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

September 6, 2006

Peter J. Luthiger
Manager, Radiation Safety
& Environmental Affairs
Rio Algom Mining LLC
P.O. Box 218
Grants, NM 87020

SUBJECT: NRC INSPECTION REPORT 040-08905/06-001

Dear Mr. Luthiger:

This refers to the inspection conducted on July 26-27, 2006, at the Ambrosia Lake facility located in McKinley County, New Mexico. 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 examination of procedures and representative records, observations of activities, and interviews with personnel. Details of the inspection were presented to you at the preliminary exit briefing conducted on July 27, 2006. A final exit briefing was presented telephonically to you on August 28, 2006.

One unresolved item was identified related to a high uranium bioassay result of a worker in 2005 which you concluded was not the result of an actual intake of uranium by the worker. An unresolved item is a matter about which more information is required to determine whether the issue in question is an acceptable item, a deviation, a nonconformance, or a violation. Please provide the NRC with additional information on this matter including plausible scenarios for what may have caused the positive bioassay result, and what has been done or is proposed to prevent its recurrence. Upon receipt of this information, NRC will continue its review.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," 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 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.

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.: 040-08905
License No.: SUA-1473

Enclosure:
NRC Inspection Report
040-08905/06-001

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SUNSI Review Completed: RJE ADAMS: ■ Yes ☐ No Initials: RJE
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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	040-08905
License No.:	SUA-1473
Report No.:	040-08905/06-001
Licensee:	Rio Algom Mining LLC
Facility:	Former Ambrosia Lake Mill
Location:	McKinley County, New Mexico
Dates:	July 26-27, 2006
Inspector:	Robert Evans, P.E., C.H.P., Senior Health Physicist Fuel Cycle & Decommissioning Branch
Accompanied by:	Linda M. Gersey, Health Physicist Nuclear Materials Inspection Branch
Approved by:	D. Blair Spitzberg, Ph.D., Chief Fuel Cycle & Decommissioning Branch
Attachment:	Supplemental Inspection Information

EXECUTIVE SUMMARY

Rio Algom Mining's Ambrosia Lake Facility
NRC Inspection Report 040-08905/06-001

This inspection included a review of site status, management organization and controls, radiation protection, operator training, maintenance and surveillance testing, environmental protection, transportation and radwaste activities, and emergency preparedness. In summary, the licensee was conducting activities safely and in accordance with regulatory and license requirements.

Management Organization and Controls

- The organizational structure and staffing levels were sufficient for the work in progress. Site procedures were established and were being maintained up-to-date (Section 1).

Radiation Protection

- The licensee implemented a radiation protection program that met the requirements of 10 CFR Part 20 and the license (Section 2).

- Unresolved Item 040-08905/0601-01 was opened which related to the licensee conclusion that a 2005 high bioassay result for a worker was not valid (Section 2).

Operator Training/Retraining

- Radiation protection training was provided to site workers as required by regulations (Section 3).

Maintenance and Surveillance Testing

- Instruments were being calibrated as required by site procedures. Survey meters in service appeared operable with up-to-date calibrations (Section 4).

- The licensee was conducting soil sampling and analysis during the inspection. Because the NRC had not yet approved the soil decommissioning plan, this program area will be reviewed at a later date as part of the NRC's confirmatory survey process (Section 4).

Environmental Protection

- The licensee had not released licensed material into the environment in quantities exceeding regulatory limits for the periods reviewed, which included the years 2004-2005. The routine groundwater and environmental monitoring program reports were submitted to the NRC as required by the license (Section 5).

Transportation of Radioactive Material and Radioactive Waste Management

- The licensee was conducting transportation and waste disposal operations in accordance with license requirements (Section 6).

Emergency Preparedness

- The licensee had adequate procedures, equipment, and training needed to respond to emergencies (Section 7).

Report Details

Site Status

Rio Algom Mining's Ambrosia Lake facility was one of the nation's largest uranium ore processing facilities. The conventional mill ceased operations in 1985. The mill was demolished between November 2003 and February 2004. Mill debris was placed into an 11e.(2) disposal cell that is located north of Pond 2 as allowed by License Condition 32. Mill demolition included asbestos abatement. The asbestos material was placed in a special area of the disposal cell. Remaining structures included the machine shop, water treatment facility, and site offices.

Two tailings ponds remain onsite. Pond 1 contains about 30 million tons of mill tailings covering 260 acres, and Pond 2 contains 3 million tons of tailings covering 90 acres. Both mill tailings ponds were covered with final radon barriers in 1995 and 1996, respectively, excluding a portion of Pond 2 still being used for byproduct material disposal. Tailings Pond 2 does not have a rock cover and final radon barrier on the northern end of the pond because the licensee continues to dispose of 11e.(2) byproduct material into this portion of the pond.

At the time of the inspection, the licensee was actively reclaiming the Section 4 evaporation ponds in accordance with License Condition 42 requirements. These 11 ponds are located across the state highway from the main site and cover 265 acres. The licensee installed a special bridge across the state highway to support this reclamation activity. The reclaimed material from Section 4 was being transferred from Section 4 and was being disposed in the onsite disposal cell. Following completion of Section 4 remediation, the licensee will disassemble the bridge structure.

License Condition 42 also provides instructions for the reclamation of Pond 9. During the inspection, Pond 9 was in the process of being dried and will be reclaimed at a later date.

License Condition 13 allows the licensee to operate a mine water uranium recovery treatment facility at the site. Mine water treatment activities were discontinued simultaneously with the NRC’s approval of alternate concentration limits for groundwater (License Condition 34) during February 2006. In conjunction with the approval of alternate concentration limits, the licensee implemented its long-term monitoring program.

The permanent shutdown of the mine water treatment facilities allows the licensee to commence with decommissioning of Pond 3. Pond 3 remained open at the time of the inspection for disposal of residual soil material. In the near future, Pond 3 will be permanently closed.

The licensee plans to scrape the mill yard in the near future to remove all residual radioactive soils. The scraped material will be placed into the disposal cell. The licensee plans to complete site decommissioning, including demolition of all remaining site structures, within a year. The licensee also plans to install a diversion ditch for the postulated 100-year flood. Finally, radon flux testing will be conducted on Pond 3 and the disposal cell after installation of the final radon barrier but prior to installation of the final erosion barrier.

1 Management Organization and Controls (88005)

1.1 Inspection Scope

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

1.2 Observations and Findings

During the inspection, 22 Rio Algom Mining employees were assigned to the project. The ranking employee was the company president. The manager of radiation safety and regulatory compliance was the radiation safety officer who was responsible for implementation of the radiation protection program. Other employees included eight individuals in the reclamation group, four individuals in maintenance, one mill supervisor (who was about to retire), five individuals in the environmental/radiation group, and two administration personnel. The licensee used approximately 38 contractors to conduct the reclamation work. Other contractors included a safety consultant, a geotechnical consultant, and security staff. The inspectors concluded that the licensee's staffing and organization were appropriate for the work in progress.

License Conditions 14 and 16 requires that written procedures be established and reviewed by the radiation safety officer at least annually. The inspectors reviewed several procedures and determined that they were adequately established. The radiation safety officer had performed the annual procedure reviews during calender years 2004 and 2005.

1.3 Conclusions

The organizational structure and staffing levels were sufficient for the work in progress. Site procedures were established and were being maintained up-to-date.

2 Radiation Protection (83822)

2.1 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.

2.2 Observations and Findings

The licensee's personnel monitoring program included the use of dosimeters to monitor external exposures. The inspectors reviewed the licensee’s exposure records for 2004-2005. The highest exposure to an individual occurred during mill demolition. With a regulatory limit of 5,000 millirems, the highest employee deep dose equivalent exposure was 127 millirems.

Exposures to radon progeny were calculated using a time-weighted average format. Since the demolition project began, the radon progeny exposure to individuals measured less than 0.08 working levels, which was the licensee's administrative limit. The annual allowable occupational exposure limit is 4 working level months.

During mill demolition, internal exposures to uranium were determined by analyzing air samples for gross alpha particle activity and by calculating average air concentrations for a particular area. Internal doses were then calculated based on the individual's occupancy time. The inspectors reviewed the calculations and exposure data used to determine internal doses. The highest internal exposure to uranium measured less than 5-percent of the derived air concentration-hour limit. The inspectors determined that worker exposures were well below the annual limit of intake for natural uranium.

License Conditions 16 and 17 specify the bioassay sampling requirements. The inspectors reviewed the licensee's bioassay records. In 2005, one sample was found to be 455 micrograms per liter (µg/L), a result that was above the action levels specified in the license. An investigation was conducted, and the radiation safety officer concluded that the sample result was not a true intake. This conclusion was based on the radiation safety officer's interview with the individual, air sampling data, work activities being performed by the individual and others in the area, and confirmatory sampling that was conducted several weeks later. However, no plausible scenario was investigated as to what caused the bioassay sample result to be positive.

Unresolved Item 040-08905/0601-01 was identified related to this high uranium bioassay result which was determined not to be the result of an actual intake of uranium by the worker. Additional information was determined to be necessary including plausible scenarios for what may have caused the positive bioassay result, and what has been done or was proposed to prevent its recurrence. Upon receipt of this information, NRC will determine whether the issue in question is an acceptable item, a deviation, a nonconformance, or a violation.

License Condition 25 establishes the requirements for release of equipment and packages from the restricted area. During 2004-2005, the licensee released vehicles and construction equipment for unrestricted use. The inspectors reviewed the survey records of equipment and trucks being released. Nothing was identified with contamination that exceeded the NRC's release limits.

The inspectors conducted an extensive site tour with the company president, including areas where reclamation activities were in progress. The inspectors determined that licensed material was secure within the site property as required by 10 CFR 20.1801, and fences were posted with radioactive material signs as required by License Condition 28. Fences and gates were observed to be in good condition. In addition, the inspectors observed that the licensee maintained 24-hour security coverage at the site.

During the site tour, the NRC inspectors conducted radiation surveys using a microRoentgen survey meter (Serial number 015518, calibration due date of December 22, 2006). Ambient gamma exposure rate readings averaged 30-50 microRoentgens per hour in most areas of the site. The areas with slightly elevated exposure rates were most likely impacted by previous mining activities and not licensed materials.

2.3 Conclusions

The licensee implemented a radiation protection program that met the requirements of 10 CFR Part 20 and the license. Unresolved Item 040-08905/0601-01 was opened which related to the conclusion that a 2005 high bioassay result for a worker was not valid.

3 Operator Training/Retraining (88010)

3.1 Inspection Scope

The inspection objectives were to determine whether the licensee was complying with regulations and license requirements related to the training of employees.

3.2 Observations and Findings

The inspectors reviewed the licensee's training program to determine compliance with 10 CFR 19.12 which requires that workers be provided radiation safety training. Initial training for new employees and refresher training for all employees were provided in 2004 and 2005. The inspectors noted that training included written radiation safety tests. Since 2004, U.S. Department of Transportation hazardous material training has not been conducted because there have been no radioactive material shipments. The inspectors determined that the licensee's training met the requirements of the license and 10 CFR 19.12.

3.3 Conclusions

Radiation protection training was provided to site workers as required by regulations.

4 Maintenance and Surveillance Testing (88025)

4.1 Inspection Scope

The inspection objectives were to determine whether surveillance tests and calibrations were being conducted in accordance with license requirements and site procedures.

4.2 Observations and Findings

License Condition 20 requires, in part, that calibration of equipment be documented. The inspectors reviewed the licensee's instrument calibration records for 2004 and 2005. Equipment being calibrated included a variety of air samplers, alpha and gamma spectrometers, and radiological survey instruments. The licensee had documentation demonstrating that the equipment had been properly calibrated at the respective intervals. Equipment in use during the inspection appeared fully functional with up-to-date calibrations.

The inspectors reviewed the licensee's soil sampling program. The licensee was actively collecting soil samples from the windblown areas east of the state highway. The

licensee was analyzing these samples for radium-226 and thorium-230 concentrations. At the time of this inspection, the NRC had not formally approved the licensee's soil decommissioning plan which includes the soil sampling program. Therefore, the licensee was conducting this activity at risk, in part, because the NRC had not approved the proposed background values for naturally occurring radioactive material. This program area will be reviewed by the NRC at a later date as part of the confirmatory survey process.

4.3 Conclusions

Instruments were being calibrated as required by site procedures. Survey meters in service appeared operable with up-to-date calibrations.

The licensee was conducting soil sampling and analysis during the inspection. Because the NRC had not yet approved the soil decommissioning plan, this program area will be reviewed at a later date as part of the NRC's confirmatory survey process .

5 Environmental Protection (88045)

5.1 Inspection Scope

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

5.2 Observations and Findings

a. Environmental Monitoring

License Condition 10 requires the licensee to maintain an environmental monitoring program, while License Condition 19 requires the results of environmental monitoring to be reported to the NRC in semi-annual reports. The licensee's environmental monitoring program is described in its Health Physics and Environmental Procedures Manual. The program consisted of air particulate, radon, gamma radiation, soil, surface water, sediment, and vegetation sampling.

At the time of the inspection, the licensee maintained seven environmental monitoring sampling stations, including two additional stations located adjacent to the Section 4 ponds. The inspectors reviewed the licensee's semi-annual effluent reports for the second half of 2003 through 2005. The sample results were compared to the respective regulatory limits. In summary, none of the sample results exceeded regulatory limits.

Air particulates were sampled at seven stations using high volume air samplers. The filters were exchanged weekly and analyzed quarterly for natural uranium, thorium-230, radium-226, and lead-210 concentrations. The sample results were less than or equal to 3-percent of the respective effluent concentration limits, although most sample results were less than 1-percent of the respective limits.

Radon-222 was monitored at the seven stations. The track-etch canisters were exchanged quarterly. The highest sample results were collected at the North Fence locations during 2003. The licensee concluded that this sample station was negatively impacted by radon emanating from local underground uranium mines. When averaged over the year, the sample results were still less than the annual effluent concentration limit specified in 10 CFR Part 20, Appendix B. Following mine closure by the licensee, the inspectors noted that radon concentrations trended down at this location.

Gamma radiation was monitored at the seven stations. The dosimeters were exchanged quarterly. The Mill Diversion sample station indicated elevated ambient gamma radiation levels during 2004-2005. The radiation levels were 78 (2004) and 71 (2005) millirems above background. This sample station is located near Pond 9 within the restricted area and was located near current reclamation activities. The ambient gamma radiation at this location is expected to decrease in the near future after Pond 9 has been remediated and after reclamation activities have been completed in this area.

Soil samples were collected annually at the seven sample stations. The soil samples were analyzed for natural uranium, thorium-230, radium-226, and lead-210 concentrations. No acceptance criteria has been established for soil, and the samples were collected for trending purposes only. The trends indicate that the sample results for two stations, the Section 30 West Ventilation Hole No. 6 location and the North Fence location, dropped significantly from 2004 to 2005. This reduction was directly attributed to mine reclamation activities in the vicinities of these two sampling stations.

Six creek water samples were collected once per quarter and analyzed for total uranium (soluble and insoluble) and radium-226 concentrations. Action levels were based on the licensee's National Pollutant Discharge Elimination System permit limits. Since the last inspection, most samples could not be collected because the creek was dry in most locations. Of the samples collected, no sample result exceeded the respective discharge permit limit.

Four creek bed sediment samples were collected annually and analyzed for natural uranium, thorium-230, radium-226, and lead-210 concentrations. The samples were collected for trending purposes. The data for 2004 and 2005 indicate a downward trend in radionuclide concentrations, most likely a result of site reclamation activities.

Finally, the licensee conducted vegetation sampling three times a year at the seven sample stations. The samples were analyzed for natural uranium, thorium-230, radium-226, and lead-210 concentrations. No limits have been established for vegetation, and the sample results were used for trending. No significant adverse trends were identified during the review of the vegetation sample results.

In summary, the licensee had established and implemented an environmental monitoring program that was in compliance with license requirements. Recent sample results indicate licensee compliance with all regulatory limits. Selected sample results were elevated because of influences from previous mining activities. The inspectors also concluded that the 100-millirem dose limit to members of the pubic, as required in 10 CFR 20.1301(a), had not been exceeded.

b. Groundwater Compliance Monitoring Program

The groundwater sampling program requirements are specified in License Condition 34. During February 2006, the NRC approved the licensee's request for implementation of groundwater alternate concentration limits. During February 2006, the licensee implemented its new monitoring program. The licensee's annual report dated August 1, 2005, was reviewed during the inspection. The report provided an overview of the program as well as specific sample results. The next semi-annual groundwater report, due August 1, 2006, was not available during the inspection. The licensee's implementation of the revised groundwater monitoring program will be reviewed during a future inspection.

The licensee optionally submitted Section 4 monitoring well sampling data to the NRC in the semi-annual environmental and effluent monitoring reports. Prior to 2005, the licensee sampled 31 wells in Section 4 on a quarterly basis. During 2005, the licensee plugged 19 wells and installed new 2 wells with State authorization. Currently, the licensee sampled 14 wells for 22 different chemical constituents including uranium.

The Section 4 monitoring well sample results indicated that most wells were dry. During early 2005, only 2 of 31 wells provided sufficient quantity of fluid for sampling. During late 2005, only 2 of 14 wells were sampled. The sample results were generally consistent with the level of quality of mine water.

5.3 Conclusions

The licensee had not released licensed material into the environment in quantities exceeding regulatory limits for the periods reviewed, which included the years 2004-2005. The routine groundwater and environmental monitoring program reports were submitted to the NRC as required by the license.

6 Transportation of Radioactive Materials and Radioactive Waste Management (86740 and 88035)

6.1 Inspection Scope

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

6.2 Observations and Findings

The inspectors reviewed mill demolition and disposal records for November 2003-February 2004. The records indicate that the licensee had implemented increased radiation protection controls during the demolition work. None of the sample results (bioassay, air sampling, radon progeny, or surface contamination) exceeded the respective action levels.

License Condition 15 requires the licensee to use radiation work permits for all work where the potential for significant exposure to radioactive material exists. The inspector

reviewed the radiation work permits issued during mill demolition. The mill demolition projects were controlled by work orders which included radiation work permit requirements. The work orders included additional industrial safety controls when asbestos abatement work was being conducted. The inspector determined that the radiation work permits provided appropriate information about the work to be performed and the corresponding radiological restrictions for the work. The radiation work permit program was found to be adequate for the site's activities.

The inspectors observed the transport of reclaimed pond material from Section 4 to the onsite disposal cell. The licensee used system operating procedures to control this work. The work was being conducted in a safe, orderly manner. Radiological controls were in place to protect both workers, and sampling was in place to monitor the potential impacts to the environment.

6.3 Conclusions

The licensee was conducting transportation and waste disposal operations in accordance with license requirements.

7 Emergency Preparedness (88050)

7.1 Inspection Scope

The objective of this portion of the inspection was to ensure that the licensee's emergency preparedness program was being maintained in a state of readiness.

7.2 Observations and Findings

The licensee has procedures in place for responding to emergencies including fires. The employees are the first responders and have adequate response training. Annual drills were conducted with participation from the local hospital. There is capability for a Lifeflight helicopter to land on site in case of medical emergencies.

7.3 Conclusions

The licensee had adequate procedures, equipment, and training needed to respond to emergencies.

8 Exit Meeting Summary

The inspectors presented the inspection results to the licensee's representatives at the conclusion of the onsite inspection on July 27, 2006. A final exit briefing was presented telephonically to the licensee on August 28, 2006. 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.

ATTACHMENT

PARTIAL LIST OF PERSONS CONTACTED

Licensee

T. Fletcher, General Manager
P. Luthiger, Manager, Radiation Safety & Environmental Affairs

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

Unresolved Item 040-08905/0601-01 was opened which related to the conclusion that a 2005 high bioassay result for a worker was not valid

Closed

None

Discussed

None

INSPECTION PROCEDURES USED

IP 83822	Radiation Protection
IP 86740	Transportation of Radioactive Material
IP 88005	Management Organization and Control
IP 88010	Operator Training/Retraining
IP 88025	Maintenance and Surveillance Testing
IP 88035	Radioactive Waste Management
IP 88045	Environmental Monitoring
IP 88050	Emergency Preparedness

LIST OF ACRONYMS USED

ALARA	as low as is reasonably achievable
IP	Inspection Procedure
µg/L	micrograms per liter
NRC	Nuclear Regulatory Commission