



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

REGION IV  
1600 E. LAMAR BLVD.  
ARLINGTON, TX 76011-4511

September 11, 2015

Mr. Jesse R. Toepfer, Closure Manager  
Homestake Mining Company of California  
P.O. Box 98  
Grants, NM 87020

SUBJECT: NRC INSPECTION REPORT 040-08903/15-001

Dear Mr. Toepfer:

This letter refers to the routine U.S. Nuclear Regulatory Commission (NRC) inspection conducted on August 17-21, 2015, at your Homestake Grants Project facility in Cibola County, New Mexico. This inspection was an examination of activities conducted under your 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.

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 RSBrowder Acting For/***

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

Docket: 040-08903  
License: SUA-1471

Enclosure:  
Inspection Report 040-08903/15-001

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  
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1190 Saint Francis Drive  
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Santa Fe, NM 87502

Deborah Barr, Site Manager  
DOE Office of Legacy Management  
2597 Legacy Way  
Grand Junction, CO 81503

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U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket: 040-08903

License: SUA-1471

Report: 040-08903/15-001

Licensee: Homestake Mining Company of California

Location: Homestake Grants Project  
Cibola County, New Mexico

Date: August 17-21, 2015

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

Jack D. Parrott, Senior Project Manager  
Reactor Decommissioning Branch  
Division of Decommissioning, Uranium Recovery, and  
Waste Programs  
Office of Nuclear Material Safety and Safeguards

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

Homestake Mining Company of California  
NRC Inspection Report 040-08903/15-001

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

### Management Organization and Controls

- The organizational structure and staffing levels were sufficient for the work in progress. The licensee had filled all management-level positions with qualified staff. Site procedures were established and were being maintained up-to-date. The licensee conducted an annual audit of the radiation protection program, and the audit was determined to be a thorough review of site radiation protection activities. (Section 1.2)
- The licensee revised its procedure for evaluation of site changes as required by License Condition 16. The revision expanded the scope of the review to better encompass all relevant safety and environmental evaluations previously completed for the current licensing basis. The licensee revised the previous Safety and Environmental Review Panel evaluations using the new procedure. All together, the licensee conducted seven proposed changes through its performance-based license. The inspectors confirmed that the proposed changes were adequately documented and did not require prior NRC approval. (Section 1.2)

### Radiation Protection/Operator Training

- The licensee implemented a radiation protection program that met the requirements of 10 *Code of Federal Regulations* (CFR) Part 20 and the license conditions. Occupational exposures were small fractions of the regulatory limit. Bioassay sampling and contamination survey results indicate that the licensee was controlling contamination at the site. The licensee was controlling instrument calibrations in accordance with license conditions. The licensee provided radiation protection training to employees and contractors as required by regulations and the license. (Section 2.2)

### Radioactive Waste Management

- The licensee was conducting waste management operations in accordance with license requirements. (Section 3.2)

### Effluent Control and Environmental Protection

- The licensee had established groundwater and environmental monitoring programs as required by the license. Doses to members of the public were below the regulatory limit. The environmental and groundwater monitoring reports were submitted to the NRC as required by the license. (Section 4.2)

- During the last inspection, the inspectors observed that the licensee's NRC requirements, under regulation or license, were not always traceable to which licensee policy and/or procedure implemented or addressed them. During this inspection, the inspectors verified that the licensee now has specific references to relevant regulations and license conditions for each of its policies and procedures. (Section 4.2)

## Report Details

### Summary of Plant Status

The Homestake mill was a conventional uranium mill that operated from 1958-1990. The mill was decommissioned in 1993-1994, and the wind-blown tailings cleanup was completed in 1995. Tailings generated from milling operations were placed on two piles, a large tailings pile and a small tailings pile.

The side slopes of the main tailings pile have been covered with a permanent radon barrier and erosion protection layer. An interim cover is being maintained on top of the large tailings pile. Two lined evaporation ponds are situated on top of the small tailings pile. The remainder of the small tailings pile is covered with an interim cover. In addition, two water collection ponds were constructed adjacent to the small tailings pile. A third evaporation pond was constructed in 2011 to the north of the main tailings pile.

Activities conducted at the site since the previous inspection included expansion capacity of the reverse osmosis system, drilling of additional wells on top of the large tailings pile into the alluvial aquifer, construction of an expanded zeolite system on top of the large tailings pile, and operation of the groundwater restoration system. In recent months, the licensee terminated flushing activities within the large tailings pile, but continued with dewatering activities. The licensee also continued to dispose of water through enhanced evaporation in the three evaporation ponds on a seasonal basis.

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

### 1.1 Inspection Scope

The inspectors reviewed the licensee's oversight and control of licensed activities. In particular, the inspectors reviewed the licensee's implementation of site staffing, audits and reviews, and the performance-based license.

### 1.2 Observations and Findings

#### a. Site Staffing

The inspectors reviewed site staffing to ensure that the licensee had sufficient staff for conducting decommissioning work. At the time of the inspection, site staffing consisted of seven individuals including the closure manager/radiation protection administrator, site supervisor, senior project engineer, three utility operators, and a community relations specialist.

Contractors were used to supplement the site staff. The contractors drilled wells, constructed and modified systems and structures, installed piping, conducted electrical work, and conducted routine site maintenance. Consultants were used as necessary to implement portions of the radiation protection, training, environmental monitoring, and annual audit programs. The licensee estimated that it had about 20 contractors on site on any given day. In summary, the licensee had sufficient staff for implementing the requirements of the license.

b. Audits and Reviews

Regulation 10 CFR 20.1101(c) requires licensees to conduct annual radiation protection program reviews. License Condition 32 provides details about the audit requirements, and License Condition 42 requires the licensee to submit a copy of the audit to the NRC in the annual report. Further, License Condition 35.E requires the licensee to complete an annual performance review by March 31<sup>st</sup> of each year. The licensee submitted the most recent annual performance review to the NRC by letter dated March 31, 2015, which included the annual audit for 2014 (ML15104A259).

A third-party contractor conducted the annual As Low As Reasonably Achievable (ALARA) audit on behalf of the licensee in December 2014. The auditor did not identify any findings but provided seven recommendations. The inspectors concluded that the annual ALARA audit was a comprehensive, independent review of the licensee's radiation protection program.

One of seven findings identified in the 2014 annual ALARA audit involved the licensee's control and labeling of its radioactive source cabinet. The inspectors observed the status of the storage cabinet and the radioactive material stored in the cabinet. The inspectors confirmed that the cabinet was locked and labeled, and the radioactive material within the cabinet had been inventoried.

License Condition 23 requires, in part, that standard operating procedures be established for all operational activities involving radioactive materials. In addition, written procedures must be established for environmental monitoring, bioassay analysis, and instrument calibrations. The inspectors reviewed the licensee's procedure list and selected procedures.

The licensee updated several key procedures in August 2014 based on site work activities. The licensee rescinded procedures for air sampling, respiratory protection, and airborne radon progeny measurements because it no longer conducted work with dry tailings material. The licensee combined procedures for performing radiological contamination surveys and calculating radiation doses to personnel. Further, the zeolite system operating procedures were in draft during the inspection. These draft procedures will be reviewed during a future inspection. In summary, the inspectors determined that site procedures had been adequately established and implemented.

c. Implementation of the Performance-Based License

License Condition 16 allows the licensee to use a risk-informed, performance-based approach to determine if proposed changes to licensed site activities, or any new activities, could result in an environmental impact greater than that evaluated in the current licensing basis for the site. The inspectors reviewed seven Safety and Environmental Review Panel (SERP) evaluations developed in 2014-2015. Six of seven changes involve the licensee's groundwater restoration program and the seventh involved a change in radiation protection administrators.

The inspectors reviewed the implementation of License Condition 16 which allows the licensee to use a risk-informed, performance-based approach for determining if proposed changes to any licensed site activities, or any new activities, could result in an environmental impact greater than that evaluated in the current licensing basis for the



site. During the last annual inspection related to the implementation of this license condition, the licensee recently established a procedure entitled, "Procedures for Evaluating Changes, Tests, and Experiments at the Grants Project," to provide its staff with instructions for evaluating these changes. This procedure describes the SERP process commonly used by uranium recovery licensees to review changes to their facilities.

One of the NRC observations from the last inspection was that the implementation of that license condition was not fully implemented by the procedure. The inspectors found that the procedure had been updated and the title changed to "Procedure for Conducting a Safety and Environmental Review Panel (SERP)." The new SERP procedure expanded the scope of the review to better encompass all relevant safety and environmental evaluations previously completed for the current licensing basis.

Using the new procedure, the licensee revised three evaluations completed under the old version of the procedure. The licensee also completed approximately four SERP reviews of new activities using the revised procedure. These were reviewed and each review appeared to adequately implement the SERP procedure and the conclusions reached were appropriate.

The inspectors concluded that the licensee adequately documented the seven SERP evaluations and none of the proposed changes required prior NRC approval. Additional details about some of these changes are provided in Section 4 of this Inspection Report.

### 1.3 Conclusions

The organizational structure and staffing levels were sufficient for the work in progress. The licensee had filled all management-level positions with qualified staff. Site procedures were established and were being maintained up-to-date. The licensee conducted an annual audit of the radiation protection program, and the audit was determined to be a thorough review of site radiation protection activities.

The licensee revised its procedure for evaluation of site changes as required by License Condition 16. The revision expanded scope of the review to better encompass all relevant safety and environmental evaluations previously completed for the current licensing basis. The licensee revised the previous SERP evaluations using the new procedure. All together, the licensee conducted seven proposed changes through its performance-based license. The inspectors confirmed that the proposed changes were adequately documented and did not require prior NRC approval.

## **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 licensee's Manual of Standard Practices provides instructions for implementing the various aspects of the radiation protection program. At the time of the inspection, the

radiation protection program consisted of occupational dose assessments, bioassay sampling, and contamination surveys, radiation work permits (RWPs), instrument calibrations, and worker training. Based on the limited work in progress, the licensee previously suspended the respiratory protection and breathing zone air sampling programs.

External occupational exposures were monitored using optically-stimulated dosimeters that were exchanged quarterly. The inspectors reviewed the licensee's records for 2014-2015. During 2014, the licensee monitored 137 employees and contractors. The highest recorded exposure was 0.023 rem with a regulatory limit of 5.0 rem. Although well below the regulatory limit, the licensee considered this dose as an outlier because the second highest recorded exposure was 0.002 rem. The cause of this elevated dose was not clearly identified. During the first half of 2015, the highest external exposure was recorded as 0.002 rem.

The licensee chose not to conduct internal dose exposure assessments in 2014-2015. As noted below, work was conducted on the large tailings pile, but this work did not involve contact with dry tailings material; thus, respiratory protection and air sampling was not necessary.

The licensee implemented an extensive bioassay program which included collection of urine samples for analysis of uranium content. During 2014, the licensee collected and an offsite laboratory analyzed about 500 bioassay samples including blanks and spiked samples. At the time of the onsite inspection, the licensee had collected and analyzed about 380 total samples since January 2015. All sample results were less than the lowest action level.

In summary, the licensee's occupational exposure monitoring program results indicate that occupational exposures were small fractions of the regulatory limits. The highest total effective dose equivalent, 0.023 rem, was well below the regulatory limit of 5.0 rem. The licensee chose to suspend internal dose monitoring as allowed by 10 CFR 20.1502 requirements. The licensee's bioassay results confirmed that site workers' intake of uranium was effectively controlled by the licensee.

The contamination control requirements are provided in License Conditions 14 and 32. The licensee conducted contamination surveys of clean areas, personnel, and equipment releases. The inspectors reviewed the licensee's survey results for 2014- 2015. The licensee surveyed offices, lunch rooms, and contractor trailers on an annual basis but began surveying these areas quarterly in 2015. No removable contamination was identified during the surveys in excess of the action levels.

The licensee also conducted equipment release and personnel contamination surveys, including drillers who worked on the large tailings pile. These surveys were conducted under guidance provided in RWPs. Based on a review of selected records, the inspectors concluded that no individual or item was released with contamination above the release limits. In summary, the licensee implemented its contamination control program in accordance with license requirements. The results of the licensee's survey program indicated that the site does not have widespread contamination problems.

License Condition 24 specifies the requirements for RWPs. The inspectors reviewed the licensee's RWPs for 2014-2015. The licensee issued nine RWPs during this time frame.

The RWPs included safety instructions, survey requirements, and work precautions. The work that required RWPs included drilling wells on top of the large tailings pile, transfer of sediments from one pond to another, repair of a pond liner, repair of erosion on the large tailings pile, probe insertions into the tailings material, and zeolite system work on top of the large tailings pile. In summary, the RWPs provided sufficient guidance for protection of personnel from potential exposures to radioactive material.

License Conditions 22, 23, and 32 provide instructions for conducting and recording instrument calibrations. The inspectors reviewed the licensee's calibration records and determined that survey instruments and high volume air samplers were being routinely calibrated. The available instrumentation included meters to measure ambient gamma radiation, surface contamination, and removable contamination levels. The inspectors observed survey meters in service during the inspection, and the survey meters appeared operable with up-to-date calibrations.

Site worker training requirements are provided in regulation 10 CFR 19.12 as well as License Conditions 22, 23, and 32. In addition, the licensee's Manual of Standard Practices states that proper training will be provided to all personnel who will be exposed to occupational radiation. The licensee developed a spreadsheet to track worker training. The licensee's records indicate that it provided orientation and initial training to new employees/contractors. The licensee conducted annual refresher training to site workers in December 2014. Further, the radiation protection administrator received 40-hour, biennial training at an offsite location in March 2015.

### 2.3 Conclusions

The licensee implemented a radiation protection program that met the requirements of 10 CFR Part 20 and the license conditions. Occupational exposures were small fractions of the regulatory limit. Bioassay sampling and contamination survey results indicate that the licensee was controlling contamination at the site. The licensee was controlling instrument calibrations in accordance with license conditions. The licensee provided radiation protection training to employees and contractors as required by regulations and the license.

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

### 3.1 Inspection Scope

The inspectors 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.

### 3.2 Observations and Findings

License Condition 12 specifies that the licensee shall conduct periodic embankment inspections and document these inspections in the annual report. The most recent embankment inspection was conducted in October 2014 and documented in Appendix D to the annual report dated March 31, 2015 (ML15104A259). The embankment inspector concluded that the tailings impoundments and three evaporation ponds were in generally good condition and were being maintained within the operating limits of the NRC license and respective facility designs.

The embankment inspector recommended repair of slumping subgrade fill on the south in-slope of evaporation pond EP-1 to protect the pond liner from future displacement. This observation was also identified in the previous annual inspection report. The licensee continued to monitor the embankment of Pond EP-1 on a daily basis and planned to repair the slumping subgrade fill at a later date. The inspectors toured this area during the inspection and confirmed that the liner remained intact at the location of the slumping.

License Condition 26 specifies, in part, that the licensee shall keep records of offsite transfers of all mill tailings. The licensee stated that, since the previous inspection, there were no outgoing shipments of tailings material and no incoming shipments of waste material for disposal. Further, the licensee does not expect to ship any mill tailings or receive material for disposal in the future.

License Condition 36.E states, in part, that the licensee is to verify compliance with the radon flux standard of 20 picocuries per square meter-second by performing an annual radon flux survey on the two tailings piles. The licensee is required to sample radon at 100 points. The licensee collected 64 sample points from the large tailings pile and 36 sample points from the small tailings pile. The licensee conducted the annual radon flux measurements in October 2014 and reported the results to the NRC in Appendix F to the annual report dated March 31, 2015 (ML15104A259).

The results for 2014 indicate that the average sample result for the two tailings piles was above the licensed limit at 20.95 picocuries per square meter-second. In response, the licensee increased the thickness of the interim cover on the large tailings pile in the areas exhibiting elevated radon flux measurements. After this additional cover material was added, new measurements were collected at seven sample points. This updated data was substituted for the previously collected data at the same points. Following rework and resampling, the average radon flux measurement decreased to 19.70 picocuries per square-meter-second. Although the licensee exceeded the radon flux release rate from the tailings cells, as noted below, the licensee's public dose assessment confirmed that exposures to the nearest residents were less than regulatory limits.

During site tours, the NRC inspectors conducted radiological surveys using a Ludlum Model 2401-S microRoentgen survey meter (NRC No. 079971, calibration due date of 03/13/15). With a background of 10 microRoentgen per hour ( $\mu\text{R/hr}$ ), the ambient gamma radiation levels on top of the large tailings pile was at or near background levels, 15-20  $\mu\text{R/hr}$ . The ambient gamma exposure rate in the reverse osmosis building was noted to be at or below background, at 5-10  $\mu\text{R/hr}$ . The area around the tripolyphosphate alluvial pilot test area was measured at background, 10  $\mu\text{R/hr}$ . The highest measurement, 400  $\mu\text{R/hr}$ , was identified at the edge of evaporation pond No. 1. This pond is located within the radiologically restricted area and is not accessible to members of the public. In summary, no area was identified that required posting as a radiation area.

### 3.3 Conclusions

The licensee was conducting waste management operations in accordance with license requirements.

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

### **4.1 Inspection Scope**

The inspectors 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**

License Conditions 10, 15, and 23 specify the environmental monitoring program requirements. Details about the program are provided in the licensee's Manual of Standard Practices. The program consisted of air particulate, radon gas, and direct radiation sampling. The licensee received NRC approval to discontinue soil and vegetation sampling in 1996. The inspectors compared the program in operation at the time of the inspection to the requirements specified in the license. In summary, the inspectors confirmed that the licensee was implementing the environmental monitoring program as required by the license.

License Condition 15 requires the licensee to report the results of the environmental monitoring program to the NRC. The licensee provided the results for 2014 to the NRC by letters dated August 20, 2014 (ML14245A373) and February 25, 2015 (ML15068A205). The inspectors reviewed the results of the licensee's environmental monitoring program for 2014 during the inspection.

The licensee conducted air particulate sampling at seven locations including two nearest residences and one background location. The licensee also measured ambient gamma radiation levels at eight locations, and the licensee measured radon gas concentrations at nine locations. The licensee conducted calculations of potential dose to a member of the public using this sampling information.

The licensee's records indicate that the air particulates remained at or below 7.4-percent of the applicable limit during 2014 with most results less than 1-percent of the limits. Radon ranged from 0.33-1.6 picocuries per liter. Direct radiation levels ranged from 54-75 millirems per year at the various sample points. Based on these results, the licensee conducted a public dose assessment. For calendar year 2014, the calculated dose to the two nearest residences were determined to be 68 millirem and 54 millirem for the year, with most dose originating from exposure to radon. The licensee's calculated doses for 2014 remained below the annual public dose limit of 100 millirems per year as specified in regulation 10 CFR 20.1301(a).

License Condition 42 specifies that a land use survey be conducted and presented in the annual report to the NRC. The most recent land use survey was included as Appendix E to the annual report dated March 31, 2015 (ML15104A259). The land use survey included a review of occupied residences and verification of sources of water. The report noted that two lots were planted with alfalfa and irrigated in 2014 using non-contaminated sources of water. Further, areas to the south and west within the site boundary were seasonally used for livestock grazing. In summary, the inspectors confirmed that the licensee conducted the land use survey and reported the results to the NRC as required by the license.

b. Groundwater Monitoring

License Condition 35 specifies that the licensee shall implement a groundwater compliance monitoring program to assess the performance of the groundwater restoration program. This program included groundwater monitoring for comparison to groundwater protection standards. The inspectors reviewed the status of the groundwater compliance monitoring program during the inspection. In summary, the inspectors concluded that the licensee was implementing the requirements specified in the license regarding the operation of the groundwater compliance monitoring program.

License Condition 15 requires the licensee to include the sample results for the point of compliance wells (D1, X, and S4) and background well (P) in the semi-annual effluent and environmental monitoring report. License Condition 35.E requires the licensee to submit a performance review of the corrective action program to the NRC by March 31<sup>st</sup> of each year. The licensee submitted the semi-annual reports for 2014 to the NRC by letters dated August 20, 2014 (ML14245A373), and February 25, 2015 (ML15068A205). The annual performance review for 2014 was submitted to the NRC by letter dated March 31, 2015 (ML1510A242). The annual performance review included the sample results for all wells.

The NRC staff reviewed these routine reports. The NRC staff concluded that the groundwater restoration program continues to make progress and no negative trends exist based on the licensee's groundwater monitoring results.

With regards to event reporting, the inspectors evaluated the licensee's implementation of License Condition 41. This license condition requires the licensee to report any spills, leaks, or excursions of source, 11e.(2) byproduct material, and process chemicals that may have an impact on the environment, or any other incidents/events, to State or Federal Agencies including the NRC. During the last inspection, the inspectors found that the procedures did not address the requirement of reporting to the NRC, only a requirement to report to the State of New Mexico under its State discharge permits DP-200 and DP-725. The licensee's manual of Standard Operation Procedures and Policy Guidance Documents requires the radiation safety officer to ensure compliance with regulatory and license requirements under the section entitled "Authority to Implement." The inspector verified that the licensee addressed this deficiency by updating the procedure to ensure compliance by including a reference to License Condition 41.

The inspectors also evaluated the implementation of License Condition 43, which requires in part, that before engaging in any developmental activity not previously assessed by the NRC, the licensee shall administer a cultural resource inventory. During the last inspection, the licensee could not identify a specific procedural requirement to do the types of cultural resource surveys required by License Condition 43, before engaging in any unassessed developmental activity. The inspectors verified that the licensee's procedure entitled "General Work and Maintenance Procedure," Rev. 1, now includes this requirement. However, since the last inspection no developmental activities requiring a cultural resource survey have been performed.

c. Groundwater Corrective Action Program

License Condition 35.C specifies that the licensee shall implement the groundwater corrective action program with the objective of returning the concentrations of

molybdenum, selenium, thorium-230, uranium, and vanadium to the site standards listed in the license. The inspectors reviewed the licensee's recent changes to the groundwater corrective action program. In addition, the inspectors observed the status of the operating equipment during site tours. In summary, the licensee continues to implement and expand the corrective action program in accordance with license requirements.

One change made by the licensee was the replacement of the old sand filter units in the reverse osmosis system with new microfiltration units. This change was approved through SERP evaluation 14-01. This SERP evaluation also approved the installation of additional treatment system equipment and a new treatment building. The inspectors noted that the new microfiltration units were in service. The licensee's addition of the new microfiltration units essentially doubled the system flow rate, from roughly 300 gallons per minute to 600 gallons per minute.

The licensee was also expanding the capacity of the reverse osmosis system. The licensee approved this change through SERP evaluation 14-03. This change will increase system capacity from 600 to 1,200 gallons per minute. The inspectors noted that the licensee was implementing this change during the inspection.

As noted in the previous inspection, the licensee conducted a pilot test of a zeolite treatment system. This system was designed to increase the uranium cleanup capacity, by supplementing the reverse osmosis treatment system. The pilot test was conducted on top of the large tailings pile using a 300-gallon per minute system. The licensee approved an expansion of the zeolite treatment system, from 300 gallons to 1,500 gallons per minute, through SERP evaluation 14-02. During the inspection, the inspectors observed the licensee's construction of the expanded zeolite treatment system on top of the large tailings pile.

The third change involved an expanded pilot test for using tripolyphosphate as an alternative groundwater treatment system. This system would supplement the corrective action program. At the time of the onsite inspection, the licensee was conducting the second phase of pilot testing to demonstrate the efficiency of treatment on a larger scale. In this pilot test, tripolyphosphate was injected into the alluvial aquifer, inside the site hydraulic barrier, reacting with dissolved uranium to form uranium phosphate mineral precipitates. This chemical reaction should create a barrier to uranium movement through the groundwater. The test results will not be available for at least a year, as the licensee continues to monitor the effectiveness of system operation.

The licensee also conducted a groundwater pilot study using electric coagulation, but these test results were not promising, and the licensee has suspended this study.

In addition to groundwater treatment, the licensee recently made changes to the restoration wellfields. Through SERP evaluation 14-05, the licensee approved the installation of alluvial wells on top of the large tailings pile. Roughly 50 wells were installed through the disposal cell. The wells will be approximately 200-feet deep. The goal of these wells is to restore the groundwater beneath the cell. This installation work was started in December 2014 and was completed in early 2015. The inspectors observed the completed wells during site tours.

The licensee also discussed the status of its large tailings pile injection program with the inspectors. The licensee discontinued injecting clean fluid into the large tailings pile in early-July 2015. The original goal of the injection program was to dewater the cell for stability reasons. A secondary goal was to reduce uranium concentrations in the tailings. The licensee continues to extract water from the large tailings pile, but the licensee does not plan to resume injecting water into the cell.

The licensee approved the construction and operation of additional onsite wells and offsite restoration wellfields. The licensee approved these changes through SERP evaluation 15-01. The licensee reviewed and approved changes to the injection and extraction network where groundwater treatment was necessary. The goal of these wells was to shrink or eliminate plumes of contaminated groundwater. The inspectors observed the licensee installing pipeline for the various groundwater networks during the inspection.

Finally, the inspectors toured the areas where the licensee was expanding the groundwater treatment systems. The reverse osmosis building was being expanded to support additional cleanup equipment. Further, the licensee was constructing an expanded zeolite treatment system on top of the large tailings pile. The inspectors will review the licensee's operation of these expanded systems during a future inspection.

#### 4.3 Conclusions

The licensee had established groundwater and environmental monitoring programs as required by the license. Doses to members of the public were below the regulatory limit. The environmental and groundwater monitoring reports were submitted to the NRC as required by the license. During the last inspection, the inspectors observed that the licensee's NRC requirements, under regulation or license, were not always traceable to which licensee policy and/or procedure implemented or addressed them. During this inspection, the inspectors verified that the licensee now has specific references to relevant regulations and license conditions for each of its policies and procedures.

#### 5 **Exit Meeting**

The inspectors reviewed the inspection findings during an exit meeting conducted at the conclusion of the onsite inspection on August 21, 2015. During the inspection, the licensee did not identify any information reviewed by the inspectors as proprietary.



## **SUPPLEMENTAL INSPECTION INFORMATION**

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

#### **Rio Algom Mining**

S. Cohen, Technical Expert, ARCADIS  
C. Farr, Operations Manager, ERG  
G. Hoffman, Hydrologist, Hydro-Engineering  
M. Schierman, Senior Health Physicist, ERG  
J. Toepfer, Closure Manager  
A. Venable, Site Supervisor

### **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**

None

#### **Discussed**

None

### **LIST OF ACRONYMS**

ADAMS	Agencywide Documents Access and Management System
ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
IP	Inspection Procedure
µR/hr	microRoentgen per hour
NRC	U.S. Nuclear Regulatory Commission
RWP	radiation work permit
SERP	Safety and Environmental Review Panel