



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

June 9, 2017

Ken Garoutte, Manager  
Safety, Health and Environment Health  
Power Resources, Inc.,  
dba Cameco Resources  
P.O. Box 1210  
Glenrock, WY 82637

SUBJECT: NRC INSPECTION REPORT 040-08964/2017-001

Dear Mr. Garoutte:

This letter refers to the U.S. Nuclear Regulatory Commission's (NRC) routine inspection conducted from May 8-11, 2017, at Smith Ranch Highland and North Butte uranium recovery facilities, respectively, in Converse and Campbell Counties, Wyoming. The enclosed inspection report documents the inspection results which were discussed at the conclusion of the inspection with you and members of the Smith Ranch Highland and North Butte staff at the exit conducted May 11, 2017.

The purpose of the inspection was to examine activities conducted under your license as they relate to public health and safety, 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. Due to the emphasis on transportation activities during the November 2016 inspection, this inspection included only observations of transportation activities and not an inspection of transportation activities. No violations were identified and no response to this letter is required.

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.

K. Garoutte

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

Sincerely,

*/RA/*

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 040-08964/2017-001

w/Attachment: Supplemental Information

cc:

Brent Berg, Cameco Resources, Power Resources, Inc.

Doug Pavlick, Cameco Resources, Power Resources, Inc.

Scott Ramsay, Wyoming Radiation Control Program

Ryan Schierman, WDEQ

Dale Anderson, WDEQ

Robert Breuer, WDEQ

Kyle Wendtland, WDEQ

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket: 040-08964

License: SUA-1548

Report: 04008964/2017-001

Licensee: Power Resources Inc. dba Cameco Resources

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

Dates: May 8-11, 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

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 04008964/2017-001

The U.S. Nuclear Regulatory Commission (NRC) performed a routine health and safety inspection from May 8-11, 2017, which included observations of site activities, independent surveys, review of records, and interviews with site personnel. The inspectors did not inspect but made observations related to the licensee's transportation program during this inspection. 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. (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)

### **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 Radioactive Waste Processing, Handling, and Storage**

The management, storage, and disposal of byproduct material and 11e.(2) wastes were conducted in accordance with the license and regulatory requirements. (Section 5.2)

## 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 Highland CPP. The Reynolds Ranch Satellite has received Wyoming Department of Environmental Quality (WDEQ) approval and the inspectors understand that a decision to proceed with construction depends on market conditions. The Gas Hills 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

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 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 98 full-time employees, a decrease of six employees since the June 2016 inspection. The North Butte Satellite had 12 full-time employees. The changes in Cameco's staffing levels result from its decision to stop additional mine unit development at Smith Ranch Highland and North Butte.

Since the previous inspection, the organizational structure has not changed. The organizational chart reflects the movement of individuals from one job position to another and a redistribution of responsibilities to address attrition. The inspectors found that the movement of duties and responsibilities associated with attrition did not have a negative impact on essential functions, such as operations and radiation protection.

The Radiation Safety Officer (RSO) left the facility March 16, 2017, and an interim RSO was approved in the 03/17-04 SERP date March 15, 2017. The interim RSO has served the licensee previously as interim RSO and is supported by three Health Physics Technicians (HPT), two HPT-in-training, and four technicians performing various environmental sampling 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.

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 June 2016 inspection:

01/17-01 ORC/SERP	SR1 to Selenium Plant Pipeline and Tank Addition
03/17-04 ORC/SERP	RSO Approval – Tami Dyer

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 licensee was conducting and documenting a daily walk-through of all work and storage areas of the facility to ensure that good radiation practices were being followed. The RSO, RSO-designees 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 are not available, such as weekends and holidays. The RSO or an RSO designee reviews 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 an RSO 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 monthly reviews by the RSO were conducted timely.

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 Facilities (89001)**

### **2.1 Inspection Scope**

Determine if in-situ recovery 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 MUs 3, 7, 9, 10, 15, 15A, F, J, K and K-North. Recovery Operations were underway for North Butte MUs 1 and 2 and for Smith Ranch Highland MUs 2, 4, 4A, C, D, E, H and I were in restoration. There were 90 header houses in restoration (468 injection wells and 213 recovery wells) and 131 header houses in production (589 injection wells and 272 recovery wells).

At the time of the inspection, the average production flow for Smith Ranch Highland was 10,534 gallons per minutes for calendar year 2016 and for 2017 year to date, the average production flow was 7,767 gallons per minutes. North Butte was 3,956 gallons per minute for calendar year 2016 and for the 2017 year to date, the average production flow was 3,672 gallons per minute; which 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 2016 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. However, the inspectors did not verify the licensee maintained the required continuous bleed during this inspection. This item will be reviewed in a subsequent inspection.

#### **b. Site Tours**

The inspectors conducted a site tour to observe in-situ restoration process testing in progress at the Smith Ranch Highland Central Processing Plant (CPP), focusing on maintenance activities and the progress in Production Area 2 and Header House 9. The inspectors also reviewed the condition of deep disposal well DDW-4. The inspectors determined operators 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 central processing plant, remote satellite facility, selenium plant, header houses and wellfields. The surveys were conducted using a Ludlum Model 19 microRoentgen rate meter (NRC No. 015544 calibration due date of July 13, 2017, 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, not posted as a radiation area, was at the slurry trailer measuring 1.0 millirem per hour. The highest radiation reading in the selenium plant was on a barium sulfate sludge filled IP-2 bag of 4.8 millirem per hour. No area was identified that met the definition of a radiation area (5.0 millirem in one hour) that was not posted as a radiation area.

In addition, the inspectors toured the Selenium Processing Plant. The inspectors observed facility changes with regard to shipment of barium sulfate sludge, a prior barium sulfate sludge package test, and a photographic review of the licensee's process for loading the IP-2 bags into an IP-1 overpack. The licensee indicated they are still testing their packaging methods and materials to ensure the packages will not leak.

### 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.

## **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 for calendar year 2016. Approximately 65 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 and maintenance workers. The highest deep dose equivalent exposure reviewed as 45 millirem (0.45 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.

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 calendar year 2016. 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.



b. Radiation Work Permits

Since the previous inspection, seven radiation work permits were issued and involved repair/maintenance work on dryer pedestals, shaker screens, and filter press; and closure of selenium plant IP-2 bags. 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 Smith Ranch Highland, the 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.

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

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 to December 2016 semiannual reports and compared the reported data to the licensee's records, procedures, and daily operations. The data was consistent with the inspectors' observations.

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 maximum dose for 2015 was less than the annual limit (100 millirem per year) specified in 10 CFR 20.1301(a)(1).

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, four spills occurred resulting in a total of 546 gallons, with 120 gallons of production fluid were recovered. Of the unrecovered fluids, 226 gallons of production fluid were released.

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 logs indicating groundwater monitoring was occurring. No excursions occurred since the previous inspection. The inspectors did not review 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 this inspection. These items will be reviewed in a future inspection.

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 Radioactive Waste Processing, Handling and Storage (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 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.

b. Wastewater Treatment Activities

The licensee processes liquid effluent through reverse osmosis units, stored in storage tank(s), or disposed 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 monthly injection rate and total volume information for July 2016 through March 2017. The average injection rates (rounded to the nearest whole number) maximum injection pressure and total volumes were:

	Avg. Injection Pressure (psi)	Max Injection Pressure (psi)	Permit Max Pressure (psi)	Total Volume (gal)
Morton 1-20	699	943	1050	7,919,180
Vollman 33-27	760	991	1093	8,141,435
SRHUP #6	1032	1131	1116	10,611,907
SRHUP #7	541	634	636	1,280,273
SRHUP #9	461	809	916	0
SRHUP #10	452	984	1000	1,418,794
DDW #1	1060	1493	1578	20,904,136

On November 17, 2016, DDW SHRUP #6 received a high pressure alarm causing the well to automatically shut down. The automatic shutdown action resulted in a water hammer creating a high pressure spike, exceeding the maximum level, which did not exceed 15 minutes in duration. The licensee installed a delayed shutdown on the pump to eliminate future water hammers and prevent high pressure spikes. Deep disposal wells SHRUP #9 and SHRUP #10 were not used during periods of high formation pressures. The DDW #2 was not operated during the period reviewed and the licensee submitted a report, based on historical work overs and investigations, to Wyoming Department of Environmental Quality supporting DDW #2 plugging and abandonment. The Reynolds DDW was not operated during the reviewed time period.

5.3 Conclusions

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

**6 Exit Meeting Summary**

The NRC inspectors presented the inspection findings to the licensee's representatives at the conclusion of the onsite inspection on May 11, 2017. During the inspection, the licensee did not identify any information reviewed by the NRC as proprietary that was included in this report.

**SUPPLEMENTAL INSPECTION INFORMATION**

**PARTIAL LIST OF PERSONS CONTACTED**

Licensee Personnel

Mike Thomas, Director, Safety, Health, Environment and Quality (SHEQ)  
Doug Pavlick, General Manager US Operations  
Tami Dyer, Radiation Safety Officer (Acting)  
Duce Laird, Central Processing Plant Foreman  
Eric Heide, Superintendent, Central Processing Plant and North Butte Satellite  
Ty Spence, Wellfield Services Foreman  
Cory Griffiths, Satellite Foreman  
Larry Reimann, Technical Services Manager  
Ken Garrotte, Manager SHEQ  
Perry Hershberger, Safety Coordinator  
Derek Eager, Wellfield Operations Supervisor

**Items Opened, Closed and Discussed**

Opened

None

Closed

None

Discussed

None

### **Inspection Procedures**

IP88005	Management Organization and Control
IP89001	In-situ Leach Operations
IP83822	Radiation Protection
IP88045	Effluent Control and Environmental Protection
IP87102	Maintaining Effluents from Materials Facilities ALARA
IP88035	Radioactive Waste Processing, Handling, Storage and Transportation

### **List of Acronyms**

ADAMS	Agencywide Documents Access and Management System
ALARA	As Low As is Reasonably Achievable
CFR	Code of Federal Regulations
CPP	Central Processing Plant
DDW	Deep Disposal Well
HPT	Health Physics Technician
IP	NRC Inspection Procedure
IP-2	Industrial Package Type 2
MU	Mine Unit
NRC	U.S. Nuclear Regulatory Commission
ORC	Occupational Review Committee
RSO	Radiation Safety Officer
SERP	Safety and Environmental Review Panel
WDEQ	Wyoming Department of Environmental Quality

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