UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 E. LAMAR BLVD
ARLINGTON, TX 76011-4511

November 30, 2017

Mr. John Cash, Vice President
Regulatory Affairs
Lost Creek ISR, LLC
58800 Enterprise Drive, Suite 200
Casper, WY 82609

SUBJECT: LOST CREEK ISR - NRC INSPECTION REPORT 040-09068/2017-002 AND NOTICE OF VIOLATION

Dear Mr. Cash:

This letter refers to the routine U.S. Nuclear Regulatory Commission's (NRC) inspection conducted from October 17-November 1, 2017 at the Lost Creek in-situ recovery facility in Sweetwater County, Wyoming. The purpose of the inspection was to determine whether uranium recovery activities were being conducted safely and in conformance with the conditions of your license. A preliminary exit was conducted with you and your staff on October 19, 2017. After a discussion with NRC management and continued review of the information, two of the findings were re-characterized and were discussed with you and your staff at the final telephonic exit conducted on November 1, 2017. The enclosed inspection report documents the details of the inspection.

The NRC inspection examined activities conducted under your license as they relate to public health and safety, the common defense and security, and to confirm compliance with the Commission's rules and regulations and the conditions of your license. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, tours of the uranium recovery facilities, environmental monitoring locations, and interviews with personnel.

Based on the results of this inspection, the NRC determined one Severity Level IV violation occurred. This violation was a failure to ensure radioactive waste containers were covered. The violation was evaluated in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's Web site at (http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html). This violation is cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding it is described in detail in the enclosed inspection report. This violation is being cited in the enclosed Notice because the NRC inspectors identified the violation as discussed in the Enforcement Policy, Section 2.3.2.b.

If you contest the violation or significance of the violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, Region IV; and the Director, Office of Enforcement,

U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001 with a copy to the Regional Administrator, Region IV.

In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter, its enclosure, and your response, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy or proprietary, information so that it can be made available to the Public without redaction.

Should you have any questions concerning this matter, please contact Ms. Bernadette Baca, Health Physicist, at (817) 200-1235 or the undersigned at (817) 200-1191.

Sincerely,

/RA/

Ray L. Kellar, P.E., Chief
Fuel Cycle and Decommissioning Branch
Division of Nuclear Materials Safety

Docket: 040-09068
License: SUA-1598

Enclosure:
1. Notice of Violation (NOV)
2. NRC Inspection Report 040-09068/2017-002

w/Attachment: Supplemental Information

cc:
S. Ramsay, WY Office of Homeland Security
M. Rogaczewski, WY Dept. of Env. Quality, Region III
R. Schierman, WY Dept. of Env. Quality, Land Quality Division
N. Williams, WY Dept. of Env. Quality, Region II

NOTICE OF VIOLATION

Lost Creek ISR, LLC
Sweetwater County, Wyoming

Docket: 040-09068
License: SUA-1598

During a U.S. Nuclear Regulatory Commission (NRC) inspection conducted on October 17 – November 1, 2017, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

> License Condition (LC) 9.2, of NRC License SUA-1598, Amendment No. 5, (ADAMS Accession No. ML16123A338), requires, in part, that the licensee shall conduct operations in accordance with the commitments, representations, and statements contained in the license application dated March 31, 2008, (ADAMS Accession No. ML081060509). License Application Section 4.3.2, states, in part, equipment which cannot be decontaminated and process wastes will be placed in clearly labeled, covered containers and temporarily stored in restricted areas with clearly visible radioactive warning signs.
>
> Contrary to the above, on October 18, 2017, the licensee failed to place equipment that cannot be decontaminated and process wastes in clearly labeled , covered containers, while temporarily stored in a restricted area with clearly visible radioactive warning signs. Specifically, during an NRC inspection of the licensee's storage area (i.e. bone yard), the inspectors identified contaminated mixed media consisting of equipment and process wastes (sediments, pipefittings, hoses, etc.), in an uncovered container within the licensee's bone yard located in the evaporation pond restricted area.
>
> This is a Severity Level IV violation. (NRC Enforcement Policy Section 6.3.d)

Pursuant to the provisions of 10 CFR 2.201, Lost Creek ISR, LLC is thereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-001, with a copy to the Regional Administrator, Region IV within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to Notice of Violation" and should include for each violation: (1) the reason for the violation or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken and (4) the date when full compliance will be achieved. Your response may reference or include previously docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an Order or Demand for Information may be issued requiring information as to why the license should not be modified, suspended or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001 with a copy to the Regional Administrator, Region IV.

Your response will be made available electronically for public inspection in the NRC Public Document Room or in the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information).

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days of receipt.

Dated this 30th day of November 2017

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	040-09068
License:	SUA-1598
Report:	04009068/2017-002
Licensee:	Lost Creek ISR, LLC
Location:	Lost Creek Project Sweetwater County, Wyoming
Dates:	October 17 – November 1, 2017
Lead Inspector:	Bernadette Baca, Health Physicist Fuel Cycle and Decommissioning Branch Division of Nuclear Materials Safety Martha Poston-Brown, Health Physicist Fuel Cycle and Decommissioning Branch Division of Nuclear Materials Safety
Accompanied by:	David Adams, Project Health Physicist State of Wyoming Department of Environmental Quality Land Quality Division Reid Brown, Project Principal State of Wyoming Department of Environmental Quality Land Quality Division
Approved by:	Ray L. Kellar, P.E., Chief Fuel Cycle and Decommissioning Branch Division of Nuclear Materials Safety

Enclosure 2

EXECUTIVE SUMMARY

Lost Creek ISR, Inc.
NRC Inspection Report 040-09068/17-002

The U.S. Nuclear Regulatory Commission (NRC) performed a routine health and safety inspection from October 17 – November 1, 2017, which included observations of site activities, independent surveys, review of records, and interviews with site personnel. In summary, the licensee was conducting operations in accordance with regulatory and license requirements as described below.

Management Control and Organization

The organizational structure and staffing levels maintained by the licensee during the inspection period met the requirements specified in the license and were sufficient for the work in progress. The licensee's safety and environmental reviews were performed in accordance with the license requirements. The licensee conducted audits and inspections as required by regulatory requirements and the license. (Section 1.2)

In-Situ Leach (ISL) Facilities

The licensee conducted in-situ recovery (ISR) and operations in accordance with the license and regulatory requirements. Radiological controls including signs and postings were implemented in accordance with license and regulatory requirements. (Section 2.2)

Radiation Protection

Occupational exposures since the last inspection were below regulatory limits. Survey instruments were found to be in calibration and were being used appropriately by the licensee's staff. The licensee implemented a radiation protection program that met the requirements of 10 CFR Part 20 and the license. (Section 3.2)

Effluent Control and Environmental Protection and Maintaining Effluents from Materials Facilities As Low As Reasonably Achievable

The licensee conducted environmental monitoring in accordance with license requirements. The licensee reported the results in semi-annual reports to the NRC. The annual dose to members of the public remained below regulatory limits. The licensee was documenting spills and conducting excursion sampling as specified in the license. (Section 4.2)

Inspection of Transportation Activities and Radioactive Waste Processing, Handling and Storage

Transportation of yellowcake, waste water treatment, disposal of byproduct material and management and storage of 11.e(2) wastes were conducted in accordance with license and regulatory requirements with one exception:

- A violation of License Application Section 4.3.2. was identified for a failure to ensure radioactive waste containers were covered. (Section 5.2)

Emergency Response and Fire Protection

The licensee has standard operating procedures associated emergency preparedness and fire protection program sufficient to meet the requirements of LC10.4. Employees and visitors are provided emergency preparedness and fire protection training as applicable. Fire protection equipment is maintained by an outside contractor. The licensee has coordinated with Local Law Enforcement Agency organizations for emergency response. (Section 6.2)

Report Details

Site Status

Lost Creek ISR, LLC (Lost Creek) received NRC authorization to begin full operations on October 3, 2013 (ADAMS Accession No. ML13276A588). At the time of this inspection, Lost Creek was extracting uranium using the ISR process. The Central Processing Plant (CPP) was in service and supporting operations of two mine units Mine Unit 1 and 2. Active uranium recovery was occurring at 11 of 13 header houses (HH) in Mine Unit 1 and 1 header house (HH2-2) in Mine Unit 2 with throughput of up to approximately 2,500 gallons per minute (gpm) and an average throughput of 2,231 gpm since the last inspection. Both dryers are available for operation at the time of inspection. Lost Creek has two primary methods for waste water disposal consisting of deep disposal wells and Class V wells.

1 Management Organization and Control (88005)

1.1 Inspection Scope

Ensure that the licensee has established an organization to administer the technical programs and to perform internal reviews, self-assessments and audits.

1.2 Observations and Findings

a. Organizational Structure

The inspectors reviewed the licensee's organizational structure for Lost Creek Operations and found it was in agreement with the structure specified in the license application and as modified by Safety and Environmental Review Panels (SERP).

At the time of the inspection, the licensee had approximately 35 full-time employees at the mine site. The inspectors determined that the licensee had sufficient staff for the work in progress

b. Safety and Environmental Review Panel (SERP)

License Condition 9.4 of the performance-based license requires, in part, the license establish a SERP to evaluate if the program changes, tests or experiments require an NRC license amendment prior to implementation. The inspectors reviewed the following three SERP evaluations completed since the last inspection:

1) SERP LC17-07, related to the approval of an individual's qualifications to serve as a Project Engineer.

2) SERP LC17-08, related to creation of a bone yard area for the storage of wastes inside the fenced plant area.

3) SERP LC17-09, related to start-up of Mine Unit 2 along with utilization of a temporary groundwater monitoring plan around HH2-1, 2-2 or 2-3.

The inspectors found that the licensee had implemented the SERP determinations for the above evaluations in accordance with the performance based License Conditions.

c. Audits and Inspections

The inspectors reviewed the audits and inspections being generated by the licensee in accordance with LC9.7, which states, in part, that the licensee shall follow the guidance in NRC Regulatory Guide 8.31. The Radiation Safety Officer (RSO), Health Physics Technician, or qualified designees were conducing and documenting a daily walk-thorough of all work and storage areas of all facilities to ensure good radiation practices were being followed. The RSO and Site Manager also performed a weekly walk-through of all plant areas to observe general radiation control practices. In addition, the RSO was generating a monthly report that summarized the results of the daily and weekly inspection, air monitoring, and radiation exposure data. The inspectors found that the audit and inspections met the requirement contained in the license.

The licensee had completed a 2016 calendar year annual audit of the radiation safety program. The findings of this audit were reviewed during this inspection and no issues were identified.

1.3 Conclusions

The organizational structure and staffing levels maintained by the licensee during the inspection period met the requirements specified in the license and were sufficient for the work in progress. The licensee's safety and environmental reviews were performed in accordance with the license requirements. The licensee conducted audits and inspections as required by regulatory requirements and the license.

2 In-Situ Leach (ISL) Facilities (89001)

2.1 Inspection Scope

Determine if ISR activities were conducted in accordance with regulatory requirements and the license.

2.2 Observation and Findings

a. Uranium Recovery

Since the previous inspection in May 2017, the licensee had brought online one additional header house (HH2-2) the only header house currently active in Mine Unit 2. The daily average production rate is 2,231 gallons per minute which is within the maximum average daily flow rate of 6,000 gallons per minute, as required by LC10.2.

The daily production for the facility since the previous inspection ranged between 756 gpm to 2,564 gpm, which is less than the average daily flow rate of 6,000 gpm and the maximum instantaneous flow rate of 6,300 gpm as stipulated in LC10.2. In accordance with LC10.1, the lixiviant consisted of native groundwater, carbon dioxide, sodium bicarbonate, and oxygen.

Based on Section 5.7.8.2 of the approved License Application (referenced in LC9.2) the licensee committed to maintaining a production bleed between 0.5 and 1.5 percent of the production rate. Since the previous inspection, the daily bleed varied

between 0.55 and 0.71 percent of the daily production rate. The long term bleed was approximately 0.62 percent of the daily production rate.

The inspectors reviewed the records for daily pressures on the injection and recovery manifolds for each header house since the previous inspection. During the first and second quarters of 2017, the maximum daily pressure was for HH-6 at 138 pounds per square inch. This pressure is less than the maximum of 90 percent of the fracture pressure, in accordance with commitment in Section 3.2.7.1 of the approved License Application, and the maximum allowed operating pressure for piping materials of 150 pounds per square inch (psi), in accordance with License Application 3.2.6.

b. Site Tours

The inspectors conducted tours in the Central Processing Plant (CPP), selected header houses (HH1-6, HH1-4 and HH2-2), and deep disposal well (DDW) DDW-4. The inspectors observed environmental sampling at one sampling station HV-2. The inspectors also toured the 11.e(2) waste storage areas, the evaporation ponds, and the bone yard. The inspectors found that all entrance areas to the facility and wellfields were posted with the words, “Any Area Within This Facility May Contain Radioactive Material”, as required by LC9.8.

The inspectors conducted independent radiological surveys of the gamma exposure rates present in the CPP, office buildings, header houses, and DDW-4. The surveys were conducted using a Ludlum Model 19 microRoentgen survey meter (NRC Serial #015530 calibration due July 24, 2018). Gamma exposure rates measured by the inspectors were as expected and the inspectors did not identify any areas in the CPP, header houses, or other areas which had not already been identified and posted as radiation areas by the licensee.

2.3 Conclusion

The licensee conducted ISR and operations in accordance with the license and regulatory requirements. Radiological controls including signs and postings were implemented in accordance with license and regulatory requirements.

3 Radiation Protection (83822)

3.1 Inspection Scope

Determine whether the licensee’s radiation protection program was conducted in compliance with the license and 10 CFR Part 20 requirements.

3.2 Observations and Findings

a. Occupational Exposures

The inspectors reviewed the licensee’s occupational exposure records since the last inspection for calendar year 2017. Approximately 42 employees and contractors were monitored in the first quarter of 2017; 46 employees and contractors were monitored in the second quarter of 2017. Occupational monitored employees included plant and wellfield operators, health physics staff and maintenance workers. The highest deep

dose equivalent exposure to an individual since the last inspection was recorded as 59 millirem (mrem) assigned to a plant operator.

The licensee conducted air sampling, in part, for assessment of internal exposures. The inspectors reviewed the licensee's radon-222 air sampling records and the uranium particulate and worker breathing zone results for since the last inspection. The highest employee derived airborne concentration in hours (DAC-hrs) was 62 DAC-hrs for radon daughters, and 26 DAC-hrs for airborne uranium, through the end of the second quarter of 2017. All DAC-hrs results were below the regulatory limit of 2,000 DAC-hrs per year. The highest exposure to radon was 155 mrem assigned to an office worker.

The licensee monitored for soluble uranium intake in compliance with 10 CFR 20.1201(e). The highest weekly intake of soluble uranium was 0.42 milligrams from a breathing zone sample and 0 milligrams from a bioassay. This was below the regulatory limit of 10 milligrams soluble uranium intake per week. There were no bioassay result above the action level for investigation.

License Condition 9.7 requires in part that the licensee follow the guidance in NRC Regulatory Guide 8.22, "Bioassay at Uranium Mills". Table 1 of Regulatory Guide 8.22, recommends a minimum routine bioassay frequency of weekly for Uranium Oxide (UO_3), solubility Class W. The licensee committed to weekly bioassays for operators working in the dryer area and with the mini press in accordance with the above recommendations in Standard Operating Procedure HP-009, Rev 2, "Bioassay Monitoring", Section 6.12 states, in part, that weekly bioassay samples will be collected from each worker that meets either of the following conditions: 1) routine exposure to airborne yellowcake, such as yellowcake drying, packaging, cleaning and decontamination operations [i.e.; Dryer Operators] or 2) direct involvement in maintenance tasks in which yellowcake dust may be produced, especially related to filter presses or in the dryer room [i.e. Plant Maintenance]. The inspectors identified that from January 2017 to March 2017, weekly bioassay samples were not analyzed for four individuals of the dryer operators/plant maintenance staff as required by the standard operating procedure (SOP). Further review into this issue revealed the weekly submission of the urine samples by employees were performed as required and the previous RSO made a decision to not submit the samples for analysis based on prior results and survey results. The SOP does not provide the flexibility for the RSO to make a decision not to analyze urine samples. Review of subsequent monthly analyzed samples made by the effected personnel reported uranium content at de minimus levels; therefore, internal radiation exposure was not a concern. This failure to comply with the requirements of the SOP as written is considered a violation of minor safety significance which is not subject to enforcement action in accordance with Section 2 of the Enforcement Policy.

The inspectors confirmed internal exposures were below the limits established in 10 CFR 20. The inspectors confirmed that the licensee had conducted air sampling at the required intervals. The appropriate exposures were calculated and recorded for each employee. Occupational doses were below the limits established in 10 CFR 20.1201.

b. Radiation Work Permits

Section 9.7 of the license application requires, in part, that the licensee will require a Radiation Work Permit when an employee is required to conduct activities of a non-

routine nature where there is a potential for significant exposure to radioactive materials and no standard operating procedure exists for the activity. Since the previous inspection, thirty-eight (38) radiation work permit (RWPs) were issued by the licensee and involved various ion exchange circuit and component maintenance, dryer and dryer room maintenance, header house maintenance, resetting of the evaporation pond netting, drum lid refitting activities, and deep disposal well DDW-4, yellowcake, and other 11.e(2) material clean up. The inspectors reviewed the RWPs and found they included the necessary direct surveys, air sampling, and protective equipment requirements for work being performed.

The inspectors identified one incident were an RWP required the use of breathing zone (BZ) air samplers where the BZ samplers were not worn by the employees signed in on the RWP. A second phase of the maintenance activities, documented on an additional RWP also required BZ monitoring, and the BZ samplers were used. The licensee used the information from this second day to determine a dose for the individuals associated with the first RWP. Interviews with the employees indicated this was an isolated event where employees, forgot the wear the BZ samplers for the one day's activities. Area air sampling results and bioassay results for the employees support the conclusion that there was not a dose concern to the workers associated with the failure to wear the BZ samplers. The failure to comply with the RWP requirements was an isolated event, additional monitored did not indicate the work presented an occupational dose concern, and is considered a violation of minor safety significance which is not subject to enforcement action in accordance with Section 2 of the Enforcement Policy.

c. Radiation Surveys

License Condition 9.2 requires, in part, the licensee conduct operations in accordance with Section 5.7.2.2, revised April 2010 (ADAMS Accession No. ML102100263, and ADAMS Accession No. ML102420249) of the license application and its supplements. This specifically required that the licensee perform quarterly gamma radiation surveys in approximately 46 areas throughout the CPP area to verify radiation postings and to assess external radiation conditions. At the time of the inspection, the inspectors determined that the licensee was conducting the gamma radiation surveys on a monthly basis.

In a previous inspection, the licensee was cited for inadequate surveys for free release (VIO-040-09068/2016-001-04). The licensee essentially failed to establish adequate representative background measurements and used background survey data which exceeded the equipment being released. The inspectors reviewed survey data (direct alpha and contamination measurements) and background measurements since the previous inspection. In addition, the inspectors reviewed an assessment performed by the RSO of the facility's ambient background; survey methodology and equipment; relocation of survey locations to achieve lower background; and procedures and training for scanning materials for unrestricted use. The assessment provided a number of additional causal factors contributing to the inadequate surveys along with corrective actions. The inspectors determined the licensee has taken and is planning to take appropriate corrective action to address. This violation is considered closed.

d. Radiation Instrumentation

The inspectors reviewed the licensee's operability, calibration, and maintenance records for portable radiation survey instruments in accordance with LC10.4. All portable survey instruments to an outside vendor for calibration on an annual basis. The inspectors reviewed instrument calibration certificates and maintenance records for several portable survey instruments and found the calibration certificates to be adequate, maintenance records adequately maintained, and the instruments currently calibrated. The inspectors observed survey meters being used by the licensee's employees when exiting restricted areas. The survey instruments examined by the inspectors were found to be in calibration and were being used appropriately by the licensee's staff.

e. Contamination Control

The inspectors reviewed the licensee's procedure for contamination control and observed personnel surveying out from restricted areas, such as the CPP and the wellfield. The observations were in accordance with the licensee's procedures. The surveys were conducted in accordance with licensee procedures.

3.3 Conclusions

Occupational exposures since the last inspection were below regulatory limits. Survey instruments were found to be in calibration and were being used appropriately by the licensee's staff. The licensee implemented a radiation protection program that met the requirements of 10 CFR Part 20 and the license.

4 Maintaining Effluents from Material Facilities As Low As is Reasonably Achievable (ALARA) and Effluent Control and Environmental Protection (87102 and 88045)

4.1 Inspection Scope

Determine if the environmental and effluent monitoring programs are adequate to monitor the impacts of site activities on the local environment.

4.2 Observations and Findings

a. Environmental Monitoring

The semi-annual reports were submitted timely by the licensee in accordance with the requirements of 10 CFR 40.65. Submissions were initially reviewed and evaluated by NRC headquarters staff. The NRC's review of these documents will be provided to the licensee under separate correspondence.

The inspectors reviewed the January – June 2017 semiannual report and compared the reported data to the licensee's records, procedures and daily operations. The data was consistent with the inspector's observations.

b. Dose to Members of the Public

The licensee performed a public dose assessment based on environmental monitoring results on February 27, 2017. This dose assessment stated that there have not been

any ranchers, campers, hunters or other members of the general public spending any significant amount of time near the plant, so doses were calculated for a contractor employee spending 3 days onsite or the occasional delivery driver who was onsite for 173 hours/year. Both doses were well below the allowable limit of 100 mrem/year or 2 mrem in any one hour.

c. Wellfield and Excursion Monitoring

License Condition 10.5 requires, in part, the licensee perform well mechanical integrity (MIT) tests on all injection and production wells before utilization and retest each well at least once every 5 years. The inspectors reviewed the MIT records for wells tested since the previous inspection. Of 111 wells tested in the first and second quarter of 2017, only four wells failed their MIT. The wells which failed were plugged and abandoned according to procedure.

The inspectors reviewed data collected since the last inspection under the licensee's excursion monitoring program conducted in accordance with LC11.5. At the time of the inspection, one well, KPW-2, was placed on the on excursion status, with increased sampling, as of October 8, 2017. The NRC was provided written notice (ADAMS Accession No. ML17283A216) on October 9, 2017, per LC11.5.

Two reportable spills occurred during the inspection period. An additional spill of a small volume (approximately 40 gallons and not reportable) occurred when a vehicle backed into an injection wellhead, breaking the well cover and the u-bend. The licensee had properly documented and performed soil samples at the spill locations and notified NRC in accordance with LC11.6.

The first spill occurred on August 18-19, 2017, at HH-6 due to a broken 6" injection line. The volume of the spill was conservatively estimated to be 188,000 gallons of injection fluid, based on (1) the volume of the fluid recovered in the basement of the header house (13,000 gallons), (2) the ground using a vacuum truck (3,200 gallons), and (3) an estimate of the flowrate from the line for the duration of the leak. The inspectors and licensee performed a RESRAD-ONSITE calculation to estimate the occupational dose for an individual due to the spill. The calculation conservatively assumed 100 percent occupancy at the header house and that the U-238 and U-234 were in equilibrium at 6.13 picocuries per gram (pCi/gm), U-235 at 0.045 pCi/gm and Ra-226 at 16 pCi/gm. The conservative, maximum dose to a worker from the spill was calculated to be 131.5 mrem. The anticipated dose to an actual worker was much lower than the conservative dose estimate stated above.

The leak was identified by the operators at approximately 10:58 pm due to change in flow pressures. The operators requested wellfield check the header houses, wellfield operations started at HH1-13 and completed an inspection there and at HH1-12, HH1-11, HH1-10, HH1-09, HH1-08 and HH1-07 without identifying the source of the change in flow rates. At 12:00 am the operators contacted the Mine Manager who advised them to shut down operations, after discussion the decision was made to place the plant in bypass instead. The plant was placed in bypass at 12:32 am. Shortly thereafter, one of the plant operators went into wellfield to assist in checking of the remaining header houses. The leak was found at HH1-6 and shutdown at 1:26 am. The six inch injection fluid line from the filter pots had failed at the u joint and injection fluid was being sprayed onto the panel, flooding the basement area and flowing out the door

of the header house and into a drainage ditch that was slightly downhill from the header house. The draining ditch flows thru Mine Unit 1 and terminated near HH1-4. The high-high leak detection alarm system for HH1-6 did not alarm.

The second spill occurred September 5, 2017, in HH1-10. An injection line in the header house had ruptured due to stress on a flange. The release volume was estimated to be approximately 10,000 gallons. The inspectors reviewed the information related to the release and determined that any exposure to a worker would have been minimal.

On September 6, 2017, the licensee shutdown all the header houses in Mine Unit 1. Each header house was visually inspected and wellfield operators were tasked with checking the leak detection system operability for each system, including testing of the high level alarm and testing of the high/high level alarm under management observation, to verify that when the float in the header house was lifted; 1) the power to the header house was terminated and 2) the operators at the CPP received an alarm. The emergency shutdown device (ESD) was also tested and verified to be functioning correctly during this shutdown. The licensee also installed a flashing blue light to the roof of each header house that will illuminate when one those critical systems alarms or fails. This blue light supplements the red light that was already present. The red light illuminates when any problem occurs at the header house. Any systems found to not be functioning correctly were identified and repaired. When the testing (and any associated repairs) were completed for a header house it was returned to service. At the time of the inspection, only HH1-1 and HH1-3 were still shutdown. HH1-1 did not include level alarms and HH1-3 has communication equipment issues.

Prior to these leaks, the high leak detection system and the high-high leak detection systems were only tested at installation and were not tested at any specific frequency, which likely contributed to the duration of the spill for HH1-6. The licensee has proposed preventive maintenance and testing intervals for the wellfield header house equipment. The proposed maintenance and testing intervals are as follows:

- Injection and production well head floats will be tested for operability semiannually

- Header house high-high production pressure and low-low flow will be tested semiannually

- Header house leak detection systems (high level and high-high), ESD, audible alarms will be tested monthly. The licensee expects to do this for three months and if all systems pass, will likely move to quarterly testing

The SOP that would document these maintenance frequencies had not been modified at the time of the inspection. The licensee has checked every operable wellhead and completed the high level alarms and shutdown testing. The licensee has partially completed the ESD testing, high-high pressure and low-low flow testing for the majority of the header houses. The licensee expects to complete the testing above and modify the SOP by the end of November.

4.3 Conclusions

The licensee conducted environmental monitoring in accordance with license requirements. The licensee reported the results in semi-annual reports to the NRC. The annual dose to members of the public remained below regulatory limits. The licensee was documenting spills and conducting excursion sampling as specified in the license.

5 Inspection of Transportation Activities and Radioactive Waste Processing, Handling and Storage (86740 and 88035)

5.1 Inspection Scope

Determine if storage and disposal activities were conducted in compliance with regulatory and license requirements.

5.2 Observations and Findings

a. Inspection of Transportation Activities

The inspectors reviewed transportation activities since the last inspection. During this time period, the licensee made yellowcake shipments and 11.e(2) byproduct waste shipments. The inspectors reviewed the licensee's procedures and shipping records associated with these shipments. A previous violation was cited for the failure to include the name of each radionuclide on associated shipping papers. During the review of shipment records, the inspectors identified the licensee made corrections to the 11.e(2) shipping paperwork starting in August 2017 to include the name of each radionuclide on the associated paperwork. The inclusion of the name of each radionuclide on associated shipping papers closes this violation (040-09068/2017-001-01).

On June 20, 2017, the licensee provided a notification to the US Department of Transportation (DOT) regarding the loss of yellowcake during the loading of yellowcake drums for shipment (ADAMS Accession No. ML17216A041). The cause of the spill was a drum puncture by the drum loading device on the fork lift. The main frame of the drum loading device has large angled corners or edges which created a small puncture on one drum. The licensee determined approximately 0.5 pounds of yellowcake spilled from the punctured drum. The licensee performed the removal of all drums, cleanup, and decontamination surveys of the conveyance under an RWP. The licensee stopped the shipment until the spill was investigated and the drum removed from the shipment lot. The licensee determined a corner of the drum lifting device punctured the drum while another drum was being loaded into the trailer. The licensee changed the method of drum loading when resuming the shipment.

In addition to the spill report, the inspector reviewed the RWP, air monitoring results, and contamination surveys for the event. The licensee performed air monitoring during the spill remediation and the highest exposure to natural uranium was 12.4 mrem, well below the regulatory limit. The contamination surveys after decontamination and from the resulting shipment were below the required DOT contamination levels for an exclusive use shipment.

b. Inspection of Byproduct Waste Storage

The inspectors observed the CPP's 11.e(2) byproduct material waste storage areas were appropriately located and labelled. The 11.e(2) storage areas consist of 11.e(2) staging areas with in the CPP and a restricted area attached to the CPP which is normally accessed through a door in the CPP. The CPP's outside 11.e(2) byproduct material waste storage bins were within a fenced and locked restricted area. The inspectors performed an ambient gamma radiation survey of the containers to confirm that the areas were appropriately posted and controlled in accordance with 10 CFR 20 regulations.

The inspectors reviewed a waste storage area called the bone yard recently approved for a corner of the fenced evaporation ponds area. During a tour of the evaporation pond area and the bone yard, the inspectors identified an additional example of a failure to ensure radioactive waste containers were covered.

License Condition 9.2 states, in part, that the licensee shall conduct operations in accordance with the commitments, representations, and statements contained in the license application. License Application Section 4.3.2, states, in part, that equipment that cannot be decontaminated and process wastes will be placed in clearly labeled, covered containers and temporarily stored in restricted areas with clearly visible radioactive warning signs.

Contrary to the above, during a tour of the bone yard on October 18, 2017, the licensee failed to place equipment and process wastes in covered containers while temporarily stored in restricted areas. Specifically, a container of mixed 11.e(2) material (sediments, pipe fittings, hose pieces, etc.) was identified in the bone yard uncovered with an on contact reading of 2.8 mR/hr (VIO-040-09068/2017-002-01). The failure to place equipment and process wastes in covered containers while temporarily stored in restricted areas was originally identified in the previous inspection regarding uncovered waste material in header houses (040-09068/2017-001-02). The previous violation remains opens.

c. Wastewater Treatment Activities

The licensee has three Class I deep disposal wells (DDWs), DDW-1, DDW-3 and DDW-4, and two Class V shallow disposal wells. During the reporting period, excluding October's incomplete monthly data set, the average disposal flow rates and injection pressures to the DDWs were:

Well	Avg. Flow Rate (gpm)	Max Flow Rate (gpm)	Permitted Injection Flow (gpm)
DDW-1	1.2	1.8	50
DDW-3	6	16	50
DDW-4	8	16	50

Well	Avg. Injection Pressure (psig)	Max Pressure (psig)	Permitted Injection Pressure (psig)
DDW-1	577	603	609
DDW-3	839	898	915
DDW-4	698	808	838

psig – pounds per square inch gauge

The data for October was not complete to provide a monthly average. This discharge rate was sufficient for the waste disposal generated by the current production rates but less than the design rate of 50 gpm for each well. The discharge rate was limited by pressure buildup. In addition, the injection pressures did not exceed the permitted injection pressure limits for each well.

By Amendment 5 to the license, the licensee began on January 12, 2017, injecting treated permeate to the Class V injection facility. Only one Class V well was in operation during the reporting period (M-FG7) with an average disposal rate of 70 gpm, a maximum injection rate of 192 gpm and a maximum pressure of 10.6 psig. The injections were at or below the maximum permitted limit 200 gpm for flow and 45 psig for pressure. During the reporting period, the well operated a variable percentage of time and performed disposals in a batch process.

d. Pond Inspections

The inspectors reviewed the ponds and leak detection systems according to LC10.8 and Section 5.3.2 of the license application. The inspectors found the ponds and equipment to be in good condition and equipment performing its function. There were no leaks detected since the last inspection. The licensee samples water from the sumps before discharging the fluid into the ponds. The licensee confirms the water is rain or groundwater through conductivity tests. These tests are compared to the conductivity of the ponds and indicate the water source is not from the pond.

The inspectors reviewed the licensee's freeboard records to ensure the requirements of LC10.8.A were being met in maintaining a minimum freeboard of 3 feet. Since the last inspection, the licensee has maintained a daily minimum freeboard of 3 feet.

The inspectors review the operations of the two ponds used for wastewater storage. During the reporting period, the ponds had been properly maintained, and inspected daily, weekly, quarterly and annually in accordance with LC10.8.

5.3 Conclusions

Transportation of yellowcake, waste water treatment, disposal of byproduct material and management and storage of 11.e(2) wastes were conducted in accordance with license and regulatory requirements with one exception:

- A violation of License Application Section 4.3.2. was identified for a failure to ensure radioactive waste containers were covered

6 Emergency Preparedness (88050) and Fire Protection (88055)

6.1 Inspection Scope

Determine if the licensee's emergency preparedness and fire protection programs are adequate to protect the safety and health of employees, members of the public and the environment.

6.2 Emergency Preparedness

License Condition 10.4 requires in part that the licensee develop and implement standard operating procedures for potential accidents/unusual occurrences, including equipment or facility damage, pipe breaks or spills, loss or theft of yellowcake, fires and other natural disasters. The inspectors reviewed the following SOPs: First Aid/CPR, Emergency Action Plan, and Crisis Management Plan. The licensee last conducted an emergency evacuation drill for the site on April 10, 2015. Employees are required to review and sign off on the review for the above procedures during initial training and emergency response topics are included in the annual refresher training. Visitors to the site are provided site orientation training, which includes evacuation gathering points. The licensee coordinated with, and provided training and tours to local emergency response organizations as part of the pre-operational phase.

6.3 Fire Protection

The inspectors reviewed the fire protection plan developed by the licensee in response to the requirements of LC10.4. The fire protection plan meets the minimum requirements of 29 CFR 1910.39. Employees are trained on fire prevention and fire extinguisher use as part of new employee orientation. The licensee has scheduled refresher training in fire prevention for all employees the week of October 23, 2017. The licensee has a subcontractor who comes to the site annually to perform an independent assessment of the fire protection program (tanks, control valves, etc.). The last assessment was performed by the contractor in September 2016, the subcontractor is scheduled to perform an assessment in November 2017.

6.4 Conclusions

The licensee has standard operating procedures associated emergency preparedness and fire protection program sufficient to meet the requirements of LC10.4. Employees and visitors are provided emergency preparedness and fire protection training as applicable. Fire protection equipment is maintained by an outside contractor. The licensee has coordinated with Local Law Enforcement Agency organizations for emergency response.

7 Exit Meeting Summary

The NRC inspectors presented preliminary inspection results to Mr. Steve Hatten, Vice President of Operations, and members of the license's staff at the conclusion of the onsite inspection on October 19, 2017. The NRC discussed the findings with management and

continued its review of the circumstances surrounding the findings and re-characterized two of the findings as minor violations. A final exit was conducted with Mr. John Cash, Vice-President of Regulatory Affairs Exploration and Geology, and members of the licensee's staff on November 1, 2017. During the inspection, the license did not identify any information reviewed by the NRC inspectors are proprietary that was included in the report.

SUPPLEMENTAL INSPECTION INFORMATION

Partial List Of Persons Contacted

Licensee Personnel

K. Brown, Mine Manager
A. Buehrle, Corporate Radiation Safety Officer
J. Cash, Vice President, Regulatory Affairs
M. Gaither, Manager, Environment, Health, and Safety/Regulatory Affairs
S. Hatten, Vice President, Operations
A. Hunt, Process Engineer/Plant Manager

Items Opened, Closed and Discussed

Opened

040-09068/2017-002-01	VIO	Failure to ensure radioactive waste containers were covered

Closed

040-09068/2017-001-01	VIO	Failure to include the name of each radionuclide on associated shipping papers
040-09068/2016-001-04	VIO	Inadequate surveys for free release

Discussed

040-09068/2017-001-02	VIO	Failure to ensure radioactive waste containers were covered
040-09068/2017-002-01	VIO	Failure to ensure radioactive waste containers were covered

Inspection Procedures

IP83822	Radiation Protection
IP86740	Inspection of Transportation Activities
IP87102	Maintaining Effluents from Materials Facilities ALARA
IP88005	Management Organization and Control
IP88035	Radioactive Waste Processing, Handling, Storage and Transportation
IP88045	Effluent Control and Environmental Protection
IP88050	Emergency Preparedness
IP88055	Fire Protection
IP89001	In-situ Leach (ISL) Facilities

List of Acronyms

ADAMS	Agencywide Documents Access and Management System
ALARA	As Low As is Reasonably Achievable
BZ	breathing zone
CFR	Code of Federal Regulations
CPP	Central Processing Plant
DAC	derived air concentration
DDW	Deep Disposal Well
DOT	Department of Transportation
ESD	Emergency shutdown device
gm	gram
gpm	gallons per minute
HH	Header House
IP	Inspection Procedure

ISR	in-situ recovery
ISL	in-situ leach
LC	license condition
MIT	mechanical integrity
Mrem	millirem
NRC	U.S. Nuclear Regulatory Commission
pCi	picocurie
RSO	Radiation Safety Officer
RWP	radiation work permit
SERP	Safety and Environmental Review Panel
SOP	standard operating procedure

LOST CREEK ISR - NRC INSPECTION REPORT 040-08943/2017-001 AND NOTICE OF VIOLATION – DATED NOVEMBER 30, 2017

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■ SUNSI Review By: BDB	ADAMS ■ Yes ☐ No	■ Non-Sensitive ☐ Sensitive	■ Publicly Available ☐ Non-Publicly Available	Keyword: NRC-002
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