

April 23, 2009

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

SUBJECT: SUMMARY OF APRIL 16, 2009 MEETING WITH LOST CREEK ISR, LLC

Dear Mr. Heili:

Enclosed is the summary of the meeting between U.S. Nuclear Regulatory Commission (NRC) staff and representatives of Lost Creek ISR, LLC, discussing health physics issues associated with its responses to NRC's request for additional information dated November 6, 2008.

If you have any questions concerning this letter, please contact me either by telephone at (301) 415-6443, or by e-mail at ronald.burrows@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 public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

Sincerely,

/RA/

Ronald A. Burrows, Project Manager
Uranium Recovery Licensing Branch
Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Docket No. 40-9068

Enclosure: Meeting Summary

cc: John Cash, LCI
Mark Thiesse, WDEQ
Mark Newman, BLM
Melissa Bautz, WDEQ
Jon Kaminsky, BLM

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

SUBJECT: SUMMARY OF APRIL 16, 2009 MEETING WITH LOST CREEK ISR, LLC

Dear Mr. Heili:

Enclosed is the summary of the meeting between U.S. Nuclear Regulatory Commission (NRC) staff and representatives of Lost Creek ISR, LLC, discussing health physics issues associated with its responses to NRC's request for additional information dated November 6, 2008.

If you have any questions concerning this letter, please contact me either by telephone at (301) 415-6443, or by e-mail at ronald.burrows@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 public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

Sincerely,

Ronald A. Burrows, Project Manager
Uranium Recovery Licensing Branch
Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Docket No. 40-9068

Enclosure: Meeting Summary

cc: John Cash, LCI
Mark Thiesse, WDEQ
Mark Newman, BLM
Melissa Bautz, WDEQ
Jon Kaminsky, BLM

DISTRIBUTION: JWhitten, RIV KMcConnell DOrlando BVonTill

ML091120505

Office	DWMEP	DWMEP	DWMEP	DWMEP
Name	RBurrows	BGarrett	SCohen	RBurrows
Date	04 /23/09	04 /23/09	04 /23/09	04 /23/09

OFFICIAL RECORD COPY

MEETING SUMMARY

DATE: April 16, 2009

TIME: 1:00 p.m. – 3:30 p.m.

PLACE: U.S. Nuclear Regulatory Commission (NRC)
Two White Flint North, Rockville, Maryland
Room T7A4

PURPOSE: To discuss health physics issues associated with Lost Creek ISR, LLC's (LCI's) responses to NRC's request for additional information (RAI) dated November 6, 2008.

ATTENDEES: SEE ATTACHED ATTENDEE LIST

BACKGROUND:

The purpose of this meeting was to discuss health physics issues associated with LCI's responses to NRC's RAIs regarding its application for a source material license for the Lost Creek in situ recovery project in Sweetwater County, Wyoming. The meeting was publicly noticed on the NRC webpage on April 3, 2009.

DISCUSSION:

The teleconference started at 1:00 p.m. Eastern Time in Room T7-A4. An opening statement was presented by Ron Burrows, NRC. The meeting continued with a discussion of health physics issues associated with LCI's RAI responses as stated in the background of this meeting report. Attached is a detailed summary of this discussion.

ACTIONS:

For individual actions associated with this teleconference, see the attached summary

ATTACHMENTS: 1. Attendee List
2. Meeting Agenda
3. NRC and Lost Creek ISR, LLC Detailed Discussion Summary

Enclosure

MEETING AGENDA
Lost Creek ISR, LLC
April 16, 2009

MEETING PURPOSE: Teleconference to Discuss Health Physics RAI Responses.

MEETING PROCESS:

<u>Time</u>	<u>Topic</u>	<u>Lead</u>
1:00 p.m.	Introductions	All
	Discussion of Health Physic RAI Responses	All
	Summary of Action Items	Moderator
	Public Comment/Questions	Moderator
3:30 p.m.	Adjourn	

NRC and Lost Creek ISR, LLC's Detailed Discussion Summary

1) U₃O₈ / Accident scenarios

RAIs: 4.1(5)

Discussion:

In its analysis of a thickener failure and spill, NUREG/CR-6733 analyzed the material U₃O₈. Lost Creek ISR, LLC (LCI) relied on this analysis for comparison to its uranium recovery operations. However, LCI's process will produce uranyl peroxide (generally, UO₄•2H₂O), not U₃O₈.

Lost Creek Response:

LCI responded that it thought it had answered the question because the terms U₃O₈ and uranyl peroxide are used interchangeably. According to LCI, U₃O₈ does not exist in nature. LCI requested guidance regarding a response that would satisfy the NRC Staff.

NRC staff disagreed with characterizing U₃O₈ and uranyl peroxide as interchangeable compounds. NRC staff stated that it is looking to see how substituting uranyl peroxide affects the accident scenario. This is necessary because U₃O₈ and uranyl peroxide have different chemical and physical properties that may impact the dose calculations.

Action:

LCI will review the accident analysis in NUREG/CR-6733 and state how their process is or isn't bound by that analysis.

2) Derived airborne concentration (DAC)

RAIs: 4.1(2), 5.7.3(1), 5.7.4(5), 5.7.5(1)

Discussion:

NRC staff stated that it could not find justification for assuming that the use of Class D for calculating internal dose adequately represents the inhalation class of uranium compounds that could be encountered at the proposed facility. This issue is being addressed at all facilities, proposed and existing.

Lost Creek Response:

LCI explained that it used Regulatory Guide 8.30 and previous experience at licensed uranium recovery facilities to derive an inhalation class for its operations. Further, since it was not drying its product, LCI did not expect the solubility to change because uranyl carbonate and uranyl peroxide are expected to be soluble or Class D.

NRC staff stated that Regulatory Guide 8.30 did not provide specific guidance on which inhalation class should be applied to uranium recovery operations, other than to consider yellowcake “soluble” if dried at low temperatures. However, this terminology does not comport with the current regulatory basis of 10 CFR 20, Appendix B, which uses a three-tiered system of inhalation classes; D, W, and Y. Furthermore, the regulations do not specifically address the carbonate and peroxide forms of uranium that are relevant to LCI’s operations.

LCI questioned the staff on how to derive an inhalation class for unlisted materials.

NRC staff responded that LCI could make conservative assumptions to begin operations and that, once operating, it could use site specific data to derive an inhalation class (or combination of classes) that is more representative of its operating conditions.

LCI is concerned that the Regulatory Guides are incorrect and that this is complicating the review.

Action:

LCI will research the issue and get back to us. The Path forward is to provide a justification for the proposed inhalation class.

3) Worker dose calculations

RAIs: 5.7.4(4)

Discussion:

Industry practice has been that the plant air particulate samples would be analyzed for gross alpha activity but assumed to be primarily, if not all, due to natural uranium. However, NRC’s regulations in 20.1204(g) are specific with respect to mixtures of radionuclides. Radionuclides may only be disregarded if certain criteria are met. Otherwise, doses from individual radionuclides must be addressed. The licensee, therefore, must characterize the radionuclides in the plant or apply the gross alpha activity to the radionuclide with the most restrictive DAC (10 CFR 20.1204(f)). In this case, since thorium is in the process stream, the DAC for thorium would be the controlling radionuclide.

Lost Creek Response:

LCI responded that such characterization is not possible until the facility has been in operation.

NRC staff stated that LCI could use conservative assumptions to estimate doses for the initial start of operations and that licensees are required to make appropriate surveys to evaluate the concentrations of radioactive materials and potential radiological hazards (10 CFR 20.1501).

In response, LCI stated that it will make a set of assumptions for initial startup and then it will develop methods for determining actual isotopic concentrations and refining the DAC if necessary.

Action:

LCI will submit a plan that is consistent with its response above.

4) Contamination control program

RAIs: 5.7.6(1) & (3)

Discussion:

Issue 1

On page 5-40 of the Technical Report, first full paragraph, LCI describes the limits that it will use to control loose surface contamination. However, the description is confusing and it is not clear whether 100 percent of the loose surface contamination limit will be used or 25 percent of the limit will be used as an action level for cleaning an area.

Issue 2

It appears that LCI is not correctly applying the methods of assessing surface contamination per Regulatory Guide 8.30, Regulatory Guide 1.86, and Fuel Cycle Policy and Guidance Directive 80.23. Industry is including radium (and potentially thorium-230) in the gross alpha measurements and this would appear to allow for higher release limits than would otherwise be allowed if radium (and potentially thorium) was excluded from the gross alpha measurements and viewed separately.

NRC staff noted that Regulatory Guide 8.30, Regulatory Guide 1.86, and Fuel Cycle Memorandum 83-23 are ambiguous with respect to surface contamination guidelines. There was an attempt by the NRC in the early to mid-90s to define the terminology (e.g., the meaning of “associated decay products”) and application of surface release criteria. As an example, for contamination surveys, LCI proposes including radium (and potentially thorium-230) with overall natural uranium, but that is not the way the NRC has applied these limits in the past for industries other than uranium recovery. DPM value in table only applied to thorium and protactinium isotopes in secular equilibrium with uranium, not radium. NRC staff examples include dose calculations in SECY 98-155 and release criteria for the Molycorp York, PA facility.

Lost Creek Response:

Issue 1

LCI will clear up the language regarding loose surface contamination limits.

LCI will specify that total contamination surveys will be done with survey meters. Removable contamination surveys will be performed with smears.

Issue 2

Going forward LCI stated that it will define surface contamination limits for natural uranium as noted by NRC staff so that radium (and potentially thorium-230) is not included in the release limits for natural uranium. It will use the same general strategy as for airborne contamination. First, LCI will characterize its operations with respect to potential contributors to surface contamination and make assumptions regarding the type and quantities of radionuclides being released. It will then confirm those quantities once operations have started with isotopic analyses. The result may be that LCI cannot release any equipment until specific isotopes and their associated release limits are evaluated.

Action:

LCI will submit a program consistent with its responses above.

5) Preoperational and operational environmental sampling

RAIs: 2.9(3) & (4), 5.7.7(2)

Discussion:

Preoperational sampling:

1) LCI does not address radon daughter deposition on vegetation as indicated in its application and this RAI question 2.9(3). The vegetation sampling data submitted was intended to address a future yellowcake dryer only. These locations would not necessarily be the same as areas maximally impacted by radon daughter deposition. As an example, NRC staff discussed the lack of sampling at the general locations near SEB1 and SEB2, which are the highest dose locations according to the modeling performed by LCI.

2) LCI does not present a coherent air sampling program:

- Selection of air particulate locations does not appear to comport with criteria in Regulatory Guide 4.14 (e.g., para 1.1.1 of this regulatory guide regarding prevailing wind direction, location of estimated maximum concentrations of radioactive materials, etc.), nor is there enough discussion to determine why it chose the given locations.
- There are no co-located particulate samplers with radon sampling stations as recommended in RG 4.14 nor is there a discussion on why this is the case.

Operational Environmental monitoring:

3) LCI does not address Pb-210 in its proposal to not monitor for airborne particulates.

4) NRC staff commented that the evaluation for vegetation, food, and fish was a good analysis but asked if LCI had analyzed Note (O) in Regulatory Guide 4.14 regarding operational vegetation or forage sampling for its site.

5) LCI does not address soil sampling, as recommended in RG 4.14 for an operational radiological monitoring program, and as asked RAI question 5.7.7(2). As pointed out in the question, and identified in the application, radon daughters will accumulate in soil, among other places. RG 4.14 includes Pb-210, a radon daughter, as a radionuclide to sample.

Lost Creek Response:

Preoperational sampling:

LCI understood NRC staff concerns and will reevaluate its response.

Operational Environmental monitoring:

LCI understood NRC staff concerns and will reevaluate its response.

Action:

LCI stated that it will address these issues.

6) Dose to public/Effluent monitoring

RAIs: 5.7.1(1), 5.7.7(1)

Discussion:

NRC staff stated that it was not clear that LCI went through the process of identifying the most exposed member of the public and included onsite areas as is required by 10 CFR 20.1302. Furthermore, the staff notes that §40.65 requires quantification of radionuclides released to unrestricted areas. This can either be calculations or monitoring; however, calculations or modeling must be confirmed by sampling.

The staff also noted that LCI should be careful to state that certain members of the public would not exceed 2mrem/hr. This may not necessarily be true, and could be grounds for a citation if an inspection indicated that this was false.

LCI should refer to 60 FR 36038 for a revised definition of “member of the public” and “public dose.”

Lost Creek Response:

LCI responded that it will review its data and identify the most affected member of the public, and it will provide more information regarding effluent monitoring/sampling. Specifically, it will identify the equipment evaluated and its analysis for continuous sampling and look at grab

sampling. NRC staff asked if LCI had evaluated EPA testing method 114 for radon, as previously suggested. LCI noted that it did not review this issue in more detail pending NRC staff's review of this issue.

When LCI questioned where the correct place was to monitor for compliance with 10 CFR 40.65 as it pertained to controlled radon discharges (as opposed to uncontrolled, or "out the door" radon discharges), NRC staff replied that it will generally be at the stack discharge. There was some confusion with LCI as to what constituted a stack and NRC staff replied that in this scenario it would include piping, etc., that directed airborne effluent outside of the facility into the unrestricted area. NRC staff also suggested that LCI review guidance in NUREG-1736 for compliance with 10 CFR 20.1302 in regard to measurement locations for airborne effluents at boundaries of unrestricted areas.

Action:

LCI will reevaluate its response and submit information as discussed above.

7) Spill cleanup criteria

RAIs: 6.5(2), 7.4(1)

Discussion:

NRC staff stated that LCI needs to develop soil cleanup criteria for uranium. Currently, LCI intends to use the background radiological survey to develop cleanup criteria; however, this is for radium only.

LCI has made commitments throughout its application to clean up spills that exceed 10 CFR 40, Appendix A, Criterion 6, levels (see, for example, 5.7.1(3)(b) and (d), 5.7.7(2) and 7.4(1)). LCI cannot comply with its commitments unless it has established acceptable levels beforehand.

Lost Creek Response:

LCI stated that developing uranium soil cleanup criteria is premature since the surrounding land use may change.

NRC staff responded that it can make conservative assumptions regarding land use for uranium cleanup criteria using an appropriate computational methodology such as RESRAD, for example. Staff can then confirm those assumptions prior to decommissioning. LCI agreed to reevaluate its response in accordance with this discussion.

Action:

LCI will address this issue and submit a plan that incorporates its response as indicated above.

8) Pre-reclamation radiation survey

RAIs: 6.5(4)

Discussion:

NRC staff stated that the application has not adequately demonstrated that the gamma/Ra-226 correlation can be used to form a correlation with other radionuclides in order to meet 10 CFR 40, Appendix A, Criterion 6 criteria.

The application and literature references submitted by the LCI are focused on correlating gamma survey readings with surface soil Ra-226 concentrations. In fact, the only correlation between Ra-226 and uranium is found in this application in one figure (Fig. 2.9-8). This correlation has an R-squared value of 0.73. Further, there is no discussion of how this second order correlation (i.e, Uranium correlated to Ra-226, which itself is correlated to a gamma survey) and the associated errors will affect the ability to detect, for example, uranium.

Lost Creek Response:

LCI and its contractors will discuss this issue and propose a solution.

Action:

LCI will submit the results of its analysis discussed above to NRC staff.