



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

December 27, 2017

Larry Reimann, Manager
Compliance and Licensing
Power Resources, Inc.,
dba Cameco Resources
P.O. Box 1210
Glenrock, WY 82637

**SUBJECT: POWER RESOURCES, INC. 040-08964, NRC INSPECTION
REPORT 2017-002**

Dear Mr. Reimann:

This letter refers to the routine U.S. Nuclear Regulatory Commission's (NRC) inspection conducted from November 13-16, 2017, at Smith Ranch Highland and North Butte uranium recovery facilities, in Converse and Campbell Counties, Wyoming, respectively. 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 held with you and your staff on November 15, 2017. After discussion with NRC management and continued review of information provided by your staff and gathered during the inspection, a final exit was conducted on November 30, 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. No violations were identified and no response to this letter is required.

As part of this inspection, the NRC reviewed the status of the agreed upon corrective actions associated with the Confirmatory Order EA-16-051 issued on September 30, 2016 (ADAMS Accession No. ML16274A117). Based on the inspectors' findings the Confirmatory Order remains open until actions related to the annual management reviews as outlined in Section A of the Order and the required training associated with individuals' responsibility to report non-compliances to management as outlined in Section C of the Order are completed.

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 by LEBrookhart Acting for/

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

Docket: 040-08964
License: SUA-1548

Enclosure:
NRC Inspection Report 040-08964/2017-002

w/Attachment: Supplemental Information

cc:
Brent Berg, Cameco Resources, PRI
Doug Pavlick, Cameco Resources, PRI
Scott Ramsay, WY Radiation Control Program
Ryan Schierman, WDEQ
Robin Jones, WDEQ
Brandi O'Brien, WDEQ
Mark Rogaczewski, WDEQ

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket: 040-08964

License: SUA-1548

Report: 04008964/2017-002

Licensee: Power Resources Inc. dba Cameco Resources

Location: Smith Ranch Highland and North Butte Satellite
Converse and Campbell Counties, Wyoming

Dates: November 13-30, 2017

Inspectors: 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: Douglas Mandeville, Senior Project Manager
Uranium Recovery Licensing Branch
Division of Decommissioning, Uranium Recovery and
Waste Programs
Office of Nuclear Materials Safety and Safeguards

Brandi O'Brien, Project Health Physicist
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

Attachment: Supplemental Information

Enclosure

EXECUTIVE SUMMARY

Power Resources Inc., In-Situ Recovery Facility NRC Inspection Report 04008964/2017-002

The U.S. Nuclear Regulatory Commission (NRC) performed a routine health and safety inspection from November 13-30, 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 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 Facilities

The licensee conducted in-situ recovery 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. The licensee was maintaining financial assurance in accordance with license requirements. (Section 2.2)

Radiation Protection

The licensee implemented a radiation protection program that met the requirements of 10 CFR Part 20 and the license. Occupational doses were less than established limits. (Section 3.2)

Follow-up of Confirmatory Order (CO)

The Confirmatory Order EA-16-051 issued September 30, 2016 (ADAMS Accession No. ML16274A117) remains open until actions related to the annual management reviews as outlined in Section A of the Order and the required training associated with individuals' responsibility to report non-compliances to management as outlined in Section C of the Order are completed. (Section 4.2)

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 5.2)

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

The shipment of yellowcake and resin and the management, storage, transportation, and disposal of byproduct material and 11e.(2) wastes were conducted in accordance with the license and regulatory requirements. (Section 6.2)

Emergency Preparedness and Fire Protection

Emergency Preparedness and Fire Protection programs are in place and maintained in accordance with license and regulatory requirements. (Sections 7.2)

Report Details

Site Status

At the time of the inspection, Power Resources, Inc. was extracting uranium using the in-situ recovery process. Uranium processing and drying operations were in progress at the Smith Ranch Highland Central Processing Plant (CPP). Additionally, four satellite facilities (Sat-2, Sat-3, SR-1 and SR-2) and one remote satellite facility (North Butte) were in service. The Sat-2 facility is supporting mine unit restoration activities.

Uranium recovery operations were on standby at the renovated Highland CPP. The Reynolds Ranch Satellite has received Wyoming Department of Environmental Quality approval and the inspectors understand that a decision to proceed with construction depends on market conditions. The Highland and Ruth Satellites are not in operation at this time, although the licensee inspected these facilities once per quarter. The licensee indicated that due to current economic conditions, new mine unit production and development are not a top priority.

1 Management Organization and Control (88005)

1.1 Inspection Scope

The licensee's established organization structure to administer the technical programs and to perform internal reviews, self-assessments and audits were reviewed by the inspectors.

1.2 Observations and Findings

a. Organizational Structure

The inspectors reviewed the licensee's organization structure for the Smith Ranch Highland and the North Butte Satellite facilities. At the time of the inspection, the Smith Ranch Highland facility operation currently had approximately 72 full-time employees, a decrease of 26 employees since the May 2017 inspection. The North Butte Satellite had 8 full-time employees, a reduction of 4 employees. The changes in Cameco's staffing levels resulted from its decision to stop additional mine unit development at Smith Ranch Highland and North Butte and the corresponding decrease in yellowcake production.

Since the previous inspection, the organizational structure has changed. The organizational changes were reviewed under the Safety and Environmental Review Panel (SERP) process and the current organizational chart reflects the movement of individuals from one job position to another and a redistribution of responsibilities to address attrition and the reduction in force. The inspectors found that the movement of duties and responsibilities associated with the reduction in force did not have a negative impact on essential functions, such as operations and radiation protection.

During the previous inspection, it was noted that the Radiation Safety Officer (RSO) left the Smith Ranch Highland facility March 16, 2017, and an interim RSO was approved in the 03/17-04 SERP that occurred on March 15, 2017. The interim RSO divided her time between the Smith Ranch Highland facility and the Cameco Crow Butte site. As of the date of this inspection, the interim RSO continued to serve the licensee and is supported

by two Health Physics Technicians (HPT), two HPT-in-training, and four environmental technicians performing various sampling activities for the radiation protection program. The inspectors determined that the licensee had sufficient staff to implement the radiation protection, groundwater monitoring and environmental programs at current operating levels. The licensee is actively supporting training of one of the HPTs to allow that individual to be appointed RSO and allow the interim RSO to return to full-time support of Cameco's Crow Butte facility.

b. Safety and Environmental Review Panel (SERP)

License Condition 9.4 of the performance based license requires, in part, that the licensee establish a SERP process to evaluate if program changes, tests or experiments require an NRC license amendment prior to implementation. The licensee also convenes Occupational Review Committee (ORC) meetings to determine if changes, tests, and experiments require a SERP or license amendment. The inspectors reviewed the following SERP evaluations completed since the May 2017 inspection:

07/17-07 SERP	Multi-pattern, multi-tester Tracer Test
07/17-08 SERP	Header House 15-16 Push Pull Test
08/17-10 SERP	Organizational Structure and Chapter 9 Revisions
09/17-12 SERP	Reynolds Ranch Deep Disposal Well and Pipeline
10/17-14 SERP	IP-2 Shipping Containers

In accordance with License Condition 9.4, the licensee is expected to submit a description of each change, including a summary of each safety and environmental evaluation to the NRC in a future annual report. The inspectors concluded that the licensee correctly implemented the performance-based license, and the evaluations did not require prior NRC approval.

c. Audits and Inspections

The inspectors reviewed the audits and inspections generated by the licensee since the previous inspection, in accordance with the requirements of License Condition 9.7 and Regulatory Guide 8.30. The RSO, individuals designated by the RSO to perform specific activities (designee), along with trained and qualified operators performed and documented the daily walk-throughs. Site procedures allow trained and qualified operators to perform the daily walk-throughs on days when radiation safety staff were not available, such as weekends and holidays. The RSO or designee reviewed the walk-through documentation upon return to the facility. A review of the daily walk-throughs conducted since the previous inspection revealed no examples of the RSO or designee failing to perform the required review, if delays in review occurred the reason for the delay was documented on the form (illness, document misplaced, etc.). The weekly and monthly reviews by the RSO or designee were conducted at the required frequencies.

d. Additional Protocols

The inspectors verified that the licensee had provided the NRC with appropriate 2016 documentation to comply with 10 CFR 75.11, which related to the Agreement between the United States of America and the International Atomic Energy Agency for the Application of Safeguards in the US. The licensee provided four of the necessary forms

which provide contact information, the capacity of yellowcake production, the actual annual yellowcake production, and the quantity of yellowcake on hand. The inspectors concluded the reports were accurate, complete, and consistent for the calendar year 2016.

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

The licensee's in-situ recovery operations, facility status, and financial status were reviewed to determine if activities were conducted in accordance with regulatory requirements and the license.

2.2 Observation and Findings

a. Uranium Recovery

At the time of the inspection, uranium recovery operations were being performed at Smith Ranch Highland Mine Units (MU) 3, 7, 9, 10, 15, 15A, F, J, K and K-North, and North Butte MUs 1 and 2. In these MUs, operations consist of circulation of water through the subsurface and the ion exchange columns. Since the last inspection, the licensee has not added additional complexing chemicals to the lixiviant and is utilizing the existing chemicals in the formation to recover uranium from these MUs. Smith Ranch Highland MUs 2, 4, 4A, C, D, E, H and I were in restoration. The licensee is preparing an amendment request for alternate concentration limits (ACLs) for Mine Unit 1 and Smith Ranch.

At the time of the inspection, the average production flow for Smith Ranch Highland was 6,500 gallons per minute. At the time of the inspection, North Butte average production flow was 1,100 gallons per minute. The licensee is below the maximum rated capacity of 20,000 gallons per minute specified in License Condition 10.1.1. The inspectors reviewed the licensee's uranium production records and noted that the annual production for calendar year 2017 to date was well below the annual limit specified in License Condition 10.1.1.

During this inspection, the inspectors discussed the monitoring well sampling protocols and the monitoring well water level tracking system used by the licensee to demonstrate and maintain the inward hydraulic gradient and optimize use of lixiviant. This item will continue to be reviewed in future inspections.

b. Site Tours

The inspectors conducted a site tour to observe in-situ uranium recovery activities at the Smith Ranch Highland Central Processing Plant (CPP), focusing on packaging and movement of yellowcake drums in the CPP. The inspectors discussed the licensee's drum inspection and drum movement procedures with the dryer operator to better understand the licensee's approach.

The inspectors also conducted tours at the Ruth and Highland Satellites to verify the lack of production at these two facilities. The inspectors observed activities at the following header houses (HH) and satellite facilities: North Butte Ponds, HH1-5, HH1-10, HH2-4, HH2-5, HH7-5, HHK-10, HHF-18, North Butte deep disposal well (DDW), Satellite-2 (Sat-2) and selenium plant. The inspectors determined operators at Highland Smith Ranch and North Butte facilities were conducting operations in accordance with the site procedures.

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 License Condition 9.8. Additionally, the temporary storage of byproduct waste materials was located in fenced and locked restricted areas as required by License Condition 10.1.7.

The inspectors conducted independent radiological surveys of the gamma exposure rates present in the Smith Ranch Highland's central processing plant, remote satellite facility, selenium plant, header houses and wellfields. The surveys were conducted using a Ludlum Model 19 microRoentgen rate meter ($\mu\text{R/hr}$) [NRC No. 015530 calibration due date of July 25, 2018, calibrated to Ra-226]. The inspectors noted that the as-found gamma exposure rates were consistent with the licensee's measurements. The licensee had several areas conservatively posted as radiation areas. The highest exposure rate within the central processing plant posted as a radiation area, was 2,800 $\mu\text{R/hr}$ at the F-20 sand filter. The highest exposure at the selenium treatment plant was 3,600 $\mu\text{R/hr}$ on contact with barium sulfate sediment packages. The inspectors did not identify any areas that had not already been posted as radiation areas by the licensee. The inspectors determined the licensee identified and posted radiation areas as required by 10 CFR 20.1902.

c. Financial Assurance

In accordance with License Condition 9.5, the licensee submitted its most recent annual financial assurance updates for Smith Ranch on June 21, 2017; the Gas Hills Satellite on July 31, 2017; the North Butte Satellite on January 26, 2017; and the Ruth Satellite on December 20, 2016. All four of these submittals remain under review by the NRC. During the inspection, the NRC staff reviewed copies of the licensee's letters of credit and determined that the letters of credit maintained a financial assurance amount that is equal to or greater than the amount identified in License Condition 9.5

2.3 Conclusion

The licensee conducted in-situ recovery 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. The licensee was maintaining financial assurance in accordance with license requirements.

3 Radiation Protection (83822)

3.1 Inspection Scope

Areas of the licensee's radiation protection program was reviewed to determine if radiation protection activities were 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 for the first three quarters of 2017. Approximately 52 employees were monitored for external exposure using optically stimulated luminescence dosimeters that were exchanged on a quarterly basis. Occupational monitored employees included plant and wellfield operators, health physics staff, laboratory staff and maintenance workers. The highest deep dose equivalent exposure reviewed as 252 millirem (2.52 milliSievert). This dose was assigned to a central processing plant operator. All doses were below the limits established in 10 CFR 20.1201. No bioassay results were above the action level for investigation (15 µgm/L).

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 the first three quarters of 2017. The inspectors identified that 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.

In a previous inspection report, 2016-001 (ADAMS Accession No. ML16323A110), the licensee was cited for a violation regarding the failure to use correct bioassay intake retention fractions when calculating the committed effective dose equivalents for four individuals since the 2006 timeframe (VIO 040-08964/2016-001-01). During the inspection, the inspectors discussed the software calculation method and reviewed the recalculation of the assigned doses for those individuals identified in the violation and the applicable procedures revisions to prevent recurrence. Based upon the information reviewed, this violation is closed.

b. Radiation Work Permits

Since the previous inspection, three radiation work permits were issued involving repair/maintenance work on tank rubber gaskets, sediment removal from a pond liner and clean-up associated with a damaged yellowcake drum. The inspectors reviewed the permits and found they included the necessary air sampling and protective equipment requirements for the work being performed.

c. Free release surveys

Free release surveys since the previous inspection from the Smith Ranch Highland CPP and North Butte were reviewed and found to be performed in accordance with License Condition 9.6.

d. Radiation Safety Instrumentation

The inspectors reviewed the licensee's operability, calibration and maintenance records for survey instruments in accordance with License Condition 10.4. Instruments reviewed were found to be in calibration. The licensee uses an offsite vendor to perform annual calibration for radiation safety instrumentation. The inspectors observed survey meters used by licensee personnel when exiting restricted areas. The survey meters examined by the inspectors were found to be in calibration and were used appropriately by licensee's staff.

e. Respiratory Protection

The inspectors examined the respiratory protection equipment and reviewed the licensee's respiratory protection procedures, medical testing and fit testing results. The inspectors found the licensee's respiratory protection program to meet the license and regulatory requirements.

3.3 Conclusions

The licensee implemented a radiation protection program that met the requirements of 10 CFR Part 20 and the license. Occupational doses were less than established limits.

4 Follow-up of Confirmatory Order (92703)

4.1 Inspection Scope

The licensee's progress with the agreed upon commitments as required in the Confirmatory Order (CO) EA-16-051 issued on September 30, 2016 (ADAMS Accession No. ML16274A117) were reviewed to determine if acceptable corrective actions had been taken in accordance with the order requirements.

4.2 Observations and Findings

On September 30, 2016, the NRC issued a CO to PRI-Smith Ranch as a result of an alternative dispute resolution (ADR) agreement for an investigation related to a former operations supervisor who willfully failed to maintain complete and accurate records of contamination exit surveys. The inspectors reviewed the status of the commitments made under the CO. Management review of the performance indicators, license changes, operations changes, health physics issues and procedure compliance occurred as part of the management review in CY2016 as documented in the by Section A of the CO. However, the management review was limited in scope rather than a comprehensive overview. For example, the procedure compliance review was limited to self-identified violations; and the discussion of health physics issues was limited to the violations identified in the 2016 NRC Inspection Report (040-08964/2016-003, ADAMS

Accession No. ML17151B102) related to transportation and the licensee's efforts to address the inspection findings. This limited scope was discussed with licensee representatives during the onsite portion of the inspection. The NRC expects the future annual management reviews to be more comprehensive for the required topics. Training of personnel on the need for complete and accurate information and individual accountability were conducted as required by Section B of the CO, but the training did not include the discussion of an individual's responsibility to report non-compliances to management. The licensee indicated that the individual responsibility portion of the training was conducted with the North Butte staff but not with the staff at Smith-Highland. A review of records of released equipment verified compliance with requirement for a HPT to survey and release equipment and materials per Section C of the CO and the licensee provided a written notification of the completion of the CO requirements on October 27, 2017 (ADAMS Accession No. ML17278A661) as required by Section D of the CO. As a result of the limited scope addressing Section A and the missing training for Section C, the CO will remain open. Since the requirement for an annual management review in accordance with Section A of the CO are effective until modified by the NRC, compliance with the CO will be reviewed in future inspections.

4.3 Conclusion

The Confirmatory Order EA-16-051 issued September 30, 2016 (ADAMS Accession No. ML16274A117) remains open until actions related to the annual management reviews as outlined in Section A of the Order and the required training associated with individuals' responsibility to report non-compliances to management as outlined in Section C of the Order are completed.

5 Effluent Control and Environmental Protection and Maintaining Effluents from Material Facilities ALARA (88045 and 87192)

5.1 Inspection Scope

The licensee's environmental and effluent monitoring programs were reviewed by inspectors to determine if adequate controls were established to monitor the impacts of site activities on the local environment.

5.2 Observations and Findings

a. Environmental Monitoring

The semi-annual Environmental Monitoring reports required to be submitted by 10 CFR 40.65 were submitted in a the required timeframe. 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 toured air sampling stations at Smith Ranch-Highland and North Butte. Air Samplers were in calibration and running. The passive radon etch track detector and optically stimulated laser (OSL) dosimetry were in place at the observed monitoring stations.

b. Dose to Members of the Public

The licensee conducted annual assessments of public doses as required by 10 CFR Part 20. The maximum public dose for calendar year 2016 was 10.1 millirem total effective dose equivalent at the fence line and 2.5 millirem total effective dose equivalent for the closest resident. The dose was calculated using data from optically stimulated luminescence dosimeters, radon track etch detectors, and particulate air samples. The assigned doses were primarily from radon-222 and its progeny. The licensee had not assessed public dose for 2017 at the time of the inspection.

c. Wellfield and Excursion Monitoring

The inspectors examined the reportable and non-reportable spill reports since the last inspection pursuant to the requirements of License Condition 12.1. According to licensee records, one spill occurred resulting in a total of 533 gallons, with no restoration fluids recovered.

License Condition 11.5 requires, in part, that the licensee monitor groundwater at the designated excursion monitoring wells at least twice a month. The inspectors reviewed records indicating groundwater monitoring was occurring. Two North Butte monitoring wells (NB2M-059 and NB2M-060) were identified as in excursion status on November 17, 2017. A notification was made to the NRC on November 20, 2017 (ADAMS Accession No. ML17345A154). The excursion is currently being monitored in accordance with License Condition 11.5. Since the spill and excursion events occurred after the on-site portion of the inspection was completed, the documentation associated with the events will be reviewed in detail during a future inspection.

The inspectors also reviewed recent mechanical integrity testing (MIT) documentation to determine whether test results were appropriately reported and to ensure that tests were performed in accordance with License Conditions 10.2 during the inspection period. The inspectors determined that the integrity testing was being performed in accordance with License Condition 10.2.

5.3 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.

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

6.1 Inspection Scope

The licensee's transportation, storage, and disposal programs were reviewed to determine if activities were conducted in compliance with regulatory and license requirements.

6.2 Observations and Findings

a. Inspection of Transportation Activities

The inspectors reviewed transportation activities since the last inspection. During this time period, the licensee made two yellowcake, 58 resin, and eight 11.e(2) byproduct waste shipments. The inspectors reviewed the licensee's procedures and shipping records associated with these shipments.

On July 14, 2017, the licensee provided a notification to the US Department of Transportation (DOT) regarding the loss of yellowcake during the shipment of yellowcake drums to Honeywell Metropolis (ADAMS Accession No. ML17248A527). The cause of the spill was a drum puncture by the drum loading device. The end of the gripping section of the device had angled corners or edges which created a small puncture on one drum. It was determined that approximately less than 25 grams of yellowcake spilled from the punctured drum. Honeywell performed the removal of all drums, decontamination, and surveys of the conveyance. No contamination was identified on the outside the conveyance and decontamination of the conveyance was to DOT releasable levels. The NRC determined that the licensee took appropriate corrective action by ceasing yellowcake shipment until the spill was investigated and the drum lifting device was replaced.

The inspectors also reviewed the licensee's transportation program to close previous cited violations. A previous violation documented in Inspection Report 2015-001 (ADAMS Accession No. ML15191A335) involved for a failure to include the total quantity of hazardous material on shipping papers associated with resin shipments (VIO 04008964/2015-001-01). The inspectors reviewed the licensee's revised shipping paperwork process (no longer utilizing previous copies of shipment paperwork) and noted that in addition to changes in how shipping papers were prepared, the licensee established a single point of contact for shipments. The inspectors determined subsequent shipment documentation included the correct resin activity. The information reviewed and observed related to the shipping paperwork activities closes this violation.

The Notice of Violation (ADAMS Accession No. ML17151B102) documented the violations as described in Inspection Report 2016-003 (ADAMS Accession No. ML17079A564). The inspectors reviewed a number of documents associated with the corrective actions taken by the licensee to address the violations. Inspectors reviewed the licensee's revised procedures WYO-RPP-008, "Transportation of Radioactive Materials," Revision 26, WYO-SOP-097, "ISO Intermodal Container Acceptance, Loading, and Shipping," Revision 4, and WYO-SOP-146, "Selenium Removal Circuit Process (SHR)," Revision 4. Other documentation reviewed included (1) a safety audit, CAM-SRHO-17-034, "Cameco Resources Smith Highland Operation Transportation Safety Audit," issued October 25, 2017; (2) a SERP evaluation 10/17-14, "IP-2 Shipping Containers;" (3) Event Reports SHR-2017-000122 and SHR-2017-000123; (4) corrective actions SHR-CA-2017-00060 through SHR-CA-2017-00076; (5) shipping paperwork for an October 24, 2017, barium sulfate sludge shipment and selected resin shipments; (6) employee training documentation; and (7) observed facility, equipment, and process changes to determine if the violations could be closed.

In corrective action SHR-CA-2017-00076, the licensee revised Procedure WYO-RPP-008, "Transportation of Radioactive Materials," to include the methods to be

used to properly test samples for radon and other isotopes in order to properly classify material for transport. Section 1.5.2 of WYO-RPP-008, Revision 26, specified composite and representative samples be taken of sludge and sediment shipments and for the licensee to ensure a third party analyzes the samples with Environmental Protection Agency (EPA) approved methods for proper Ra-226 quantities; i.e. EPA Method E901.1 Modified or equivalent. The accuracy of the radionuclides within the shipment dictates the marking and labeling of the shipment. Therefore, with the correction of analyzing samples to accurately reflect the quantity of material within the shipment, the licensee identified the root cause for the inaccurate assessment of radioactive material, corrected the error, and has prevented recurrence of the failure to accurately assess the activity of pond sediment and barium sulfate sludge waste shipments. The actions taken by the licensee described above close VIO 04008964/2016-003-01.

The licensee appointed a single point of contact for all shipping paperwork, revised the spreadsheet used for characterizing and classifying shipments, and developed a Material Safety Data sheet to accurately describe the physical and chemical composition of the barium sulfate sludge. The inspectors reviewed the calculations within the spreadsheet to verify all necessary radionuclides were present and the correct activities and classification would be determined. Based on the licensee changes the inspectors determined, the shipments would be properly sampled to identify the accurate activity, the material would be correctly characterized/classified, and the appropriate labeling would be applied. In addition, the inspector reviewed shipping paperwork during inspection period for accuracy and compliance to DOT regulations regarding radionuclide content, activity, classification, characterization, and labeling. The licensee identified the apparent cause for the incorrect characterization and classification of pond sediment and barium sulfate sludge shipments and took corrective actions for the (1) failure to have appropriate paperwork documenting the total activity for pond sediment, barium sulfate sludge, and resin shipments (VIO 04008964/2016-003-02); (2) failure to appropriately label packages for pond sediments and barium sulfate sludge waste shipments (VIO 04008964/2016-003-03), (3) failure to appropriately classify pond sediment and barium sulfate sludge waste shipments as LSA-II (VIO 04008964/2016-003-04), (4) failure to provide the name of each radionuclide and an accurate description of the chemical description of content in shipping papers for barium sulfate sludge shipments (VIO 04008964/2016-003-08). The licensee's corrective actions and correct performance of subsequent resin shipments and a barium sulfate shipment provide the basis to close the violations described above. No shipment of pond sediment occurred during the inspection period.

The SERP 10/17-14, "IP-2 Shipping Containers," dated October 17, 2017, included the approval and documentation of Duratek Technical Services IP-2 certification of the IP-2 containers used for pond sediments and barium sulfate sludge shipments. The SERP package contained applicable DOT required certification and testing of the IP-2 package for the type of material to be shipped in the containers. The licensee tested the superabsorbent material (sodium polyacrylate) to develop a ratio of superabsorbent material to barium sulfate sludge material. The inspectors observed a testing of the superabsorbent material during a previous inspection. The licensee revised Procedure WYO-SOP-146, "Selenium Removal Circuit Process (SHR)," to include changes to the barium sulfate sludge press process to reduce water intrusion into the IP-2 containers and include the addition of superabsorbent material as the sludge is placed into the IP-2 containers. In addition, the licensee made modifications to the barium sulfate sludge press area to prevent water intrusion into the IP-2 containers.

The licensee made multiple tests to ensure the ratio of superabsorbent material and drying/activation time left a final product capable of preventing water separation from the sludge encountered from the vibration and acceleration during transport. The licensee revised Procedure WYO SOP-097, "ISO Intermodal Container Acceptance, Loading, and Shipping," to ensure checks are made of the gasket sealing and locking mechanisms and the addition of superabsorbent at the door seal of the IP-1 overpack containers for potentially wet material; i.e. barium sulfate sludge and pond sediments. The licensee demonstrated DOT compliance with contamination levels for an IP-2 and IP-1 overpack in the October barium sludge shipment. The licensee took corrective actions for the (1) failure to ship pond sediment and barium sulfate sludge in IP-2 containers when the shipments contained LSA-II material (VIO 04008964/2016-003-05), (2) failure to ensure by examination or appropriate tests that packages were proper for the contents to be shipped and closure devices were properly secured (VIO 04008964/2016-003-06), and (3) failure to perform evaluations or perform tests that ensure the transportation package would be capable of withstanding the effect of acceleration and vibration incident to transportation (VIO 04008964/2016-003-07). The licensee successfully shipped barium sulfate sludge for disposal with no indication of material loss or liquid present in the overpack. Based on the use of certified and tested IP-2 containers, revision to applicable procedures, and a successful shipment of barium sulfate sludge, the violations described above are closed.

The inspector reviewed employee training documentation since November 2016 to ensure the transportation corrective actions taken, procedure revisions, and additional DOT functional training was performed for applicable employees. Based on the information above the violation for the failure to provide specific training concerning the requirements that were specifically applicable to the functions the employee performed (VIO 04008964/2016-003-09) is closed.

b. Inspection of Byproduct Waste Storage

The inspectors observed that all 11e.(2) byproduct material waste storage bins were staged within restricted areas with surrounding fences and locked entries. The inspectors performed an ambient gamma radiation survey of the central processing plant containers to confirm that the area was appropriately posted and controlled in accordance with 10 CFR 20 regulations.

The NRC staff reviewed the licensee's agreements for off-site disposal of solid 11e.(2) byproduct material. The NRC staff determined that the licensee's disposal agreements are consistent with the requirements of License Condition 9.6

c. Wastewater Treatment Activities

The licensee processes liquid effluent through reverse osmosis units, by storage in tanks, or by disposal to a deep disposal well. The licensee is authorized to release liquid effluent by land application after constituents are processed and reduced to below regulated levels through the selenium plant.

The inspectors toured selected deep disposal wells and the selenium plant and reviewed records to determine if the licensee was processing and disposing of wastes through the deep disposal wells in accordance with regulatory and license commitments.

The licensee has eight deep disposal wells (DDW). The inspectors reviewed the DDW weekly injection rate for one week in October 2017 and one week in November 2017. The average injection rates for the two weeks reviewed, rounded to the nearest whole number, were: Morton 1-20 at 51 gallons per minute (gpm), Vollman 33-27 at 50 gpm, SRHUP #6 at 25 gpm, SRHUP #7 at 22, SRHUP #9 at 17 gpm, SRHUP #10 at 11 gpm, RR DDW #1 at 5 gpm.

6.3 Conclusions

The shipment of yellowcake and resin and the management, storage, transportation, and disposal of byproduct material and 11e.(2) wastes were conducted in accordance with the license and regulatory requirements.

7 **Emergency Preparedness and Fire Protection (88050 and 88055)**

7.1 Inspection Scope

The licensee's emergency preparedness and fire protection programs were reviewed to determine if adequate measures were established to protect the safety and health of employees, members of the public, and the environment.

7.2 Observations and Findings

a. Emergency Preparedness

License Condition 9.3 requires in part that the licensee conduct operations in accordance with the commitments, representations and statements maintained in the license application or amendments. In July 2002, Cameco Resources acquired the Smith Ranch facility and committed to "abide by all constraints, conditions, requirements and commitments associated with the transfer of the license." This commitment included adopting the following documents from the 1999 license amendment:

- ESH (Environmental, Safety and Health) Management Procedure, Manual 8 "Emergency Preparedness Manual", and;
- Appendix G "Transportation Accident Guide".

These documents dealt with potential accidents/unusual occurrences and assess the impact on the public and the environment. The required accidents include equipment or facility damage, loss or theft of yellowcake, fires and other natural disasters, and transportation accidents during shipment of yellowcake, resin or chemicals. The inspectors reviewed the current emergency manual and procedures and determined the licensee had a comprehensive chemical response guide, appropriate emergency reporting protocols, an evacuation plan and procedures associated with responding to radiological emergencies, security threats, natural disasters and fire/explosions. The response guide for transportation accidents was also reviewed and determined to be sufficient. The licensee coordinates with the Emergency Services organization in Campbell County (North Butte facility) and Converse County (Smith Ranch-Highland). Both organizations last toured the facility they would respond to in the fall of 2017.

b. Fire Protection

The inspectors reviewed the fire protection program developed by the licensee in response to the requirements of License Condition 9.3 and the license application. The fire protection plan meets the requirements of 29 CFR 1910.39. Employees are trained on fire prevention and fire extinguisher use as part of new employee orientation. As indicated above Emergency Services personnel for Campbell and Converse Counties toured the respective facilities to identify and discuss hazards and response in the fall of 2017.

7.3 Conclusions

The licensee has standard operating procedures associated with emergency preparedness and fire protection sufficient to meet the requirements of License Condition 9.3 and the application. Employees and visitors are provided emergency preparedness and fire protection training as applicable. The licensee has coordinated with local law enforcement and emergency response organizations for emergency response purposes.

8 Exit Meeting Summary

The NRC inspectors presented the preliminary inspection findings to the licensee's representatives at the conclusion of the onsite inspection on November 17, 2017. During the inspection, the licensee did not identify any information reviewed by the NRC as proprietary that was included in this report. The final inspection findings were discussed with licensee representatives via telephone on November 30, 2017.

SUPPLEMENTAL INSPECTION INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

Doug Pavlick, General Manager US Operations
Tami Dyer, Radiation Safety Officer (Acting)
Eric Heide, Superintendent, Central Processing Plant and North Butte Satellite
Ty Spence, Wellfield Services Foreman
Cory Griffiths, Satellite Foreman
Larry Reimann, Licensing and Compliance Manager
Ken Garrotte, Senior SHEQ Coordinator
Derek Eager, Wellfield Operations Supervisor
Beth Frye, Health Physics Technician
Mindy Griffiths, Health Physics Technician
Jessica Eads, Health Physics Technician in Training
Devin Collins, Health Physics Technician in Training
Kirk Lehner, Laboratory Foreman

Items Opened, Closed and Discussed

Opened

None

Closed

040-08964/2015-001-01	VIO	Failure to include the total quantity of hazardous material on shipping papers.
040-08964/2016-001-01	VIO	Failure to use correct bioassay Intake Retention Fractions when calculating the committed effective dose equivalents.
040-08964/2016-003-01	VIO	Failure to accurately assess the activity of pond sediment and barium sulfate sludge waste shipments.
040-08964/2016-003-02	VIO	Failure to have appropriate shipping paperwork that documented total activity for pond sediment, barium sulfate sludge and resins shipments.
040-08964/2016-003-03	VIO	Failure to appropriately label packages used for pond sediment and barium sulfate sludge shipments.
040-08964/2016-003-04	VIO	Failure to appropriately classify pond sediment and barium sulfate sludge waste shipments as LSA-II

040-08964/2016-003-05	VIO	Failure to ship pond sediment and barium sulfate sludge waste shipments in IP-II containers when the shipments contained LSA-II materials.
040-08964/2016-003-06	VIO	Failure to ensure by examination or appropriate tests that the packages were proper for the contents to be shipped and closure devices were properly secured.
040-08964/2016-003-07	VIO	Failure to perform evaluations or perform test that ensured the transportation package would be capable of withstanding the effects of any acceleration and vibration normally incident to transportation.
040-08964/2016-003-08	VIO	Failure to provide the name of each radionuclide and an accurate chemical description of content in shipping papers for barium sulfate sludge.
040-08964/2016-003-09	VIO	Failure to provide function specific training to a hazmat employee concerning the requirements that were specifically applicable to the functions the employee performed.

Discussed

None

Inspection Procedures

IP83822	Radiation Protection
IP86740	Inspection of Transportation Activities
IP87102	Maintaining Effluents from Materials Facilities ALARA
IP88005	Management Organization and Control
IP88045	Effluent Control and Environmental Protection
IP88035	Radioactive Waste Processing, Handling, Storage and Transportation
IP89001	In-situ Leach Operations
IP92703	Follow-up of Confirmatory Action Letters or Orders

List of Acronyms

ADAMS	Agencywide Documents Access and Management System
ADR	Alternative Dispute Resolution
ALARA	As Low As is Reasonably Achievable
CFR	Code of Federal Regulations
CO	Confirmatory Order
CPP	Central Processing Plant
CY	Calendar Year
DDW	Deep Disposal Well
DOT	Department of Transportation
ESH	Environmental Safety and Health
gpm	gallons per minute
HH	Header House
HPT	Health Physics Technician
IP	NRC Inspection Procedure
IP-2	Industrial Package Type 2
MIT	Mechanical Integrity Testing
μR/hr	microRoentgen per hour
MU	Mine Unit
NRC	U.S. Nuclear Regulatory Commission
OSL	Optically Stimulated Laser
RSO	Radiation Safety Officer
SERP	Safety and Environmental Review Panel
VIO	Violation