



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005

October 16, 2007

Larry L. Teahon
Manager, Health Safety and
Environmental
Crow Butte Resources, Inc.
86 Crow Butte Road
Post Office Box 169
Crawford, NE 69339-0169

SUBJECT: NRC INSPECTION REPORT 040-08943/07-001

Dear Mr. Teahon:

This refers to the inspection conducted on September 17-19, 2007, at the Crow Butte Resources facility in Crawford, Nebraska. The inspection was an examination of activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of selected examinations of procedures and representative records, observations of activities, and interviews with personnel. Details of the inspection were presented to you at the exit briefing conducted on September 19, 2007. A final exit briefing occurred by telephone with your site staff on October 15, 2007.

Based on the results of this inspection, the NRC has determined that two Severity Level IV violations of NRC requirements occurred. The first violation involves your failure to conduct pond monitor well sampling during portions of 2006, while the second violation involves your failure to conduct radiological surveys of a package of radioactive material being shipped to an out-of-state facility. These non-repetitive, licensee-identified and corrected violations are being treated as Non-Cited Violations (NCVs), consistent with Section VI.A.8 of the Enforcement Policy. The NCVs are described in the subject inspection report. If you contest the violations or significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to: (1) the Regional Administrator, Region IV; and (2) the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

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

Crow Butte Resources, Inc.

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Should you have any questions concerning this inspection, please contact the undersigned at (817) 860-8191 or Mr. Robert J. Evans, Senior Health Physicist, at (817) 860-8234.

Sincerely,

/RA/

D. Blair Spitzberg, Ph.D., Chief
Fuel Cycle and Decommissioning Branch

Docket No.: 040-08943

License No.: SUA-1534

Enclosure:

NRC Inspection Report

040-08943/07-001

cc w/enclosure:

Public Document Room

Upper Niobrara-White Natural Resources District

805 East Third

Chadron, Nebraska 69337

Nebraska Department of Environmental Control

Box 94877 Statehouse Station

301 Centennial Mall South

Lincoln, Nebraska 68509

Nebraska Radiation Control Program Director

Julia Schmitt, Program Manager

Nebraska Health & Human Services

Dept. of Regulation & Licensing

Division of Public Health Assurance

301 Centennial Mall, South

P.O. Box 95007

Lincoln, NE 68509-5007

bcc w/enclosure (via ADAMS e-mail distribution):

Len Wert
 CLCain
 RGLukes, FSME/DWMEP/DURLD
 SJCohen, FSME/DWMEP/DURLD
 Bill vonTill, FSME/DWMEP/DURLD
 EAStriz, FSME/DWMEP/DURLD
 JEWhitten
 LMGersey
 RJEvans
 RITS Coordinator
 FCDB
 RIV Nuclear Materials File - 5th Floor

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RJEvans	SJCohen (via e-mail)	RGLukes (via e-mail)	DBSpitzberg
/RA/	/RA R.J.Evans for/	/RA R.J.Evans for/	/RA/
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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.: 040-08943

License No.: SUA-1534

Report No.: 040-08943/07-001

Licensee: Crow Butte Resources, Inc.

Facility: Crow Butte Facility

Location: Dawes County, Nebraska

Dates: September 17-19, 2007

Inspectors: Robert J. Evans, PE, CHP, Senior Health Physicist
Fuel Cycle & Decommissioning Branch

Robert G. Lukes, Health Physicist
Decommissioning and Uranium Recovery Licensing Directorate
Division of Waste Management and Environmental Protection
Office of Federal and State Materials and Environmental
Management Programs

Accompanied by: Elise A. Striz, Hydrogeologist
Decommissioning and Uranium Recovery Licensing Directorate
Division of Waste Management and Environmental Protection
Office of Federal and State Materials and Environmental
Management Programs

Stephen J. Cohen, PG, Project Manager
Decommissioning and Uranium Recovery Licensing Directorate
Division of Waste Management and Environmental Protection
Office of Federal and State Materials and Environmental
Management Programs

Approved by: D. Blair Spitzberg, PhD, Chief
Fuel Cycle & Decommissioning Branch

Attachment: Supplemental Inspection Information

Executive Summary

Crow Butte Resources, Inc.
NRC Inspection Report 040-08943/07-001

This inspection included a review of site status, management organization and controls, site tours, radiation protection, environmental protection, transportation, and radwaste activities. In summary, the licensee was conducting operations safely and in accordance with regulatory and license requirements, with two exceptions identified below.

Management Organization and Controls

- The organizational structure and staffing levels were sufficient for the work in progress at the facility. The licensee's Safety and Environmental Review Panel evaluations were conducted in accordance with requirements of the performance-based license. The licensee conducted the As Low As Reasonably Achievable program review as required by the license (Section 1).

In-Situ Leach Facilities

- Site operations were being conducted in accordance with applicable performance-based license conditions and regulatory requirements (Section 2).

Radiation Protection

- The licensee implemented a radiation protection program that met the requirements of 10 CFR Part 20 and the license. Occupational exposures were below the annual regulatory limit (Section 3).
- Remediation and final surveys conducted within Mine Unit 1 were performed in accordance with the licensee's Environmental Manual (Section 3).

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 did not release licensed material into the environment in quantities exceeding regulatory limits (Section 4.2.a).
- Wells were being sampled in accordance with site procedures, with one exception. The licensee's failure to conduct pond monitoring well sampling was identified as a Non-Cited Violation (Section 4.2.b).
- Wellfields in excursion status were properly reported to the NRC as required by the license. The licensee maintained records of spills, and the inspectors confirmed that none of the spills were reportable to the NRC. The licensee maintained records of well maintenance, including mechanical integrity tests (Section 4.2.c).

Transportation of Radioactive Material and Radioactive Waste Management

- The licensee was conducting transportation and waste disposal operations in accordance with license and regulatory requirements, with one exception. The failure to conduct radiological surveys of a container of byproduct waste material shipped to an out-of-state disposal site was identified as a Non-Cited Violation (Section 5).

Report Details

Site Status

The Crow Butte facility commenced with commercial operations during April 1991. At the time of the inspection, the licensee continued to recover uranium through in-situ recovery operations. Uranium processing and drying operations were in progress at the Central Processing Plant (CPP). The groundwater in Mine Unit 1 had been restored, and surface reclamation activities had been conducted. Mine Units 2-5 were in groundwater restoration. Mine Units 6-10 were in operation. Mine Unit 11 was under construction with mining and monitoring wells being installed.

Since the previous inspection, conducted during August 2006, the licensee submitted an amendment request to add a new satellite facility, the North Trend Expansion site, to the license. Exploratory drilling was in progress during the inspection in the North Trend Expansion area. The licensee plans to submit an amendment to the license for a second satellite facility during late-2008. Background sampling was in progress in this area, the Three Crow permit area, during the inspection.

In addition to the two new wellfield areas, the licensee previously submitted an amendment request to the NRC to increase the CPP throughput from 5,000 gpm to 9,000 gpm. In support of this upgrade, the licensee was planning to install six new downflow- ion exchange (IX) columns in the plant. Eight upflow IX columns are currently being used to support uranium recovery operations at the licensed limit of 5,000 gpm.

1 Management Organization and Controls (88005)

1.1 Inspection Scope

The purposes of this portion of the inspection were to ensure that the licensee established an organization to administer the technical programs and established programs to perform internal reviews, self-assessments, and audits.

1.2 Observations and Findings

The licensee's corporate organization structure is illustrated in Figure 5.1-1 of the license application. The inspectors compared the actual structure to the license application requirements. At the time of the inspection, the licensee had 57 employees with a budget of 61 full-time employees. Since the last inspection, the licensee filled the position of environmental health & safety coordinator. To support corporate certification initiatives, the licensee plans to staff two additional environmental health & safety positions in the near future. The licensee also used 19 contract employees for drilling and heavy equipment operations. In summary, the licensee had sufficient staff to implement the conditions of the license.

License Condition 9.4 of the performance-based license requires the licensee to establish a Safety and Environmental Review Panel (SERP). The inspectors reviewed the licensee's SERP evaluations that were performed during 2006-2007. Six reviews

were conducted during 2006, and two reviews were conducted during 2007. Seven of the eight SERP reviews involved approvals of new wellfields, while the eighth review deleted the position of senior vice president position from the NRC-approved organizational structure. The inspectors concluded that the evaluations were technically adequate and provided sufficient detail to support the proposed changes. Also, the changes that resulted from the SERP recommendations did not negatively impact the licensing basis of the site.

Annual As Low As Reasonably Achievable (ALARA) program reviews are required by License Condition 9.12 and License Application Section 5.4.4. The annual ALARA audit for 2006 was conducted in April 2007 by a third-party contractor. No significant problems were identified by the auditor. The ALARA auditor also provided suggestions to the licensee to further reduce occupational doses. In summary, the licensee's ALARA audit was determined to be a thorough review of licensed activities.

1.3 Conclusions

The organizational structure and staffing levels were sufficient for the work in progress at the facility. The licensee's SERP evaluations were conducted in accordance with requirements of the performance-based license. The licensee conducted the ALARA program review as required by the license.

2 In-Situ Leach Facilities (89001)

2.1 Inspection Scope

The objectives of this portion of the inspection were to determine if operations were being conducted in accordance with regulatory and license requirements.

2.2 Observations and Findings

Site tours were conducted to observe in-situ recovery operations in progress. Areas toured included the CPP, the reverse osmosis facility, wellfields, selected header houses, and evaporation ponds. The inspectors observed the condition of plant equipment, fences, postings, and gates. Plant operating parameters (flow, pressure) were compared to licensed limits. In summary, operations were being conducted in accordance with license requirements and established procedures.

The inspectors compared dryer operations to the safety requirements listed in License Condition 10.8. The licensee demonstrated the operability of the emission control equipment. The inspectors concluded that the dryer's safety features were functional in accordance with license requirements.

License Condition 11.4 and License Application Section 5.8.8.3 specify that the licensee perform and document inspections of its onsite evaporation ponds. The most recent annual pond inspection report was submitted to the NRC by letter dated January 24, 2007. The inspection was conducted by a third-party representative for the licensee during October 2006. The auditor determined that the three solar evaporation ponds,

two research & development ponds, and associated diversion ditches were “operating in the constraints of the engineering design.”

NRC staff inspected the three commercial evaporation ponds to document the condition of the pond liners, condition of the side slopes, the manner in which the ponds are being operated. At the time of the inspection, animal burrows were identified along the bottom of Pond 3 east slope. The licensee stated that it maintains a contract with a U.S. Department of Agriculture representative to monitor burrows and trap animals if the burrows appear active. The licensee stated that the animal burrows at Pond 3 are not active based on the professional opinion of the contractor.

Also, the inspectors observed slight rill erosion along the north side of Pond 1 and the north side of Pond 4. The inspectors also observed geotextile reinforcement on the east side of Pond 4. The licensee also maintained the proper freeboard in each commercial pond. The inspectors concluded that the ponds were being operated properly and according to their license.

2.3 Conclusions

Site operations were being conducted in accordance with applicable performance-based license conditions and regulatory requirements.

3 Radiation Protection (83822)

3.1 Inspection Scope

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

3.2 Observations and Findings

The licensee's occupational dose monitoring program was reviewed to ensure that no worker had exceeded the occupational dose limits specified in 10 CFR 20.1201. The licensee's exposure records for 2006-2007 were reviewed. The records indicated that the highest total effective dose equivalent exposure for calendar year 2006 was 713 millirems with an average employee dose of 323 millirems. The average and peak exposures for 2006 were slightly higher than those measure in 2005, although exposures remained below the annual limit of 5,000 millirems as specified in 10 CFR 20.1201(a). In summary, occupational exposures were less than the regulatory limit.

In addition to occupational exposure records, the inspectors reviewed the 2006-2007 records for in-plant radiological surveys, solid waste surveys, radiation work permits, employee training, and instrument calibrations. All records met regulatory and license requirements.

During site tours, the inspectors performed independent radiological surveys using two NRC-issued survey meters, a Ludlum Model 2401-P survey meter (NRC No. 016297G, calibration due date of 12/11/07) and a Ludlum Model 19 microRoentgen meter (NRC

No. 015546, calibration due date of 02/12/08). The inspectors did not observe any area that was greater than five millirems per hour that the licensee had not previously identified and posted as a radiation area. The inspectors determined that the licensee was posting radiation areas as required by 10 CFR 20.1902.

The inspectors conducted limited radiological surveys at two locations that had been remediated by the licensee. Well Houses 1 and 2, located in Mine Unit 1, had been remediated by the licensee, including removal of potentially contaminated soil. The inspectors conducted a walk-down of the areas where the well houses had been located and reviewed the licensee's post-remediation soil sample results. With a background of 24 $\mu\text{R/hr}$, the area around former Well House 1 measured 24-28 $\mu\text{R/hr}$ including background. The area around former Well House 2 measured 21-28 $\mu\text{R/hr}$ with a background of 21 $\mu\text{R/hr}$.

The licensee collected composite samples from each well house location. The samples were analyzed for uranium and radium-226 concentrations. The composite soil sample result for Well House 2 was reviewed, but the result for the Well House 1 composite sample was not available during the inspection. The Well House 2 sample results were compared to the soil cleanup standards provided in Section 12.3 of the licensee's Environmental Manual. With a limit of 5 pCi/g above background, the radium-226 concentration was 0.4 pCi/g. The uranium concentration was 2.1 pCi/g with a limit of 230 pCi/g.

Although the licensee has remediated the surface areas of Mine Unit 1, the area will continue to remain within the licensed area. In addition, access to the area will remain controlled by the licensee.

3.3 Conclusions

The licensee implemented a radiation protection program that met the requirements of 10 CFR Part 20 and the license. Occupational exposures were below the annual regulatory limit. Remediation and final surveys conducted within Mine Unit 1 were performed in accordance with the licensee's Environmental Manual.

4 Environmental Protection and Maintaining Effluents from Materials Facilities ALARA (88045, 87102)

4.1 Inspection Scope

The environmental and effluent monitoring programs were reviewed to assess the impacts of site activities on the local environment.

4.2 Observations and Findings

a. Environmental Monitoring

The effluent and environmental monitoring program requirements are specified in License Condition 11.3, and the reporting requirements are specified in License

Condition 12.1. The semi-annual environmental monitoring reports for 2006 and the first half of 2007 were reviewed during the inspection. The semi-annual reports include the status of wells in excursion status, production water pressures and flow rates, and waste water flow rates. All reported data were within licensed flow and pressure limits. In summary, the semi-annual reports were submitted to the NRC in a timely manner and provided relevant data for the facility.

The environmental monitoring program consisted of air particulate, radon, groundwater, surface water, sediment and ambient gamma exposure rate sampling. The licensee has seven monitoring stations situated at various locations around the licensed property, including one background station.

The seven stations measured natural uranium, radium-226, and lead-210 concentrations in air. Radon-222 was also measured using track-etch detectors. The sample results were less than 5 percent of the effluent concentration limits specified in 10 CFR Part 20, Appendix B, Table 2, for air releases. The results for the site perimeter sample stations were similar to the sample results measured at the background station.

The licensee measured ambient gamma radiation levels at the seven sample stations using dosimeters that were exchanged quarterly. The ambient gamma radiation levels were less than 5 millirems per quarter above background values.

Water supply wells within 1-kilometer of the wellfields were sampled quarterly. Nineteen wells were sampled in 2006-2007. Surface water was collected quarterly from each stream and water impoundment in the wellfield areas. The licensee collected water samples from five streams and three impoundments during 2006-2007. The samples were analyzed for natural uranium and radium-226 concentrations. The sample results were less than 30 percent of the effluent concentration limits for water.

Sediment samples were collected annually at locations where water sampling was conducted. The samples were analyzed for natural uranium, radium-226, and lead-210 concentrations. No specific limit has been established for sediment samples, but the data is used for trending purposes.

Based on the environmental and effluent monitoring sample results, the inspectors concluded that the potential radiation dose to any member of the public from licensed material during 2006 was below the 100 millirem per year annual dose limit specified in 10 CFR 20.1301(a).

b. Groundwater Sampling

The NRC staff reviewed well monitoring records and observed sampling of one well to determine if groundwater samples were being collected in accordance with standard industry practices and the licensee's standard operating procedures. The licensee collected groundwater samples after using one of the following well purge protocols:

- Purging one and a half well volumes and collecting and measuring four sets of water quality parameters
- Purging at least three well volumes and collecting/measuring one set of water

- quality parameters
- Pumping a well almost dry, allowing it to recharge, and then collecting and measuring one set of water quality parameters

Although the licensee had established different protocols for collecting water samples, all of the methods were found to be acceptable for ensuring that a representative water sample was collected for analysis. A random review of well sampling data sheets indicated that the licensee was collecting the necessary data to determine compliance with its procedures and to assess the representativeness of the sample.

NRC staff observed the sampling of Well CM-57. The licensee measured the water level, purged almost six well volumes, conducted water quality measurements, and collected the water sample. NRC staff concluded that the licensee had sampled the well in accordance with site procedures.

The inspectors reviewed private well and surface water sampling reports, semi-annual groundwater reports, well sampling records, and groundwater analytical data. The licensee had effectively implemented the groundwater sampling programs including biweekly monitoring well sampling in active mine units, weekly sampling of wells in excursion status, and lower-frequency well sampling in mine units under restoration.

License Condition 11.4 states that the licensee shall perform and document pond inspections in accordance with the Evaporation Pond Onsite Inspection Program. During the monitoring well sampling event for the first quarter of 2007, the licensee recognized that it had failed to collect samples from some of the pond monitor wells during the third and fourth quarters of 2006. The commercial pond monitor wells had not been sampled during the fourth quarter of 2006, while the research & development ponds had not been sampled during the third and fourth quarters of 2006.

The failure to perform and document pond inspections in accordance with the Evaporation Pond Onsite Inspection Program during the third and fourth quarters of 2006 was a violation of License Condition 11.4 requirements. However, this non-repetitive, licensee-identified and corrected violation is being treated as a Non-Cited Violation (NCV), consistent with Section VI.A.8 of the NRC Enforcement Policy (NCV 040-08943/0701-01). The licensee identified the error and implemented an investigation during February 2007.

The cause of the missed samples was attributed to human error. A member of the licensee's staff marked these wells off from the sampling list before they were actually sampled. As part of the corrective actions, the licensee compared the first quarter 2007 sample results to previous sample results, and no adverse trends were identified. Further, the licensee reassigned the work to specific individuals to ensure accountability for future samples. The corrective actions appeared to have been effective because the second quarter 2007 samples were collected without incident.

c. Wellfield and Excursion Monitoring

License Condition 11.2 specifies the monitoring well sampling requirements and the criteria for placing a well on excursion status. Wells IJ-13 and PR-8 have been on excursion status since at least 2003. Well PR-15 was placed on excursion status during 2006. All of these wells are located between Mine Unit 1, which has been restored, and other mine units that are currently under restoration. The licensee stated that it expects to be able to remove these wells from excursion status once the surrounding mine units (2, 3, and 4) have been restored.

NRC staff reviewed groundwater monitoring data collected between September 2006 and September 2007 to determine if the licensee was correctly identifying and reporting excursions. The inspectors selected monitoring data at random and examined the reports to confirm the licensee's automated excursion reporting system was functioning properly and to identify any excursions that were not reported. Data from known excursions was also reviewed to ensure that the monitoring frequency had been increased according to License Condition 11.2 requirements. The inspectors concluded that the licensee was correctly identifying and reporting excursions.

License Condition 12.2 requires, in part, that the licensee maintain documentation of unplanned releases of source material, 11e.(2) byproduct material, or process chemicals. The license also describes the reporting requirements. The inspectors reviewed the licensee's spill records to determine if the licensee was in compliance with the reporting requirements. Since August 2006, the licensee experienced 11 spill events totaling 13,340 gallons. Of this volume, 2,485 gallons, or 18.6 percent, was pregnant lixiviant. Most spills were injection well leaks. The licensee's final assessments concluded that none of the spills were reportable to the NRC per 10 CFR 41.60. Based on the information provided in each assessment, the inspectors concurred with the licensee's conclusions.

The inspectors also interviewed staff and reviewed records regarding well mechanical integrity tests, maintenance procedures, and records. Test records were reviewed for the new wells recently installed in Mine Unit 10 in addition to all other wells tested in 2006 and 2007. No test failures were noted. NRC staff also reviewed an example of well maintenance records from a dedicated well work-over log book from Well House 38. This log book contained field records of each well with actions described and dated. Well plugging and abandonment records and work procedures were also reviewed for Mine Unit 1 and found to be acceptable. As part of the mechanical integrity test review, the inspectors observed a mechanical integrity test in progress at Well 4757 in Mine Unit 10. The licensee technician performed the test in accordance with license conditions and procedures.

4.3 Conclusions

The licensee conducted environmental monitoring in accordance with license requirements. The licensee did not release licensed material into the environment in quantities exceeding regulatory limits. Wells were being sampled in accordance with site procedures, with one exception. The licensee's failure to conduct pond monitoring well sampling was identified as an NCV. Wellfields in excursion status were properly reported to the NRC as required by the license. The licensee maintained records of spills, and the inspectors confirmed that none of the spills were reportable to the NRC.

The licensee maintained records of well maintenance, including mechanical integrity tests.

5 Transportation of Radioactive Materials and Radioactive Waste Management (86740, 88035)

5.1 Inspection Scope

The objectives of this portion of the inspection were to determine if transportation and disposal activities were being conducted in compliance with regulatory requirements.

5.2 Observations and Findings

License Condition 9.7 allows the licensee to dispose of 11e.(2) byproduct material at a site licensed to receive such material. The licensee had two agreements, one that expires at the end of 2007, and a second that expires during 2009. The licensee shipped 20 containers of wastes to an out-of-state disposal site since the last inspection.

The licensee maintained records of yellowcake and waste disposal shipments. The shipping papers were compared to the requirements of 49 CFR 172.202 and 172.203. The papers were in compliance with U.S. Department of Transportation (DOT) requirements.

The licensee self-identified a situation where a shipment of byproduct material was transported during early-September 2007 without the required radiological surveys being completed. Regulation 10 CFR 71.5 states, in part, that each licensee who transports licensed material shall comply with the applicable requirements of the DOT regulations. Regulation 49 CFR 173.441 provides the radiation level limitations, while regulation 173.443 provides the contamination limits. The failure to conduct a container survey for both the radiation level and the contamination level before shipment in early-September 2007 was a violation of 10 CFR 71.5. This non-repetitive, licensee-identified and corrected violation is being treated as an NCV, consistent with Section VI.A.8 of the NRC Enforcement Policy (NCV 040-08943/0701-02).

The licensee identified the shipping error and implemented an investigation. The licensee concluded that the cause of the shipment error was plant operations' failure to notify the environmental health & safety department prior to shipping the container. This notification failure resulted in an unsurveyed container being shipped without verification of compliance with DOT requirements.

The licensee concluded that the actual safety significance was low because the survey results of all other containers met DOT requirements. Corrective actions planned by the licensee to prevent recurrence of the event included development of a checklist and review of site procedures. The licensee planned to implement a checklist for each shipment, with the new procedural requirement that a container cannot be shipped until the checklist has been completed. The licensee plans to implement these corrective actions prior to the next shipment of byproduct material for disposal.

5.3 Conclusions

The licensee was conducting transportation and waste disposal operations in accordance with license and regulatory requirements, with one exception. The failure to conduct radiological surveys of a container of byproduct waste material shipped to an out-of-state disposal site was identified as an NCV of NRC requirements.

6 Exit Meeting Summary

The inspectors presented the preliminary inspection results to the licensee's representatives at the conclusion of the onsite inspection on September 19, 2007. A final exit briefing occurred by telephone with the licensee on October 15, 2007. Representatives of the licensee acknowledged the findings as presented. During the inspection, the licensee did not identify any information reviewed by the inspectors as propriety.

SUPPLEMENTAL INSPECTION INFORMATION

Partial List of Persons Contacted

Licensee

D. Crawford, Manager, Project Development
R. Grantham, Radiation Safety Officer
J. Stokey, Mine Manager
L. Teahon, Manager, Health Safety and Environmental

Items Opened, Closed, and Discussed

Open

040-08943/0701-01 NCV Failure to collect quarterly pond monitor well samples
040-08943/0701-02 NCV Shipment of waste material without DOT-required surveys

Closed

040-08943/0701-01 NCV Failure to collect quarterly pond monitor well samples
040-08943/0701-02 NCV Shipment of waste material without DOT-required surveys

Discussed

None

Inspection Procedures Used

IP 83822 Radiation Protection
IP 86740 Transportation of Radioactive Material
IP 87102 Maintaining Effluents from Materials Facilities ALARA
IP 88005 Management Organization and Controls
IP 88035 Radioactive Waste Management
IP 88045 Effluent Control and Environmental Protection
IP 89001 In-Situ Leach Facilities

List of Acronyms Used

ALARA	As Low As Reasonably Achievable
CPP	Central Processing Plant
DOT	U.S. Department of Transportation
IP	Inspection Procedure
$\mu\text{R/hr}$	microRoentgens per hour
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
pCi/g	picocuries per gram
SERP	Safety and Environmental Review Panel