



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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ARLINGTON, TEXAS 76011-4005**

April 16, 2003

Mr. Al Cox, Corporate Manager
of Grants Reclamation
Homestake Mining Company
P.O. Box 98
Grants, New Mexico 87020

SUBJECT: NRC INSPECTION REPORT 40-8903/03-001

Dear Mr. Cox:

On April 3, 2003, an NRC inspection was completed at your former Grants Mill facility in Cibola County, New Mexico. The enclosed report presents the results of that inspection. The inspection consisted of a routine review of site status, decommissioning and reclamation activities, management organization and controls, radiation protection, radioactive waste management, and environmental monitoring. The inspection findings were presented to you and members of your staff at the conclusion of the onsite inspection. The enclosed report presents the results of that inspection.

Based on the results of this inspection, no violations or deviations were identified; therefore, no response to this letter is required.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact Mr. Louis C. Carson II at (817) 860-8221 or the undersigned at (817) 860-8186.

Sincerely,

/RA/

Charles L. Cain, Chief
Nuclear Materials Licensing Branch

Docket No.: 40-8903
License No.: SUA-1471

Enclosure:
NRC Inspection Report
040-08903/03-001

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.: 40-8903

License No.: SUA-1471

Report No.: 40-8903/03-001

Licensee: Homestake Mining Company

Facility: Former Grants Mill

Location: Grants, Cibola County, New Mexico

Date: April 2-3, 2003

Inspector: Louis C. Carson II, Senior Health Physicist

Approved By: Charles L. Cain, Chief
Nuclear Materials Licensing Branch

Attachment: Supplemental Inspection Information

EXECUTIVE SUMMARY

Former Grants Mill Facility NRC Inspection Report 040-08903/03-001

This inspection included a review of site status, decommissioning and reclamation activities, management organization and controls, site operations, radiation protection, radioactive waste management, and environmental monitoring.

Site Status and Decommissioning for Uranium Mills

- Site activities and decommissioning programs were being conducted in accordance with the Homestake Reclamation Plan, the license, and applicable NRC regulations for uranium mill sites (Section 1).

Management Organization and Controls

- The site organization structure was consistent with previous inspections (Section 2).
- Adequate oversight was being provided for the current mode of site operations (Section 2).
- Established procedures at the site were found to be adequate and met the intent of the license (Section 2).

Operations Review

- Site operations appeared to have been conducted in accordance with applicable license and regulatory requirements (Section 3).
- Site fences were in good condition, and perimeter postings were appropriate (Section 3).
- Structures appeared to be in good condition. No significant health or safety hazards were identified during the site tour (Section 3).

Radiation Protection

- The licensee had implemented a radiation protection program that met requirements established in 10 CFR Part 20 and the license (Section 4).
- Occupational doses for site personnel during calendar years 2001 and 2002 were consistent with the scope of work activities at the site and were only a small fraction of the occupational dose limits established in 10 CFR 20 (Section 4).
- Homestake's annual As Low As Reasonably Achievable (ALARA) Audit reports were submitted in compliance with the license and met the requirements of 10 CFR 20.1101 (Section 4).

Radioactive Waste Management and Environmental Protection

- Radioactive waste management, effluent, environmental monitoring, and groundwater monitoring programs were reviewed and found to be acceptable (Section 5).
- The licensee had not released radioactive material into the environment that exceeded the limits established in 10 CFR Part 20 (Section 5).
- Periodic embankment inspections were performed by the licensee in accordance with the license (Section 5).

Report Details

1 Site Status and Decommissioning Inspection Procedure for Uranium Mill Sites (87654)

1.1 Inspection Scope

The site status was reviewed to determine if licensee decommissioning activities were being conducted in accordance with the Homestake Reclamation Plan, the license, and applicable NRC regulations for uranium mill sites.

1.2 Observations and Findings

a. Site Status

Homestake Mill operated from 1958 to 1990. Mill decommissioning began in 1993 and was essentially complete in 1994. Mill components were buried in pits in the general vicinity of the former mill site.

Two tailings impoundments were located on site. The large impoundment contained approximately 21 million tons of tailings material covering 170 acres. An interim cover was installed on top of this impoundment in 1994. A final radon barrier has been installed on the side slopes of this impoundment. At the time of this inspection, settlement monitors still had not reached the 90 percent settlement point. Therefore, the final radon barrier has not been placed on top of the large impoundment.

The small tailings impoundment contained approximately 2 million tons of tailings covering 40 acres. Two collection ponds were installed adjacent to the small tailings impoundment in 1985. Additionally, two lined evaporation ponds were installed on top of the small tailings impoundment. Evaporation Pond No.1 was installed in 1991 and is used for dewatering the large tailings impoundment and for collection and storage of groundwater. Evaporation Pond No. 2 was installed in 1995 between the collection ponds and Evaporation Pond No. 1 to increase the site's evaporation capacity. During 1996, the licensee placed a sprinkler system into operation to enhance the evaporation ponds' water removal capacity. The licensee plans to reclaim the small tailings impoundment and all ponds when groundwater cleanup has been completed in 10-12 years.

b. Remediation Activities

Since the last inspection in November 2000, the licensee has continued to conduct remediation operations consisting primarily of groundwater restoration. A reverse osmosis facility was operating to increase the site's groundwater cleanup capacity. The licensee continued to operate and maintain environmental monitoring stations and inspect the interim cover and embankments on the tailings impoundment.

1.3 Conclusion

The inspector concluded that site activities and decommissioning programs were being conducted in accordance with the Homestake Reclamation Plan, the license, and applicable NRC regulations for uranium mill sites.

2 Management Organization and Controls (88005)

2.1 Inspection Scope

The organization structure was reviewed to ensure that the licensee had maintained an organization with defined responsibilities and functions. The site standard operating procedures were reviewed, and the licensee's implementation of these procedures was assessed to evaluate the effectiveness of the licensee's control of site activities.

2.2 Observations and Findings

a. Management Organization

At the time of this inspection, site staffing consisted of seven Homestake employees. The ranking manager at the site was the corporate manager of the reclamation project. The corporate manager-reclamation was also the site radiation protection administrator (RPA) responsible for the implementation of the radiation safety program at the site. Three operators and two general laborers were responsible for various duties related to groundwater remediation and site maintenance. Other Homestake employees assigned to the site included administrative personnel.

b. Management Controls

License Condition 23 requires, in part, that standard operating procedures be established for all operational process activities involving radioactive materials. In addition, written procedures must be established for non-operational activities to include in-plant and environmental monitoring, bioassay analysis, and instrument calibrations. License Condition 23 further requires that the RPA shall perform a documented review of all existing operating procedures at least annually.

The inspector reviewed the licensee's established procedures and determined that the procedures had been adequately implemented. The RPA had conducted the annual procedure reviews in years 2001 and 2002.

2.3 Conclusions

The site organization structure was consistent with previous inspections. Adequate oversight was being provided for the current mode of site operations. Established procedures were found to be adequate and met the intent of the license.

3 Operations Review (88020)

3.1 Inspection Scope

A facility tour was performed to verify that site operations were being conducted in accordance with applicable regulations and the license to ensure that operational controls were adequate to protect the health and safety of the workers and members of the general public.

3.2 Observations and Findings

Site Tour and Operations

A site tour was performed to inspect the condition of the tailings impoundment, evaporation ponds, site buildings, fences, gates, and operating equipment. Site fences and gates were found to be in good condition. The inspector determined that licensed material was secure within the site property as required by 10 CFR 20.1801, and fences were posted with radioactive material signs required by 10 CFR 20.1902. During the site tour, the NRC inspector conducted radiation surveys using a Ludlum Model 19 microRoentgen meter. Exposure rate readings were 10-12 microRoentgen per hour ($\mu\text{R/hr}$) near the large tailings impoundment and at two high volume air monitoring stations. No hazards were identified during tours of the site properties.

The licensee continued to operate the reverse osmosis (RO) water treatment plant. The inspector toured the RO plant and observed its operation. The RO plant processed water from the groundwater aquifer affected by tailings and re-injected it after the purification process. Additionally, the licensee used the RO plant to flush and treat water from alluvial wells on the top of the large tailings pile. The RO plant was operating at a feed rate of about 300 gallons per minute. Radiation readings at the RO plant measured 10-12 $\mu\text{R/hr}$.

The inspector reviewed the licensee's daily water inspection logs for the evaporation ponds and collection ponds. The licensee's records included evaporation pond water levels, leakage monitoring and sump levels, and maintenance needs. Based on records reviewed and observations, the inspector determined that the wastewater systems were being well maintained.

3.3 Conclusions

Site operations appeared to have been conducted in accordance with applicable license and regulatory requirements. Site fences were in good condition and perimeter postings were appropriate. Structures appeared to be in good condition. No significant health or safety hazards were identified during the site tours.

4 Radiation Protection (83822)

4.1 Inspection Scope

The purpose of this portion of the inspection effort was to determine if the licensee's radiation protection program was in compliance with the requirements established in the license and 10 CFR Part 20 regulations.

4.2 Observations and Findings

a. Employee Exposures

The licensee's personnel monitoring program included providing dosimeters to site workers and collecting worker bioassay samples for analysis. A review of dosimetry records indicated that personnel exposures were well within the regulatory limits. Most dosimeters recorded little or no external radiation exposures for individuals during 2001 and 2002.

The licensee used a contractor laboratory to analyze urine bioassay samples. None of the sample results exceeded the action level of 15 micrograms per liter ($\mu\text{g/l}$) of natural uranium. Sample results were below the action level of 15 $\mu\text{g/l}$. The licensee submitted a spiked sample in each batch of urine samples as a quality control check. Results of the quality assurance samples were in good agreement with the known spiked concentrations.

Based on dosimeter and urine samples analyzed during 2001 and 2002, workers had been assigned a total effective dose equivalent of less than 10 percent of the occupational dose limit established in 10 CFR 20.1201.

b. Radiation Protection Training

License Condition 21 requires the RPA to maintain the minimum qualifications specified in Section 2.4.1 of Regulatory Guide (RG) 8.31, "Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Mills Will be As Low As Reasonably Achievable." The RPA completed bi-annual radiation safety officer training in April 2002.

Site worker training requirements are provided in Table 3, "Homestake Occupational Monitoring Program." In accordance with this table, site workers were required to receive initial site training and annual refresher training. Worker annual refresher training had been conducted in December 2001 and October 2002.

c. Equipment Calibrations

License Condition 22 requires, in part, that instrument calibration records be maintained. The inspector reviewed the licensee's 2001 and 2002 records and determined that survey instruments had been calibrated routinely. The inspector observed that instruments in use during the inspection had current calibration stickers affixed. The licensee had maintained duplicate survey instruments and rotated the survey meters to ensure that instruments were always operable, calibrated, and available.

d. Release of Equipment for Unrestricted Use

License Condition 14 provides guidance related to the equipment releases from the site and equipment decontamination requirements. The licensee's equipment release records for 2001 and 2002 were reviewed. Drilling trucks were the primary equipment being released from the site. No equipment was identified with radioactive contamination that exceeded the NRC's guideline release values for unrestricted use.

e. Annual ALARA Audit

License Condition 42 requires that a copy of the annual ALARA audit be submitted to the NRC as part of the annual report. In addition, 10 CFR 20.1101(c) requires that the licensee periodically (at least annually) review the radiation protection program content and implementation. The 2001 and 2002 annual ALARA audit reports were submitted to the NRC on December 11, 2001, and March 28, 2003, respectively.

The ALARA audits were conducted in accordance with Guide RG 8.31. Section 2.3.3 of RG 8.31 recommends the detail that an ALARA audit should contain. Both audit reports appropriately summarized the radiation protection program and were noted to be comprehensive and thorough.

f. Radiation Work Permits

License Condition 24 requires the licensee to use (RWPs) for all work or non-routine maintenance jobs where the potential for significant exposure to radioactive material exists and for which no standard written procedure already exists. The licensee had written three RWPs during 2001 and three during 2002 which were reviewed during the inspection. The RWPs were primarily for well drilling on top of tailings. The RWPs were noted to include appropriate radiological restrictions, special instructions and worker authorizations. As of this inspection, no RWPs had been written in 2003.

4.3 Conclusions

The licensee had implemented a radiation protection program that met requirements established in 10 CFR Part 20 and the license. Occupational doses for site personnel during calendar years 2001 and 2002 were consistent with the scope of work activities at the site and were only a small fraction of the occupational dose limits established in 10 CFR Part 20. Homestake's annual ALARA audit report was submitted in compliance with the license and met the requirements of 10 CFR 20.1101.

5 Radioactive Waste Management (88035) Environmental Protection (88045)

5.1 Inspection Scope

The radioactive waste management, effluent, environmental monitoring, and groundwater monitoring programs were reviewed to assess the effectiveness of the licensee's program and to evaluate the effects, if any, of site activities on the local environment.

5.2 Observations and Findings

a. Radioactive Waste Management

License Condition 37(F) does not allow the licensee to place a radon barrier on top of the large tailings pile until the impoundment is 90 percent settled. License Condition 12 requires, in part, that the licensee conduct periodic embankment inspections at the tailings piles and provide an annual status report to the NRC. The 2002 annual inspection of the tailings embankments was conducted on November 19, 2002, and the results were submitted to the NRC in the annual groundwater report as required by License Condition 42. Also, the inspector reviewed the licensee's embankment inspection logbook for 2001 and 2002. The inspector toured Homestake's tailings impoundment and evaporation pond areas and did not observe any damage. The licensee had determined that the large tailings impoundment had not reached 90 percent settlement on top. The inspector determined that the radioactive waste program was being handled adequately.

b. Environmental Monitoring

License Condition 10 requires that the licensee implement the environmental monitoring program as listed in Table 1, "Homestake Environmental Monitoring Programs Excluding Groundwater Monitoring," submitted to the NRC by letter dated September 2, 1993. Currently, the environmental monitoring program consisted of air particulate sampling, radon sampling, and measurement of the ambient gamma exposure rates using environmental dosimeters at the eight sample stations. During the site tour, the inspector observed two operating environmental monitoring stations that included a continuous air particulate sampler, a radon monitor, and environmental dosimeters. The inspector found both stations to be operational and well maintained.

c. Effluent Monitoring

License Condition 15 requires that the results of all effluent and environmental monitoring required by this license be reported to the NRC in the format shown in the attachment to SUA-1471 entitled, "Sample Format for Reporting Monitoring Data." The inspector reviewed the semi-annual reports for years 2001 and 2002. The licensee provided all data required by License Condition 15.

According to the semi-annual reports, air particulate sampling had been continuously conducted at six locations around the perimeter of the site. The composite samples were analyzed on a quarterly basis for natural uranium, thorium-230, and radium-226 content. Environmental monitoring station HMC-5 is located nearest to public residences. The air sample results for 2001 and 2002 were less than the effluent concentration limits (ECL) established in 10 CFR Part 20, Appendix B, Table 2 for natural uranium, thorium-230, and radium-226.

During years 2001 and 2002, radon monitoring was performed at eight locations around the site. The licensee used the continuous track-etch method of detection and replaced the samplers on a semi-annual basis. The sample results indicated that the highest radon gas concentration was 2.2 E-9 microcuries per milliliter ($\mu\text{Ci/ml}$), measured at sample station HMC-2 during 2001. HMC-2 was located northeast of the site. This sample result was 22 percent of the ECL ($1 \text{ E-8 } \mu\text{Ci/ml}$, without daughters) established in 10 CFR Part 20. The background radon concentration was noted to be 10 percent of the limit during the same period. All other sample results were less than 20 percent of the 10 CFR Part 20 ECL.

Cumulative gamma exposures were measured at seven sample stations using environmental dosimeters that were replaced on a semiannually basis. Based on the inspector's radiation measurements using a microRoentgen meter, the Homestake site gamma exposure rate was well below the annual 10 CFR 20.1301 limit of 100 millirem.

In the semi-annual reports for the 2001 and 2002, the annual effective dose equivalent to the nearest site residence was reported as well below the 10 CFR 20.1301 limit of 100 millirems. The licensee included the appropriate potential pathways in the estimated exposure.

d. Groundwater Compliance Monitoring Program

The groundwater compliance monitoring program was reviewed to verify that the program was consistent with the requirements specified in the license. The groundwater compliance monitoring program is required to be implemented as outlined in License Condition 35. The program in use at the site consisted of injection wells, collection wells, and monitoring wells. The injection wells were used to control the underground movement of groundwater, while collection wells were used to intercept seepage from the tailings piles. Monitoring wells were used for obtaining groundwater samples. The groundwater that was extracted from the site wells was pumped to the collection ponds.

License Condition 35(A) requires that the licensee implement the monitoring program shown in Table 2, "Homestake Groundwater Monitoring Program." Table 2 lists the point-of-compliance (POC) wells, monitoring wells, parameters to be monitored, and frequency of monitoring. The licensee's groundwater monitoring program was noted to be extensive and consisted of numerous wells that were sampled on a routine basis. A review of the semi-annual reports for years 2001 and 2002 indicated that some of the chemical and radionuclide constituents in the POC wells remained above the protection standard limits established in License Condition 35(B). The chemical constituents that were still above the limits included molybdenum and selenium in the POC wells. The radionuclide

constituents above the limits included thorium-230 and natural uranium.

5.3 Conclusions

Radioactive waste management, effluent, environmental monitoring, and groundwater monitoring programs were reviewed and found to be acceptable. The licensee had not released radioactive material into the environment that exceeded the limits established in 10 CFR Part 20. Periodic embankment inspections were performed by the licensee in accordance with the license.

6 **EXIT MEETING SUMMARY**

An exit meeting was conducted on April 3, 2003. During this meeting, the inspector reviewed the scope and findings of the inspection. The licensee did not identify as proprietary any information provided to, or reviewed, by the inspector.

ATTACHMENT

SUPPLEMENTAL INSPECTION INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

Al Cox, Corporate Manager-Reclamation & Radiation Protection Administrator
Adrian Venable, Radiation Technician
Joseph Vigil, Environmental Technician

New Mexico Environmental Department (NMED)

Louis Baca, Radiation Specialist, NMED
Dave Baggett, Radiation Specialist, NMED

INSPECTION PROCEDURES USED

IP 83822	Radiation Protection
IP 87654	Decommissioning Inspection Procedure for Uranium Mill Sites
IP 88005	Management Controls and Controls
IP 88020	Operations Review
IP 88035	Radioactive Waste Management
IP 88045	Environmental Protection

ITEMS OPENED, CLOSED AND DISCUSSED

Opened

None

Closed

None

Discussed

None

LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
ECL	effluent concentration limits
µCi/ml	microcuries per milliliter
µg/liter	micrograms per liter
µR/hr	microRoentgens per hour
RWP	Radiation Work Permit
PDR	Public Document Room
POC	Point of Compliance (well)
RG	Regulation Guide
RO	Reverse Osmosis
RPA	Radiation Protection Administrator