



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
612 EAST LAMAR BLVD, SUITE 400  
ARLINGTON, TEXAS 76011-4125

October 26, 2009

Mr. Terry L. Fletcher  
President  
Rio Algom Mining LLC  
P.O. Box 218  
Grants, New Mexico 87020

SUBJECT: NRC INSPECTION REPORT 040-08905/09-001

Dear Mr. Fletcher:

This refers to the inspection conducted on September 22-24, 2009, at Rio Algom Mining's Ambrosia Lake facility located in McKinley County, New Mexico. This 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 examination of procedures and representative records, observations of activities, and interviews with personnel. The enclosed report presents the results of this inspection.

During the inspection, representatives from Oak Ridge Institute for Science and Education (ORISE) conducted confirmatory surveys on behalf of the NRC staff. The preliminary results of the confirmatory survey were presented to you at the conclusion of the onsite inspection. The final confirmatory survey results will be presented to you at a later date, following NRC review and approval of ORISE's confirmatory survey report.

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 you choose to provide one, 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's 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.

Should you have any questions concerning this inspection, please contact Mr. Robert Evans, Senior Health Physicist, at (817) 860-8234 or the undersigned at (817) 860-8197.

Sincerely,  
*/RA/*  
Jack E. Whitten, Chief  
Nuclear Materials Safety Branch B

Docket: 040-08905  
License: SUA-1473  
Enclosure:  
NRC Inspection Report 040-08905/09-001

cc w/enclosure:

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RIV:DNMS:NMSB-B	RSFSB	C:NMSB-B		
RJEvans	GSchlapper	JEWhitten		
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U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket 040-08905

License SUA-1473

Report 040-08905/09-001

Licensee: Rio Algom Mining LLC

Facility: Ambrosia Lake facility

Location: McKinley County, NM

Dates: September 22-24, 2009

Inspectors: Robert Evans, PE, CHP, Senior Health Physicist  
Nuclear Materials Safety Branch B

Gerald Schlapper, PhD, PE, CHP, Health Physicist  
Repository & Spent Fuel Safety Branch

Accompanied By: Wade Adams, Project Leader  
Survey Projects  
Independent Environmental Assessment & Verification  
Oak Ridge Institute for Science and Education

Mark Jadick, Assistant Project Leader  
Survey Projects  
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Dean Herrera, Senior Radiation Technician  
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Approved By: Jack E. Whitten, Chief  
Nuclear Materials Safety Branch B

Attachment: Supplemental Inspection Information

ENCLOSURE

## EXECUTIVE SUMMARY

### Rio Algom Mining Ambrosia Lake Facility NRC Inspection Report 040-08905/09-001

This inspection was a routine, announced inspection of decommissioning activities being conducted at the former Ambrosia Lake mill. The inspection included a confirmatory survey of Section 4, an area where evaporation ponds were previously reclaimed by the licensee. The inspectors were supported by representatives from Oak Ridge Institute for Science and Education (ORISE) during the onsite inspection. In summary, the licensee was conducting decommissioning in accordance with license and regulatory requirements.

#### Closeout Inspection and Survey

- The inspectors reviewed the licensee's draft soil sampling data for Section 4. None of the individual soil sample results exceeded the respective NRC-approved soil cleanup levels presented in the Soil Decommissioning Plan (Section 1).
- The inspectors noted that the licensee had not analyzed all soil samples for total uranium concentrations, as discussed in the Soil Decommissioning Plan. During the inspection, the licensee agreed to explain its technical justification for this action in the final status survey report. This issue was not a violation of the license because the licensee was still compiling all soil sampling data from Section 4 (Section 1).
- The inspectors and ORISE staff conducted field measurements for ambient gamma radiation levels. Three discrete areas of elevated radiation levels were identified, but the licensees remediated these three areas during the inspection (Section 1).
- The inspectors and ORISE staff could not conduct subsurface sampling. The licensee agreed to address this issue in the final status survey report, perhaps through the performance of dose modeling, as allowed by the Soil Decommissioning Plan (Section 1).
- The ORISE measured ambient gamma radiation levels and collected a number of soil samples. These sample results were not available at the conclusion of the onsite inspection. The ORISE confirmatory survey results will be presented to the licensee under separate correspondence at a later date (Section 1).

#### Effluent Control and Environmental Protection

- A previously cited violation was closed involving the licensee's failure to conduct confirmatory groundwater sampling. The inspectors noted that the licensee completed all commitments as discussed in the licensee's violation response letter (Section 2).

## Report Details

### Summary of Plant Status

The Ambrosia Lake site is a former uranium recovery facility that is currently undergoing decommissioning. At the time of this inspection, the licensee was installing a rock erosion cover on the slopes of Pond 3. This work was scheduled to be completed during October 2009. Next, the licensee plans to install a rock cover on top of Pond 3 during October-November 2009. A channel was also being constructed to the northeast of Ponds 1 and 3. This channel was designed as a 100-year flood channel.

In the near future, the licensee plans to demolish all remaining structures. The debris will be placed in the north disposal cell located north of Pond 2. Final status surveys will be conducted as the buildings are demolished and removed. The cover will then be completed on top of Pond 2. Radon flux testing will be conducted on Pond 2 after the cover has been installed. This work is expected to be completed by mid-2010.

The licensee replaced the site radiation safety officer since the last inspection. The previous radiation safety officer retired during early 2009. The NRC was notified about the change in radiation safety officers by letter dated April 16, 2009. Currently, the licensee has 27 employees working at the site, plus a contract security force. The licensee plans to reduce the staffing levels in conjunction with a reduction in onsite reclamation activities.

## **1 Closeout Inspection and Survey (83890)**

### 1.1 Inspection Scope

The inspectors attempted to verify if the Section 4 area had been remediated to acceptable radiological levels for future unrestricted use.

### 1.2 Observations and Findings

Section 4 is the area where the licensee previously constructed and used 11 evaporation ponds. Section 4 is located approximately 2 miles northwest of the former millsite. The ponds when operational were used to evaporate liquid wastes generated from the former mill. The ponds were also used to evaporate other sources of water including groundwater. The ponds were constructed in the late 1970's on 256 acres of land. The ponds remained in service until 2004.

License Condition 42 allowed the licensee to consolidate and transport Section 4 evaporation pond sediment material, while License Condition 37 allowed the licensee to dispose of the pond sediments in Tailings Cell 2, also known as Pond 2. Pond 2 covers 65 acres. The southern portion of Pond 2 was previously reclaimed, but the northern portion remained open for placement of additional byproduct material. The licensee commenced with movement of Section 4 material during November 2005. The licensee completed the movement of Section 4 material by December 2007. Based on the licensee's records, approximately 3,281,000 cubic yards of material were removed from Section 4 and placed into Pond 2.

Following movement of Section 4 pond sediments to Pond 2, the licensee commenced with a final status survey of Section 4. The final status survey included measurement of

ambient gamma exposure rates and collection of soil samples. The licensee commenced with soil sampling during March 2007 and completed the sampling during July 2009. The licensee collected approximately 950 soil samples from Section 4. License Condition 32 references the Soil Decommissioning Plan. The NRC-approved soil cleanup criteria are provided in the Soil Decommissioning Plan. The total uranium limit is 38 picocuries per gram (pCi/g), the thorium-230 limit is 17 pCi/g, and the radium-226 limit is 7 pCi/g. All limits include background concentrations.

The inspectors compared the licensee's draft soil sample results to the cleanup criteria. All sample results were less than the respective cleanup criteria. In the top six inches of soil, the highest thorium-230 sample result was 14 pCi/g with a limit of 17 pCi/g, while the highest radium-226 sample result was 6 pCi/g with a limit of 7 pCi/g.

The licensee analyzed the soil samples onsite for radium-226 and thorium-230 concentrations. One-tenth of the samples were submitted to an offsite laboratory for independent analysis. The offsite laboratory analyzed the samples for total uranium in addition to radium-226 and thorium-230 concentrations. The inspectors reviewed the third-party sample results that were available at the time of the inspection. The highest thorium-230 concentration was 16.3 pCi/g with a limit of 17 pCi/g. The highest radium-226 concentration was 4.17 with a limit of 7 pCi/g. Finally, the highest uranium-238 concentration was 14.6 pCi/g with a total uranium concentration limit of 38 pCi/g. (The doubling of the uranium-238 concentration is roughly equivalent to the total uranium concentration.)

The Soil Decommissioning Plan requires that the licensee sample for thorium-230, radium-226, and total uranium. The inspectors discussed with the licensee its decision to analyze only one-tenth of the soil samples for total uranium concentrations. The licensee believed that uranium would be non-existent in the samples, as confirmed by its quality assurance sample results. The licensee stated that it would provide a technical justification for this reduced frequency in the final status survey report. The final status survey report will be submitted to the NRC for formal review at a later date. This issue was not considered a violation of the Soil Decommissioning Plan because the licensee had not finalized its sample results for Section 4.

The inspectors conducted field measurements in Section 4. The inspectors were assisted by representatives from Oak Ridge Institute for Science and Education (ORISE). The inspectors measured ambient gamma exposure rates, while the ORISE staff measured ambient gamma exposure rates and collected soil samples.

Prior to the inspection, ORISE submitted a confirmatory survey plan to the NRC for review and approval. The plan provided ORISE's proposed sampling protocol. Following NRC review, the plan was updated and issued on September 11, 2009. The plan divided the property into three survey units. Within each survey unit, 18 randomly selected (rank set sampling), 100-square meter survey grids were identified for sampling. The ORISE staff conducted ambient gamma radiation surveys in these 54 survey grids. In addition, ORISE collected 18 soil samples from selected survey grids. Each sample was a 4-point composite sample. Some of the samples were split with the licensee. At the end of the randomly selected survey grid sampling, the ORISE staff conducted biased walk-over surveys of the remaining land area in an effort to identify any area that exhibited elevated ambient gamma exposure rates.

The licensee previously conducted ambient gamma exposure rate surveys on the Section 4 property. The surveys included both in-process and final status surveys. The licensee established an action level that was about two and a half times the background reading for its survey meters. Accordingly, the NRC inspectors and ORISE staff conducted daily background measurements. The NRC and ORISE staff elected to use acceptance criteria that were three times the instrument background measurements.

During the onsite inspection, the inspectors and ORISE staff identified three distinct areas in Section 4 that exhibited elevated ambient gamma exposure rates. The areas exhibited radiation that was at least three times the background values. In response to the NRC and ORISE staff findings, the licensee mobilized its staff and reclaimed all three areas during the inspection. The residual material was transferred to Pond 2.

At the exit meeting, the inspectors questioned the licensee about the possibility of subsurface contamination in Section 4. The inspectors and ORISE staff only conducted surface surveys. The NRC and ORISE staff could not effectively conduct subsurface surveys in Section 4. The licensee agreed to consider conducting dose modeling, as allowed by the Soil Decommissioning Plan, to account for any possible subsurface contamination that may remain in the Section 4 area. The results of dose modeling, if conducted by the licensee, will be included in future correspondence with the NRC.

The final results of ORISE's ambient gamma surveys and soil sampling were not available at the end of the inspection period. These results will be presented to the licensee at a later date under separate correspondence from the NRC.

### 1.3 Conclusions

The inspectors reviewed the licensee's draft soil sampling data for Section 4. None of the individual soil sample results exceeded the respective NRC-approved soil cleanup levels presented in the Soil Decommissioning Plan.

The inspectors noted that the licensee had not analyzed all soil samples for total uranium concentrations, as discussed in the Soil Decommissioning Plan. During the inspection, the licensee agreed to explain its technical justification for this action in the final status survey report. This issue was not a violation of the license because the licensee was still compiling all soil sampling data from Section 4.

The inspectors and ORISE staff conducted field measurements for ambient gamma radiation levels. Three discrete areas of elevated radiation levels were identified, but the licensees remediated these three areas during the inspection.

The inspectors and ORISE staff could not conduct subsurface sampling. The licensee agreed to address this issue in the final status survey report, perhaps through the performance of dose modeling, as allowed by the Soil Decommissioning Plan.

The ORISE measured ambient gamma radiation levels and collected a number of soil samples. These sample results were not available at the conclusion of the onsite inspection. The ORISE confirmatory survey results will be presented to the licensee under separate correspondence at a later date.

## **2 Effluent Control and Environmental Protection (88045)**

### **2.1 (Closed) Violation 040-08905/0801-01: Failure to conduct confirmatory sampling in accordance with License Condition 34.F**

The NRC conducted a routine inspection of the licensee during October 2008. The results of this inspection are documented in NRC Inspection Report 040-08905/08-001 dated November 25, 2008. During the October 2008 inspection, the NRC identified one violation of License Condition 34.F involving the licensee's failure to conduct confirmatory groundwater sampling.

License Condition 34.F requires, in part, that if the laboratory results indicate that the concentration of any constituent exceeds its associated ground water protection standard or alternate concentration limit (ACL), the licensee shall collect a second sample within 7 calendar days of becoming aware of any exceedance of the ACL. The inspectors identified three instances where the constituents exceeded the ACLs, but the licensee did not collect second samples after receiving the laboratory results.

In its reply to the Notice of Violation dated December 2, 2008, the licensee committed to hiring a new supervisor of environmental affairs/radiation safety officer to enhance the site staff by March 1, 2009. This position was subsequently filled by the licensee. As noted above, the NRC was notified of this staffing change by letter dated April 16, 2009.

In its response letter, the licensee also committed to update its procedures to prevent a recurrence of the violation. During this inspection, the NRC staff reviewed the licensee's updated procedure. The inspectors noted that Health Physics and Environmental Program Manual dated December 4, 2008, Section 5.5, Environmental Sampling Program – Groundwater, requires that the radiation safety officer evaluate groundwater monitoring results immediately upon receipt. The results will also be forwarded to an outside engineering firm for evaluation. The outside engineering firm will evaluate the results and notify the President of Rio Algom Mining of any exceedance within five working days. The procedure also requires that confirmatory sampling be conducted in accordance with the license.

In order to evaluate the effectiveness of these corrective actions, the semi-annual groundwater reports dated January 30, 2009, and July 29, 2009, were reviewed. The reports were submitted in a timely manner as required by the license. The reports did not identify any exceedance of ACL parameters. However, the inspectors identified two errors in the reported data. The licensee committed to correct these errors and include the corrected information as part of its next routine data submittal. In summary, the inspectors concluded that the licensee had implemented the commitments that were made in its response letter to the NRC.

## **3 Exit Meeting Summary**

The inspectors presented the preliminary inspection results to the licensee's representatives at the conclusion of the onsite inspection on September 24, 2009. Representatives of the licensee acknowledged the findings as presented. During the onsite inspection, the licensee did not identify any information reviewed by the inspectors as proprietary. A final exit briefing will be held with the licensee after the ORISE report has been reviewed and approved by the NRC staff.

## **SUPPLEMENTAL INSPECTION INFORMATION**

### **PARTIAL LIST OF PERSONS CONTACTED**

#### Licensee

T. Fletcher, President  
C. Wentz, Environmental Supervisor/Radiation Safety Officer

### **INSPECTION PROCEDURES USED**

IP 83890                      Closeout Survey and Inspection  
IP 88045                      Effluent Control and Environmental Protection

### **ITEMS OPENED, CLOSED, AND DISCUSSED**

#### Opened

None

#### Closed

040-08905/0801-01    VIO    Failure to conduct confirmatory sampling in accordance with  
License Condition 34.F

#### Discussed

None

### **LIST OF ACRONYMS**

ACL                      alternate concentration limit  
IP                        Inspection Procedure  
NRC                     Nuclear Regulatory Commission  
ORISE                  Oak Ridge Institute for Science and Education  
pCi/g                    picocuries per gram  
VIO                      NRC Notice of Violation