



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION IV  
1600 E LAMAR BLVD  
ARLINGTON, TX 76011-4511

September 11, 2015

Mr. Anthony Baus, Site Manager  
Rio Algom Mining LLC  
P.O. Box 218  
Grants, NM 87020

SUBJECT: NRC INSPECTION REPORT 040-08905/15-002

Dear Mr. Baus:

This letter refers to the routine inspection conducted on August 18-20, 2015, at your former Ambrosia Lake facility in McKinley County, New Mexico. This inspection was an examination of activities conducted under your U.S. Nuclear Regulatory Commission (NRC) 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 inspection findings were discussed with you at the conclusion of the onsite inspection. The enclosed report presents the results of this inspection. No violations were identified, and no response to this letter is required.

During this inspection, the NRC's contractor, ORAU, conducted a confirmatory survey of the former Section 4 evaporation pond area. The confirmatory survey included measurement of ambient gamma radiation levels and collection of soil samples. The preliminary survey findings were presented to you at the conclusion of the onsite inspection. Although a brief summary of the survey is provided in the enclosed report, the final survey results will be presented to you at a later date under separate correspondence.

During the July 2013 inspection, documented in the NRC Inspection Report 040-08905/13-001 dated December 26, 2013 (ADAMS Accession Number ML13361A121), the NRC staff identified four violations and two Unresolved Items. During this inspection, the NRC reviewed and closed the four violations and one of two Unresolved Items. The Unresolved Item that remains open involves your inability to meet the lower limits of detection for certain environmental monitoring samples. As discussed in the enclosed inspection report, you continue to take actions to try to resolve this technical issue, but at the end of the inspection period, you still had not resolved this problem. We understand that you may submit a license amendment request to update the lower limits of detection, or you may request the NRC approval to delete the sampling requirements. This Unresolved Item remains open pending final resolution of the lower limit of detection problem identified in July 2013.

A. Baus

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In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice and Procedure," 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 Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy or proprietary 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 817-200-1234 or the undersigned at 817-200-1191.

Sincerely,

***/RA by RSBrowder Acting For/***

Ray L. Kellar, P.E., Chief  
Repository and Spent Fuel Safety Branch  
Division of Nuclear Materials Safety

Docket: 040-08905  
License: SUA-1473

Enclosure:  
Inspection Report 040-08905/15-002

cc: Santiago Rodriguez, Chief  
New Mexico Environment Department  
Radiation Control Bureau  
P.O. Box 5469  
Santa Fe, NM 87502-5469

Michelle Hunter, Chief  
New Mexico Environment Department  
Ground Water Quality Bureau  
Harold Runnels Building  
1190 Saint Francis Drive  
P.O. Box 5469  
Santa Fe, NM 87502

A. Baus

- 3 -

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U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket: 040-08905

License: SUA-1473

Report: 040-08905/15-002

Licensee: Rio Algom Mining LLC

Location: McKinley County, New Mexico

Date: August 18-20, 2015

Inspector: Robert Evans, Ph.D., P.E., C.H.P., Senior Health Physicist  
Repository and Spent Fuel Safety Branch  
Division of Nuclear Materials Safety

Approved by: Ray L. Kellar, P.E., Chief  
Repository and Spent Fuel Safety Branch  
Division of Nuclear Materials Safety

Attachment: Supplemental Inspection Information

Enclosure

## EXECUTIVE SUMMARY

Rio Algom Mining LLC  
NRC Inspection Report 040-08905/15-002

This inspection was a routine, announced U.S. Nuclear Regulatory Commission (NRC) inspection of decommissioning activities being conducted at the former Rio Algom Mining mill in McKinley County, New Mexico. In summary, the licensee was conducting reclamation activities in accordance with license and regulatory requirements.

### Management Organization and Controls

- The licensee had staffed all management-level positions and had sufficient staff for the work in progress. The licensee conducted routine site audits, inspections, and reports in accordance with license and regulatory requirements. (Section 1.2)
- The inspector reviewed and closed two previously-cited violations related to the licensee's failure to assign a qualified individual to the position of radiation safety officer and failure to conduct weekly site inspections. (Section 1.2)

### Radiation Protection/Operator Training

- The licensee and its contractor implemented their radiation protection programs in compliance with license and regulatory requirements. Occupational exposures were small fractions of the annual limits. Equipment calibrations and training were up to date, and no contamination problems were identified. (Section 2.2)

### Radioactive Waste Management

- The licensee managed radioactive wastes in accordance with license requirements. Since the previous inspection, the licensee conducted extensive reclamation work including re-remediation of the Section 4 area. The NRC's contractor conducted a confirmatory survey of this area during the inspection, and the results of this survey will be presented to the licensee at a later date. (Section 3.2)

### Effluent Control and Environmental Protection

- All environmental and groundwater monitoring samples were collected as required by the license, and no sample result exceeded the respective action levels except for three monitoring wells. The licensee was considering options including a license amendment request to revise the groundwater protection standards for these three wells. (Section 4.2)
- The licensee conducted the annual land use survey and submitted the results to the NRC as required by the license. (Section 4.2)
- One Unresolved Item related to the licensee's public dose assessment was reviewed and closed. A second Unresolved Item related to the licensee's lower limits of detection for environmental samples was reviewed and left open pending the licensee's final resolution of the vegetation lower limits of detection. Two previously cited violations related to failures to

submit semi-annual and quarterly reports to the NRC in a timely manner were reviewed and closed. (Section 4.2)

## Report Details

### Summary of Plant Status

The Ambrosia Lake mill processed approximately 33 million tons of uranium ore from 1958-1985. Reclamation of the tailings cells commenced in 1989, and the mill was demolished in 2003-2004. The licensee demolished additional site structures in November 2014, including the administrative office, maintenance shop, change house/guard shack, scale house, pump house, block house (used for records storage), decontamination pad, water tower, and other miscellaneous foundations and concrete pads. In March 2015, the licensee demolished the ion exchange and water treatment buildings. (Details of the March 2015 demolition activities are provided in NRC Inspection Report 040-08905/15-001 dated April 30, 2015; ML15120A222.)

At the time of this inspection, final site reclamation activities were in progress including placement of radon cover material on the northern area of Pond 2 and construction of diversion ditches and channels. The licensee was stockpiling erosion rock for placement on Pond 2 and other areas at a later date. The licensee reclaimed its former borrow pit and was using a second borrow pit. The borrow pit provided a source of shale-clay soil for use in site construction activities.

The licensee was also in the process of revegetating areas across the site that had been previously remediated. The licensee was roughly two-thirds complete with its revegetation efforts. In the near future, the licensee plans to conduct radon flux measurements on the recently covered areas of Pond 2. After the radon flux testing is complete, the licensee plans to install frost and erosion protection covers on the pond.

The remaining structures included two 500,000-gallon water tanks and temporary trailers to house site workers. The licensee plans to continue using the two water tanks for future reclamation work. The two tanks are scheduled for demolition in October 2015. In addition to demolition and onsite disposal of the two tanks, the licensee has identified an area with contaminated soil near the former ore stockpile area. The contaminated soil and tanks will be placed into disposal area No. 2, the last available place onsite for material to be disposed. The licensee plans to complete site reclamation work by November-December 2015.

## **1 Management Organization and Controls (88005)**

### **1.1 Inspection Scope**

The inspector reviewed the licensee's oversight and control of licensed activities. In particular, the inspector reviewed site staffing, annual audits, and site inspections. The inspector also reviewed and closed two previously cited violations.

### **1.2 Observations and Findings**

#### **a. Site Staffing**

At the time of the inspection, site staffing consisted of a combination of licensee staff and contractors. The manager of operations was the highest ranking onsite individual. Other licensee staff assigned to the project included the operations site superintendent, regulatory and groundwater superintendent, radiation safety officer (RSO), and reclamation project manager.

The licensee recently made two management-level changes. By letter dated August 26, 2014 (ML14247A234), the licensee notified the NRC about a change in site managers. The previous site manager assumed the position of reclamation project manager, and a different individual was assigned to the position of site manager of operations. In addition, the licensee created the position of regulatory and groundwater superintendent to supplement the staffing.

During the inspection, approximately 20 contractors were onsite. The contractors provided services including site reclamation, radiation protection program support, and groundwater consultation. In summary, the licensee had staffed all management-level positions and had sufficient staff for the work in progress.

b. Routine Site Audits, Inspections and Reports

Regulation 10 CFR 20.1101(c) requires licensees to periodically (at least annually) review the radiation protection program content and implementation. In addition, License Condition 29 specifies the health physics and environmental monitoring program requirements which includes a requirement for an annual report. The inspector reviewed the licensee's annual program reviews for 2012-2104 during the inspection.

The licensee conducted the annual program reviews for 2012 and 2013 in March 2014, and the licensee conducted the annual program review for 2014 in February 2015. (The 2012 review was delayed due to a turnover in radiation safety officers in 2013.) The inspector reviewed the three program reviews and discussed the results with the RSO. The inspector concluded that the reports provided adequate summaries of bioassays, air sampling, occupational exposures, contamination monitoring as well as applicable trends and corrective actions. The inspector concluded that the licensee had conducted and documented program reviews as stipulated by license and regulatory requirements.

License Condition 29 specifies that the licensee's staff shall conduct daily site inspections, weekly inspections, and monthly reports. According to Section 2.4.8 of the Health Physics and Environmental Protection Manual dated July 2014, the licensee shall conduct weekly site inspections and issue monthly reports. The weekly site inspections are visual inspections of active work areas to ensure that proper radiation protection practices are being used. The RSO is responsible for developing monthly reports that present summaries of the radiation protection program including trends and proposed corrective measures for unacceptable conditions. The licensee maintained records demonstrating that it conducted the weekly inspections and developed monthly reports. The inspector reviewed a random sampling of the weekly inspections and concluded that the licensee was conducted the inspections with an emphasis on radiological protection.

c. (Closed) Violation 040-08905/1301-01: Failure to assign qualified individual to the position of RSO

License Condition 11 specifies that the licensee shall designate an RSO who will be responsible for the establishment and maintenance of a facility radiation protection program including the personnel monitoring and environmental monitoring programs. The RSO is also required to possess minimum qualifications as specified in Section 2.4.1 of Regulatory Guide 8.31, "Information Relevant to Ensuring That Occupational



Radiation Exposures at Uranium Recovery Facilities Will Be As Low As Is Reasonably Achievable.”

The previous RSO left the company in early February 2013. The licensee did not assign a new individual to the position until April 25, 2013, in part, because the search for a replacement RSO took longer than the licensee had anticipated. In the interim, the duties of the RSO were reassigned to various staff including the radiation protection technicians. The licensee’s failure to designate an RSO between early February 2013 and April 25, 2013, was previously identified as a violation of License Condition 11.

The inspector confirmed that the current RSO had remained in the position since April 2013, and the individual had the qualifications for the position as specified in Regulatory Guide 8.31. Because the RSO was not onsite on a daily basis, the licensee formally assigned a second individual the responsibility to fulfill the duties of acting RSO when the primary RSO was offsite. This RSO designation memo was issued in July 2013, after the licensee had confirmed that the second individual had the training and qualifications to act as RSO. The primary RSO continues to provide oversight of site activities through review of all radiation protection program records in addition to routine site visits.

d. (Closed) Violation 040-08905/1301-02: Failure to conduct weekly site inspections

License Condition 29 specifies that the licensee’s staff shall conduct daily site inspections, weekly inspections, and monthly reports. (The licensee has since eliminated the daily inspection requirement through revision of the Health Physics and Environmental Protection Manual.) During the July 2013 inspection, the inspector noted that the weekly inspections were not conducted between early February 2013 and mid-June 2013. The weekly inspections were not completed, in part, because the RSO position was unfilled during much of this time frame. The failure to conduct weekly site inspections between early February 2013 and mid-June 2013 was a violation of License Condition 29.

During this inspection, the inspector noted that the licensee implemented the weekly inspection program and has consistently documented these inspections since June 2013. The licensee also developed and maintained monthly reports on file.

1.3 Conclusions

The licensee had staffed all management-level positions and had sufficient staff for the work in progress. The licensee conducted routine site audits, inspections, and reports in accordance with license and regulatory requirements. The inspector reviewed and closed two previously cited violations related to the licensee’s failure to assign a qualified individual to the position of RSO and failure to conduct weekly site inspections.

**2 Radiation Protection/Operator Training (83822/88010)**

2.1 Inspection Scope

The inspector reviewed the licensee’s implementation of its radiation protection and training programs to verify compliance with 10 CFR Part 20 and license requirements.

## 2.2 Observations and Findings

The inspector reviewed the licensee's occupational exposure records for 2013-2015. To monitor for worker exposures to radioactive material, the licensee conducted external exposure monitoring, internal exposure monitoring, and bioassay sampling. In summary, the licensee's records indicate that occupational exposures were small percentages of the annual limits.

To monitor for external exposures, the licensee issued dosimeters to occupational workers. The inspector reviewed the dosimeter records for 2013-2015. The highest external dose during this time frame was 0.015 rem with a regulatory limit of 5 rem.

To monitor for internal exposures, the licensee sampled certain areas for radon progeny and uranium dust concentrations on a quarterly frequency. The licensee sampled the ion exchange building, office, and other locations specified by the RSO on a quarterly basis. The licensee's records indicate that it sampled six locations quarterly during 2013-2014. All sample results were less than 1-percent of the applicable derived air concentration limit. As of the first quarter of 2015, no process-related structures remained at the site, and the licensee has suspended uranium dust sampling.

The radon progeny concentrations were measured monthly in the ion exchange building, mill pond, and other locations as assigned by the RSO. In 2013-2014, the licensee sampled 12 locations including five locations within the ion exchange building. All sample results were less than the action level (0.08 working levels). Similar to uranium dust sampling, the licensee suspended radon progeny sampling in the first quarter of 2015.

The licensee collected bioassay samples from site workers on a quarterly basis. The inspector reviewed the sample results for 2013-2015, and the licensee's records indicate that all sample results were non-detectable (less than 5 micrograms of uranium per liter of urine).

In accordance with License Condition 29, the licensee conducted semi-annual gamma radiation surveys to measure the exposure rates in various areas of the site. The licensee's records indicate that it surveyed 10 locations in 2013-2014. The licensee demolished most onsite structures in November 2014. In March 2015, the licensee demolished the two remaining process buildings, the ion exchange building and the water treatment building. In the past, the highest ambient gamma radiation measurements were recorded in the ion exchange building, an area that was rarely occupied. As of March 2015, no structure existed onsite that required semi-annual surveying; therefore, the licensee discontinued the semi-annual gamma radiation survey program at that time.

The licensee implemented a program for personnel contamination surveys. Site staff conducted and documented these surveys when leaving the restricted areas. The personnel surveys also included quarterly radiation protection technician surveys of staff leaving the restricted areas. The inspector reviewed the survey results for 2013-2015. No documented survey result exceeded the action level. In addition, the licensee conducted weekly surface contamination surveys. The areas surveyed included the office, lunchroom, change rooms, laboratory, and vehicles. All sample results were less

than the action levels. These various survey results indicate that the site did not have widespread contamination problems.

Similar to radon and uranium dust sampling, the licensee reduced the number of surface contamination surveys required to be collected during November 2014 and March 2015 coincident with the demolition of onsite structures. As of February 2015, the licensee continued to conduct surveys in four locations—two vehicles, guard trailer, and office trailer.

License Condition 14 states that written standard operating procedures shall be established, and the procedures shall be reviewed annually. The licensee's records indicate that site procedures had been established and were being updated annually. At the time of the onsite inspection, the licensee had not completed the procedure review for 2015, in part, because the licensee plans to inactivate some procedures as reclamation continues to reduce worker exposures to radioactive materials.

The licensee issued one radiation work permit in 2014, a permit to allow non-routine entries into the ion exchange building to perform radiological surveys. At the time of the onsite inspection, no radiation work permits had been issued for 2015.

The licensee maintained radiation detecting instrumentation for use during routine surveys and scans. The licensee established and maintained a program to ensure that instruments were being calibration checked as required by the license. The inspector also confirmed that the licensee continued to calibrate air samplers on a routine basis.

License Condition 29 provides the training requirements. The licensee conducted various types of training including visitor orientation, initial site training, on-the-job training, and annual refresher training. The inspector confirmed that the licensee had provided initial and refresher training to site workers, and the RSO's training was maintained up to date.

The licensee continued to maintain a respiratory protection program. The licensee plans to keep the program active until the remaining radioactive material is covered in disposal cell No. 2. The licensee maintained records of worker physicals and respirator fit tests on file for 2013-2014.

During the inspection, the licensee's contractor was conducting reclamation work using its own radiation protection program and related procedures. These procedures had been reviewed by the licensee's staff. The inspector reviewed the contractor's radiation protection program and discussed the program results with the on-site RSO. The contractor started work in early March 2013. The inspector reviewed the contractor's radiation protection program records for 2014. The contractor conducted occupational exposure monitoring, bioassay sampling, breathing zone air sampling, high-volume general area air sampling, vehicle and equipment surveys, personnel surveys, and area surveys to support the work in progress.

The contractor monitored 41 individuals, and the maximum dose for half of 2014 was 0.002 rem with a 5 rem regulatory limit. The contractor also issued radiation work permits for special work activities including ion exchange building demolition preparation work and routine onsite decommissioning activities. The licensee maintained documentation of worker training. The inspector reviewed the contractor's records and

confirmed that none of the various radiological sample results exceeded the respective action levels.

During limited site tours, the NRC inspector measured the exposure rates around the site using a Ludlum Model 19 survey meter (serial number 209782, calibration due date of 03/04/16). With a background of approximately 8-10 microRoentgens per hour, the onsite measurements ranged from 5-20 microRoentgens per hour. No area was identified that required posting as a radiation area.

### 2.3 Conclusions

The licensee and its contractor implemented their radiation protection programs in compliance with license and regulatory requirements. Occupational exposures were small fractions of the annual limits. Equipment calibrations and training were up to date, and no contamination problems were identified.

## 3 **Radioactive Waste Management (88035)**

### 3.1 Inspection Scope

The inspector interviewed licensee representatives, toured the site, and reviewed applicable records to determine if the licensee had established and maintained an effective program for managing radioactive wastes. In addition, the NRC's contractor, ORAU, conducted a confirmatory survey in the Section 4 area, to confirm whether the licensee's remediation efforts were successful and the area could be free-released for unrestricted use.

### 3.2 Observations and Findings

#### a. Status of Reclamation Activities

License Condition 32 states that the licensee is authorized to dispose of and bury contaminated waste materials resulting from past operations into designated disposal areas. The inspector reviewed the licensee's control of radioactive wastes.

Since the July 2013, inspection, the licensee demolished and disposed of all onsite structures. The remaining structures included two water tanks that will remain in service on an interim basis to support reclamation activities. The licensee completed reclamation of Pond 9, Pond 10, and the mill yard. The licensee submitted the results of its survey of these three areas by letter dated January 27, 2015 (ML15034A563). The NRC is considering its options for conducting a confirmatory survey of these areas in the near future.

Work in progress during the onsite inspection included placement of the radon barrier on Pond 2, construction of site diversion ditches and channels, and seeding of reclaimed areas. At some point in the near future, the licensee plans to dispose of these tanks in disposal area No. 2, located immediately north of Pond 2. The licensee will also excavate and dispose of some contaminated soils identified in an area north disposal area. The NRC staff plans to conduct a construction-related inspection at the site in the future.

b. Confirmatory Survey of Section 4

License Condition 42 allows the licensee to consolidate and transport Section 4 evaporation pond sediments, while License Condition 37 allows the licensee to dispose of the pond sediments in Tailings Cell 2. Section 4 is the area where the licensee previously constructed and operated 11 evaporation ponds. The Section 4 area consists of approximately 300 acres, including buffer zones and roads.

The NRC conducted a confirmatory survey of this area in September 2009. The results of the confirmatory survey were submitted to the licensee by report dated February 12, 2010 (ML100560099). The 2009 survey results indicated that additional remediation was necessary before the area could be free-released for unrestricted use. Several areas located within Section 4 contained contamination that exceeded the release limits for thorium-230.

In response to the NRC's confirmatory survey results, the licensee conducted additional surveys and reviews to identify the areas to be re-excavated. The licensee subsequently remediated and resurveyed the Section 4 area. The licensee's records indicate that approximately 77,462 cubic yards of material was removed from Section 4, and the area was resurveyed in 2014. The licensee collected roughly 2,500 soil samples and conducted scan surveys of approximately 900 grids. The radionuclides of concern in the Section 4 area includes total uranium, radium-226, and thorium-230. The licensee plans to submit the final report to the NRC at a later date, possibly in conjunction with a request to remove the Section 4 property from the license.

The NRC's contractor, ORAU, conducted the confirmatory survey of Section 4 from August 17-20, 2015. The survey consisted of ambient gamma radiation scan surveys, fixed point gamma radiation measurements, and collection of soil samples. The preliminary survey results indicated that ORAU surveyed 39 1,500-square meter areas including 33 systematic and 6 biased locations. The preliminary survey results will be presented to the NRC for review and comment, and the final survey results will be presented to the licensee at a later date.

The licensee has not transported any radioactive material over public highways since the last inspection; therefore, this program area was not reviewed. Also, License Condition 41 allows the licensee to dispose of waste material from other sites, but the licensee stated that it had not received wastes from other licensees since the last inspection.

3.3 Conclusions

The licensee managed radioactive wastes in accordance with license requirements. Since the previous inspection, the licensee conducted extensive reclamation work including re-remediation of the Section 4 area. The NRC's contractor conducted a confirmatory survey of this area during the inspection, and the results of this survey will be presented to the licensee at a later date.

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

### **4.1 Inspection Scope**

The inspector reviewed the licensee's effluent and environmental protection programs to ensure compliance with license and regulatory requirements.

### **4.2 Observations and Findings**

#### **a. Effluent and Environmental Monitoring**

The effluent and environmental protection program requirements are specified in License Conditions 10 and 29. Section 5.0 of the Health Physics and Environmental Program Manual provides detailed instructions for implementing the program. The program consists of air, water, soil, and vegetation sampling as well as ambient gamma radiation measurements. The sample results are presented to the NRC in semi-annual reports in accordance with License Condition 19. The inspector reviewed the sample results for 2013-2014 during the inspection and discussed the results with site staff.

The licensee collected air particulate samples at seven locations. The air samplers operated continuously, and the filters were exchanged weekly. The filters were composited and analyzed quarterly for natural uranium, thorium-230, radium-226, and lead-210 concentrations. All sample results were less than 5-percent of the respective effluent concentration limit, and most sample results were less than 1-percent of the limits. The inspector confirmed that the licensee or its contractor routinely calibrated the air samplers as stipulated by License Conditions 10 and 16.

Radon concentrations were sampled at the seven sample stations using track etch canisters. The canisters were exchanged quarterly. The sample results varied over time and ranged from 0.3 to 3.6 picocuries per liter per quarter.

Ambient gamma radiation was also monitored at the seven sample stations. The highest measurements were consistently obtained at Section 30W-VH6, a sample station near a former mine shaft ventilation hole. The records for 2013-2014 indicate that the ambient gamma radiation level at this station was approximately 45 millirem per year above background, a measurement that was consistent with recent yearly data.

Soil samples were collected annually at the sample stations. Sediment samples were collected at four creek locations once per year. (One creek location was recently regraded during reclamation and no longer exists as a sample point.) Further, vegetation samples are collected three times a year in the vicinity of the air sample stations. The various samples were submitted to an offsite laboratory for analysis of natural uranium, thorium-230, radium-226, and lead-210 concentrations. No specific action levels are established in the license for these samples. The inspector confirmed that the licensee collected the samples as available. The licensee used the data for trend analysis to ensure that radioactivity was not building up in the soil, sediment, and vegetation over time.

The licensee's environmental sampling program includes a requirement for sampling of surface water, in particular, water discharge from the ion exchange plant. Because the licensee did not operate the ion exchange plant during 2012-2015, no water samples

were collected. As noted earlier, the licensee demolished the ion exchange building in March 2015.

The licensee conducted public dose assessments and documented the results of this assessment in the annual ALARA report. The licensee concluded that the dose to the nearest resident was no more than 35 millirem for calendar year 2013 and no more than 25 millirem for 2014, assuming an occupancy factor of 75-percent. These estimated doses were below the 100-millirem per year limit specified in 10 CFR 20.1301(a).

b. Groundwater Monitoring

The groundwater compliance monitoring program requirements are provided in License Condition 34. The program includes routine sampling of 22 wells in four formations. The license requires semi-annual sampling, but the licensee voluntarily sampled the wells more frequently from 2006 until mid-2014. The license also requires the licensee to submit semi-annual groundwater monitoring reports to the NRC. The samples are analyzed for various chemical constituents including gross alpha, lead-210, radium-226 plus radium-228, thorium-230, and natural uranium.

The inspector reviewed the reports for 2013-2015 and discussed the results of the sampling program with licensee staff. The inspector concluded that the licensee has collected all required samples and reported the sample results in the semi-annual reports. The inspector noted that some wells could not be sampled due to insufficient volume or because the wells were dry. In recent months, samples from three wells (36-06, 31-02, and 32-45) have exceeded certain groundwater protection standards as specified in the license. These wells were being sampled monthly in accordance with License Condition 34.F.

Recent sample results for Well 36-06 indicate that the beryllium concentration exceeded the groundwater protection standard specified in the license. In addition, the cadmium concentration has varied above and below the groundwater protection standard. Samples collected from Well 31-02 exceeded the gross alpha activity groundwater protection standard. Finally, samples collected from Well 32-45 indicate that the molybdenum concentration exceeded the groundwater protection standard. License Condition 34.F states, in part, that if the exceedances continue for three consecutive months, the licensee shall submit to NRC a groundwater corrective action designed to regain compliance with groundwater protection standards. In response to the above exceedances, the licensee is considering options such as submitting a license amendment request to the NRC to revise the limits specified in the license for the above wells.

c. Annual Land Use Survey

License Condition 39 requires the licensee to conduct annual land use surveys. The license also requires the licensee to submit the results of the land use survey to the NRC once per year. The most recent land use surveys were submitted to the NRC by letters dated June 25, 2014 (ML14178B437), and June 25, 2015 (ML15182A238). In both surveys, the licensee concluded that no changes in land use have occurred since the previous surveys. Land use within 2 miles of the mill site was limited to grazing of livestock and maintenance of utilities. The nearest resident is located approximately three miles from the site. Possible doses to the nearest resident are considered in the

licensee's effluent and environmental monitoring programs. In summary, the licensee conducted and documented the annual land use survey in accordance with license requirements.

d. (Closed) Violation 040-08905/1301-03: Failure to submit semi-annual report to NRC

License Condition 19 specifies that the results of all effluent and environmental monitoring required by the license shall be reported semi-annually to the NRC in accordance with 10 CFR 40.65. This regulation states that each report shall be submitted within 60 days after January 1<sup>st</sup> and July 1<sup>st</sup> of each calendar year. During the July 2013 inspection, the licensee had not submitted the semi-annual effluent and environmental monitoring report for the second half of 2012 to the NRC. This report was due March 1, 2013. The licensee's failure to submit this license-required report to the NRC in a timely manner was identified as a violation of License Condition 19.

During this inspection, the inspector reviewed the licensee's response to the violation. The licensee notified the NRC by letter dated January 31, 2014 (ML14056A427) that the overdue reports (second half of 2012 and first half of 2013) would be submitted in conjunction with the next report (second half of 2013). The licensee subsequently submitted the report for the second half of 2012 to the NRC along with the calendar year 2013 results by letter dated February 24, 2014 (ML14078A408). The reports for 2014 were submitted to the NRC in a timely manner by letters dated August 27, 2014 (ML15243A256), and February 25, 2015 (ML15096A021).

e. (Closed) Unresolved Item 040-08905/1301-04: Calculation of public dose assessment

The licensee conducted public dose assessments and documented the results of this assessment in the annual ALARA report. The licensee concluded that the dose to the nearest resident was no more than 13 millirem for calendar year 2011 and no more than 11 millirem for 2012. However, the licensee's radiation protection staff could not explain these calculations because the reported values did not appear to be based on the environmental monitoring program sample results. The inspector concluded that this finding was an Unresolved Item because the licensee's staff could not clearly explain how it previously calculated the public dose assessments.

By NRC letter dated February 27, 2014 (ML14062A126), the NRC summarized the licensee's commitment to review its 2012 and 2013 calculations. The licensee would recalculate these public dose assessments using the environmental sample results. The licensee also stated that it would include updated assessments in the annual ALARA reports that were maintained onsite.

During this inspection, the licensee attributed the problem to spreadsheet calculation errors. The inspector noted that the licensee had calculated the public dose assessments for 2013-2014 using environmental monitoring data. As noted above, the licensee's assessments were found to be less than the annual regulatory limit.

f. (Discussed) Unresolved Item 040-08905/1301-05: Lower limits of detection for soil, sediment, and vegetation samples

By letter dated August 30, 1990, the licensee committed to implement lower limits of detection for environmental samples equal to those recommended in Section 5 of NRC



Regulator Guide 4.14, "Radiological Effluent and Environmental Monitoring at Uranium Mills." This letter was incorporated by reference into License Condition 10. During the July 2013 inspection, the inspector noted that the licensee's vegetation, sediment, and soil sample results for 2011-2012 did not always meet the lower limits of detection specified in Regulatory Guide 4.14. At that time, the licensee could not explain these discrepancies without first discussing the possible reasons for the discrepancies with the laboratory. In addition, the inspector was not sure if the licensee correctly calculated the lower limits of detection for uranium samples because the laboratory conducted chemical analyses and not radioactivity analyses. The inspector concluded that these findings were an Unresolved Item until the licensee determines whether it has complied with the lower limits of detection as specified in the license.

In the NRC letter dated February 27, 2014, the NRC summarized the licensee's plans for resolving this issue at that time. The licensee planned to locate a different laboratory that can meet the license-required lower limits of detection, and the licensee planned to propose new limits as part of a comprehensive license amendment request to modify the radiation safety program at the site. The licensee stated that it plan to submit this comprehensive amendment request to the NRC about September 2014. The licensee also stated that it planned to reach out to other sites, to determine how they maintain compliance with the license-required lower limits of detection. Finally, the licensee stated that it planned to resolve this issue by April 2014, when the next environmental samples were required to be collected and analyzed.

During this inspection, the licensee explained that it had changed laboratories, and the new laboratory could meet the lower limits of detection requirements for soil and sediment samples. This problem was resolved, for soil and sediment, during the first half of 2015.

With regards to vegetation sampling, the licensee's laboratory could not meet the lower limit of detection without a significant increase in sample volume or count time, which was not cost effective. The licensee's proposed long-term solution was to submit a license amendment request to the NRC to change the license-required lower limit of detection or delete the vegetation sampling requirements since reclamation was almost complete.

Although this issue is not safety significant, this Unresolved Item remains open until the licensee identifies a laboratory that can meet the lower limit of detection specified in the license for vegetation samples, or the licensee submits a license amendment to the NRC.

- g. (Closed) Violation 040-08905/1301-06: Failure to submit the quarterly groundwater report to NRC

License Condition 34.F requires quarterly reporting of exceedances. During the July 2013 inspection, the inspector identified that the licensee had failed to submit a quarterly groundwater report to the NRC in a timely manner, a violation of License Condition 34.F. [The NRC Inspection Report 040-08905/13-001 (ML13361A121) erroneously listed the fourth quarter of 2012 report as the untimely report. In reality, the licensee failed to submit the first quarter 2013 report to the NRC in a timely manner.] During this inspection, the inspector confirmed that the licensee submitted the first quarter 2013 report to the NRC by letter dated July 30, 2013 (ML13226A227; ML13226A228).

The NRC inspector confirmed that all quarterly reports were submitted to the NRC in a timely manner since July 2013. The licensee also developed a compliance calendar, a spreadsheet of dates and activities required to be completed, to ensure that future submittals are delivered in a timely manner.

#### 4.3 Conclusions

All environmental and groundwater monitoring samples were collected as required by the license, and no sample result exceeded the respective action levels except for three monitoring wells. The licensee was considering options including a license amendment request to revise the groundwater protection standards for these three wells. The licensee conducted the annual land use survey and submitted the results to the NRC as required by the license. One Unresolved Item related to the licensee's public dose assessment was reviewed and closed. A second Unresolved Item related to the licensee's lower limits of detection for environmental samples was reviewed and left open pending the licensee's final resolution of the vegetation lower limits of detection. Two previously cited violations related to failures to submit semi-annual and quarterly reports to the NRC in a timely manner were reviewed and closed.

#### **5 Exit Meeting**

The inspector reviewed the inspection findings during an exit meeting conducted at the conclusion of the onsite inspection on August 20, 2015. During the inspection, the licensee did not identify any information reviewed by the inspector as proprietary.

## **SUPPLEMENTAL INSPECTION INFORMATION**

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

#### Rio Algom Mining

T. Ballaine, Superintendent, Regulatory and Groundwater  
A. Baus, Operations Manager  
L. Collins, On-site Radiation Safety Officer  
D. Murray, Site Superintendent, Operations  
B. Ray, Reclamation Project Manager  
B. Squibb, Radiation Safety Officer

#### ORAU

D. Edds, Health Physics Technician  
A. Kirthlink, Senior Health Physics Technician  
T. Vitkus, Survey and Technical Operations Director

### **INSPECTION PROCEDURES USED**

IP 88005 Management Organization and Controls  
IP 83822 Radiation Protection  
IP 88010 Operator Training/Retraining  
IP 88035 Radioactive Waste Management  
IP 88045 Effluent Control and Environmental Protection

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

#### Opened

None

#### Closed

040-08905/1301-01	VIO	Failure to assign qualified individual to the position of RSO
040-08905/1301-02	VIO	Failure to conduct weekly site inspections
040-08905/1301-03	VIO	Failure to submit semi-annual report to NRC
040-08905/1301-04	URI	Calculation of public dose assessment
040-08905/1301-06	VIO	Failure to submit quarterly groundwater report to NRC

Discussed

040-08905/1301-05 URI Lower limits of detection for soil, sediment, and vegetation samples

**LIST OF ACRONYMS**

ADAMS	Agencywide Documents Access and Management System
ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
IP	Inspection Procedure
NRC	U.S. Nuclear Regulatory Commission
RSO	radiation safety officer
URI	Unresolved Item
VIO	Violation