance program for its effluent and environmental programs.

Section 6.0 GROUND WATER QUALITY RESTORATION, SURFACE RECLAMATION AND FACILITY DECOMMISSIONING

The applicant has not provided sufficient information regarding groundwater quality restoration, surface reclamation and facility decommissioning. Additional information regarding the groundwater quality restoration, surface reclamation, and facility decommissioning is requested to allow staff to adequately understand and assess the applicant's operations. Please provide the information requested in the following sections.

Section 6.1 Plans and Schedules for Groundwater Quality Restoration

1. The specific language in the TR of "*consistent with the pre-operational baseline conditions*" and a secondary goal of "*pre-operational ... class of use*" is not consistent with NRC regulatory requirements. The regulatory requirements, as documented in RIS-09-05, are Commission-approved background levels, MCLs or ACLs as specified in Criterion 5B(5) of Appendix A of 10 CFR Part 40. The primary goals for restoration of the production zone aquifer should be either background levels or MCLs; the secondary goal may be ACLs. However, an application for

ACLs must be approved by the Commission. Guidance for preparing an application for ACLs to the Commission is found in various documents (e.g., NUREG-1724, NUREG-1620 and NUREG-1757) but an application must demonstrate that the best management activities have been conducted and that the ACLs are protective of human health and the environment by demonstrating that the levels at the boundary of the exempted aquifer meet the background levels or MCLs. Please revise the language in the TR to be consistent with the above guidance and regulatory requirements.

2. In the TR, the applicant indicated the target restoration goals (TRGs) will be based on a statistical analysis following ASTM standard D6312 (ASTM, 2001). The reference should be ASTM D6312-98 (Re-approved 2005). Please address this comment.
3. Table 6.1-1 of the TR provided a list of baseline water quality parameters and methods that will be used for establishing groundwater TRGs. Within the references for the table, NRC staff requests clarification of the passage “methods that will be used for establishing groundwater TRGs.” This reference is to the laboratory analytical methods to be used to determine the concentration of a constituent and not a specific method (e.g., statistical average) for establishing TRGs based on the analytical data. In addition, the footnote in Table 6.1-1 suggests that the parameter list is derived from NUREG-1910. However, a similar table is not identified in NUREG-1910. Staff notes that the list of parameters in Table 6.1-1 is a subset of those recommended in NUREG-1569. Please correct the references in Table 6.1-1 and provide rationale or justification for excluding those other parameters listed in NUREG-1569.
4. The applicant provided a brief discussion of the restoration methods to be used but the discussion is too general and contains several confusing references. The discussion lacks details on the proposed specific restoration methods to be used and how those methods affect the aquifer. The applicant needs to provide a more in-depth discussion on the proposed methods to be used in clear terms. For example, the applicant needs to define “injection sweep method” in more commonly accepted terms (e.g. groundwater transfer, groundwater sweep, groundwater treatment or groundwater recirculation). The methods should be described in sufficient detail for staff to review (i.e., for groundwater treatment, staff needs to consider the volume of waste, clean makeup water, pore volumes and timing). If groundwater treatment is the only restoration method, then the applicant needs to discuss how flaring will be captured by using this method only. Please address this comment.
5. The applicant reported expected concentrations for baseline, post-mining, post-restoration and stabilization based on the Crow Butte analog. The applicant indicated that the initial restoration concentrations will be similar to those seen during production but will decline throughout the groundwater treatment process and “*further via the natural restoration process (NUREG/CR-3136, 1983)*”. The staff suggests that reference to NUREG-3136 be clarified. The reference may be interpreted as NRC-sanctioned restoration method of natural flushing (i.e.,

restoration is accomplished by discontinued active pumping and allowing groundwater to flow under natural conditions). This is not a NRC-approved method. In fact, the staff will require a statement that the applicant will maintain hydraulic control at all wellfields (negative or inward pressure gradient) at all times during production and restoration until stabilization period. Please address this comment.

6. The applicant's preferred restoration method is solely groundwater treatment by reverse osmosis with deep well disposal of the brine. This method is preferred due to lower groundwater consumptive use and minimum land disturbance. The applicant needs to discuss the effectiveness of this method and provide appropriate analogues demonstrating the effectiveness of groundwater treatment as the sole restoration process. Please address this comment.
7. The application did not include estimates on the pore volume for a wellfield, porosity or flare factors. The staff needs this information to evaluate the financial assurance calculations and the proposed schedule and water balance for the restoration process. Please provide this information for staff to review.
8. The applicant reported that because lixiviant injection was discontinued during restoration, the groundwater quality will continually improve and the potential for an excursion is greatly reduced. The applicant proposed to monitor the water quality indicators in Table 6.1-1 and water levels once every 60 days in the monitor ring wells, and monitoring wells in the overlying and underlying aquifers. The applicant proposed to contact NRC if wells cannot be monitored within 65 days of the last sampling event. Staff notes that this monitoring plan is for excursion monitoring and not restoration monitoring. The excursion monitoring program should continue during restoration similar to that conducted during operations but will accept a frequency of monitoring greater than once every two weeks. However, should the levels indicate an excursion status for a well during restoration, the applicant must document corrective actions to be undertaken. Please address this comment.
9. The applicant did not propose a monitoring program to document the effectiveness of the restoration program. The monitoring program should include a detailed description of the monitoring of the mining zone during restoration, including sampling density, parameters, and frequency to substantiate that it will be able to closely monitor and optimize their restoration strategy or to determine whether or not any flare or hot spots have been effectively captured during the restoration process. Please address this comment.
10. The applicant proposed a minimum six month stability monitoring program to demonstrate that the restoration goal has been maintained. The monitoring program includes sampling groundwater at the monitoring ring wells, one every two months for chloride, total alkalinity and conductivity and at the production wells at the beginning, middle and end of the stability parameters for the indicator parameters listed in Table 6.1-1. The applicant proposed to contact NRC if any well cannot be monitored within 65 days of the last sampling event. The staff has determined that this monitoring program is inconsistent with NUREG-1569. The monitoring program should consist of four quarterly events using a full suite of

parameters for each sampling event. Furthermore, the applicant needs to discuss statistical methods to be used to determine whether or not a trend is observed or hot spots exist. Please address this comment.

11. The applicant included a Gant-type chart to depict the proposed restoration schedule in the application. The schedule is based on the entire project rather than individual mine units or wellfields. The proposed restoration period encompasses an eight-year time-frame starting at year five. The restoration period overlaps the production, stability monitoring and wellfield decommissioning elements of the schedule. Also note that should the restoration schedule exceed 24 months for a wellfield, the applicant will have to request NRC approval of that schedule as an alternate schedule. Please address this comment.

Section 6.2 Plans for Reclaiming Disturbed Lands

1. Consistent with NUREG-1569, Acceptance Criteria 6.2.3(2), 6.2.3(8) and 6.2.3(9), the applicant should provide additional discussion of the land cleanup program, including:
 - a. The areas that will be focused on during the surveys such as well field surfaces, areas around structures in process and storage areas, on-site transportation routes, historical spill areas, retention ponds, and areas near the deep disposal wells,
 - b. Plans for decommissioning non-radiological hazardous constituents as required by 10 CFR Part 40, Appendix A, Criterion 6 (7), and
 - c. Demonstration that the actual quality assurance and quality control program will address all aspects of decommissioning.
2. As discussed in Section 2.9 of this RAI, the applicant has not sufficiently demonstrated that background radiological conditions have been established within the Permit Area. In addition, the applicant has not sufficiently demonstrated the correlation of gamma surveys with Ra-226 (or other radionuclides) concentrations in soil. In Section 6.2.1 of the TR, the applicant stated that baseline soils, vegetation, and radiological data will be used as a guide in evaluating the final reclamation. The following questions pertain to pre-reclamation surveys and planned cleanup activities.
 - a. Consistent with NUREG-1569, Acceptance Criterion 6.2.3(2), please identify instruments and techniques that will be used in the pre-reclamation radiological survey program to identify areas of the site that need to be cleaned up to comply with NRC concentration limits.
 - b. Consistent with NUREG-1569, Acceptance Criterion 6.2.3(3), please describe how pre-reclamation survey results will be used to identify candidate areas for cleanup operations.

Section 6.3 Removal and Disposal of Structures, Waste Material, and Equipment

1. It appears that the bullet at the top of page 6-23 should read, "Not salvageable and contaminated *below* release limits...." Please clarify this point.
2. In Section 6.3.1 of the TR, the applicant references Regulatory Guide 1.86 as the criteria for surface contamination release limits. However, Regulatory Guide 1.86 is for use by nuclear power reactors, while Enclosure 2 to Policy and Guidance Directive FC-83-23 (as updated) is used as the criteria for surface contamination release limits by materials licensees. Please provide the correct reference in the TR.
3. In Section 6.3.2, the applicant describes how materials with potential surface contamination will be treated. Please provide a description of how materials such as concrete exposed to

Section 6.4 Methodologies for Conducting Post Reclamation and Decommissioning Radiological Surveys

1. Consistent with NUREG-1569, Acceptance Criterion 6.4.3(1), please describe the manner in which areas that meet the Ra-226 cleanup criteria but still have elevated Th-230 levels will be addressed.
2. As discussed in Section 2.9 of this RAI, it does not appear that the applicant has sufficiently demonstrated that background radiological conditions have been established within the Permit Area. Consistent with NUREG-1569, Acceptance Criterion 6.4.3(2), please demonstrate that the applicant has sufficiently determined background radionuclide concentrations as described in Section 2.9 of NUREG-1569.
3. In Section 6.4.1.2 of the TR, the formula for the unity rule appears with the uranium soil standard formula. It appears that this should be moved to the next paragraph. Please clarify this point.
4. In Section 6.4.3 of the TR, the applicant stated that it will evaluate compliance with cleanup criteria in terms of soil concentrations that will be supplemented by field gamma surveys. The applicant will conduct final GPS-based gamma surveys in affected areas and buffer zones. The staff cannot evaluate the comprehensiveness of the soil cleanup verification and sampling plan. Please define more specifically what constitutes affected areas.
5. The applicant has not provided assurance that the survey method for verification of soil cleanup is designed to provide 95% confidence that the soil units meet the cleanup guidelines. The staff cannot evaluate the effectiveness of the cleanup based on the information provided. Consistent with NUREG-1569, Acceptance Criterion 6.4.3(5), please clarify that the survey method for verification of soil cleanup will be designed to provide 95-percent confidence that the survey units will meet the cleanup guidelines.

6. In Sections 6.4.2 and 6.4.3 of the TR, the applicant states that it will utilize gamma ray measurements to determine compliance with soil cleanup criteria. However, as discussed in Section 2.9 of this RAI, it does not appear that the applicant has demonstrated the feasibility of relating gamma ray measurements to radium or any other radionuclides. Consistent with NUREG-1569, Acceptance Criteria 6.4.3(1), 6.4.3(3) and 6.4.3(5), please demonstrate that the applicant's methodology for gamma ray surveys for excavation control monitoring and final status surveys will provide 95-percent confidence that the survey units will meet the cleanup guidelines.
7. Consistent with 10 CFR 40, Appendix A, Criterion 6(6), please discuss how byproduct material containing concentrations of radionuclides other than radium in soil, and surface activity on remaining structures will not result in a total effective dose equivalent (TEDE) exceeding the dose from cleanup of the radium contaminated soil to the benchmark dose and will be at levels which are ALARA. This discussion should describe how the radium benchmark dose will be applied to the surface activity on remaining structures.
8. The applicant stated that the QAPP will contain recommendations in NRC Regulatory Guide 8.15. The correct reference appears to be Regulatory Guide 4.15. Please address this discrepancy.

SECTION 7 ENVIRONMENTAL EFFECTS

The applicant has not provided sufficient information regarding the manner in which it will monitor for, remediate, and prevent accidents. Please provide the following information:

Section 7.0 Accidents

Based on NUREG-1569, the applicant needs to address the following issues in Section 7.0 of the TR.

1. Consistent with Regulatory Guide 3.46 and NUREG-1569, Acceptance Criteria 7.5.3(1) and 7.5.3(2), please address preventive measures, consequences from, and actions and equipment used to stop, a major pipe or tank rupture in the facility. In the discussion, please provide the manner in which major piping/tank ruptures will be stopped and also the capacity of the sumps/bermed areas.
2. Consistent with Regulatory Guide 3.46 and NUREG-1569, Acceptance Criterion 7.5.3(2), please address any site specific preventive and mitigating measures for potential chemical accidents.
3. Consistent with Regulatory Guide 3.46 and NUREG-1569, Acceptance Criteria 7.5.3(1), 7.5.3(2) and 7.5.3(3), please provide a discussion on accident consequences, including preventive and mitigating measures for, fires and explosions at the Dewey-Burdock facility. In the discussion, include the potential for wildfires.

4. Based on NUREG/CR-6733, the applicant concluded that the most significant risk from natural events at the proposed Dewey-Burdock facility is a tornado that dispersed yellowcake. However, the applicant did not address emergency procedures including notification of personnel of potential severe weather, evacuation procedures, damage inspection and reporting, and cleanup and mitigation of spills. Please address these issues.