July 5, 2008

Mr. John McCarthy
Power Resources, Inc.
Smith Ranch-Highland Uranium Project
P.O. Box 1210
Glenrock, WY 82637

SUBJECT: REVIEW OF BASELINE GAMMA RADIATION SURVEY FOR GAS HILLS SATELLITE OF THE SMITH RANCH HIGHLAND URANIUM PROJECT SOURCE MATERIALS LICENSE SUA-1548 (TAC J00541)

Dear Mr. McCarthy:

On September 4, 2007, Cameco Resources, doing business as Power Resources, Inc. (PRI), submitted a report documenting the baseline radiological characteristics at the Gas Hills Satellite of the Smith Ranch-Highland Uranium Project to the U.S. Nuclear Regulatory Commission (NRC). This report was submitted to meet the requirements of License Condition 9.13, which states that *"Before engaging in any uranium recovery operations in an undeveloped area, the licensee shall submit a complete evaluation of the area's baseline radiological characteristics for NRC's review and approval."*

NRC staff has completed its review PRI's characterization of the baseline radiological characteristics at Gas Hills. The staff's evaluation is documented in the enclosed Technical Evaluation Report. Based on its review, the staff concludes that the baseline radiological characteristics at Gas Hills have been adequately characterized. Therefore, the NRC approves this report.

If you have any questions regarding this action, please contact Mr. Douglas T. Mandeville, the Project Manager for Source Materials License SUA-1548, at 301-415-0724 or, by e-mail, at douglas.mandeville@nrc.gov.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records

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Sincerely,

/RA/

Douglas T. Mandeville, Geotechnical Engineer
Uranium Recovery Licensing Branch
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Docket No.: 40-8964
License No.: SUA-1548

Enclosure: Technical Evaluation Report for Gas Hills

cc: S. Ingle, WDEQ

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TECHNICAL EVALUATION REPORT
REVIEW OF BASELINE RADIOLOGICAL CONDITIONS AT GAS HILLS
POWER RESOURCES INC. SMITH RANCH-HIGHLAND URANIUM PROJECT
CONVERSE COUNTY, WYOMING

Docket No.: 40-8964

License No.: SUA-1548

Date: May 16, 2008

Facility: Smith Ranch-Highland Uranium Project

Technical Reviewer: Thomas Youngblood

Project Manager: Douglas T. Mandeville

1.0 Summary and Conclusions

On September 4, 2007, Power Resources Inc. (PRI) submitted a report to U.S. Nuclear Regulatory Commission (NRC) staff that documented the baseline radiological characteristics at the Gas Hills Satellite of the Smith Ranch-Highland Uranium Project (SR-HUP) (PRI, 2007). This report was submitted to meet the requirements of License Condition (LC) 9.13, which reads as follows:

> *Before engaging in any uranium recovery operations in an undeveloped area, the licensee shall submit a complete evaluation of the area's baseline radiological characteristics for NRC's review and approval.*

LC 9.13 was added to PRI's license as part of Amendment 11, dated January 31, 2007. NRC staff reviewed PRI's submittal, including the narrative description of the survey, sample location maps, and the test results. The review included an evaluation using the applicable procedures identified in NUREG-1569 (Standard Review Plan for In Situ Leach Uranium Extraction License Applications) (NRC, 2003) and Regulatory Guide 4.14, Revision 1 (Radiological Effluent and Environmental Monitoring at Uranium Mills) (NRC, 1980). NRC staff determined that the licensee has adequately established the baseline radiological characteristics at the Gas Hills Satellite of SR-HUP.

2.0 Background

PRI currently conducts commercial scale *in-situ* leach (ISL) uranium recovery operations at SR-HUP under NRC license SUA-1548. The facility includes a central processing plant (CPP), satellite buildings, wellfields, major roads, and an administrative building. The administrative building and central processing plant are located approximately 22 miles (35.4 km) northeast of Glenrock, Wyoming, in Converse County.

Gas Hills is a remote satellite located approximately 130 miles (210 km) west of the SR-HUP permit area. As part of ISL operations, it is anticipated that wellfields, header houses, a satellite building, and piping will be installed at Gas Hills.

3.0 Technical Evaluation

3.1 Baseline Radiological Characteristics

This section discusses the baseline radiological characteristics for the SR-HUP Gas Hills satellite. The baseline radiological characteristics are used to evaluate the radiological impact of milling operations on the environment and to establish the radiological baseline for use in decommissioning and remediation of the project when uranium recovery operations are terminated.

An acceptable preoperational monitoring program for this satellite area includes soil sampling and analyses and direct radiation measurements. The soil sampling and direct radiation measurements were conducted according to the guidance in Regulatory Guide 4.14, Revision 1 (NRC, 1980), and NUREG-1569 (NRC, 2003). The sample density specified in NRC guidance was followed and was at 490-feet (150-meter) intervals for direct radiation measurements and at 980-ft (300-meter) intervals for the 2-inch and 6-inch (5-cm and 15-cm) depth for soil sampling.

Surface soil and subsurface soil samples were taken in Study Areas A, B, C and D. The soil sample results on a dry-soil-basis are provided below.

In **Study Area A**, the 2-inch (5-cm) soil samples contained radium 226 concentrations from 0.8 to 41.1 pCi/g. The 6-inch (15-cm) soil samples contained radium 226 concentrations from 0.4 to 13.8 pCi/g. The 2-inch (5-cm) soil samples contaiend natural uranium, thorium 230 and lead 210 concentrations that ranged from 2.81 to 102 mg/kg, 0.7 to 71 pCi/g, and < 0.1 to 88 pCi/g, respectively. The 6-inch (15-cm) soil samples contained natural uranium, thorium 230 and lead 210 concentrations that ranged from 1.37 to 27.9 mg/kg, 0.4 to 8.0 pCi/g, and <0.1 to 16 pCi/g, respectively.

In **Study Area B**, the 2-inch (5-cm) soil samples contained radium 226 concentrations from 1.8 to 80.6 pCi/g. The 6-inch (15-cm) soil samples contained radium 226 concentrations from 1.4 to 85.1 pCi/g. The 2-inch (5-cm) soil samples contained natural uranium, thorium 230, and lead 210 concentrations that ranged from 2.81 to 102 mg/kg, 0.7 to 72 pCi/g, and <0.1 to 88 pCi/g, respectively. The 6-inch (15-cm) soil samples contained natural uranium, thorium 230, and lead 210 concentrations that ranged from 2.39 to 188 mg/kg, 0.8 to 86 pCi/g, and <0.1 to 61 pCi/g, respectively.

In **Study Area C**, the 2-inch (5-cm) soil samples contained radium 226 concentrations from 0.8 to 2.1 pCi/g. The 6-inch (15-cm) soil samples contained radium 226 concentrations from 0.7 to 2.7 pCi/g. The 5-cm soil samples contained natural uranium, thorium 230, and lead 210 concentrations that ranged from 1.28 to 2.35 mg/kg, 0.3 to 0.8 pCi/g, and <0.1 to 1.9 pCi/g, respectively. The 6-inch (15-cm) soil samples contained natural uranium, thorium 230, and lead 210 concentrations that ranged from 1.33 to 11.8 mg/kg, 0.2 to 0.7 pCi/g, and 1.4 to 2.1 pCi/g, respectively.

In **Study Area D**, the 2-inch (5-cm) soil samples contained radium 226 concentrations from 0.4 to1.8 pCi/g. The 6-inch (15-cm) soil samples contained radium 226 concentrations from 0.6 to 1.7 pCi/g. The 2-inch (5-cm) soil samples contained natural uranium, thorium 230, and lead 210 concentrations at 1.31 mg/kg, 0.2 pCi/g, and 0.6 pCi/g, respectively. The 6-inch (15-cm) soil samples contained natural uranium, thorium 230, and lead 210 concentrations at 0.65 mg/kg, 0.2 pCi/g, and 0.9 pCi/g, respectively.

Direct radiation measurements were made at 490-feet (150-meter) intervals with Ludlum Model 19 microR survey meters in four areas designated as Study Areas A, B, C, and D. The radiation measurements were taken at 3.3-feet (1-meter) above the ground surface. The direct radiation results are reported below. The direct radiation measurement locations are provided in Maps 3 5, 7 and 9 of PRI's September 4, 2007 submittal (PRI, 2007).

Direct radiation measurements in **Study Area A** ranged from 17 to 75 µR/h with an average reading of 21.84 µR/h. Direct radiation measurements in **Study Area B** ranged form 22 to 150 µR/h with the average reading of 39.86 µR/h. Direction radiation measurements in **Study Area C** ranged from 15 to 19 µR/h with an average reading of 16.79 µR/h. Direction radiation measurements in **Study Area D** ranged from 16 to 28 µR/h with an average reading of 20.55 µR/h.

Several anomalies reported by the licensee were identified for the Gas Hills satellite area. Survey points near roads appeared to have higher gamma readings. This could be attributed to open pit mining that occurred in the area several years ago. The licensee surmises that ore was lost in transit or that truck tires were contaminated.

3.2 Conclusions

NRC has completed its review of the characterization information concerned with the preoperational monitoring or baseline radiological characteristics at the SR-HUP Gas Hills satellite. This review included an evaluation using the review procedures in NUREG-1569, Standard Review Plan Section 2.9.2 and the acceptance criteria outlined in Standard Review Plan Section 2.9.3 (NRC, 2003).

The licensee has adequately established the baseline radiological characteristics by providing (i) monitoring programs to demonstrate baseline radiological characteristics that include radionuclides monitored, sampling frequency, and methods, location, and density, and (ii) radiological analyses of soil samples taken at 2-inch (5-cm) and 6-inch (15-cm) depths.

The report indicates that systematic soil sampling was performed at the density specified in Regulatory Guide 4.14, Revision 1. The report also indicates that all soil sample were analyzed for radium-226 and ten percent of the samples were analyzed for natural uranium, thorium-230 and lead-210, as specified in Regulatory Guide 4.14, Revision 1 (NRC, 1980).

Based on the information provided in the license amendment request, and the detailed review conducted of the characterization of the baseline radiological characteristics at the SR-HUP Gas Hills satellite, the staff concludes that the information is acceptable in T32N, R90W Sections 1, 10, and 11 and T33N, R89W Sections 21, 22, 28, 29, 33, and 34. This is in compliance with 10 CFR 51.45, which requires a description of the affected environment containing sufficient data to aid the Commission in its conduct of an independent analysis of potential impacts to the environment and the adequacy of decommissioning activities when operations are terminated.

4.0 References

Power Resources, Inc. (2007), Smith Ranch – Highland Uranium Project Baseline Gamma Radiation Survey for Gas Hills, prepared by Western Environmental Services and Testing, Inc., September 4, 2007 **[ADAMS Accession No. ML072640421]**.

U.S. Nuclear Regulatory Commission (1980), Regulatory Guide 4.14 - Radiological Effluent and Environmental Monitoring at Uranium Mills, April 1980 **[ADAMS Accession No. ML003739941].**

U.S. Nuclear Regulatory Commission (2003), NUREG 1569 - Standard Review Plan for In Situ Leach Uranium Extraction License Applications, prepared by J. Lusher, June 2003.