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LOST CREEK ISR, LLC

August 17, 2015

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Re: Response to NRC RAIs Dated July 23, 2015
UIC Class V Amendment
Lost Creek ISR Project License SUA-1598, Docket 040-09068

To Whom It May Concern:

Please find behind this cover responses to RAI's issued by your office on July 23, 2015 regarding our license amendment request to utilize Class V UIC wells.

The response to the RAI's required the revision of two pages of the application. Please remove Page 14 and Table 3.3 and replace them with the revised versions included with this submittal. Page 14 was revised to correct a reference to 40 CFR 140 which should have been to 40 CFR 141. Table 3.3 was revised to change the heading of one of the columns to "Effluent Limit," to correct the units of Gross Beta and to correct footnote 6.

Please feel free to contact me if you have any questions.

Sincerely,
Lost Creek ISR, LLC

John W. Cash
Vice President

cc: NRC Deputy Director, Decommissioning and Uranium Recovery Licensing Directorate
Mrs. Theresa Horne, Ur-Energy, Littleton

HMSS01

RAI-1 – Table 3, Effluent Limits

A) On Page 1, Lost Creek states that the wells will be UIC Class V, Subclass 5C3 wells "Industrial Process Water and Waste Disposal Facility" in accordance with Wyoming Department of Environmental Quality Rule and Regulations. In Section 5.1, Lost Creek states that the "average analyte composition of the fluids must be less than the corresponding effluent standard in 10 CFR 20 Appendix B, Table 2, Column 2". Table 3.3 *Effluent Limits* contains a column titled "Injectate Limit" but not a specific column for effluent limits.

Please clarify the following:

(1) NRC considers the fluid as 11e.(2) byproduct material even though it is treated to meet the effluent limits in 10 CFR Part 20. Please explain how the proposed onsite disposal of the treated byproduct material meets the ALARA principle (i.e., NRC's policy for a dose criterion of a few millirem per year). The dose assessment for onsite disposals should include site-specific, realistic scenarios.

Response:

The injection wells and the respective Areas of Influence are located on lands managed (surface and mineral) by the BLM. The only realistic scenario we can conceive of where the water would be brought to the surface for a beneficial use is for livestock watering. Human consumption of the water isn't realistic because of the well's location on BLM land and because the native water contains contaminants that preclude its use as a drinking water supply.

The proposed effluent (injection) limits are equal to the appropriate regulatory standard or baseline conditions; whichever is higher. In the case of radionuclides, in every case the quality of the native groundwater is worse than NRC's effluent limits codified in 10 CFR Part 20 Appendix B. Therefore, the injection limit for the radionuclides is set at the native background levels. Furthermore, the concentration of radionuclides in the injection fluid will never be higher than the native concentration of radionuclides so that the dose to a potential user, regardless of the scenario, will be no greater than if the proposed activity never occurred. In fact, the concentration of some radionuclides, such as radium, is expected to be significantly lower in the injectate than in the native water. The proposed activity is ALARA for members of the public because the radionuclide contaminated shallow aquifer will be diluted with cleaner treated water.

(2) Include a column titled "Effluent Limit" on Table 3-3 (or notation that the "Injectate Limit" are the proposed effluent limits.

Response:

"Effluent Limit" column title replaces "Injectate Limit" title for clarity, although both words define the same limit, see updated Table 3-3.

B) Please provide justification that the use of observed "maximum values" is appropriate for the Receiving Aquifer Background values, and for several parameters, the injectate or effluent limit in Table 3-3.

Response:

Permeate water (injectate) quality needs to be equal to or better than the worst water quality in the receiving aquifer. Hence, it is appropriate to use the highest observed analyte concentration to define each parameter's not-to-exceed limit.

C) Please correct the regulation referenced in the column on Table 3-3 titled "EPA MCL: 40 CFR 140" and in the narrative of the report to the proper regulation (10 CFR Part 141).

Response:

The reference has been corrected in the table and in the text.

D) Please correct the units for the EPA MCL for Gross Beta to 4 millirems per year and not (pCi/L)

Response:

The table has been corrected.

E) Please provide calculations for determining Gross Alpha levels in the Receiving Aquifer Background Values

Response:

The background gross alpha levels in the receiving aquifer were determined by Energy Laboratories Inc. using method 900.0.

Both alpha and beta specific activities in units of pCi/L are calculated in the manner below from crosstalk-corrected gross count rates.

$$A = \frac{CPM}{2.22 * F(m_r) * V}$$

Where:

A = Specific activity of sample (pCi/L)

CPM = Sample crosstalk corrected, net count rate (counts/min)

$F(m_r)$ = Overall per detector efficiency as a function of the mass of residual solids

m_r = Mass of residual solids (mg)

2.22 = Unit conversion factor for dpm to pCi

V = Sample volume in liters

F) Please clarify why the levels for the Th-230, Pb-210 and Po-210 in the Receiving Aquifer Background include both dissolved and suspended fractions whereas the future monthly composite will only analyze the dissolved fraction.

Response:

The baseline analysis of the native ground water included both dissolved and suspended fractions in order to accurately characterize the concentration of the radionuclides. However, during operational monitoring, we propose to analyze only the dissolved fraction since the injection fluid will be passed through several filters and reverse osmosis treatment which will effectively remove the particulate fraction. Analysis for particulate is

expected to yield zero or negligible concentrations of radionuclides, and therefore is not worth the cost.

RAI 2 – Receiving Aquifer Properties

In the amendment request submitted to NRC, Lost Creek elected to include only qualitative statements and no data from the pumping test data apparently performed in support for the UIC permit. The qualitative statements provides no basis for staff's evaluation of the following licensee's conclusion in Section 2.4: "thus limiting or negating the effect on nearby Mine Unit 1 and 2 receiving aquifer monitor well water levels". Staff's concern is not specifically water level changes in the receiving aquifer, but also: (1) the potential for migration of the injectate to the nearby mine units affecting the water quality of the monitoring program during the life of the mine units; and (2) potential for mounding in the area of the surface impounds affecting the safety of the impoundment liners.

Please clarify or provide backup data for the following:

A) Hydraulic Conductivity – Appendix B uses a value of 0.59 feet per day for the PHAST analysis but the calculations in Section 4.2 Maximum Area of Impact and Section 2.4 Receiving Aquifer Characteristics uses or suggest that the horizontal hydraulic conductivity exceeds 1 foot per day.

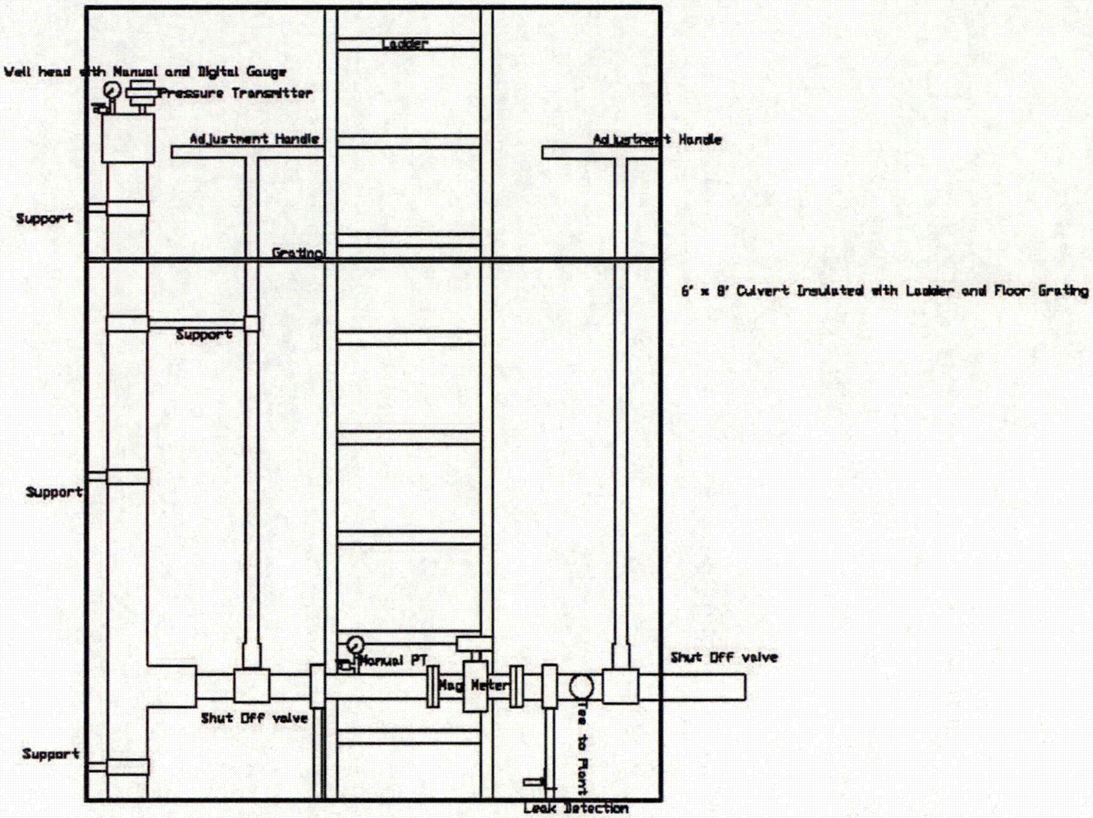
   Response:

   The June 2014 geochemical modeling of the permeate injection response was performed six months prior to conducting the first FG Horizon pump test (December, 2014). Lacking actual FG Horizon aquifer characteristic values, HJ Horizon hydraulic conductivity values were deemed representative and appropriate substitute model input parameters. The reviewer is reminded that all named horizons are derived from the same depositional environment, thus they should have similar aquifer characteristics, which the December 2014 tests confirmed. The higher hydraulic conductivity value used in the "Maximum Area of Impact" calculation is a pump test derived value, and its use results in a more conservative estimate of potential impact.

B) Specific Capacity – Section 2.4 states the specific capacity calculation was approximately 1 gpm per foot of drawdown. If correct, then for injection of 200 gallons per minute at a single well would result in an increase in head at the injection well to ground surface and potential spill at the surface.

   Response:

   Every Class V injection well on the Lost Creek property is fitted with a pressure tight, leak proof cap and pressure gauge. Permeate injection wells M-FG6 and M-FG7 will be constructed similarly as shown on the following figure.



Injection Well Vault and Piping Schematic

C) Drawdown – Section 2.4 states that drawdown in monitoring well M-FG8 was about an eighth of the expected drawdown implying the North Fault acted as a barrier to flow toward Mine Unit 1.

Response:

The third paragraph in Section 2.4 clearly states (not just implying) that the North Fault acts as a low-flow barrier to the movement of fluids across the fault. The restriction of ground-water flow is a common characteristics of Lost Creek fault systems. Typically, the faults cause a significant head differential (5 to 15 feet) across the fault; usually lower on the south side.

D) Please provide the estimated distance traveled for the injected effluent for the duration of operations and restoration of mine unit 1.

Response:

The reviewer is referred to Section 4.2, Maximum Area of Impact, for the ground-water flow velocity and life-of-mine displacement calculations.

RAI 3 – Reporting Requirements

In Section 6.0, the applicant discusses its monitoring program but did not include a discussion on evaluation and reporting of the data. The licensee will have to report the quantity of each principal radionuclide released by the effluent discharges, including liquid effluents, in accordance with requirements of 10 CFR 40.65.

Please clarify that Lost Creek will include the quantity of the principal radionuclides released by the proposed activities in accordance with requirements of 10 CFR 40.65.

Response:

We confirm that we intend to comply with the reporting standards in 10 CFR 40.65.

Please clarify that Lost Creek will review the effluent monitoring program in the annual audit of the Radiation Protection Program.

Response:

We confirm that we will review the effluent monitoring program during the annual audit of the RPP.

RAI 4 – Potentiometric Pressure Increase

The proposed injection of up to 200 gpm will increase the potentiometric head in the surrounding aquifer. Depending upon the interconnection between the FG and HJ horizons and effectiveness of the North Fault as a barrier, the increase may affect the water levels in monitoring wells used for the excursion monitoring program. Please provide a description of: (1) the anticipated impacts; and (2), should those impacts be measurable, procedures to account for those impacts.

Response:

The following paragraphs specifically address NRC's questions posed above.

(1) Regarding "anticipated impacts", LCI ISR believes that permeate will be largely confined to the north side of the North Fault. However, because the North Fault is leaky some pressure response is anticipated south of the fault. The following bullets explain our rationale for significant confinement of permeate within the FG Horizon north of the fault:

1. The Lost Creek Shale (LCS) which separates the FG from the underlying HJ Horizon is aerially extensive in the proposed injection area as discussed in Section 2.3, thus permeate should remain in the FG Horizon.
2. Based on pump test results, the FG horizontal hydraulic conductivity is significantly higher than the LCS vertical hydraulic conductivity; hence the preferential flow path will be parallel to the LCS not across it.
3. Permeate will be injected over 260 feet of screened interval, therefore, no pressuring up of the injection well is initially anticipated given the beginning minimal injection rate (10 to 50 gpm). Injection rates on the order of 200 gpm won't be experienced until groundwater restoration occurs at the end of the life of the first mine unit.
4. The top 15 feet of the M-FG7 well screen is completed adjacent to an unsaturated zone, thus providing a significant receiving reservoir.
5. As discussed in Section 2.4, the North Fault was observed to restrict flow across the fault. Additionally, Figure 2-1 shows that there are other faults located between the North Fault and the MU1 ring monitor wells that will further limit the flow of ground water toward MU1.

(2) Regarding "procedures to account for those impacts", note that monitor well M-FG8 was intentionally located south of the North Fault to not only observe the drawdown response resulting from the M-FG6 pump test, but also to serve as a long-term permeate monitor well. As discussed in the last paragraph of Section 6.0, water level in monitor well M-FG8 (as well

as the other three monitor wells) will be measured quarterly after which water samples will be collected for analysis.

LCI ISL's is in agreement with NRC staff's RAI 2 statement (first paragraph) that a rise in water level in FG Horizon monitor wells is, in and of itself, not considered problematic. However, should a significant water level rise be observed in M-FG8, then an evaluation will be initiated to determine the pressure wave radius of influence. The evaluation would likely include supplemental field measurements, more frequent monitoring and/or hydrologic modeling. The evaluation objective would be to ascertain whether permeate injection is likely to cause a material rise in the well field FG monitor well water levels.

With respect to changes in water quality at the well field FG monitor well, the Maximum Area of Impact calculation, Section 4.2, indicates that permeate will never reach the well field during the life-of-mine even if there were no faults present.

4.3 Existing Water Rights Within Impact Area

Figure 4-3 identifies existing water rights located within a 1-mile radius of the injection well's ROFD (**Table 4-2** is a compilation of water rights obtained from the State Engineer's database shown on **Figure 4-3**). Note that there are no private water rights within the impact area other than those owned by LCI/NFU (NFU is a subsidiary of Ur-Energy, Inc.). There are however, eleven listed BLM wells that were jointly registered water rights with LCI, but are functionally part of LCI's operation.

Note that the closest water supply wells (potable LC1148W and fire water LC229W) belong to LCI, and are completed in different hydrostratigraphic horizons separated vertically by over 400 feet of sand/shale interbedded layers, and horizontally by approximately 240 feet (**Plate 1** and **Figure 2-3**).

5.0 FACILITY CONSTRUCTION AND OPERATION

5.1 Source Water Characterization

The water to be treated and injected will be derived from a combination of sources including:

- Mining solutions captured during the maintenance of the hydrologic sink;
- Water derived from plant processing including but not limited to solutions from: plant wash-down, washing of product, chemical makeup, and dryer condensate;
- Chemistry lab waste water;
- Water derived from ground-water restoration;
- Water derived from UIC Class I and Class III wells during drilling, completion and maintenance; and
- Water captured from spills of mining solutions.

Most of the source waters listed above are defined by the NRC as byproduct material because they were generated during the recovery of uranium. As such, the average analyte composition of the fluids must be less than the corresponding effluent standard in 10 CFR 20 Appendix B, Table 2, Column 2 prior to being injected into a UIC Class V well or better than the background quality of the ground water. In other words, the average quality of the effluent must be better than the NRC effluent standard or the baseline water quality; whichever is higher.

The WDEQ-WQD also regulates the quality of water injected into a UIC Class V well. Specifically, the WQD regulates the parameters described in the Primary Drinking Water MCLs listed in 40 CFR §141. In cases where the water quality of the receiving horizon is of poorer quality than the respective EPA MCL, the quality of the injection fluid must be equal to or better than the receiving horizon. In other words, the quality of the effluent must be better than the MCL or the baseline water quality; whichever is higher.

Table 3-3 Effluent Limits

Frequency	Parameter (dissolved)	EPA MCL: 40 CFR 141	NRC Effluent Limit: 10 CFR Part 20 App B	Receiving Aquifer Background [2]	Effluent Limit	Expected Post Treatment Quality	Ground-Water Classification from WDEQ-WQD R&R Chapter 8 Table I	Sample Point(s)
Continuous	pH (standard units)	N/A	N/A	8.94	N/A	6.0 to 9.0	II	Post Treatment[1]
	Conductivity (μmhos/cm)	N/A	N/A	443	N/A	150	N/A	Post RO & Post Treatment[1]
Quarterly Grab	Selenium (mg/L)	0.05	N/A	0.01	0.05	0.0015	I	Post Treatment
	Arsenic (mg/L)	0.01	N/A	0.004	0.01	0.0005	I	
	Barium [3] (mg/L)	2	N/A	ND	2	0.0001	I	
	Beryllium [3] (mg/L)	0.004	N/A	ND	0.004	[5]	I	
	Cadmium [3]	0.005	N/A	ND	0.005	0.001	I	
	Chromium[3] (mg/L)	0.1	N/A	ND	0.1	0.0004	I	
	Copper [3] (mg/L)	1.3	N/A	ND	1.3	0.0005	I	
	Flouride [3] (mg/L)	4	N/A	0.4	4	0.0001	I	
	Lead [3] (mg/L)	0.015	N/A	ND	0.015	0.0001	I	
	Mercury [3] (mg/L)	0.002	N/A	ND	0.002	0.0001	I	
Quarterly Grab & Monthly Composite	Unat (mg/L)	0.03	0.44	0.158	0.158	0.012	N/A	
	Ra-226 (pCi/L)	5	60	3.6	5.5	0.78	Exceeds all Classes	
	Ra-228 (pCi/L)		60	1.9		[5]		
	Gross Alpha [6] (pCi/L)	15	N/A	57	57	[5]	Exceeds all Classes	
	Gross Beta (pCi/L)	4 (mrem/yr)	N/A	15.1	15.1	[5]	N/A	
Monthly Composite	Th-230 (pCi/L)	N/A	100	1.9[4]	100	[5]	N/A	
	Pb-210 (pCi/L)	N/A	10	3.5[4]	10	[5]	N/A	
	Po-210 (pCi/L)	N/A	40	5.1[4]	40	[5]	N/A	

(1) Sample collected to verify treatment systems are working as designed.

(2) Receiving aquifer background water quality is based on the maximum value from samples collected from injection well and surrounding monitor wells.

(3) Since these parameters are not expected to be in the feed stock, LCI proposes to halt routine analysis for these parameters if four consecutive monthly grab samples of the feed stock contain less than the EPA MCL of the respective parameter.

(4) Includes dissolved and particulate fractions.

(5) Value not determined, but RO rejection estimated to be approximatly 98% of feed concentration.

(6) Gross Alpha value presented includes uranium and radon contributions.

N/A = Not Applicable