



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

July 6, 2017

Thomas Wohlford
Closure Manager
Homestake Mining Company of California
P.O. Box 98
Grants, NM 87020

SUBJECT: NRC INSPECTION REPORT 040-08903/2017-001 AND NOTICE OF VIOLATION

Dear Mr. Wohlford:

This letter refers to the U.S. Nuclear Regulatory Commission (NRC) inspection conducted from April 24-26, 2017, at your Grants reclamation project in Cibola County, New Mexico. This inspection was an examination of activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of selected examination of procedures, representative records, observations of activities, and interviews with personnel.

The preliminary inspection findings were presented to you and your staff at the conclusion of the onsite inspection. The final inspection results were presented to you by telephone on June 12, 2017, after the NRC had completed its compliance review of the inspection findings. The enclosed report presents the results of the inspection.

Based on the results of this inspection, the NRC has determined that three Severity Level IV violations of NRC requirements occurred. The violations involve your failure to: (1) establish standard procedures for all activities involving radioactive materials that are handled, processed, or stored; (2) prepare and record an environmental evaluation of all activities not previously assessed by the NRC; and (3) conduct a cultural resources survey. These violations were evaluated in accordance with the NRC Enforcement Policy included on the NRC's Web site at http://www.nrc.gov/about_nrc/regulatory/enforcement/enforce_pol.html. The three violations are cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding them are described in detail in the subject inspection report. The violations are being cited in the Notice because they were identified by the NRC.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

The NRC inspectors found another example of a previously identified violation. The violation involved your failure to implement the 1989 groundwater corrective action program, as revised, a violation of License Condition 35.C requirements. Details about this violation are provided in

Section 1.2 of the enclosed inspection report. This violation is the same as the first apparent violation discussed in the NRC's letter to Homestake Mining dated October 4, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16251A526). This new example does not change the safety significance or the regulatory concern arising out of the initial violation. In addition, the corrective actions for this apparent violation are described in the NRC's Confirmatory Order dated March 28, 2017 (ML17060A752). Therefore, no new enforcement action is issued in this report for this violation.

In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's 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 Dr. Robert Evans at 817-200-1234 or the undersigned at 817-200-1191.

Sincerely,

/RA/

Ray L. Kellar, PE, Chief
Fuel Cycle and Decommissioning Branch
Division of Nuclear Materials Safety

Docket: 040-08903
License: SUA-1471

Enclosures:

1. Notice of Violation
2. NRC Inspection Report 040-08903/2017-001

cc w/encl:

Michelle Hunter, New Mexico Environment Department
Santiago Rodriguez, New Mexico Environment Department
Bernadette Tsosie, U.S. Department of Energy

NOTICE OF VIOLATION

Homestake Mining Co. of California
Grants, New Mexico

Docket No. 040-08903
License No. SUA-1471

During a U.S. Nuclear Regulatory Commission (NRC) inspection conducted from April 24-26, 2017, three violations of NRC requirements were identified. In accordance with the NRC's Enforcement Policy, the violations are listed below:

- A. License Condition 23 states, in part, that standard procedures shall be established for all activities involving radioactive materials that are handled, processed, or stored.

Contrary to the above, as of April 24, 2017, the licensee failed to establish standard procedures for all activities involving radioactive materials that are handled, processed, or stored. Specifically, the licensee failed to establish standard procedures for disposal of wastes in the onsite small tailings pile, operation of the 1,200 gallon per minute zeolite system, and operation of the evaporation ponds.

This is a Severity Level IV violation (NRC Enforcement Policy Section 6.3).

- B. License Condition 16 states that before engaging in any activity not previously assessed by the NRC, the licensee shall prepare and record an environmental evaluation of such activity. When the evaluation indicates that such activity may result in a significant adverse environmental impact that was not previously assessed or that is greater than that previously assessed, the licensee shall provide a written evaluation of such activities and obtain prior approval of the NRC in the form of a license amendment.

Contrary to the above, as of April 24, 2017, the licensee failed to prepare and record an environmental evaluation of an activity that may have resulted in a significant adverse environmental impact that was not previously assessed or that is greater than that previously assessed. Specifically, the licensee reviewed and approved a change, via Safety and Environmental Review Panel 15-01, which expanded the onsite and offsite groundwater corrective action program and approved a new methodology for injection of groundwater. However, the licensee failed to prepare and record an environmental evaluation of this activity or obtain prior approval of the NRC in the form of a license amendment.

This is a Severity Level IV violation (NRC Enforcement Policy Section 6.3).

- C. License Condition 43 states that before engaging in any developmental activity not previously assessed by the NRC, the licensee shall administer a cultural resource inventory. All disturbances associated with the proposed development will be completed in compliance with the National Historic Preservation Act (as amended) and its implementing regulations (36 CFR 800), and the Archaeological Resources Protection Act (as amended) and its implementing regulations (43 CFR Part 7).

Contrary to the above, as of April 24, 2017, the licensee failed to administer a cultural resource inventory before engaging in a developmental activity which was not previously assessed by the NRC. Specifically, the licensee reviewed and approved a change, via Safety and Environmental Review Panel 15-01, which expanded the onsite and offsite groundwater corrective action program and approved a new methodology for injection of

groundwater. However, the licensee failed to administer a cultural resource inventory before engaging in this developmental activity, an activity which was not previously assessed by the NRC.

This is a Severity Level IV violation (NRC Enforcement Policy Section 6.3).

Pursuant to the provisions of 10 CFR 2.201, Homestake Mining Company of California is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Regional Administrator, Region IV, 1600 East Lamar Blvd., Arlington, TX 76011-4511, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken; and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued requiring information as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Your response will be made available electronically for public inspection in the NRC Public Document Room or in the NRC's Agencywide Documents Access and Management 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. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information).

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days of receipt.

Dated this 6th day of July 2017

**U.S. NUCLEAR REGULATORY COMMISSION
Region IV**

Docket: 040-08903

License: SUA-1471

Report: 040-08903/2017-001

Licensee: Homestake Mining Co. of California

Facility: Grants Reclamation Project

Location: Cibola County, New Mexico

Dates: April 24-26, 2017

Inspectors: Robert J. Evans, PhD, PE, CHP, Senior Health Physicist
Fuel Cycle and Decommissioning Branch
Division of Nuclear Materials Safety

Linda M. Gersey, Health Physicist
Fuel Cycle and Decommissioning Branch
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Matthew R. Meyer, Hydrogeologist
Materials Decommissioning Branch
Division of Decommissioning, Uranium Recovery and Waste Programs
Office of Nuclear Material Safety and Safeguards

Approved by: Ray L. Kellar, PE, Chief
Fuel Cycle and Decommissioning Branch
Division of Nuclear Materials Safety

Attachment: Supplemental Inspection Information

EXECUTIVE SUMMARY

Homestake Mining Co.
NRC Inspection Report 040-08903/2017-001

This inspection was a routine, announced U.S. Nuclear Regulatory Commission (NRC) inspection of decommissioning activities being conducted at the former Homestake Mining mill in Cibola County, New Mexico.

Management Organization and Controls

- The licensee had staffed all management-level positions and provided sufficient staff for the work in progress. The licensee conducted routine audits and site inspections in accordance with license and regulatory requirements. A violation was identified related to the licensee's failure to establish standard procedures for all operational activities. (Sections 1.2.a-c)
- A second violation was identified related to the licensee's failure to conduct environmental reviews before engaging in any activity not previously assessed by the NRC. A third violation was identified related to the licensee's failure to conduct a cultural resource inventory before engaging in any developmental activity not previously assessed by the NRC. A fourth violation was identified involving the licensee's failure to implement the 1989 groundwater corrective action program, as amended in 1998, by placing a new methodology for injecting groundwater into service and placing the 1,200 gallon per minute zeolite system into service without prior NRC approval. (Section 1.2.d)

Radiation Protection/Training

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

Radioactive Waste Processing, Handling, Storage and Transportation

- The licensee established and maintained an effective program for managing radioactive wastes; although, several activities were being conducted without written standard procedures. The licensee continued to maintain site security with perimeter postings, gates, and fences. The NRC inspectors conducted independent radiological surveys, and the results were consistent with previous surveys. No area required posting as a radiation area. (Section 3.2)

Effluent Control and Environmental Protection

- The licensee was implementing the groundwater corrective action program treatment systems; although, various problems were temporarily preventing the licensee from operating the systems at full capacity. The licensee submitted the results of an expanded groundwater corrective action pilot test using tripolyphosphate to the NRC, and the NRC's program office is expected to formally respond to the licensee's technical report under separate correspondence. (Section 4.2)

Report Details

Site Status

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

The side slopes of the large 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 large tailings pile.

At the time of the inspection, the licensee continued to implement the groundwater corrective action program. The licensee operated injection and recovery wells as well as the reverse osmosis and zeolite cleanup systems. The licensee continued to dispose of wastewater through evaporation in three evaporation ponds.

1 Management Organization and Control (88005)

1.1 Inspection Scope

The inspectors reviewed the licensee's oversight and control of licensed activities.

1.2 Observations and Findings

a. Site Staffing

The inspectors reviewed site staffing to ensure that the licensee had sufficient staff to implement licensed requirements. At the time of the inspection, site staffing consisted of six individuals in seven positions including the interim closure manager/hydrogeologist, site supervisor, three environmental technicians, and community relations specialist. The position of closure manager was being filled on an interim basis by the hydrogeologist.

Two changes were made in management staffing since the previous inspection, conducted in August 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17088A761). By letter dated February 24, 2017 (ML17060A358), the licensee notified the NRC of a change in closure managers. The assignment was temporary, pending the licensee's selection of a permanent closure manager. In addition, by letter dated April 14, 2017 (ML17116A316), the licensee notified the NRC about a change in radiation protection administrators (radiation safety officers (RSO)). The inspectors reviewed the licensee's Safety and Environmental Review Process (SERP) 17-01, dated April 14, 2017, which the licensee used to evaluate the qualifications of the new RSO. The inspectors determined that the new RSO met the education, training, and experience as required by License Condition (LC) 21.

Between March 28 and April 14, 2017, no individual was formally assigned to the position of RSO. During this time frame, a contractor for the licensee, with many years

of experience at the facility, performed all RSO duties until a permanent replacement was identified. The inspectors determined that the radiation safety technician was performing the day-to-day radiation safety duties, and the contractor was reviewing the work. The contractor also generated the monthly As Low As Reasonably Achievable (ALARA) reports. The inspectors concluded that the licensee had sufficient RSO coverage during this time, and no RSO duties had been neglected.

The licensee used contractors and consultants to supplement the site staff. Contractors were used to implement portions of the groundwater corrective action program including collection of samples and installation of wells. Consultants were used as necessary to implement the radiation protection, training, environmental monitoring, and annual audit programs. Contractors were also used for construction work, electrical repairs, and routine site labor. The licensee estimated that it had about 20 contractors on site on any given day. In summary, the licensee had sufficient management oversight and site staffing to implement the requirements of the license.

b. Routine Site Audits, Inspections and Reports

Title 10, *Code of Federal Regulations* (CFR) 20.1101(c) requires the licensee to conduct annual radiation protection program reviews. License Condition 32 provides the audit requirements, and LC 42 requires the licensee to submit a copy of the audit to the NRC in the annual report. The licensee submitted the annual monitoring report and performance review for 2016 to the NRC by letter dated March 31, 2017 (ML17159A575). The annual ALARA audit was included as Appendix C to the 2016 report. A third-party contractor conducted the annual audit on behalf of the licensee in January 2017. The auditor did not identify any negative findings or trends. The auditor identified significant improvement in the clarity of recordkeeping. The inspectors concluded that the annual ALARA audit was a comprehensive, independent review of the licensee's radiation protection program.

License Condition 22 states, in part, that inspections shall be documented. The licensee conducted daily inspections of the evaporation ponds, collection ponds, spray systems, leak detection sumps, embankment conditions, and impoundment toe sumps. The licensee maintained records of these daily inspections. The inspectors reviewed recent records and confirmed that the licensee had established a program for conducting and documenting routine inspections.

License Condition 12 states that periodic embankment inspections of the large and small tailings embankment shall be conducted by knowledgeable individuals who are familiar with the site and the embankment design. An annual embankment status report shall be included in the Annual Report. The licensee conducted annual inspections of the tailings pile and pond embankments. The results of these inspections were provided in Appendix D to the annual report dated March 31, 2017.

The most recent annual inspection was conducted in October 2016. The inspector, a registered professional engineer, concluded that the tailings impoundment and evaporation ponds were in generally good condition and were being maintained within operating limits. The inspector recommended rill (i.e. shallow gulley) management and grade control to help control erosion of the small tailing pile, evaporation ponds, and the interim cover of the large tailings pile. As documented in the annual inspection report, some erosion repair work had been conducted on evaporation pond 1 (EP-1) in January 2017.

During site tours, the NRC inspectors observed evaporation pond 1 (EP-1), including the southeastern corner area where slumping had been previously identified by the licensee. By letter dated May 5, 2017 (ML17124A527), the licensee notified the NRC that it intended to conduct a technical review of the condition of the liner in EP-1 to assess for potential leakage and to verify pond integrity. In addition, the licensee informed the NRC that it planned to conduct a technical review of the interstitial pumping installation and operation of evaporation ponds 2 and 3 (EP-2 and EP-3). Although there is no evidence of leakage from any pond, the licensee informed the NRC that it would conduct evaluations of EP-2 and EP-3 to verify pond and liner integrity and the ability to detect any leakage from the ponds.

c. Site Procedures

License Condition 23 requires, in part, that standard 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. Most procedures were being controlled by the licensee as part of its Manual of Standard Practices. The records indicate that the licensee had sufficient procedures for environmental monitoring, bioassay analysis, and instrument calibrations.

However, the inspectors identified several examples where site activities were being conducted without written procedures. In particular, the licensee was disposing of wastes at the small tailings pile, operating the 1,200 gallon per minute (gpm) zeolite cleanup system, and operating the evaporation ponds without written procedures. The licensee's failure to establish standard procedures for all operational activities involving radioactive materials was identified as a violation of LC 23 (VIO 040-08903/1701-01). In addition, the site staff were using written procedures to operate the reverse osmosis treatment equipment, but these procedures were not controlled by licensee management. In response to this inspection finding, the licensee indicated that it would review all site activities and would ensure that all activities were controlled by site procedures or radiation work permits, as necessary.

d. Review of the Licensee's Change Process

License Condition 16 states that, before engaging in any activity not previously assessed by the NRC, the licensee shall prepare and record an environmental evaluation of such activity. When the evaluation indicates that such activity may result in a significant adverse environmental impact that was not previously assessed or that is greater than that previously assessed, the licensee shall provide a written evaluation of such activities and obtain prior approval of the NRC in the form of a license amendment. In addition, LC 43 states that, before engaging in any developmental activity not previously assessed by the NRC, the licensee shall administer a cultural resource inventory.

The licensee's program for evaluating changes was described in standard operating procedure SOP-10, "Procedure for Conducting a Safety and Environmental Review Panel," Revision 3, from the licensee's Manual of Standard Practices. The inspectors noted that procedure SOP-10 references LCs 16 and 43 but does not provide detailed instructions for conducting these license-required reviews.

The inspectors reviewed SERP 15-01 evaluation in detail during the inspection. The SERP 15-001 involved an expansion of the groundwater restoration program. The

inspectors concluded that the licensee failed to conduct a detailed environmental evaluation and cultural resources survey as required by LCs 16 and 43, respectively, prior to approving SERP 15-01 for implementation. The licensee's failure to conduct an environmental evaluation and cultural resource inventory were violations of LCs 16 and 43, respectively (VIOs 040-08903/1701-02 and 040-08903/1701-03). As a result, SERP 15-01 was reviewed, approved, and implemented without sufficient documentation of the required environmental and cultural reviews. The inspectors concluded that the licensee should have submitted this change to the NRC for prior approval, because it expanded the onsite and offsite groundwater corrective action program and approved a new methodology for injection of groundwater.

The inspectors noted that a potential cause for these two non-compliances could be traced to the licensee's implementing procedure. Procedure SOP-10 did not provide detailed instructions explaining how to conduct these two reviews. The inspectors noted that instructions for implementing LC 43 could be found in Procedure SOP-5, "General Work and Maintenance Procedure," Revision 3, but not in Procedure SOP-10.

The inspectors also concluded that the review, approval, and implementation of SERP 15-01 was contrary to the requirements of LC 35.C. This license condition states, in part, that the licensee shall implement the corrective action program as described in the licensee's submittal dated September 15, 1989 (ML12222A088), as modified by letter dated January 15, 1998 (ML12291A910). Contrary to this license requirement, the licensee implemented onsite and offsite expansions of the groundwater corrective action program via SERP 15-01 which included a new methodology for injecting groundwater. The new methodology consisted of injection of fresh water directly into impacted portions of the alluvial aquifer. The NRC-approved groundwater corrective action program authorizes the use of treated water or fresh water for injection to control the groundwater plume by creating a hydraulic barrier. The groundwater corrective action program allows the use of collection and fresh water injection systems to intercept constituents located between the injection and collection systems. Injection of fresh water directly into the contaminated portion of the aquifer was considered dilution and was not considered to be an NRC-approved corrective action option. Further, the inspectors noted that the licensee constructed and implemented the 1,200 gpm zeolite treatment systems without prior NRC approval (see ML15281A034 and ML16350A283). The licensee's implementation of an expanded groundwater corrective action program was identified as another violation of LC 35.C requirements as presented in the NRC's letter to the licensee dated October 4, 2016 (ML16251A526), except that the time frame is different. The NRC staff will review the implementation of the licensee's corrective actions as part of its review of the Confirmatory Order.

1.3 Conclusions

The licensee had staffed all management-level positions and provided sufficient staff for the work in progress. The licensee conducted routine audits and site inspections in accordance with license and regulatory requirements. A violation was identified related to the licensee's failure to establish standard procedures for all operational activities.

A second violation was identified related to the licensee's failure to conduct environmental reviews before engaging in any activity not previously assessed by the NRC. A third violation was identified related to the licensee's failure to conduct a cultural resource inventory before engaging in any developmental activity not previously assessed by the NRC. A fourth violation was identified involving the licensee's failure to implement the 1989 groundwater corrective action program, as amended in 1998,

by placing a new methodology for injecting groundwater into service and placing the 1,200 gallon per minute zeolite system into service without prior NRC approval.

2 Radiation Protection/Training (83822/88010)

2.1 Inspection Scope

The inspectors reviewed the licensee's 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, bioassays, contamination surveys, radiation work permits, 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, and the licensee discontinued internal dose assessments.

External occupational exposures were monitored using optically-stimulated dosimeters that were exchanged quarterly. The inspectors reviewed the licensee's records for calendar year 2016. In 2016, the licensee monitored 103 employees and contractors. The highest recorded exposure was 1.0 millirem with a regulatory limit of 5,000 millirem.

The licensee implemented an extensive bioassay program which included semi-annual collection of urine samples for analysis of uranium content. In 2016, the licensee collected and an offsite laboratory analyzed about 250 bioassay samples including blanks and spiked samples. All sample results were less than the lowest action level of 15 micrograms of uranium per liter of urine. Overall, the licensee's bioassay results confirmed that site workers' intake of uranium was being effectively controlled by the licensee.

The contamination control program requirements are provided in LCs 14 and 32. The licensee conducted contamination surveys of clean areas, one equipment release, and under certain conditions, when personnel exited the site. The inspectors reviewed the licensee's survey results for August 2016 through April 2017. No removable contamination was identified during the surveys in excess of the action levels. In addition, the licensee maintained records of leak tests that were conducted on certain sealed sources. These tests were conducted in January 2017, and the results indicate that no sealed source was leaking. The results of the licensee's survey program indicated that the site did not have widespread contamination problems.

License Condition 24 specifies the requirements for radiation work permits. No radiation work permits were issued since the last inspection, conducted in August 2016. License Conditions 22, 23, and 32 provide instructions for conducting and recording instrument calibrations. The inspectors selectively reviewed the licensee's calibration records and determined that survey instruments 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.

Training requirements for site workers are provided in 10 CFR 19.12 as well as LCs 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, although the contents of the training lacked specifics. The licensee agreed to update the training requirement details. 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 2016. Safety meetings were conducted weekly that included various safety topics and procedure changes.

2.3 Conclusions

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

3 Radioactive Waste Processing, Handling, Storage, and Transportation (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

The inspectors toured the site and observed the large tailings pile, small tailings pile, evaporation ponds, collection ponds, zeolite systems, and reverse osmosis building. No significant erosion problems were identified on the tailings cells or evaporation ponds. The inspectors observed the slumping previously identified by the licensee in the southeastern corner of EP-1, as discussed in Section 1.2.b of this inspection report. Site fences, gates, and perimeter postings were being maintained by the licensee.

As noted in Section 1.2 of this inspection report, the licensee did not have written procedures for all modes of operation of the evaporation ponds. These missing procedures included instructions for operating the enhanced evaporation sprays and transferring water from pond to pond. The licensee had log sheets for recording of critical parameters, but these log sheets were not formally controlled by the licensee in its Manual of Standard Practices.

In accordance with 10 CFR Part 40, Appendix A, Criterion 2, the licensee is allowed to dispose of waste material in the tailings piles. The inspectors toured the area where the licensee was disposing potentially contaminated waste material in the small tailings pile. To conduct these burials, the licensee was systematically excavating a series of trenches on the small tailings pile interim cover. As discussed in the violation cited in Section 1.2 of this inspection report (VIO 040-08903/1701-01), the licensee was conducting these disposal activities without written procedures. The inspectors noted that the licensee had not clearly established procedures for: (1) describing how wide and deep each trench should be; (2) controlling the excavation process to minimize the potential for exhuming previously buried wastes including tailings material; (3) controlling the material that can and cannot be disposed in the trenches; (4) minimizing voids in the

trenches; (5) replacing and compacting the cover soil; (6) controlling the spread of contamination during the entire process; and (7) documenting the burial process. In response, the licensee planned to develop a procedure that met the intent of LC 23 requirements.

The inspectors considered the impacts of the licensee's burial activities on the interim and final covers of the small tailings cell. Regulation 10 CFR Part 40, Appendix A, Criterion 6(5) states that near surface cover materials (i.e., within the top three meters) may not include waste or rock that contains elevated levels of radium. Further, soils used for near surface cover must be essentially the same, as far as radioactivity is concerned, as that of surrounding surface soils. This is to ensure that surface radon exhalation is not significantly above background because of the cover material itself. In summary, the inspectors concluded that the interim cover, where the waste material was buried, may not be used as part of the final cover, unless the licensee can demonstrate to the NRC's satisfaction that the buried material meets the radioactivity limitations provided in Criterion 6(5) and the approved cover design specifications. The licensee may have difficulty demonstrating the radioactivity of the buried material since it did not maintain records of these disposals. The NRC will review the licensee's proposed final cover to ensure that all regulatory requirements are maintained.

During site tours, the NRC inspectors conducted radiological surveys using a Ludlum Model 19 microRoentgen survey meter (NRC No. 015518, calibrated to radium-226, calibration due date of July 13, 2017). With a background of approximately 10 microRoentgen per hour ($\mu\text{R/hr}$), the ambient gamma radiation levels on top of the large tailings pile in the vicinity of the zeolite ponds were observed to be at or near background levels. The ambient gamma exposure rates in the reverse osmosis building were noted to be at or below background levels. The burial area on the small tailings pile measured approximately 30 $\mu\text{R/hr}$. The highest measurement, 500 $\mu\text{R/hr}$, was identified at the edge of EP-1. This pond is located within the radiologically restricted area and is not accessible to members of the public. These survey results were consistent with results identified during previous inspections. No area required posting as a radiation area (5,000 $\mu\text{R/hr}$).

3.3 Conclusions

The licensee established and maintained an effective program for managing radioactive wastes; although, several activities were being conducted without written standard procedures. The licensee continued to maintain site security with perimeter postings, gates, and fences. The NRC inspectors conducted independent radiological surveys, and the results were consistent with previous surveys. No area required posting as a radiation area.

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

The inspectors reviewed the licensee's control and operation of various site systems used to support the groundwater corrective action program. To begin with, the licensee

operated a number of extraction wells to collect groundwater from onsite and offsite locations. At the time of the inspection, the offsite groundwater was routed to the zeolite system for filtration, while the onsite groundwater was routed to the reverse osmosis system. The filtered water was mixed with fresh water from a production well, and the combined flow was returned to the various offsite and onsite wells for injection into the subsurface aquifers.

The original design capacity of the reverse osmosis equipment was 800 gpm, as described in the licensee's letter to the NRC dated January 15, 1998 (ML12291A910). In the last few years, the licensee expanded the reverse osmosis treatment systems in an effort to increase the flow capacity of the systems. The reverse osmosis treatment systems currently consist of two microfiltration systems, three reverse osmosis treatment units, and two high pressure treatment systems. The total design capacity of the reverse osmosis treatment system was 1,200 gpm. At the time of the inspection, the incoming flow rate of the reverse osmosis treatment system was 574 gpm. The licensee needed to complete the replacement of a key component, a pump motor, to increase the flow rate of the reverse osmosis treatment equipment.

In addition to the reverse osmosis treatment equipment, the licensee placed the zeolite system into service in 2015-2016 to supplement the site's groundwater cleanup capacity. The zeolite system currently consists of two subsystems, a 300-gpm system and a 1,200-gpm system. At the time of the inspection, total flow was 225 gpm with a total capacity of 1,500 gpm.

The inspectors observed several problems with the zeolite systems. For example, the licensee was experiencing significant algae problems that impacted system operability and availability. In addition, the inspectors noted that the 1,200 gpm system trains had a potential design error such that two trains had to be taken out of service when the licensee wanted to back-flush one train. A third problem was a lack of approved procedures. As noted in Section 1.2 of this inspection report, the licensee did not have operating procedures for the 1,200 gpm zeolite system. The plant operators developed procedures for the 300 gpm zeolite and reverse osmosis systems, but these procedures were not being controlled as part of the Manual of Standard Practices. The operators also developed an uncontrolled training procedure to help train operators. Although the inspectors concluded that certain systems were not functioning as well as designed and site procedures were not always fully developed and implemented, the inspectors noted that site operators were compensating for these design, maintenance, and procedural problems.

In addition to the expanded reverse osmosis and zeolite treatment systems, the licensee recently conducted pilot tests using tripolyphosphate (TPP) to determine the efficacy of the phosphate material to immobilize uranium in the alluvial aquifer. The licensee submitted the original work plan to the NRC by letter dated December 3, 2012, (ML12345A103 and ML12345A104). The NRC accepted the licensee's work plan by letter dated March 21, 2013 (ML13071A422), although the NRC reminded the licensee that full scale implementation of the TPP treatment technology, or any other alternative groundwater treatment methodology, must be approved via license amendment.

By letter dated July 7, 2014 (ML14196A221), the licensee provided a status update of the TPP pilot test work. The licensee also notified the NRC that it intended to pursue additional, follow up pilot testing to determine whether TPP is appropriate to include in the licensee's suite of water remediation technologies. The NRC did not respond to this letter, in part, because the licensee did not specifically request NRC review and approval

of the second phase of testing. The licensee subsequently implemented the expanded pilot test without NRC review and approval.

The licensee submitted a summary report dated October 3, 2016 (ML16351A351), for the expanded TPP pilot test. The report authors concluded that the approach to treat uranium in-situ in groundwater was feasible and a viable option; although, the licensee's hydrogeologist was not as confident of the test results. At the time of the onsite inspection, the NRC had not formally determined if the expanded pilot test will have any long-term impacts to groundwater remediation; therefore, any impact to the environment due to the licensee's expanded TPP pilot test is currently under technical review. Any response to the expanded test report dated October 3, 2016, and the licensee's notification letter dated May 17, 2017 (ML17145A307), to discontinue use of TPP, is expected to be issued out of the NRC's program office.

4.3 Conclusions

The licensee was implementing the groundwater corrective action program treatment systems; although, various problems were temporarily preventing the licensee from operating the systems at full capacity. The licensee submitted the results of an expanded groundwater corrective action pilot test using TPP to the NRC, and the NRC's program office is expected to formally respond to the licensee's technical report under separate correspondence.

5 Exit Meeting Summary

The inspectors presented the preliminary inspection results to the licensee's representatives at the conclusion of the onsite inspection on April 26, 2017. The final inspection results were presented to the licensee's representative by telephone on June 12, 2017. During the inspection, the licensee did not identify any information reviewed by the inspectors as proprietary that was included in the report.

SUPPLEMENTAL INSPECTION INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

W. Archuleta, Environmental Technician, Homestake Mining Co.
H. Burns, Environmental Director, Barrick
C. Farr, Operations Manager, Environmental Restoration Group, Inc.
R. Lowery, Principle Geologist, Brown & Caldwell
K. Martinez, Environmental Technician, Homestake Mining Co.
M. McCarthy, Counsel, Barrick
M. Schierman, Senior Health Physicist, Environmental Restoration Group, Inc.
A. Venable, Shift Supervisor, Homestake Mining Co.
R. Whicker, Radiation Protection Administrator, Environmental Restoration Group, Inc.
T. Wohlford, Interim Closure Manager, Homestake Mining Co.
C. Zimmerman, Vice President, Brown & Caldwell

INSPECTION PROCEDURES (IPs) USED

IP 83822	Radiation Protection
IP 88005	Management Organization and Controls
IP 88010	Training
IP 88035	Radioactive Waste Processing, Handling, Storage, and Transportation
IP 88045	Effluent Control and Environmental Protection

ITEMS OPENED, CLOSED AND DISCUSSED

Opened

040-08903/1701-01	VIO	Failure to establish standard procedures for all activities involving radioactive materials
040-08903/1701-02	VIO	Failure to prepare and record environmental evaluation before engaging in any activity not previously assessed by NRC
040-08903/1701-03	VIO	Failure to administer a cultural resource inventory before engaging in any developmental activity not previously assessed by NRC

Closed

None

Discussed

None

LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
gpm	gallons per minute
IP	Inspection Procedure
LC	License Condition
$\mu\text{R/hr}$	microRoentgen per hour
NRC	U.S. Nuclear Regulatory Commission
RSO	Radiation Safety Officer
SERP	Safety and Environmental Review Panel
TPP	tripolyphosphate
VIO	violation