



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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September 24, 2004

Mr. William F. Kearney, Manager
Environmental and Regulatory Affairs
Power Resources, Inc.
P.O. Box 1210
Glenrock, Wyoming 82637

SUBJECT: NRC INSPECTION REPORT 040-08964/04-001

Dear Mr. Kearney:

On August 25, 2004, the Nuclear Regulatory Commission (NRC) completed an inspection of your Highland Uranium Project Smith Ranch in-situ uranium processing facility in Converse County, Wyoming. The inspection consisted of a routine review of management organization and controls, site operations, radiation protection, radioactive waste management, environmental monitoring, and chemical process safety. The inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations of activities in progress. The inspection findings were discussed with you and your staff at the exit briefing on August 25, 2004. The enclosed report presents the results of that inspection.

Overall, the inspection determined that you had continued to operate the uranium production facility in a safe and effective manner. No violations or deviations were identified; therefore, no response to this letter is required.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact Ms. Judith Walker at (817) 860-8299 or the undersigned at (817) 860-8197.

Sincerely,

/RA/

Jack E. Whitten, Chief
Nuclear Materials Licensing Branch

Docket No.: 040-08964
License No.: SUA-1548

Enclosure:
NRC Inspection Report
040-08964/04-001
cc w/enclosure:

Power Resources, Inc.

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DOCUMENT NAME: Draft:s:\dnms\nmlb\jlw3\40896401.wpd Final: r:_dnms

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.: 040-08964

License No.: SUA-1548

Report No.: 040-08964/04-001

Licensee: Power Resources, Inc.

Facility: Highland Uranium Project
Smith Ranch In-Situ Leach Facility

Location: Converse County, Wyoming

Dates: August 23-25, 2004

Inspector: Judith Walker, Health Physicist
Nuclear Materials Licensing Branch

Approved by: Jack E. Whitten, Chief
Nuclear Materials Licensing Branch, DNMS

Attachment: Supplementary Information

EXECUTIVE SUMMARY

Highland Uranium Project: Smith Ranch In-Situ Leach Facility NRC Inspection Report 040-08964/04-001

This inspection included a review of site status, management organization and controls, site operations, radiation protection, radioactive waste management, environmental monitoring, and chemical process safety.

Management Organization and Controls

- The inspector determined that the licensee's organization structure and staffing levels were acceptable for the work in progress at the facility (Section 2).
- The inspector also determined that the licensee had both the organization and procedures in place to adequately implement the performance-based license (PBL) and staff the Safety and Environmental Review Panel (SERP) (Section 2).

In-Situ Leach Facilities and Operation Review

- Site activities observed during the inspector's tour were being conducted in accordance with applicable license and regulatory requirements. No yellowcake product spills were observed by the inspector in the central processing plant (CPP) or the satellite plants. Plant process parameters were observed by the inspector to be within license limits (Section 3).

Radiation Protection

- The inspector concluded that licensee had implemented a radiation protection program that met the requirements specified in 10 CFR Part 20 and the license (Section 4).
- Occupational exposures that occurred at the Highland Uranium Project , Smith Ranch in-situ leach (ISL) facility during calendar year (CY) 2003, and to the date of this inspection in CY 2004, were determined by the inspector to be well below the NRC's approved annual total effective dose equivalent limit (Section 4).

Environmental Protection and Radioactive Waste Management

- The inspector's review of records and data indicated that no effluents were released to the environment exceeding regulatory limits during CY 2003, and to the date of this inspection in CY 2004. Reports related to groundwater and environmental monitoring programs were submitted to the NRC as required (Section 5).

Report Details

1 Site Status

In March 1992, a commercial license was issued to Rio Algom Mining Corporation for recovery of uranium through ISL operations at the Smith Ranch facility. Full scale construction of the CPP began in January 1996, and commercial operations began on June 20, 1997. In July 2002, the ownership and control of the Smith Ranch facility were transferred to Power Resources, Inc., as part of the Highland Uranium Project. On July 11, 2002, the NRC issued License Amendment No. 3, that acknowledged the transfer of ownership and control of Smith Ranch and issued a standardized PBL.

The inspector noted that Wellfields Nos. 1, 2, 3, 4, 4A, D, E, F, H and I were in production during the inspection. Wellfield No. 2 began production in March 2003, and Wellfield I began production in April of 2004. There were four satellite facilities (1, 2, 3, and SR1) which supported all the wellfields. Groundwater cleanup activities at the time of the inspection were in progress at Wellfield C. Groundwater cleanup in Wellfields A and B was complete. One of the two yellowcake dryers and filter presses was operating during this inspection and the inspector observed yellowcake product being dried.

2 Management Organization and Controls (88005)

2.1 Observations and Findings

a. Management Organization and Staff

The licensee's approved corporate organization structure is illustrated in Figure 9-1 of the March 12, 2003, application. During this inspection, the licensee's functional organization was compared to the organization chart as referenced in the license application. The inspector found that the licensee's overall organization structure was in agreement with the license application.

At the time of this inspection, approximately 82 individuals were employed at the site. The general manager remained the licensee's highest ranking official on site, and the corporate radiation safety officer (CRSO) continued to report directly to the general manager. The inspector determined that the licensee had adequately staffed the site to support commercial operations.

b. As Low As is Reasonably Achievable Controls

License Condition 9.7 of the Smith Ranch license requires, in part, that the licensee follow the requirements of Regulatory Guide (RG) 8.31, "Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Mills will be As Low As is Reasonably Achievable (ALARA)," for the responsibilities and qualifications for the radiation safety officer (RSO) and radiation safety technicians and for performing annual ALARA Audits. During March 2004, the licensee had completed personnel qualifications and required refresher training as specified in RG 8.31.

The inspector reviewed the licensee's 2003 annual ALARA review, which was performed on August 16, 2004. The ALARA audit was found by the inspector to be thorough and comprehensive.

c. Safety and Environmental Review Panel

The licensee was issued a PBL by NRC on May 8, 2001. License Condition 9.4 of the PBL requires, in part, that the licensee establish a SERP. The SERP is required by the license to ensure that changes to the facility, procedures, and tests or experiments, which have not been reviewed by the NRC, do not have adverse effects on systems, structures, components, and the operation of the facility. The inspector reviewed the licensee's SERP evaluations performed from CY 2003 through the date of the inspection in CY 2004 and determined that the licensee's SERP was adequately staffed and functioning properly.

2.2 Conclusions

The inspector determined that the organization structure and staffing levels were acceptable for the work in progress at the facility. The licensee had both the organization and procedures in place to adequately implement the conditions of PBL and to provide adequate staffing of the SERP.

**3 In-Situ Leach Facilities (89001)
Operations Review (88020)**

3.1 Inspection Scope

3.2 Observations and Findings

a. Site Tour

The inspector conducted site tours to observe ISL process plant, wellfield, and satellite operations at both the Highland Uranium Project and Smith Ranch sites. During the site tours the inspector was tasked to verify site activities were being conducted in accordance with applicable regulations and the license. Additionally, the inspector was also tasked to ensure that operational controls were adequate to protect the health and safety of workers and members of the public. During the site tours the inspector noted that several wellfields were in production at both the Smith Ranch and Highland Uranium Project facilities. The inspector also observed the condition of the plant satellites, equipment, fences, and gates.

The inspector noted that ISL operations and activities at the satellite facilities, CPP, deep well disposal, and wellfield appeared to be conducted in accordance with established licensee procedures.

b. Yellowcake Dryer Area Operations

The inspector reviewed the standard operating procedure (SOP) No. 2040, "Yellowcake Dryer Area Operations." One of the two yellowcake dryers was operating during this

inspection. The inspector observed dryer operations and confirmed that no yellowcake product spills had occurred since the last inspection in the Smith Ranch CPP. Facility equipment and components were found to be operational and properly maintained. The inspector noted during the site tour that in the plant control room no equipment misalignments were identified, and no process flow, level, or pressure indications were found outside required parameters. The inspector reviewed the CPP operation checklist records, for activities occurring to the date of this inspection in CY 2004. The data sheets validated that the licensee had routinely tested the dryer vacuum alarms as required by License Condition 10.1.2(b). License Condition 10.1.1 states, in part, that the annual yellowcake production shall not exceed 5.5 million pounds. The inspector determined that as of July 2004, yellowcake production was below the 5.5 million pound annual limit.

3.3 Conclusions

Site activities observed during the inspector's tour were being conducted in accordance with applicable PBL and regulatory requirements. No yellowcake product spills were observed by the inspector in the CPP or at the satellite plant. Plant process parameters were observed by the inspector to be within license limits.

4 **Radiation Protection (83822)**

4.1 Inspection Scope

The purpose of the inspection effort in this area was to determine if the licensee's radiation protection program was in compliance with requirements established in the PBL and 10 CFR Part 20.

4.2 Observations and Findings

a. Routine Ambient Gamma Surveys

Section 9.8 of the license application requires, in part, that the licensee perform quarterly gamma radiation surveys in specific locations in enclosed areas and conduct spot checks in these areas to confirm the adequacy of the gamma radiation monitoring plan. The inspector reviewed records and verified that the licensee had performed the required routine surveys and spot checks as specified by the license. During the site tour the inspector observed the licensee performing surveys using a microRoentgen meter.

Within the CPP, the NRC inspector did not observe any areas greater than five millirem per hour that the licensee had not previously posted. The inspector determined that the licensee had posted its radiation areas as required by 10 CFR 20.1003.

b. Airborne Natural Uranium and Personnel Doses

License Condition 9.7 requires, in part, that the licensee perform monthly surveys for natural uranium and radon. Airborne natural uranium sample results were reviewed by the inspector for CY 2003. The inspector noted that only the air sample results from the yellowcake dryer and packaging areas routinely had measurable quantities of natural uranium. Most air sample results measured by the licensee were less than 1.0 percent of a derived air concentration (DAC) value for natural uranium. A DAC value of uranium is $5.0E-10$ microcurie/milliliter ($\mu\text{Ci/ml}$).

A review of personnel dose records indicated that personnel doses up to the date of this inspection in CY 2004, were within the regulatory limits. Dose records maintained by the licensee were based on external radiation, airborne uranium, and radon daughters. The highest total effective dose equivalent during thus far CY 2004 was 220 millirem, which was well below the 10 CFR 20.1201 occupational dose limit of 5000 millirem.

c. Bioassays

The inspector reviewed the bioassay program to determine compliance with License Conditions 11.2 and 11.3. Action levels used by the licensee were defined in Table 1 of RG 8.22, "Bioassay at Uranium Mills," Revision 1. Bioassay procedures require that evaluations be performed by the licensee when bioassay results exceeded any action level specified in RG 8.22 and that pertinent corrective actions be implemented. Bioassay samples taken by the licensee were analyzed by a contract laboratory vendor. All sample shipments provided to a contract laboratory vendor for analysis included blank and spiked samples for quality assurance. The inspector noted that all process operators and laboratory personnel were sampled by the licensee on a monthly basis, while personnel involved in dryer operations were sampled weekly. Since the last inspection, no employee's bioassay sample measured in excess of the action level of 15 micrograms/liter.

d. Instrument Calibration

Section 9.6 of the license application requires, in part, that all radiation monitoring, sampling, and detection equipment be recalibrated after each repair, as recommended by the manufacturer, or at least annually, whichever is more frequent. The inspector reviewed the licensee's calibration records and determined that survey instruments were calibrated routinely. Also, during the site tour the inspector observed that instruments in use by the licensee had current calibration stickers affixed. The inspector reviewed radiation instrument functional check records prepared since the previous inspection and determined that the licensee had complied with the license. The inspector noted that the licensee did not have a formal system to track instrumentation due for calibrations. This was identified as an Inspector Follow-up Item (IFI 040-8964/0001-01).

4.3 Conclusions

The licensee had implemented a radiation protection program that met the requirements in 10 CFR Part 20 and the license. Occupational exposures that occurred at the Smith Ranch Highland Uranium Project, ISL facility site during CY 2003, and to the date of this

inspection in CY 2004, were determined by the inspector to be well below the NRC's authorized annual total effective dose equivalent exposure limit.

5 Radioactive Waste Management (88035) Environmental Monitoring (88045)

5.1 Inspection Scope

The groundwater, environmental, and radioactive waste management programs were reviewed by the inspector to assess the effectiveness of the licensee to control waste and monitor the effects of site activities on the local environment.

5.2 Observations and Findings

a. Semiannual Effluent Reports

License Condition 12.2 states, in part, that the results of effluent and environmental monitoring shall be reported to the NRC in accordance with the provisions of 10 CFR 40.65. The semiannual environmental monitoring report for the second half of CY 2003 and the first half of CY 2004 was submitted to the NRC on February 27, 2003, and August 18, 2004, respectively. The semiannual reports were submitted to the NRC in a timely manner and provided relevant data for the facility. The environmental monitoring program had consisted of air particulate, radon, groundwater, surface water, soil, and vegetation sampling. Measurements of ambient gamma exposure rates were also performed. The inspector determined that all values reported were within acceptable limits.

b. Groundwater and Environmental Water Sampling

The inspector reviewed groundwater monitoring well and effluent monitoring data. All required data was presented in the reports. Groundwater and surface water monitoring programs were implemented by the licensee in accordance with Chapter 5 of the license application. The groundwater program consisted of the licensee conducting quarterly sampling for natural uranium and radium-226 taken from wells used for livestock or domestic wells located within 1-kilometer of the operating wellfields .

The inspector's review of data for the third quarter of CY 2003 indicated that the one well, GW-5, was 197 percent of the effluent concentration limit for natural uranium specified in 10 CFR Part 20, Appendix B, Effluent Concentration Limits. The inspector noted that Well GW-5 was dry during the fourth quarter of 2003, and the first half of 2004, and therefore no comparisons could be made to determine if Well GW-5 was an outlier. The licensee concluded that the well location may be a factor in the higher uranium concentrations, since the well is located in an area with shallow uranium mineralization.

Due to the shallow nature portions of the mineralized zone, these zones may dry out seasonally, causing an increase in uranium oxidization, and as a result, increasing the uranium solubility in water. For the first half of CY 2004 all sample results were below of 3.0 E-7 µCi/ml and 6.0 E-8 µCi/ml for uranium and radium, respectively.

c. Environmental Air Sampling

The Highland Uranium Project is considered a zero gaseous and particulate effluent release facility based on the design of the CPP and the yellowcake dryer system. However, the licensee had continuously performed air particulate sampling at three locations (five locations when yellowcake processing operations are active at the Highland Central Plant) around the site. During CY 2003 and first half of CY 2004, the licensee had analyzed samples on a quarterly basis for natural uranium, thorium-230, radium-226, and lead-210 concentrations. The air sample results reviewed by the inspector indicated that the highest radionuclide concentration occurred during the third quarter of CY 2003. The licensee's sample result recorded 35 percent, of the amounts specified in 10 CFR Part 20, Appendix B, Effluent Concentration Limits table. The inspector concluded from the records reviewed that potential radiation dose to any member of the public from licensed material during CY 2003 and to the date of this inspection in CY 2004 was below the 100 millirem per year allowed annual dose limit to the public.

d. Environmental Exposure Rates

The licensee used environmental thermoluminescent dosimeters (ETLD) to monitor ambient gamma radiation. The ETLDs were routinely placed at three locations and at five locations when yellowcake processing operations are active at the Highland Central Plant as specified in Section 5.3.4 of the license application. These ETLDs were changed on a quarterly frequency. The ETLDs at background station, referred to as Dave's Waterwell, measured 128 millirem during CY 2003. During CY 2003 the highest ETLD measured 13 millirem above background at the Wellfield I location. The ETLDs at the fence line restricted area boundary measured 8 millirem above background. The ETLD data reviewed by the inspector indicated no upward trend compared to the previous years. The inspector concluded that potential radiation dose to any member of the public from licensed material for CY 2003 was below the allowed 100 millirem per year annual dose limit to the public.

e. Wellfield Monitoring and Excursions at Highland Uranium Project

Licence Condition 12.1 requires, in part, that until the license is terminated, the licensee shall maintain documentation on spills of source materials, 11e.(2) byproduct materials, or process chemicals. Also, License Condition 12.1 requires, in part, that the licensee report any wellfield excursions, spills, or pond leaks involving source materials, 11e.(2) by product materials, or process chemicals that may have an impact on the environment. License Condition 12.1 also requires the licensee to report any other incidents or events, that the licensee reports to other State or Federal Agencies, and that a report shall be made to the NRC project manager by telephone or electronic mail (e-mail) within 48 hours. The licensee is required to make notification to the NRC in accordance with Licence Condition 9.2. The inspector reviewed correspondence that the licensee had sent to the NRC for the inspection period.

The inspector determined that the licensee had followed the SOPs for notifying the NRC of wellfield excursions. The inspector determined that Licence Conditions 9.2 and 12.1 were being met by the licensee.

f. Radioactive Waste Shipments

In CY 2003, the licensee began to decommission two radium settlement ponds located at Satellite No. 1. The ponds were used to retain treated purge and restoration fluids from Satellite No. 1 prior to pumping to Purge Storage Reservoir No. 1 and subsequent to irrigation at the land application facility. These ponds were lined with a clay liner and contained residual solids. These solids were removed and disposed as by-product material. The licensee shipped approximately 50 truck loads of waste off-site for disposal. When decommissioning activities are completed, the target soil concentrations for uranium and radium-226 is expected by the licensee to be 15 pCi/gram. The inspector toured the area of the former radium settlement ponds and observed the licensee take survey readings of 3 millirem/hour at one foot from a waste container with sludge material from the ponds.

5.3 Conclusions

A review of records and data by the inspector indicated that the licensee had not released effluents into the environment exceeding regulatory limits during CY 2003 and to the date of this inspection in CY 2004. The inspector noted that reports related to groundwater and environmental monitoring programs were submitted to the NRC as required.

6 Exit Meeting Summary

The inspector presented the preliminary inspection results to the licensee's representatives at the conclusion of the onsite inspection on August 25, 2004. Representatives of the licensee acknowledged the findings as presented. During the inspection, the licensee did not identify any information reviewed by the inspector as propriety.

ATTACHMENT

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

P. Drummond, Manager, Plant Operations
J. Hagar, Radiation Safety Technician
W. Kearney, Environmental & Regulatory Affairs /Corporate Radiation Safety Officer, Manager
R. Knode, General Manager, Uranium Operations
J. McCarthy, Radiation Safety Officer
T. McCullough, Safety Supervisor

ITEMS OPENED, CLOSED, AND DISCUSSED

Open

040-08964/001-01 IFI Review of licensees' instrument calibration tracking system to ensure instruments are routinely calibrated at the specified frequencies.

Closed

None

Discussed

None

INSPECTION PROCEDURES USED

IP 83822 Radiation Protection
IP 88005 Management Organization and Control
IP 88035 Radioactive Waste Management
IP 88045 Environmental Monitoring
IP 89001 In-Situ Leach Facilities

LIST OF ACRONYMS USED

ALARA	as low as is reasonably achievable
CPP	central process plant
CRSO	corporate radiation safety officer
DAC	derived air concentration
ETLD	environmental thermoluminescent dosimeter
ISL	in-situ leach
μCi/ml	microcurie/milliliter
NRC	Nuclear Regulatory Commission
PBL	performance-based license
PDR	Public Document Room
RG	Regulatory Guide
RSO	radiation safety officer
SERP	Safety and Environmental Review Panel
SOP	standard operating procedure