

December 18, 2009

Mr. Wayne W. Heili
President
Lost Creek ISR, LLC
5880 Enterprise Drive, Suite 200
Casper, WY 82609

SUBJECT: LOST CREEK ISR, LLC, LOST CREEK IN SITU RECOVERY FACILITY,
SWEETWATER COUNTY, WYOMING, SUMMARY OF DECEMBER 7, 2009
TELECONFERENCE - (TAC NO. J00559)

Dear Mr. Heili:

On December 7, 2009, a public conference call between the U.S. Nuclear Regulatory Commission (NRC) staff and representatives of Lost Creek ISR, LLC (LCI) was held to discuss LCI's application for a license to construct and operate a uranium *in situ* recovery facility (ISR) in Wyoming. The NRC staff had completed its review of LCI's application and prepared an internal draft of the Safety Evaluation Report (SER). The conference call was held as a follow-up to the conference call between the NRC and LCI on September 25, 2009 (ML093130083) to discuss open issues that NRC staff identified in preparing the draft SER. A summary of the meeting is enclosed.

Within 30 days of receipt of this letter, please either provide the information identified in the meeting summary or inform us of the date you expect to provide the information. At this point in the review process, NRC staff has presented all open issues to LCI regarding the Lost Creek facility SER. The staff previously provided written discussions of incomplete responses and open issues on April 23, 2009 and November 9, 2009. The staff is therefore curtailing any further work until resolution of the open issues. Note that a delay in providing information may result in a delay in NRC staff's completion of the SER. If you have any questions regarding this letter or the enclosed meeting summary, please contact me at (301) 415-6142, or by email at tanya.oxenberg@nrc.gov.

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

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Sincerely,

/RA/

Tanya Palmateer Oxenberg, Ph.D.
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.: 040-09068

Enclosure: Meeting Summary

cc: Meeting Attendees

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MEETING REPORT

DATE: December 7, 2009

TIME: 10:00 a.m. – 2:30 p.m.

PLACE: U.S. Nuclear Regulatory Commission
One White Flint North, Rockville, Maryland
Room O4B4

PURPOSE: Teleconference to discuss radiological, hydrogeological, and miscellaneous open/confirmatory issues relating to the Lost Creek ISR license application.

ATTENDEES: See Attached Attendee List

BACKGROUND:

The teleconference was held to discuss Lost Creek ISR, LLC's (LCI's or applicant) application to construct and operate an *in situ* recovery (ISR) uranium facility at its Lost Creek site in Wyoming. The U.S. Nuclear Regulatory Commission (NRC) staff had completed its review of the radiological, hydrogeological, and geotechnical aspects of LCI's application and prepared an internal draft of the Safety Evaluation Report (SER). The teleconference was held as a follow-up to the teleconference on September 25, 2009 to discuss open issues that NRC staff identified in preparing the hydrogeological, radiological and miscellaneous sections of the draft SER.

DISCUSSION:

The teleconference began at 10:00 a.m. EST. Mr. Stephen J. Cohen, NRC Team Leader, stated that the meeting was open to the public and that members of the public would be allowed to ask questions or make comments at the end of the meeting. Two members of the public listened in on the conference call. The NRC staff discussed the status of its review. The staff indicated that the meeting addresses several health physics, hydrogeology, and miscellaneous sections of the draft SER.

The following open issues and confirmatory/administrative items were then discussed.

1. MISCELLANEOUS CONFIRMATORY/ADMINISTRATIVE ITEMS

- a. **DSER section 5.2 (TR Section 2.4) (RAI Response 12/12/08 5.2)
Cultural surveys in areas not previously assessed by NRC.**

Lost Creek has performed Class I and Class III archeological surveys in the project area and included the results of the surveys in the application. The applicant has committed to complying with the National Historic Preservation Act, the Archeological Resources Protection Act, and their implementing regulations. In addition, Lost Creek has committed to cease any work resulting in the discovery of previously unknown cultural

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artifacts to ensure that no unapproved disturbance occurs. The applicant has not committed to administering a cultural resources inventory before engaging in any development activity not previously assessed by NRC.

LCI acknowledged the item and indicated that the Class I and Class III archeological surveys submitted with the project application cover the entire project area. Therefore, there are no remaining areas within the currently proposed boundary that have not been assessed for cultural resources.

The staff reviewed the Class I and Class III archeological surveys contained in section 2.4.1 of the technical report and verified that the surveys covered the proposed project area. **This administrative item has been resolved.**

b. **DSER Sections 4.2 and 6.3 (TR Section 4.3.2) (RAI Response 12/12/08 4.3)
Solid 11(e)(2) byproduct disposal agreement**

Lost Creek will develop a disposal agreement with an NRC or Agreement State facility for solid 11(e)(2) byproduct material disposal. The applicant has committed to notifying the NRC if the disposal agreement expires or is terminated or to submit a new agreement for NRC approval within 90 days of the expiration or termination. The solid 11(e)(2) disposal agreement has not been finalized at this time.

LCI acknowledged this confirmatory item and indicated that an agreement will be developed at a later time. LCI requested that this confirmatory item be resolved as a license condition.

LCI's proposal to resolve this confirmatory item as a license condition is acceptable to the NRC staff. **Therefore, this item has been resolved.**

c. **DSER Section 6.5 (TR Section 6.8) (RAI Response 12/12/08 6.8 #2)
Identification of surety mechanism**

The applicant has indicated that a number of surety mechanisms are under consideration and that the surety mechanism will be identified once the NRC and Wyoming Department of Environmental Quality (WDEQ) have approved the financial assurance amount. As the surety mechanism has not been identified as required by Part 40, Appendix A, Criterion 9, the NRC staff is not able to determine if an appropriate mechanism has been established.

LCI acknowledged this confirmatory item and indicated that the surety mechanism will be finalized at a later date. LCI requested that this confirmatory item be resolved as a license condition.

LCI's proposal to resolve this confirmatory item as a license condition is acceptable to the NRC staff. **Therefore, this item has been resolved.**

2. HYDROGEOLOGY OPEN ISSUES

a. Draft SER 2.4 Hydrogeology (TR Section 2.7) (RAI Response 12/12/08 3.2 #7)

LCI described a complex hydrogeology at the site, which includes faults that may act as hydraulic barriers, potentially anisotropic hydraulic conductivities that may result in preferential flowpaths, and abandoned wells that may act as conduit flows to the overlying and underlying aquifers. The staff, through calculations, evaluated the site hydrogeologic conditions and the results of which require additional explanation for the following issues:

- (1) Information provided by the applicant indicates that a small degree of hydraulic connection exists potentially through abandoned boreholes. Our calculations indicate that it would be difficult to identify the impact of the abandoned wells on the groundwater quality based on an observation well spacing of 1 well per 4 acres. Please provide specific details regarding the manner in which the monitoring well network will be installed to address the abandoned boreholes. Regulatory Basis: 10 CFR Part 40 Appendix A, Criterion 7A.

LCI proposed that the abandoned holes can be adequately addressed in a subsequent response to this issue. LCI questioned staff's concern as the proposed spacing is consistent with spacing currently used at former and existing ISR facilities. The staff emphasized the unique setting at this site is justification for the concern. This is an open issue.

- (2) The staff observed an apparent anisotropy to drawdown based on the October 2007 pumping test. Based on staff's calculations, the anisotropy was determined to be in the vertical direction, i.e., the HJ Horizon is subdivided into the upper, middle and lower subhorizons. Given this anisotropy, perimeter wells screened in the upper HJ Horizon may not provide timely detection of an excursion should the nearby production zone be in the middle or lower HJ Horizon. Please provide an evaluation that wells screened in one HJ Horizon subhorizon will provide timely detection of an excursion for production in the other subhorizons. Regulatory Basis: 10 CFR Part 40 Appendix A, Criterion 7A.

LCI acknowledged that they've encountered this scenario at many sites and will present to staff rationale for screening of the wells. LCI stated that the mine unit package for Mine Unit 1 has the detail and proposed that the package could be submitted at this time. The staff suggested LCI not submit the package for review and approval at this time as its review would delay the license review process. LCI and staff discussed that this issue may be included as the license condition for NRC review and approval of the mine unit package, pending LCI's response to this comment.

LCI's proposal to resolve this issue as a license condition is acceptable to the NRC staff. **Therefore, this is an open issue pending staff review of the proposed license condition.**

- (3) The mapping supplied by the applicant indicated a relatively wide zone of low permeability material in conjunction with the Lost Creek Fault, several mine units that are bisected by the Fault, and a schematic of mine units that suggests a homogeneous distribution to the production units within a mine unit. The staff's calculations indicate that the low permeability zone will hinder the applicant's ability to adequately control the migration of fluids for production units located within, straddling or in close proximity to the fault zone. Please provide a plan for the individual mine unit hydrogeologic testings that will ensure safe operations of units in close proximity of the Fault. Regulatory Basis: 10 CFR Part 40 Appendix A, Criterion 7A.

LCI inquired about staff's calculations. The staff explained that a numeric flow model was created by staff to analyze the fault and mine units. LCI requested the ability to review the model; however, staff indicated that it may be logistically difficult to provide this information at this time since NRC's policy is to make all information discussed with an applicant also available to the public. The staff suggested that the concepts of a low permeable zone within a mine unit should be addressed, and that the construction of the model can be discussed during a phone call with the project manager.

LCI acknowledged that the final mine plan will have the patterns and will not include mining across the fault. LCI has had many scenarios where similar stratigraphic variable has been adequately addressed and will provide this information to staff. This is an open issue.

**b. Draft SER 3.1.3 (TR Section 3.2) (RAI Response 12/12/09 3.2 #5)
MIT Testing and Well Casing Pressures**

LCI reported the minimum fracture gradient for the license area is 0.70 psi. It stated that during operations, injection pressures at the wellheads would not exceed MIT pressures. It also stated that the maximum injection operating pressures will not exceed 90% of the production zone fracture pressure or 95% of the ASTM maximum operation pressure for the well casing. LCI, however, did not provide the MIT pressure or maximum well casing pressures. Without an estimate of these values, NRC staff can not evaluate if the fracture gradient will be exceeded. Section 3.2.7, NUREG 1569 Section 3.1.3 No. 5 (a). Regulatory Basis: AEA, as amended Section 84 (c). 10 CFR Part 40 Appendix A

LCI acknowledged that information to address this issue can be provided to staff. LCI has the calculations; however, the maximum pressures will be header-house specific due to hydraulic conditions. As a header house is brought on-line, LCI has procedures to develop and ensure that the maximum pressure for each header house will not be exceeded. In the unlikely event that a header house consists of wells with greatly variable pressure regimes, then the maximum pressure will be based on a well-by-well basis using a pressure switch. This is an open issue.

c. **Draft SER 5.7.8 (TR Section 5.7.8)**
Completion Zone for the Overlying or Underlying Wells

LCI stated that the completion zone for an overlying or underlying well may be within the production zone but did not provide details. Regulatory basis: 10 CFR Part 40 Appendix A, Criterion 7A.

LCI agreed that this scenario is not proper and will review and revised the application accordingly. This is an open issue.

d. **Draft SER 5.7.8 (TR Section 5.7.8)**
Lack of Surficial Aquifer Baseline Quality

LCI did not include plans to acquire baseline surficial aquifer water quality for the licensed area. Regulatory basis: 10 CFR Part 40 Appendix A, Criterion 7 and 7A.

LCI inquired about the use of the term “surficial aquifer” and whether or not one existed at the proposed setting because of the clay stringers located within the unsaturated zone that isolated the uppermost aquifer from the near surface. NRC staff acknowledged that the term surficial aquifer may be interpreted as such but staff’s concern is to establish proper baseline levels for aquifer(s) at the site that may potentially be impacted by the ISR operations. The staff indicated that the term “uppermost aquifer” may be more appropriate. Although less likely to be impacted by a release or spill originating at ground surface, the uppermost aquifer may impacted by leakage from production wells at shallow depths. The uppermost aquifer is found within the DE Horizon. LCI acknowledged that it has been acquiring data for the uppermost aquifer and will provide the data to staff. This is an open issue.

e. **Draft SER 6.1 (TR Section 6.1)**
Thickness of Ore Body for Surety Calculations

NRC staff needs supporting evidence that the use of average completion thickness in lieu of thickness of the ore sand is appropriate in the pore volume calculation. LCI reports that the thickness of the mineralization varies from 5 to 28 feet, with an average of 16 feet. LCI also indicated that the restoration would only be completed in areas with multiple mineralization zones after production at all zones. If production is done in all zones, it appears the restoration pore volume should account for the thickness of multiple zones (NUREG 1569 6.1.3 (2)). Regulatory Basis: AEA, as amended Section 84 (c). 10 CFR Part 40 Appendix A, Criterion 9.

LCI acknowledged that an adequate response to demonstrate the rationale will be provided to the staff. This is an open issue.

f. **Draft SER 6.1 (TR Section 5.7.8)**
Excursion Corrective Actions

LCI did not describe how it will address corrective action at wells which were on excursion status during the restoration and restoration stability monitoring period (NUREG-1569, Section 5.7.8.3 (5)). NRC staff therefore requests that LCI provide NRC

with a plan on how it will correct any excursions at monitoring wells during restoration and stability monitoring and restore water quality near these wells to ensure that groundwater outside the exempt zone is protected. Regulatory basis: 10 CFR Part 40 Appendix A, Criterion 5D.

LCI acknowledged that an adequate response that demonstrates LCI's rationale will be provided to the staff. This is an open issue.

**g. Draft SER 6.1.2 (TR Section 5.7.8, 6.2.2)
Baseline Quality Data for the Perimeter Wells**

LCI (Section 6.2.2) stated that to establish baseline water quality, a minimum of four samples would be collected for each well at least fourteen days apart. At least one of these samples will be analyzed for all parameters listed in Table 6.2-1. LCI said other samples may be tested for a reduced list of parameters with WDEQ approval. NRC staff notes that NUREG-1569 Section 5.7.8.3 (1) states that at least four independent sample sets should be collected, with adequate time between sets to represent any pre-operational temporal variations. A set of samples is defined as a group of at least one sample at each of the designated baseline monitor wells which are analyzed for all water quality parameters in Table 2.7.3-1. NRC requests that LCI revise their sampling plan to sample for all constituents to meet the guidelines in NUREG -1569. Regulatory basis: 10 CFR Part 40 Appendix A, Criterion 7 and 7A.

LCI discussed that the sampling as proposed was in accordance with WDEQ regulations/guidelines and has been making concerted efforts to meet requirements for both regulatory agencies, WDEQ and NRC. The staff acknowledged that there are times that applicants have to meet requirements of various regulatory bodies. The staff will attempt to minimize any duplicative efforts; however, LCI must, at a minimum, meet requirements of NRC regulations if those regulations are more stringent. LCI acknowledged that an adequate response to this issue will be provided to the staff. This is an open issue.

**h. Draft SER 6.1.7 (TR Section 6.1)
Restoration Stability Monitoring Wells**

LCI did not state how many wells will be sampled during stability monitoring. NRC Staff notes that NUREG-1569, Section 6.1.3(5) recommends that the number of wells used for stability monitoring be provided. Regulatory basis: 10 CFR Part 40 Appendix A, Criterion 7 and 7A.

LCI acknowledged that it understands this issue but until the mine unit is designed will not have a specific number of wells for a mine unit at this time. LCI committed to include this information in the wellfield hydraulic testing package which will be addressed through a license condition.

LCI's proposal to resolve this issue as a license condition is acceptable to the NRC staff. **Therefore, this is an open issue pending staff review of the proposed license condition.**

i. **Draft SER 6.1.7 (TR Section 6.2)
Restoration Stability Monitoring Parameters**

LCI stated that during stabilization, monthly samples will be collected to ensure oxidation/reduction conditions do not fluctuate significantly (Section 6.2.4). LCI did not state what constituents will be measured in these samples, but said they would be based on water quality at the end of restoration and agency approval. LCI did state that at the end of the stabilization period, samples will be tested for all parameters listed in Table 6.2-1. NRC staff notes that NUREG-1569, Section 6.1.3 (5) establishes guidelines that describe the purpose of stability monitoring to ensure that all chemical species of concern do not increase in concentration after restoration. Regulatory basis: 10 CFR Part 40 Appendix A, Criterion 7 and 7A.

LCI and NRC staff discussed making this a license condition as part of NRC review of the wellfield hydraulic testing report. LCI committed to include this information in the wellfield hydraulic testing package which will be addressed through a license condition.

LCI's proposal to resolve this issue as a license condition is acceptable to the NRC staff. **Therefore, this is an open issue pending staff review of the proposed license condition.**

j. **Draft SER 6.1.7 (TR Section 6.2)
Restoration Stability Monitoring Statistical Methods**

In Section 6.2.4, LCI stated that the restoration will be considered stable if the sampling results show there are no significant increasing trends. LCI, however, did not provide a description of how the stability trends will be evaluated statistically or otherwise or describe what actions would be taken if trends are determined to be significantly increasing. NRC requests that LCI provide this information (NUREG-1569, Section 6.1.3 (3)). Regulatory basis: 10 CFR Part 40 Appendix A, Criterion 7 and 7A.

*LCI acknowledged that it understands the issue; however, LCI inquired about staff's statistical preference. The staff stated that a regression analysis would be sufficient as long as a fit analysis was reported and LCI defined what actions will be taken if trends are increasing. For their response, the staff suggests that the applicant reviews recent EPA guidance on trend analyses in Chapter 17 of EPA-530-R-09-007, "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance", dated March 2009. **This is an open issue.***

k. **Draft SER 6.1.7 (TR Section 6.2) (RAI Response 12/12/08 6.2 #17)
Lost Creek did not provide a strategy for addressing hot spots after restoration**

LCI stated they will evaluate the restoration stability for "hot spots" that may require further treatment (RAI Section 6.2 No.17, Dec. 2008). However, it has not proposed a strategy to address how "hot spots" will be identified and how they will be treated during restoration stability monitoring. NRC staff notes that depending on location and groundwater flow direction, these "hot spots" can act as potential sources of contamination and may require specific attention if they remain. NRC requests that LCI provide a method to identify "hot spots" and assess how they will be treated if they are a

concern for later contamination outside of the mine unit (NUREG-1569, Section 6.1.3 (6)). Regulatory basis: 10 CFR Part 40 Appendix A, Criterion 7 and 7A.

Note: NRC staff gave guidance at the November 2009 Workshop in Denver, Colorado, on a definition of a "hot spot" as a concentration greater than the mean value plus 2 standard deviations.

LCI acknowledged that it understands the issue and that an adequate response to this issue will be provided to the staff. This is an open issue.

I. **Draft SER 6.1.8**

Lost Creek did not provide a commitment to maintain hydraulic control on a wellfield for the period between operation and restoration

NRC staff requests that LCI commit to maintaining a bleed, which creates a sufficient inward gradient to prevent excursions on all wellfields during all production /restoration operations, including when production/ restoration operations are suspended or the wellfield is put in a standby mode. LCI may only cease this bleed when the wellfield is in its stability monitoring phase or through specific approval by NRC (NUREG1569 3.1.3 (5b, f & i). Regulatory Basis: AEA, as amended Section 84 (c). 10 CFR 40.31(g)

LCI acknowledged that it understands the issue and that an adequate response to this issue will be provided to the staff. This is an open issue.

3. **HYDROGEOLOGY CONFIRMATORY ITEMS**

a. **Draft SER 2.3 (TR Section 2.6) (RAI Responses 12/12/08 2.6 #3; 01/19/09 2.6 #1 & 2) Inconsistencies in the Geologic Information**

In the TR, December 12, 2008 and January 19, 2009 responses, geologic information that was submitted includes revisions to isopach mapping and cross-sections as well as development of structural contour mapping. The information has several inconsistencies, notably, the thicknesses of the units depicted on the cross-sections and isopach mapping as well as thickness determined from the structural contour mapping. Also, the depiction of fault traces is inconsistent on the submitted documents.

During the September 25, 2009 tele-conference, LCI committed to further discussion and submittal of uniform information.

At the request of LCI, the staff provided more detailed information on inconsistencies in the information. In brief, the staff requests that information presented in the report is consistent on cross-sections and various map views. The existing inconsistencies include:

- (1) Additional traces of faults other than the Lost Creek Fault on various cross-sections and map view (e.g., the potentiometric surface contour maps).
- (2) Possible inaccuracies in the isopach mapping. In response to RAIs, LCI updated cross-section C-D in which an unidentified error was corrected. The initial submittal

had a discontinuity in the selection of the sage Brush Shale (SBS) horizon at location P2-19. On the initial and current cross-section B-C the top of the SBS at location P2-19 was at an elevation of approximately 6380 ft-MSL; however on the initial cross section C-D, the top of the SBS at location p2-19 was at an elevation of approximately 6310 ft-MSL. The updated cross-section C-D corrected this apparent error by selecting the stratigraphically overlying shale horizon as the SBS. In essence, the designated lower HJ zone on the initial cross-section C-D is now included in the upper KM horizon.

- (3) The thickness of the HJ isopach mapping along this cross section is consistent with the depictions on the updated cross section which suggests may have been clerical in nature. However, the offset of the NNS along the fault line south of the fault between well TT40 and TT34 differs from the offset for the other units both south and north of the fault. Specifically, the offset for the other units is slightly less than 60 feet whereas the offset for the NNS is approximately 120 feet. Furthermore, based on the cross-section, the isopach of the UKM horizon is approximately 20 feet north of the fault and 110 feet south of the fault. This abrupt change in thickness is inconsistent with the isopach contour map for the UKM horizon.
- (4) In reviewing the structural contour maps, another apparent discrepancy was observed. At the location of 743280 (easting) and 534750 (northing), the top of the HJ horizon is at 6600 ft-MSL. At that same location, the top of the overlying LCS unit is less than 6600 ft-MSL. The isopach mapping for the LCS unit indicates a thickness of 10 to 20 feet.
- (5) On table 2.7-5, wells LC27M and LC28M are listed as completed in the HJ horizon. In the December 12, 2008 submittal (Volume 2), well LC27M is listed as a HJ Sand well. However, in the January 2009 submittal, wells LC27M and LC28M are depicted on the potentiometric contour map for the KM horizon. Furthermore, the boring logs for those wells in the submittal to WDEQ shows the completed horizon within the KM horizon.
- (6) In the December 12, 2008 response (Volume 3), the elevation for the top of casing for well HJMP-101 is listed at 6903.70 ft-MSL in Table 3-1 but as 6950.96 ft-MSL in Appendix A. (Also, the elevation is listed as 6903.70 ft-MSL in the boring log in the WDEQ submittal. Through staff's calculation, it is more likely that the 6950.96 FT-MSL elevation is correct.
- (7) Staff reviewed the locations of the nearby domestic and stock wells and determined that the information is consistent on the table and figures presented in the December 12, 2008 submittal.

*LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. **Therefore, this is an open issue.***

b. **Draft SER 2.3 (TR Section 2.6)
Proper Seismological Design Criteria**

In the TR, LCI proposed using the uniform building code (UBC) design criteria to meet the seismologic criterion in accordance with the then existing Wyoming regulations. However, since submittal of the TR, Wyoming adopted the international building code (IBC) in lieu of the UBC to their regulations. The primary difference with respect to seismological design criterion; the IBC criterion is based on a recurring interval of 2,500 years whereas the UBC criterion was based on a 500-year recurrence interval. During the September 25, 2009 Tele-conference call, LCI committed to adhere to the existing regulations for the design criterion.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is an open issue.

c. **Draft SER 2.4.1 (TR Section 2.7.1) (RAI Responses 12/12/08 2.7.1 #1 through #4)
Mitigation efforts for any Surface Water Inundation**

In the TR, LCI included information on surface water flow regime. NRC staff questioned whether or not the estimated flows were representative of the entire proposed licensed area and what measures were to be undertaken to minimize issues related to inundation or erosion from surface water flows.

In the December 12, 2008 responses to RAIs, LCI indicated that the evaluation in the TR represented the worst case and thus applicable for the entire area. LCI committed to installing a berm around the CPP and measures to mitigate erosion in areas in which flooding may occur.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

d. **Draft SER 3.12; 6.1 (TR Sections 3.3 & 6.2) (RAI Responses 12/12/08 3.3 #3, 6.2 #15 & #16) Insufficient Disposal Capacity**

In the TR, LCI stated that two to four deep injection wells would be installed. LCI estimated in an RAI that the capacity of each disposal well will be 100 gpm. NRC staff notes that if only two wells are installed and there is a failure of a disposal well, one well will not be sufficient to handle the concentrated brine during restoration (130 gpm). Two wells are not sufficient if there is a pond failure and all liquid waste is sent to the deep disposal well (226 gpm).

In the December 12, 2008 response to RAIs, LCI provided details on the calculation of the maximum liquid disposal capacity. It was estimated that if one well disposal well or one pond was not operational, the remaining facility storage/disposal capacity would be sufficient for two weeks. In the unlikely event that the remaining storage capacity is insufficient, LCI committed to ceasing operations until the disposal capacity is sufficient.

The staff has determined that the response is adequate and needs to be included in the Technical Report. Note that LCI will be required to maintain, at a minimum, hydraulic control of wellfields in which remnant lixiviant exists in the production aquifer. Ceasing operations must not include ceasing hydraulic control. Estimation of disposal capacity during an emergency situation must take into account the waste stream from the minimum hydraulic control.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

**e. Draft SER 3.1.2 (TR Section 3.2.2) (RAI Responses 12/12/08 3.2 #11)
Approval of Wellfield Packages**

In the TR, LCI indicated that individual Mine Unit Hydrogeologic Testing Plans and Reports will be submitted to Wyoming Department of Environmental Quality. The staff requested that the applicant commit to the submittal of those reports to, and approval by NRC prior to operations.

In the December 12, 2008 response, LCI committed to submit wellfield packages to NRC for review and approval until the NRC staff is satisfied with LCIs management experience and the SERP Process.

LCI acknowledged this confirmatory item and indicated that a license condition will be required for the submittal and approval of individual Mine Unit Hydrogeologic Testing Plans and Reports (aka Packages) to the NRC. Therefore, this is an open issue pending staff review of the proposed license condition.

**f. Draft SER 3.1.2 (TR Section 3.2.2) (RAI Responses 01/16/09 3.2 #9 & 10)
Cumulative Drawdown**

In the TR, LCI used an analytical drawdown analysis to estimate the cumulative drawdown by its operations. The staff inquired about the methodology, whether or not it accounted for the effects of the fault, and determine whether or not the cumulative drawdown posed a problem for operations.

In the January, 16, 2009 response, LCI used a transmissivity of 144 ft²/d, storativity of 7e-5 and thickness of the HJ horizon of 120 feet and predicted a drawdown at the end of production and restoration operations at an average pumping rate of 175 gpm would be 177 ft at 2 miles from the centroid of production and 147 ft at 3 miles if all production was done on one side of the fault. With production on both sides of the faults they predicted that drawdown would be 89 feet at 2 miles and 74 feet at 3 miles. LCI provided a figure which showed the magnitude of the drawdown in the mine units near the centroid of about 160 ft which would dewater the production aquifer. LCI provided an analysis of drawdown and a description of how it will operate the mine units near the fault to prevent dewatering.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

**g. Draft SER 3.1.2 (TR Section 3.2.2) (RAI Response 12/12/08 3.2 #1)
Perimeter Well Spacing**

In the TR, LCI proposed perimeter zone monitoring wells for horizontal excursion monitoring be located 500 feet apart on a ring set 500 feet from the nearest production well pattern. The staff requested supporting documentation for the proposed spacing.

In the December 12, 2008 response, LCI provided supporting evidence for the adequacy of the location of these monitoring wells.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

**h. Draft SER 3.1.2 (TR Section 3.2.2.2) (RAI Response 12/12/08 3.2 #1)
Perimeter Well Screened Interval**

In the TR, LCI proposed screening of the perimeter zone monitoring wells at the selected ore zone and not the entire HJ Horizon. The staff requested justification for the selective screened interval.

In the December 12, 2008 response, LCI stated that WDEQ requires that the ring wells only be completed in the "HJ Horizon" sand which is being targeted for extraction and provided supporting evidence for why this completion is sufficient.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

**i. Draft SER 3.1.2 (TR Section 3.2) (RAI Response 12/12/08 3.2 #7)
Instrumentation, Alarms and Control Systems in Well Fields**

In the TR, LCI provided only a general commitment to have the proper instrumentation, alarms and control systems. The staff requested more specific information.

In the December 12, 2008 responses to RAIs, LCI provided additional detailed information on the instrumentation, alarms and control systems to be used in the process plant and well fields.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

**j. Draft SER 3.1.2 (TR Section 3.2.2.2) (RAI Response 12/12/08 3.2 #6 and #7)
Field Inspection Program**

In the December 12, 2008 responses to RAIs, LCI provided additional detailed information on the field inspection program to ensure timely detection of spills or leaks.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

k. **Draft SER 6.1.3 (TR Section 6.2.3) (RAI Response 12/12/08 6.2 #13)
Biore Restoration as an Alternative Method**

In the TR, LCI indicated that the addition of biological reductants may be evaluated as an experimental technology for aquifer restoration. The staff requested more specific details on the use of biological reductants as the technology is still in experimental phases.

In the December 12, 2008 responses to RAIs, LCI indicated that use of biological reductants is only speculative and should be considered an alternative restoration method. LCI committed to providing details on any biore restoration methodology in a decommission plan for a mine unit which will be submitted to NRC for approval prior to the use of biore restoration.

The staff notes that the plan may be a well field restoration plan in lieu of a decommission plan; NRC staff will not accept use of biore restoration methods approved through the SERP process without prior NRC approval.

*LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. **Therefore, this is a confirmatory item.***

l. **Draft SER 6.1.3 (TR Section 6.2.3) (RAI Response 12/12/08 6.2 #14)
Comprehensive Safety Plan for Use of Reductants**

In the TR, LCI indicated that the addition of reductants may be used as part of the groundwater treatment phase of the aquifer restoration. LCI lists examples of typical reductants as hydrogen sulfide or sodium sulfide; their preference was sodium sulfide due to safety concerns for handling and storing hydrogen sulfide. LCI committed to implementing a comprehensive safety plan for use of reductants. The staff requested more details on the safety plan.

In the December 12, 2008 responses to RAIs, LCI indicated that a plan at this time was premature but listed issues to be addressed by a plan and that the plan will be implement on after a review by the SERP.

*LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. **Therefore, this is a confirmatory item.***

m. **Draft SER 6.1.3 (TR Section 6.1) (RAI Response 12/12/08 6.2 #11 & #12)
Perimeter Well Screened Interval**

In the TR, LCI indicated criteria to be used to determine when principal activities at a mine unit are completed. The staff requested more information with respect to requirements for timeliness of decommissioning as outlined in 10 CFR 40.42

In the December 12, 2008 responses to RAIs, LCI indicated that should a mine unit be shut down, decommissioning will commence within 24 months. Furthermore, LCI committed to notify NRC of the transition to restoration.

While meeting one criterion, LCI responses did not completely address all issues. First, for clarification purposes, NRC is using terms well field and mine unit interchangeably. Most importantly, the applicant is directed to the letter dated July 7, 2008 (ML081480293) from NRC to an existing licensee which documents NRC position on compliance with the timeliness of decommissioning regulations. Note that "principal activities" is defined as the last date of lixiviant injection. Four conditions would trigger NRC notification of decommissioning (restoration) activities: the license has expired, the licensee has decided to permanently cease principal activities, no principal activities have been conducted for 24 months under the license, or no principal activities have been conducted in a specific wellfield. Restoration of a wellfield must be completed within 24 months after initiation of restoration unless an alternate schedule is approved.

With respect to LCI reference that a well field may be temporarily shut down for an extended period, the staff's position is that the hydraulic control (i.e., inward hydraulic gradient in each wellfield) and excursion monitoring will be maintained by the licensee during any hiatus between the cessation of principal activities and the start of restoration activities.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. LCI asked staff whether or not this item was equivalent to prior LCI acknowledgement that the proposed schedule was an alternative schedule. The staff indicated that to a large extent it was but that LCI should use the terminology "principal activities" in the narrative. Therefore, this is a confirmatory item.

n. **Draft SER 6.1.3 (TR Section 6.0) (RAI Response 12/12/08 6.2 #6; RAI Response 02/27/09 6.2 #5)
Restoration at Multiple Mineralization Zones**

In the TR, LCI proposed that restoration will proceed on the well-head by well-head basis in lieu of the entire wellfield. LCI proposed that once production is completed for wells at a particular wellhead, that portion of the wellfield will immediately start restoration. LCI further states that the production and restoration processes within a wellfield may be buffered by one or two well houses. In Section 3.2.2 Mine Unit Design, 3 LCI proposed sequencing to the restoration process within a wellfield that has multiple mineralizations within the production aquifer. Production will proceed from the lowest mineralization to the uppermost mineralization. Restoration will be initiated after production from the uppermost mineralization is complete and proceeds downward. The staff questioned the viability on a method for partial restoration of the production aquifer.

In the December 12, 2008 response, LCI indicated that the entire HJ Horizon will be treated as a single unit. In the February 2009 reply, LCI indicated that multiple wells will be utilized during production of the first mine unit and that all levels will undergo restoration at the same time. LCI indicated that stacked restoration techniques may be applied to future mine units

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

The staff notes that a change to stacked restoration techniques will require review through the SERP process.

**o. Draft SER 6.1.4 (TR Section 6.1.4) (RAI Response 12/12/08 6.2 #10)
Successful Analog Examples of the Proposed Restoration Methods**

In the TR, LCI utilized six (6) pore volumes for restoration in the financial surety calculations. The staff requested justification for the six pore volumes.

In the December 12, 2008 response, LCI provided justification for their PV estimates by providing a technical memorandum that evaluates analogs of restorations at existing facilities where similar restoration methods have been used successfully. In addition, LCI proposed a strategy to adjust the PV estimates as needed as the restoration work proceeds.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

**p. Draft SER 6.1.5 (TR Section 6.1.4) (RAI Response 12/12/08 6.2 #10)
Source of Porosity Values used in Surety Calculations**

In the TR, LCI used a porosity of 0.26 to calculate the pore volume. The staff requested the applicant to provide the source of that estimate.

In the December 12, 2008 response, LCI reports that the 26 percent value for effective porosity was based on core samples from numerous areas on the property.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

**q. Draft SER 6.1.5 (TR Section 6.2.3) (RAI Response 01/16/09 6.2 #8)
Corrected Pore Volume Calculations**

In the TR, LCI stated in the narrative that both horizontal and vertical flare factors were estimated at 20 percent; however, the surety calculations utilized flare factors of 10 percent. The staff asked about this discrepancy.

In the January 16, 2009 response, LCI reiterated their opinion that a flare factor of 20 percent was appropriate based on data for existing facilities and may be less at the LCI site due to the scale of the proposed restorations (on the well house scale). LCI corrected the calculations yielding a PV of 59.97 million gallons for Mine Unit 1.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

r. **Draft SER 6.1.5 (TR Section 6.2.2) (RAI Response 12/12/08 6.2 #2)
Standards for Aquifer Restoration**

In the TR, LCI stated that the goal of the groundwater restoration is to return the groundwater quality to pre-operational class-of-use. In Section 6.2.5, LCI reported that it will conduct daily, weekly, and monthly analyses to track restoration progress. LCI stated it would sample all monitoring wells at the end of the active restoration phase for parameters listed in Table 6.2-1. It said these values would be compared to the baseline average to help ensure class-of-use criteria have been met. The staff asked the applicant to commit to restoration standards in 10 CFR Part 40 as class-of-use is a state-standard and not promulgated by NRC regulations.

In the December 12, 2008 response, LCI committed to the standards identified in Criterion 5B (5) of 10 CFR Part 40, Appendix A. Those standards are background, the values in the table in Criterion 5C of 10 CFR Part 40, Appendix A, or an alternate concentration limit established by NRC in accordance with Criterion 5B(6).

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

s. **Draft SER 6.1.5 (TR Section 6.2.2) (RAI Response 01/16/09 6.2 #3)
Standards for Aquifer Restoration**

In the TR, LCI proposed to set Restoration Target Values (RTVs) for the LC mine units as class-of-use determined from baseline water quality. For wells in the perimeter monitoring ring and in overlying and underlying aquifers, LCI stated that class-of-use would be determined on a well-by well basis. For the mine unit pattern area, the baseline water quality will be averaged to determine the class-of-use for that mine unit. Baseline water quality will be collected from all wells in accordance with a testing proposal submitted to WDEQ for review and approval. NRC staff notes that as LCI has revised its goal of restoration to pre-operational baseline water quality. Therefore the RTVs must be based on baseline water quality and not class-of-use as proposed.

In the January 16, 2009 response, LCI committed to restoration on the perimeter monitoring ring on specific baseline water quality based on a well-by-well basis.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

t. **Draft SER 6.1.6 (TR Section 6.2.2) (RAI Response 01/16/09 6.2 #3)
Ground Water Restoration Monitoring**

In Section 6.2.5, LCI reported that it will conduct daily, weekly, and monthly analyses to track restoration progress. LCI stated it would sample all monitoring wells at the end of the active restoration phase for parameters listed in Table 6.2-1. It said these values would be compared to the baseline average to help ensure class-of-use criteria have been met. LCI has committed to meet pre-operational baseline average water quality, the reference to class-of -use should be removed.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

u. **Draft SER 6.1.6 (TR Section 6.2.2)
Excursion Monitoring During Restoration/Stability**

LCI did not specifically state in Section 6.0 how often it would monitor for excursions in the overlying/underlying and well ring monitoring wells during restoration and stability monitoring. LCI did, however commit to monitoring these wells for excursions on the same schedule used during production operations in Section 5.7.8.2.

LCI responded that it thought that monthly not bi-weekly sampling was proposed for the restoration phase in the application. LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is an open issue.

v. **Draft SER 6.1.7 (TR Section 6.2.4) (RAI Response 01/16/09 6.2 #17)
Stability Monitoring Period**

In Section 6.2.4, LCI stated that once restoration has been completed, they will begin a six month stability period to demonstrate that the restoration standard has been adequately maintained. In an RAI (Section 6.2, No. 17, Dec. 2008), LCI committed to a nine month monitoring period and provided a basis for the time period based on returning the ore body to pre-operational reducing conditions.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

w. **Draft SER 6.1.7 (TR Section 6.2.4) (RAI Response 1/16/09 6.1 #6)
Well Screen Completions for Stability Monitoring**

LCI did not provide the screen location of the wells which would be used to monitor stability in the production zone. As the HJ production zone has three horizons separated by interbedded low permeability units which are not continuous, NRC staff was concerned there may be a difference in water quality in the different horizons during stability monitoring. LCI responded in an RAI (Section 6.1, No. 6, Dec. 2008) that the water quality in the HJ horizon is significantly consistent regardless of vertical position. NRC staff would like this supporting RAI text to be included in the application to justify that stability monitoring data will be representative of the entire HJ zone.

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly. Therefore, this is a confirmatory item.

4. HYDROGEOLOGY ADMINISTRATIVE ITEMS

a. **Draft SER 5.7.8 (TR Section 5.7.8)
Long-term (60-day) Excursion Monitoring Requirement**

The NRC staff will require that LCI terminate lixiviant injection, or, provide additional reclamation surety that is agreeable to the NRC, if an excursion cannot be remediated within 60 days of confirming the excursion. Please provide such a commitment in the application. Regulatory basis: 10 CFR Part 40 Appendix A, Criterion 5D.

LCI acknowledged that this is a NRC requirement and will include in the technical report. This is an open issue.

b. **Draft SER 3.2 (TR Section 3.2) (RAI Response 12/12/09 3.2 #7)
Lack of Header House Schematic and Frequency of Inspection**

In the December 12, 2008 response, LCI provided details on the instrumentation, alarms and controls but did not include a schematic of header house piping and instrumentation or a statement on the frequency of header house inspections. The staff has determined that the response is adequate with the additional schematic and statement on the frequency (pending review) which needs to be included in the Technical Report.

LCI proposed that a schematic would be considered confidential due to proprietary information. The staff indicated that the schematic can be submitted as confidential if accompanied by a completed affidavit (10 CFR 2.390), which will be reviewed for appropriateness by the staff. If the information meets the criteria for confidentiality, then the information will be reviewed as such. If not, the information will be returned to Lost Creek ISR, LLC. This is an open issue.

5. HEALTH PHYSICS OPEN ISSUES

a. **Draft SER 2.6 Background Radiation Characteristics (TR Section 2.5.5.2) (RAI Response 12/12/09 2.9 #1a; 8/5/09 5#2)**

10 CFR Part 40 Appendix A, Criterion 7 requires a preoperational monitoring program in place for one year prior to any major site construction to establish a complete baseline. The baseline is required to meet operational requirements of Criterion 7, such as (1) measure/evaluate compliance with applicable standards and regulations, (2) evaluate performance of control systems and procedures, (3) evaluate environmental impacts of operation, and (4) detect potential long-term effects.

- (1) The applicant collected radon data for three calendar quarters. These results do not represent a minimum of twelve months of consecutive data as recommended by Regulatory Guide 4.14 nor is there justification from the applicant for collecting less data. Therefore, staff cannot conclude that pre-operational air radon sampling

results accurately reflect site-specific conditions. Regulatory Basis: 10 CFR Part 40 Appendix A, Criterion 7. **This is an open issue.**

- (2) It is not clear in the TR what criteria the applicant used in determining where to place the radon monitors and air particulate samplers. The applicant provided criteria in the response dated August 5, 2009.
- (a) After reviewing the response, it is still not clear to the staff why the applicant chose location HV5 nor why samplers were only co-located at HV1 and HV4. Without this information, NRC staff cannot determine whether or not the placement of the preoperational radon monitors and air particulate samplers is consistent with Regulatory Guide 4.14. Regulatory Basis: 10 CFR Part 40 Appendix A, Criterion 7. **This is an open issue.**
- (b) It is not clear that the location of estimated maximum concentrations of radioactive materials was taken into account in selecting the locations of the air particulate samplers. NRC staff cannot determine if the placement of the preoperational air particulate monitors, other than the Bairoil monitor, is consistent with Regulatory Guide 4.14. Regulatory Basis: 10 CFR Part 40 Appendix A, Criterion 7. **This is an open issue.**

LCI agreed to provide their rationale for the location of the monitors. Lost Creek will check to make sure that they had not provided basis for not co-locating radon monitors and air particulate samplers. It may be attached to the January 2009 response. If not, they will provide the information.

Note: The staff stated an assessment of the background radiation of the site is essential before operations begin because the licensee is only responsible for radiation exposures, releases, and decommissioning of residual radioactivity that is above background. Therefore, it is in the applicant's best interest to assess the type and location of the highest radiation within the permitted area before operations begin.

Additionally, LCI must consider dose to the member of the public within the permitted area because the permitted area consists of Bureau of Land Management (BLM) property and hunting areas. Dose assessments to the public must be made within the permit boundaries and to ensure compliance with 10 CFR 20.1101(b); 20.1301, Appendix B, Table 2.

b. **Draft SER 2.6.3 Vegetation, Food, and Fish Sampling (TR Section 2.2.1) (RAI Response 12/12/09 2.9 #3, 6; 8/5/09 5#1)**

Regulatory Guide 4.14 recommends collecting (1) vegetation samples from three locations near the site in three different sectors having the highest predicted airborne radionuclide concentrations due to milling operations, (2) three food samples that include crops, livestock etc. within 3 km of the site, and (3) fish samples in each body of water.

The applicant identified three grazing allotments which provide forage for cattle, horses and sheep. The applicant stated that there will be no radiological impact on vegetation based on its operations producing yellowcake slurry. Therefore, the applicant did not

initially perform preoperational vegetation sampling. However, NRC staff notes that baseline data is also used to assess the impacts of unusual releases due to spills, accidents, etc. In addition, radon releases can lead to radionuclide foliar deposition and uptake by vegetation of radon daughter products.

Per the August 5, 2009 response, LCI ran the MILDOS computer code to determine the location of maximum contamination deposition. The locations that resulted from this analysis were "closer to the plant site than anticipated". Since previous public dose estimates were arbitrarily analyzed at the permit boundaries, the staff questions if this new analysis changed the predicted maximum expected public dose from operations. MILDOS results need to be provided and reviewed by the NRC staff. **This remains an open issue.**

LCI understands the question and agreed to provide information.

c. **Draft SER 2.6.4 Direct Radiation (TR Section 2.9) (RAI Responses 12/12/09 2.9)**

(1) The first component of the direct radiation measurement program consisted of placing thermoluminescent dosimetry (TLD) badges in the same locations as the radon samplers. These locations are shown in Figure 2.6-1 of the TR. Results are presented in Table 2.6-1. As stated in Section 2.6.1, NRC staff can not determine if the placement of the radon and particulate air samplers are consistent with Regulatory Guide 4.14. In addition, the locations for the radon and particulate air samplers are not the same. Because of these issues, NRC staff can not determine if the placement of the TLD badges is consistent with Regulatory Guide 4.14. Therefore, staff can not find the placement of TLDs associated with particulate air samples acceptable. **This is an open issue.**

LCI thought they actually addressed this issue, agreed to provide information.

(2) The second component of the applicant's direct radiation measurement program consisted of characterizing the permit area by measuring gamma exposure rates with the use of sodium iodide detectors mounted to off-highway vehicles (OHVs). The sodium iodide detectors were paired with global positioning system (GPS) receivers. Simultaneous GPS and exposure rate data for hundreds of thousands of gamma measurement throughout the Permit Area were recorded using an onboard personal computer. Although the applicant did not collect direct radiation measurements in accordance with Regulatory Guide 4.14, the applicant did take a sufficient number of gamma survey measurements to support an adequate characterization of the Permit Area. The staff has determined that the approach was reasonable for preoperational environmental monitoring and finds this aspect of their direct radiation program acceptable. **This issue has been resolved.**

d. **Draft SER 2.6.5 Background Radiation - Soil Sampling and 5.7.7.2.3 Operational Soil Sampling (TR Section 2.9 and 5.7.7) (RAI Response 12/12/08 2.9 and 5.7.7 and 8/5/09 #5)**

- (1) The applicant did not perform preoperational subsurface soil sampling as recommended by Regulatory Guide 4.14. In its January 16, 2009 response to NRC staff's November 6, 2008 request for additional information, the applicant committed to collecting these subsurface soil samples. At this time, staff cannot determine if preoperational subsurface soil sampling is consistent with Regulatory Guide 4.14. Regulatory basis 10 CFR 40, Appendix A, Criterion 7 and 6(6). **This is an open issue.**
- (2) The applicant has not committed to Pb-210 analysis consistent with Reg Guide 4.14. Regulatory basis 10 CFR 40, Appendix A, Criterion 7. **This is an open issue.**

LCI stated they have the subsurface and tissue samples and will provide the data. They collected the Pb-210 and agreed to provide information.

e. Draft SER 2.6.6 Sediment Sampling and 5.7.8 Surface Water Sampling (TR Section 2.9) (RAI Responses 12/12/09 2.9)

- (1) In Section 2.2.1 of the Technical Report, the applicant identifies four BLM stock ponds in the vicinity of the Permit Area. NRC staff cannot conclude whether these stock ponds are subject to drainage from potentially contaminated areas and therefore whether the applicant's approach for preoperational offsite sediment and offsite operational surface water sampling consistent with Regulatory Guide 4.14. **This remains an open issue until resolved.**

LCI stated they have the locations identified on a topo map, which indicates elevations. The NRC staff agreed that the map would provide the information needed for the staff's evaluation.

- (2) Note the following was not discussed in the meeting: The applicant stated in section 2.9 in the TR that sediment samples were not collected because there is no perennial surface water (page 2.9-1). Yet the applicant collected storm water samples. Sediments should have been collected in the storm water channels. The applicant should include sediment samples in these areas or an explanation as to why these locations were not included in the baseline and the proposed operational monitoring program. **This is an open issue.**

f. DSER 5.7.1 and 4.2.1.3 Dose to public/Release of Pregnant Lixiviant/System Failure (TR 5.7.1.2 and 5.7.1.3, 4.2.5.5) (RAI Responses 12/12/09 5.7.1 #1 and #3; 1/16/09 5.7.1 #3a.; 8/5/09 #6)

- (1) An analysis of the maximum exposed member of the public is at issue. The NRC questions what constitutes the place the time and place where the maximum exposed person resides. Could a hunter or someone else within the permitted area receive the maximum exposure as a member of the public? NRC staff notes that LCI has not presented a basis for relying on modeling alone with no monitoring data to validate the model. **This is an open issue.**

LCI agreed to examine the situation. No other resource development will occur within the permit area. LCI agreed to provide additional information.

- (2) Note the following was not discussed in the meeting: In section 4.2.5.5 of the TR, the applicant has stated that no liquids will be stored in the header houses, but the sumps in the buildings will be equipped with fluid detection sensors wired to automatic alarms and shutoffs in the event of a pipeline or pump failure. The CPP will be equipped with concreted containment curbing and sumps to contain and recover any releases within the plant. However, a recent accident at another ISR facility resulted in an event that exceeded the limits and released effluent to the general environment outside the plant. The applicant will need to address the contingency plans for a failure that exceeds the capacity of the sumps and the curbed floor (volume). Potential exposure to members of the public that may be in the exposed area (e.g. a hunter) and verification that the soil is not contaminated must be included in the corrective action and accident scenario. Note that a survey of the area without soil sample analysis is not sufficient to determine the area is free of contamination from the spill. Because of the low energy gammas emitted from U-238 and the low abundance of the U isotopes with higher specific activity, soils in the spill area may contain U that exceeds unrestricted limits, but yield background radiation exposure readings with a survey instrument. **This issue is an open issue.**

g. **Draft SER 5.7.3 Airborne Radiation Monitoring Program and 5.7.7 Airborne Effluent and Environmental Monitoring Program**

There has been no commitment to include analysis for Pb-210 in the operational air sampling program in accordance with Regulatory Guide 4.14 nor has there been a commitment to validate model results. **This is an open issue.**

LCI agreed to provide additional information.

h. **DSER 5.7.4 Worker dose calculations (TR 5.7.4) (RAI Responses 12/12/09 5.7.4 #5, #6, #7;8/5/09 #3)**

This issue is related to the derived air concentration (DAC) issue previously raised by the NRC staff. LCI must demonstrate how they will comply with 10 CFR 20, Subpart C. The Metzger *et al* paper cited described a mixed DAC under various stages in the ISR process. The calculations in the TR do not address calculations in accordance with 10 CFR 1204(c), (d), (e), and (f). **This is an open issue.**

LCI agreed to move forward with assuming that the yellowcake is a class W until they analyze the yellow cake, calculate solubility, and will provide the information needed.

The staff notes that not only the yellowcake needs to be addressed. LCI must include methods to determine exposures during routine and non-routine operations, maintenance, and clean-up activities as described in NUREG-1569, section 5.7.4. The class may vary depending on what stage of the process the worker is exposed.

i. **DSER 5.7.5 Bioassay (TR 5.7.5) (RAI Responses 12/12/09 5.7.5 #1; 8/5/09#2)**

The applicant stated that it would use urinalysis as the method of bioassay due to the relatively high solubility of the chemical form of yellowcake present at the ISR facility. The applicant has not justified using inhalation class D for the uranium in its facility. 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.

- (1) 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. **This is an open issue.**

LCI stated this has been discussed previously. Bioassay is really based on NUREG-0874. Low-fired yellowcake could contain Class W, but LCI still maintains the 30-day retention period is applicable for bioassay. LCI will refer to NUREG-0874, but agreed to provide information.

- (2) The applicant stated that the bioassay program would follow guidelines set forth in Regulatory Guide 8.22. However, the applicant did not specifically state what frequency specimens will be collected and evaluated for workers in the bioassay program. Since action levels are tied to the frequency that the specimens are collected and evaluated, without this information NRC staff cannot conclude that the frequency of specimen collection and evaluation is consistent with Regulatory Guide 8.22. **This is an open issue.**

LCI plans to justify the sampling frequency. May be special cases, as described in NUREG-0874. They plan to justify why Reg Guide 8.22 is appropriate.

- (3) NRC staff notes that while the applicant stated that the RSO will be responsible for documenting compliance with the Table 1 "Corrective Actions Based on Monthly Urinary Uranium Results" found in NRC Regulatory Guide 8.22, actual action levels were not specified that will apply for calculating dose as discussed in Section 5.7.4 of the TR and to determine compliance with 10 CFR 20.1201(e) for weekly soluble uranium intake. Without specific action levels tied to the applicant's worker dose calculations, NRC staff cannot conclude that the bioassay program is consistent with Regulatory Guide 8.22. **This is an open issue.**

LCI plans to justify action levels per Reg Guide 8.22.

- (4) The applicant has not provided a description of how bioassay results will be used to confirm results derived from its airborne radiation monitoring program and exposure calculations. Specifically, there is no discussion on the applicant's methods for evaluating bioassay data that result in calculated intakes. Without this information, NRC staff cannot conclude that the bioassay program is consistent with Regulatory Guide 8.9. **This is an open issue.**

LCI stated that typically under most cases, one assigns dose using the 10% DAC rule using DAC-hours and ALI. They do not need to use models or bioassays per NUREG-0874. LCI plans to justify procedure per NUREG-0874.

j. **Draft SER 5.7.6 Contamination Surveys**

- (1) The applicant's stated goal for no personal contamination above background is a good work practice and consistent with the applicant's ALARA philosophy stated in Section 5.3.3 of the Technical Report. However, NRC staff cannot determine what actions will be taken and what criteria will be used in the case of persons with contamination above background. Without this information, staff cannot determine if the applicant's personnel contamination program is consistent with Regulatory Guide 8.10. **This is an open issue.**

LCI stated they understand that the NRC needs to know what happens when personal contamination occurs above background. LCI agreed to provide the information.

- (2) The applicant's program for personnel surveys does not address the potential for other alpha emitting isotopes that may be present. The applicant has not demonstrated that it can account for and detect Ra-226 as well as other naturally occurring daughter products that were separated from the ore as a result of the uranium recovery operations, such as Th-230. Table 5.7.6-1 indicates that the lower limit of detection (LLD) for personal contamination self surveys will be 100 dpm/100 cm². Without this information, staff cannot determine if the applicant's personnel contamination program is consistent with 10 CFR 20, Subpart F, Enclosure 2 to Policy and Guidance Directive 83-23 and Regulatory Guide 8.10. Therefore, staff can not find the applicant's personnel contamination program acceptable. **This is an open issue.**

LCI understands and agreed to provide the information.

- (3) The applicant's program for personnel surveys does not address the potential for beta-gamma contamination that could result from maintenance activities, for example. NRC staff notes that according to Table 5.7.6-1 the applicant applies beta release limits to equipment contamination. Without this information, NRC staff cannot determine if the applicant's personnel contamination program is consistent with 10 CFR 20, Subpart F and Regulatory Guide 8.10. **This is an open issue.**

Response discussed below.

- (4) The applicant stated that surface contamination in plant areas would be assessed by visual inspection and measurement. Further, they state that surface contamination in restricted areas will be controlled to minimize the potential for resuspension of uranium dust that can result in inhalation or ingestion intake. The applicant did not propose any limits for surface contamination in restricted areas. Without this information, NRC staff cannot determine if the applicant's contamination program is consistent with 10 CFR 20, Subpart F and Regulatory Guide 8.10. **This is an open issue.**

Response discussed below.

- (5) For areas of the plant where work with uranium is not performed, the applicant stated that these areas will be surveyed (spotchecked) weekly for removable contamination (smear surveys). The applicant also stated that the goal for these areas is background and that areas that exceed the contamination limit of 1,000 dpm alpha per 100 cm² will be cleaned immediately and re-surveyed. Alternatively, total contamination surveys may be performed. If the total contamination level exceeds the removable contamination limit, the removable contamination level will be determined using smears. In any case, areas showing removable contamination in excess of 25 percent of the contamination limit will be cleaned and resurveyed. For the first criterion, the limit is 1,000 dpm alpha per 100 cm² removable contamination. In the second criterion, the limit is 250 dpm alpha per 100 cm² removable contamination. NRC staff finds these criteria for surveying these areas of the plant inconsistent. Without a consistent approach to surveying contamination in parts of the plant where work with uranium is not performed, NRC staff, can not conclude that the applicant's proposed program will be consistent with 10 CFR 20 Subpart F. **This is an open issue.**

Response for Items 3 through 5:

LCI stated it is controlling worker dose in the restricted areas where uranium work is not performed. LCI understands the NRC staff is interested in what action levels will be used in these areas. LCI agreed to provide the information. LCI stated they need some clarification on the alpha limits and need to address beta. They would like to use Regulatory Guide 8.30. LCI added that they could not have Th-234 and Pa-234 without the uranium present. LCI agreed to provide the information.

The NRC staff notes that the applicant can continue to use Regulatory Guide 8.30 until it is revised, but needs to understand that (1) the NRC staff is expediting the revision of the Regulatory Guide and (2) because the Regulatory Guide is not consistent with 10 CFR 20, the license will require a license condition.

k. **Draft SER 5.7.7.2 No radon or air particulate effluent monitoring program (TR Section 5.7.7) (RAI Responses 12/12/09 5.7.7 #1; 8/5/09 #6)**

- (1) In section 4.1.2, pages 4-3 and 4-4 of the TR, the applicant states that radon present in the bleed fluid may be liberated in the headspaces of tanks and that tanks will be vented to the atmosphere outside the building via a stack. The applicant did not demonstrate that the radon stacks will be monitored consistent with Regulatory Guides 8.37 and 4.14, Table 2 under "other stacks" or demonstrate why it is not necessary to do so. NRC staff cannot determine that the applicant's effluent monitoring program for gaseous effluents is in compliance with 10 CFR 1302(a), 10 CFR 40, Appendix A, Criteria 8, and 10 CFR 40.65 nor can it determine that the effluent monitoring program is consistent with Regulatory Guides 4.14 and 8.37. **This is an open issue.**
- (2) In the response dated August 5, 2009, the staff did not see an analysis of the maximally exposed member of the public nor did LCI address the failure to sample for airborne Pb-210 as recommended by RG 4.14. LCI needs to specifically state

whether or not it will perform these airborne samples and analysis in accordance with Regulatory Guide 4.14. **This is an open issue.**

LCI stated they would like to quote chapter and verse, and modern technologies that according to NUREG-1910, radon is the only effluent. For the purpose of effluent measurement and reporting of airborne particulates and radon to meet 10 CFR 40.65, they are not required to make measurements. NRC presents ways to estimate radon effluents. Would like to use the NRC approved effluents. Need to understand the mechanics of ISR. Would like to come back with their position.

Note only part of the following was discussed in the meeting. The NRC is providing additional information in response to the applicant's statements:

The NRC staff notes that although 10 CFR 40.65 allows for calculations to report effluent releases, the applicant has modeled doses based on the dissolved concentration of Ra-226 for the initial concentration of Rn-222, which may be much less than the actual Rn-222 source term. Although this method is recommended in by Faillace *et al* in "MILDOS-AREA: An Update with Incorporation of In Situ Leach Uranium Recovery Technology" (1997), the authors assume that dissolved radon in the groundwater is controlled by the concentration of radium in the host soil/rock and therefore is in equilibrium. Several studies show that Rn-222 concentrations in groundwater exceed Ra-226 concentrations by several orders of magnitude (Cecil *et al* 1991, Torgersen *et al* 1992). The disequilibria indicate that the Rn-222 concentrations are dependent on the characteristics of the aquifer rather than the Ra-226 concentration in the host soil/ore (Cook and Herezeg, ed. (2000)). Therefore, it is important to validate the modeling results with operational sampling.

Additionally, LCI misquoted NUREG-1910 stating that radon is the only effluent. The Lost Creek supplement environmental impact statement in the NUREG is a draft document and states that gaseous emissions are primarily radon. Note that radon, a noble gas having a 3.8-day half-life, is produced by the decay of Ra-226 in the uranium series and is transported from the uranium ore body by gaseous diffusion through soils and groundwater. Rn-222 emanates from soil into the atmosphere. Radon decay produces four short-lived progeny: polonium-218 (Po-218), lead-218 (Pb-218), bismuth-214 (Bi-214), and Po-214. The progeny have an effective half-life of approximately 30 minutes. Po-214 decay produces Pb-210 that has a 22-year half-life. The radon gas and particulate progeny are subject to dispersion. The particulates will form "attached" and "unattached" fractions that attach to airborne particles or charged surfaces and are subject to "wet" and "dry" deposition, whereas the gas remains in the atmosphere. Dispersion in the atmosphere prevents build-up of the radon and its progeny. However, the progeny can build-up within a few hours to equal the Rn-222 activity within buildings with poor ventilation. Because of the short-half lives of the progeny and the long air sampling intervals in the proposed environmental monitoring program, the progeny will have decayed, so the air particulate samples analyses should include Pb-210 in accordance with Regulatory Guide 4.14.

Also note that regulatory guides and standard review plans do not promulgate regulatory policy and are not substitutes for legally binding regulatory requirements and thus, compliance with them is not required. Standard review plans provide guidance to the

NRC staff on how to evaluate license applications and the regulatory guides provide the applicant/licensee with acceptable methods to perform functions to meet regulatory requirements. Procedures different from those described in the guides are acceptable if they provide a basis for the staff to evaluate and support a conclusion that the procedures meet NRC's regulations.

References:

Cecil L.D., Senior L.A. and Vogel K.L. (1991) Radium-226, radium-228, and radon-222 in groundwater of the Chickies Quartzite, Southeastern Pennsylvania. In *Field Studies of Radon in Rocks, Soils, and Water*, eds. L.C.S. Gundersen and R.B. Wanty, pp. 267-277. C.K. Smoley, Boca Raton, Florida.

Torgersen T., Benoit J., and Mackie D. (1992) Lithological control of groundwater ²²²Rn concentrations in fractured rock media. In *Isotopes of Noble Gases as Tracers in Environmental Studies*, pp. 263-287. IAEA, Vienna.

Cecil L.D. and Green J.R. (2000) Radon-222 in groundwater of the Chickies Quartzite, Southeastern Pennsylvania. In *Environmental Tracers in Subsurface Hydrology*, eds. P.G. Cook and A.L. Herezeg, pp. 175-194. Kluwer Academic Publishers, Norwell, Massachusetts.

I. DSER 5.7.7.2.3 Soil Sampling (TR Section 5.7.7) (RAI Response 12/12/08 5.7.7)

In its December 12, 2008 response to NRC staff's November 6, 2008 request for additional information, the applicant committed to cleaning up spills of lixiviant or yellowcake slurry outside the fenced area to decommissioning standards then sampling the affected soil to ensure cleanup was successful. However, the applicant did not develop soil cleanup criteria for uranium or other radionuclides as appropriate. NRC staff cannot conclude that the applicant can meet its commitment to clean up spills to decommissioning standards. **This is an open issue.**

LCI stated they collected the Pb-210 data and agreed to provide information.

m. Draft SER 7.1 Chemical Accidents and 7.2 Radiological Release Accidents (TR Section 7.4)

(1) The applicant did not address the potential for accidents in the CPP or header houses involving chemicals that will be used on site. The use of the following chemicals was discussed in the TR and included in the effect of potential transportation accidents:

- hydrochloric acid
- sulfuric acid
- hydrogen peroxide
- hydrogen sulfide/sodium sulfide
- sodium carbonate/sodium bicarbonate
- oxygen
- carbon dioxide

The applicant identified that all of the buildings will be adequately ventilated to minimize radon exposure, which will also reduce the opportunity for buildup of explosive gases, such as oxygen in the CPP and header houses. To comply with NUREG-1569, the applicant should address designs and measures, for each chemical, to prevent the occurrence of an accident and the development of emergency response procedures in the event of an accident. **This is an open issue.**

- (2) The applicant did not address the possibility of scenarios resulting in multiple tank failures such as a failure that would cause a tank to topple into another tank or if the volume of the spill exceeds the capacity of the sumps and the curbed floor. **This is an open issue.**

LCI understands the question and agreed to provide information.

6. HEALTH PHYSICS CONFIRMATORY ITEMS

a. Draft SER 2.6 Background Radiation Characteristics (TR Section 2.5.5.2) (RAI Response 12/12/09 2.9 #1a; 8/5/09 5#2)

- (1) The applicant provided additional information on the criteria for selecting radon and air particulate sampling locations in the response dated August 5, 2009. This information and the maps provided need to be in the TR. **This is a confirmatory item.**
- (2) Additional radon and air sampling results described in responses dated December 12, 2008 and January 16, 2009 need to be included in the TR. **This is a confirmatory item.**

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly.

b. Draft SER 2.6.3 Vegetation, Food, and Fish Sampling (TR Section 2.2.1) (RAI Response 12/12/09 2.9 #3, 6; 8/5/09 5#1)

Responses dated January 16 and August 5, 2009 provided sampling data, MILDOS data and results, and locations of samples. All vegetation sampling information as well as the MILDOS data and results included in this correspondence needs to be included in the TR. **This is a confirmatory item.**

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly.

c. Draft SER 2.6.4 Direct Radiation (TR Section 2.9) (RAI Responses 12/12/09 2.9)

Direct radiation information provided in the response dated January 16, 2009 needs to be included in the TR. **This is a confirmatory item.**

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly.

- d. **Draft SER 2.6.5 Soil Sampling (TR Section 2.9) (RAI Responses 12/12/09 2.9 and 8/5/09 5)**

Additional soil sampling data and the information provided in the response dated December 12, 2009 needs to be in the TR. **This is a confirmatory item.**

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly.

- e. **Draft SER 2.6.6 Sediment Sampling (TR Section 2.9) (RAI Responses 12/12/09 2.9)**

Additional sediment sampling data and the information provided in the response dated December 12, 2009 needs to be in the TR. **This is a confirmatory item.**

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly.

- f. **DSER 5.7.4 Worker dose calculations (TR 5.7.4) (RAI Responses 12/12/09 5.7.4 #5, #6, #7; 8/5/09 #3)**

Note the following was not discussed in the meeting: On page 5-37 of the TR, the applicant references ICRP report 68 in the exposure calculations. 10 CFR 20 is based on ICRP reports 26 and 30. The applicant must request approval to use ICRP-68. Reference: NUREG 1736, page 51 and Regulatory Guide 8.25, section 4. Regulatory basis: 10 CFR 20.1204(c). **This is a confirmatory item.**

- g. **DSER 5.7.5.5 Records and Reporting (TR 5.7.5)**

For employees who are monitored for internal and/or external exposure, recording and reporting of monitoring results are required in accordance with 10 CFR 20, Subpart L and 10 CFR 20 Subpart M. The applicant states that records of bioassay results will be maintained until license termination on a form compliant with Regulatory Guide 8.7, Revision 1. In addition, Section 5.2 of the Technical Report describes the recordkeeping and reporting activities proposed by the applicant. NRC staff has determined that the applicant's recordkeeping and reporting activities are consistent with Regulatory Guide 8.30 and meets the requirements for 10 CFR 20, Subparts L and M. Therefore, the staff finds the applicant's program acceptable. However, the current revision of Regulatory Guide 8.7 is Revision 2 and the applicant should use the most current version of this regulatory guide. **This is a confirmatory item.**

- h. **DSER 5.7.7.2 Environmental Monitoring**

(1) In its December 12, 2008 response to NRC staff's November 6, 2008 request for additional information, the applicant stated that the preoperational monitoring location URPA -7 (See Figure 5.7.7.2) represents background conditions. The

URPA-7 location corresponds to monitoring location PR-4 for operations. Based on wind data presented by the applicant (see Section 2.2 of this SER), NRC staff finds the monitoring location PR-4 acceptable for representing background conditions. However, the applicant's description of this monitoring station as the one representing background conditions is not included in the Technical Report. **This is a confirmatory item.**

- (2) Also in its December 12, 2008 response to NRC staff's November 6, 2008 request for additional information, the applicant stated that an additional location will be added for monitoring radon. This location corresponds to SEB1 in Figure 5.7.7-3. SEB1 represents the receptor location with the maximum calculated potential dose. NRC staff finds the placement of this radon monitor around the Permit Area consistent with Regulatory Guide 4.14. However, the applicant's description of the SEB1 radon monitoring station is not included in the Technical Report. **This is a confirmatory item.**

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly.

i. **DSER 5.7.7.2.4 Sediment Sampling**

The only onsite surface water body identified by the applicant is Crooked Well Reservoir, which is dry for the majority of the year, but fills with snow melt during the months of March and April. In the applicant's December 12, 2008 response to NRC staff's November 6, 2008 request for additional information, they stated that Crooked Well Reservoir is located upstream of any project activities. NRC staff concludes that this reservoir is not subject to drainage from potentially contaminated areas and therefore the applicant's approach for onsite sediment sampling is consistent with Regulatory Guide 4.14. Therefore, the staff finds the applicant's approach for onsite sediment sampling acceptable. However, the applicant's supporting analysis is not included in the Technical Report. **This is a confirmatory item.**

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly.

j. **DSER 5.7.7.2.5 Food and Fish Sampling**

In its December 12, 2008 response to NRC staff's November 6, 2008 request for additional information, the applicant stated that there is insufficient water in the area to support aquatic life so fish sampling will not be performed. NRC staff concludes that the applicant's reason for not collecting fish samples during operations is consistent with Regulatory Guide 4.14. Therefore, staff finds the applicant's reason for not collecting fish samples during operations acceptable. However, the applicant's supporting analysis is not included in the Technical Report. **This is a confirmatory item.**

k. **DSER 5.7.8 Environmental Monitoring - Surface Water Sampling**

- (1) In Section 2.7.1.1 of the TR, the applicant identified one small (less than one-quarter acre) detention pond within the Permit Area as the Crooked Well Reservoir and acts as an off-channel storage area for stock watering. The applicant further stated that this pond is dry for the majority of the year but fills with snow melt during the months of March and April. According to the applicant, wetland vegetation has not been observed around this impoundment. Lastly, in the applicant's December 12, 2008 response, they stated that Crooked Well Reservoir is located upstream of any project activities. NRC staff concludes that this reservoir is not subject to drainage from potentially contaminated areas and therefore the applicant's approach is consistent with Regulatory Guide 4.14. However, the applicant's supporting analysis is not included in the Technical Report. **This is a confirmatory item.**
- (2) In its December 12, 2008 response to NRC staff's November 6, 2008 request for additional information, the applicant committed to installing an automatic sampler in the downstream and upstream channel of any drainage impacted by a spill to quantify the radionuclide content of the water during the next precipitation event that results in flow in the channel. NRC staff finds this approach consistent with Regulatory Guide 4.14. However, this commitment is not included in the Technical Report. **This is a confirmatory item.)**

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly.

l. **DSER 6.4 Methodologies for Conducting Post Reclamation and Decommissioning Radiological Surveys (TR Section 6.5) (RAI Response 12/12/09 6.5 #1-5)**

The applicant's response provided to the RAI is consistent with the guidance provided in NUREG-1569, however this information is not included in the Technical Report. **This is a confirmatory item.)**

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly.

m. **DSER 7.2 Radiological Release Accidents (TR Section 7.4) (RAI Response 12/12/09 7.4 #3)**

The applicant stated in the December 12, 2008 response that an Emergency Response Standard Operating Procedure (SOP) will be developed that defines under what circumstances reporting is required and to which agency(ies). The SOP will provide guidance on how to determine the doses, which require reporting under 10 CFR 20.2202 and 2203. However, the applicant's description of the additional emergency stop buttons and the commitment to meet the reporting requirements of 10 CFR 20.2202 and 2203 is not included in the TR. . **This is a confirmatory item.)**

LCI acknowledged this confirmatory item and indicated that the technical report will be modified accordingly.

- n. Note: All information provided in the responses to the RAI dated 12/12/08, 1/16/09, and 8/5/09 not cited above, must be included in the TR. **These are confirmatory items.**

LCI acknowledged the additional confirmatory items and indicated that the technical report will be modified accordingly.

7. HEALTH PHYSICS ADMINISTRATIVE ITEMS

a. DSER 1.1 Schedule

The applicant has proposed daily inspections of the plant by the RSO, HPT, or trained worker to check for proper containment of yellowcake and mining solutions, proper storage of PPE, radiation protection signage, access control, and security measures. It is not clear if these inspections are the same as those described under Radiation Safety Inspections in Section 5.3. Daily radiation safety inspections performed by workers other than the RSO or HPT is not consistent with Regulatory Guide 8.31. **This is an administrative item.**

LCI agreed to provide clarification in the technical report.

b. DSER 5.7.6.3 Inspections

The applicant has proposed daily inspections of the plant by the RSO, HPT, or trained worker to check for proper containment of yellowcake and mining solutions, proper storage of PPE, radiation protection signage, access control, and security measures. It is not clear if these inspections are the same as those described under Radiation Safety Inspections in Section 5.3. Daily radiation safety inspections performed by workers other than the RSO or HPT is not consistent with Regulatory Guide 8.31. **This is an administrative item.**

LCI agreed to provide clarification in the technical report.

c. DSER 5.7.7 Operational Environmental Monitoring Program (TR Section 5.7.7) (RAI Response 8/5/09 5#2)

Attachment 4 in the response dated August 5, 2009 did not include the Bairoil sampling location. An inset showing the scale and location of the Bairoil location needs to be included as presented in Attachment 3 in the response. The updated figures need to be in the TR. **This is an administrative item.**

LCI agreed to provide updated map in the technical report.

d. **DSEER 6.5 and 7.2 Spill Clean-up Criteria (TR Section 5.7.1, 5.7.7, 7.4) (RAI Response 8/5/09 #7)**

LCI should submit the RESRAD analysis (input and output files) that was used to provide the response dated August 5, 2009. **This is an administrative item.**

LCI agreed to provide updated RESRAD files in the technical report.

PUBLIC DISCUSSION:

None.

ACTION ITEMS:

NRC will provide a detailed meeting summary of the issues discussed.

LCI will provide written response to issues discussed in teleconferences on September 25 and December 7, 2009.

The meeting and teleconference ended at approximately 2:40 p.m. eastern time.

ATTACHMENTS: Attendee List
Meeting Agenda



MEETING ATTENDEES

Topic: Discuss open issues related to the draft Safety Evaluation Report of LCI's (LCI's) license application to construct and operate an in situ recovery (ISR) uranium facility at its Lost Creek site in Wyoming

Date: December 7, 2009

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*Attended by telephone			

MEETING AGENDA
Lost Creek ISR, LLC
December 7, 2009

MEETING PURPOSE: Teleconference to Discuss Open Issues Resulting From RAI Responses and Draft SER.

MEETING PURPOSE: Teleconference to Discuss Open Issues Resulting From RAI Responses and Draft SER.

MEETING PROCESS:

Time	Topic	Lead
10:00 a.m.	Introductions	All
	Discussion of Hydrogeology Open Issues	All
12:00 noon	Lunch (on your own)	
1:00 p.m.	Discussion of Health Physics Open Issues	All
3:00 p.m.	Discussion of Additional Issues	All
	Summary of Action Items	Moderator
	Public Comment/Questions	Moderator
4:00 p.m.	Adjourn	