ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION REGION IV

Docket No.:	40-8903
License No.:	SUA-1471
Report No.:	40-8903/98-02
Licensee:	Homestake Mining Company
Facility:	Former Grants Mill and Ion Exchange Facilities
Location:	Grants, Cibola and McKinley Counties, New Mexico
Date:	November 17-18, 1998
Inspector:	Louis C. Carson II, Health Physicist Fuel Cycle and Decommissioning Branch Division of Nuclear Materials Safety
Approved By:	D Blair Spitzberg, PhD., Chief Fuel Cycle and Decommissioning Branch Division of Nuclear Materials Safety
Attachment:	Supplemental Inspection Information

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EXECUTIVE SUMMARY

Former Grants Mill Facility NRC Inspection Report 40-8903/98-02

This inspection included a review of site status, decommissioning, 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 organizational structure was consistent with previous inspections, and it appeared that adequate oversight had been provided for site activities (Section 2).
- Procedures had been established at the site and were found to be adequate (Section 2).

Operations Review and Radiation Protection

- Site content applicable license and regulatory requirements. No significant health or safety concern was identified during site tours (Section 3).
- The licensee had implemented a radiation protection program that met the requirements established in 10 CFR Part 20 and the license. Occupational exposures at the site were small fractions of the limits established in 10 CFR 20 (Section 3).
- Homestake's Annual ALARA Audit report was submitted in compliance with License Condition 32(C) and 10 CFR 20.1101.

Radioactive Waste Management and Environmental Protection

• Areas of the radioactive waste management, effluent, environmental monitoring, and groundwater monitoring programs that were reviewed and found to be acceptable included the collection of environmental monitoring samples, air sampling, and the groundwater corrective action program (Section 4).

- Routine embankment inspections were performed by the licensee in accordance with the conditions of the license (Section 4).
- A review of reports and laboratory documentation revealed that radiological releases from the site to the environment during 1998 were within the limits established by 10 CFR 20 (Section 4).

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Report Details

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

1.1 Inspection Scope

The site status and decommissioning program were reviewed to determine if licensee 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 that covers 170 acres. An interim cover was installed on top of this impoundment in 1994. The final radon barrier has also been installed on the slopes of this impoundment. However, the final radon barrier has not been placed on top of this impoundment because several settlement monitors had not reached the 90 percent settlement point.

The small tailings impoundment contained approximately 2 million tons of tailings that covers 40 acres. Two collection ponds were installed adjacent to the small tailings impoundment in 1985. In addition, 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 pond's water removal capacity. The licensee plans to reclaim the small tailings impoundment and all ponds when groundwater cleanup has been completed in 10-15 years.

b. Remediation Activities

Since the last inspection in January 1998, the licensee has continued to conduct remediation operations consisting primarily of groundwater restoration. 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 mills sites.

2 Management Organization and Controls (28005)

2.1 Inspection Scope

The organizational structure was reviewed to ensure that the licensee had established 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

Homestake's organization and staffing requirements are established in License Condition 10 which references licensee submittals. At the time of this inspection, site staffing consisted of six Homestake employees, two contractors, and various consultants. The ranking manager at the site was the corporate Manager-Reclamation. The corporate Manager-Reclamation was also the site radiation protection administrator (RPA) responsible for the implementation of the radiation safety program. Four operators reported to the environmental supervisor: An electrician, two operators responsible for maintaining the groundwater corrective action program, and one operator responsible for the radiation protection program.

b. Management Controls

License Condition 23 states, in part, that standard operating procedures shall 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 states that the RPA shall perform a documented review of all existing operating procedures at least annually.

The inspector reviewed the licensee's procedures and determined that all procedures required by the license had been established and implemented. The RPA had conducted the annual procedure review in August 1998.

2.3 Conclusions

The site organizational structure was consistent with previous inspections, and it appeared that adequate oversight was being provided for the current mode of site

operations. Procedures had been established at the site that met the intent of the license. The procedures were found to be adequate.

3 Operations Review (88020) and Radiation Protection (83622)

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. The purpose of the tour was to ensure that operational controls were adequate to protect the health and safety of the workers and members of the general public. Additionally, this portion of the inspection 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.

3.2 Observations and Findings

a. 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 and were properly posted. 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. No elevated gamma exposure rate readings were identified during the site tour. Offsite background radiation levels were 15 microRoentgens per hour (μ R/hr). The onsite and truck yard radiation levels were generally 25 μ R/hr. No hazards were identified during tours of the site properties.

The inspector observed the operation of the injection and collection well systems that were in place to implement the groundwater corrective action program required by License Condition 36. Water injected into an alluvial aquifer at 600 gallons per minute (gpm) was being recovered at 240 gpm and discharged into the evaporation pond as waste water.

The inspector reviewed the licensee's evaporation pond and spray system inspection records. The licensee's records included evaporation pond water levels, leakage monitoring and sump levels, maintenance needs, and a status of odors the ponds were producing. Based on records reviewed, the inspector determined that all the waste water equipment was operating as required and was well maintained.

b. Employee Exposures

License Condition 35(A) requires that the licensee implement the personnel monitoring program as shown in Table 3, "Homestake Occupational Monitoring Program," of the licensee's January 9, 1995, submittal. Routine personnel monitoring programs

consisted of issuance of thermoluminescent dosimeters (TLDs) to site workers and collection and analysis of bioassay samples. Personnel air sampling and the use of respiratory protection equipment were required only on an as-needed basis. A review of dosimetry records indicated that personnel exposures were well within the regulatory limits. Most TLDs recorded no external radiation exposures for individuals during 1998. Since the last inspection, the licensee had analyzed &2 urine samples. The licensee submitted a spiked sample in each batch of urine samples as a quality control check. Two workers sampled had measurable activity of 5 micrograms per liter (µg/l) and 13 µg/l. Both measurements were less than the action level of 15 µg/l of natural uranium. The individual whose bioassay measured 13 µg/l was resampled as required by the licensee's procedure. The second sample measured 0.0 µg/l.

Based on air samples, TLD, and urine sample analyzed during 1998, 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.

c. 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 is Reasonably Achievable." The RPA receive biennial training on September 14, 1998.

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. Annual refresher training was scheduled for December 3, 1998.

d. Equipment Calibrations

License Condition 22 requires, in part, that instrument calibration records be maintained. The licensee maintained duplicate survey instruments and rotated the survey meters to ensure that instruments were always operable, calibrated, and available. The inspector's review of the licensee's 1998 records revealed that survey instruments had been calibrated routinely. The inspector observed that instruments in use during the inspection had current calibration stickers affixed. The inspector also reviewed the licensee's "Instrument Performance Test" records for 1998 which verified the operability of survey instruments prior to use. License Condition 23 requires that standard operating procedures be established for instrument calibrations. The licensee had developed a procedure for calibration of the environmental air samplers and had performed a calibration check of the air samplers on a weekly basis. Therefore, the licensee had maintained the air samplers in an operable status throughout 1998. The inspector determined that the licensee's instrument calibration and performance test programs were adequate.

e. Release of Equipment for Unrestricted Use

License Condition 14 requires that any equipment, supplies, or personnel that comes in contact with tailings sand and/or slime will be determined to be free of radioactive material by a personnel scan and equipment decontamination. The inspector reviewed the licensee's equipment release records for 1998. One truck had been released from the site with residual contamination that exceeded the NRC's guideline values for release of equipment for unrestricted use. This matter was under investigation by the licensee. The inspector noted that some personnel and equipment had come into contact with tailings material during well drilling. In general, personnel and equipment that had been surveyed and released with residual radioactive material were found to be well below the NRC guideline values.

f. Annual ALARA Audit

License Condition 32(C) states that a copy of the report documenting the annual ALARA audit shall be submitted to the NRC within 30 days of completion of the audit. In addition, 10 CFR 20.1101(c) states that the licensee shall periodically (at least annually) review the radiation protection program content and implementation. The 1998 Annual ALARA Audit Report was submitted to the NRC on October 14, 1998, within the 30-day limit. The audit was performed by a contractor.

The ALARA audit report stated that programs were evaluated based on the recommendations contained in NRC Regulatory Guide (RG) 8.31. Section 2.3.3 of RG 8.31 recommends the detail that an ALARA audit should contain. The audit report briefly summarized the radiation protection program.

Given the status of site activities, the inspector concluded that Homestake's Annual ALARA Audit was submitted in compliance with License Condition 32(C) and 10 CFR 20.1101(c).

Additionally, the inspector compared the licensee's 1998 monthly ALARA reports to the 1998 Annual ALARA Audit Report. The inspector found that the monthing ALARA reports provided much more useful detail.

g. Radiation Work Permits

License Condition 24 requires the licensee to use radiation work permits (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 inspector reviewed the licensee's RWP procedure and seven RWPs that were written in 1998. The licensee issued an RWP each time samples were collected from mill tailings. During site tours, the inspector observed and interviewed workers who were wearing TLDs. The inspector found that the RWPs met the intent of the license and were noted to be adequately documented to include radiological restrictions, work precautions, and worker authorizations.

3.3 Conclusions

Site operations were conducted in accordance with applicable license and regulatory requirements. 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 year 1998 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. Homestake's Annual ALARA Audit report was submitted in compliance with License Condition 32(C) and the requirements of 10 CFR 20.1101.

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

4.1 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.

4.2 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 report to the NRC. The inspector reviewed the licensee's monthly tailings impoundment inspection logbook for 1998. The inspector to observe any damage. The inspector noted that licensee had drilled 60 new wells for collecting mill tailings samples and dewatering the tailings pile. 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. Effluent Monitoring

License Condition 15 states that the results of all effluent and environmental monitoring required by this license shall 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 semiannual reports for the first half of 1998 dated August 24, 1998, and for the second half of 1997 dated February 23, 1998. The inspector found that the licensee had provided all data required by License Condition 15. According to the semiannual 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. The results indicated that all radionuclides were less than the concentration limits established in 10 CFR 20, Appendix B, Table 2. Natural uranium was measured at 10 percent of the limit (Class Y) at sample station HMC-5 during 1997 and 8 percent during 1998. HMC-5 was located nearest to public residences. Natural uranium concentrations were 15 percent of the limit or less during 1998. The thorium-230 and radium-226 concentrations were less than 1 percent of the limits at all sample stations.

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 1.6 E-9 microcuries per milliliter (μ Ci/mI), measured at sample station HMC-1 during the first half of 1998. HMC-1 was located north of the site. This sample result was 16 percent of the limit (1 E-8 μ Ci/mI, without daughters) established in 10 CFR 20. The background radon concentration was noted to be 11 percent of the limit during the same period in 1997. All other sample results were less than 15 percent of the 10 CFR Part 20 limit so far in 1998.

Cumulative gamma doses were measured at seven sample stations using environmental TLDs that were replaced semiannually every October and April. The area background was 56.7 millirem during October 1997 - July 1997. Sample station HMC-5, located nearest to a residence, measured 64.9 millirem which was 8.2 millirem above background dose measurements. The Homestake site gamma dose values were we also we the annual 10 CFR 20.1301 limit of 100 millirem.

The expector observed an operating environmental monitoring station that included a commuous air particulate sampler, a radon monitor, and environmental TLDs. The inspector found the station to be operational and well maintained.

c. 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. The environmental monitoring program consisted of air particulate sampling, radon sampling, and measurement of the ambient gamma exposure rates using environmental TLDs at six to eight sample stations. Vegetation, soil, surface water, and sediment sampling were no longer required at the site.

Environmental and groundwater samples were submitted to a contract laboratory located in Casper, Wyoming. Laboratory documentation was reviewed to ascertain whether the laboratory was properly certified to perform sample analyses. The licensee provided records that revealed the laboratory was authorized to possess radioactive material including uranium mill tailings and wastes. Also, the laboratory was certified by the U.S. Environmental Protection Agency. Therefore, the contractor laboratory was found to be properly certified to perform sample analyses for the licensee.

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 by 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 nine 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 1997 and 1998 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 sulfate, molybdenum, vanadium, and selenium in the POC wells. The radionuclide constituents above the limits included thorium-230 and natural uranium. The radium-226 and radium-228 concentrations varied above and below the limits, depending on the well.

The licensee continued to operate the groundwater remediation system as part of the corrective action program in an attempt to clean up the groundwater. The licensee plans to operate a reverse osmosis system to increase the groundwater cleanup capacity. Currently, the rate of groundwater cleanup is limited by the seasonal evaporative rate of the ponds.

4.3 Conclusions

Areas of the radioactive waste management, effluent, environmental monitoring, and groundwater monitoring programs that were reviewed and found to be acceptable included the collection of environmental monitoring samples, air sampling, and the groundwater corrective action program. The review of the licensee's documentation revealed that the site had not released any radioactive material into the environment that had exceeded the limits established in 10 CFR Part 20. Routine embankment

inspections were performed by the licensee in accordance with the conditions of the license.

5 EXIT MEETING SUMMARY

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An exit meeting was conducted on November 18, 1998. 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

K. Baker, Consultant, Environmental Restoration Group, Inc.

R. Cellan, Corporate Manager-Reclamation & Radiation Protection Administrator

R. Waterland, Environmental Project Supervisor

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S. Fitch, Radiation Specialist

INSPECTION PROCEDURES USED

- IP 83822 Radiation Protection
- IP 87654 Decommissioning Inspection Procedure for Uranium Mill Sites

None

- IP 88005 Management Controls and Controls
- IP 88035 Radioactive Waste Management
- IP 88045 Environmental Protection

ITEMS OPENED, CLOSED AND DISCUSSED

Opened None

Closed None

Discussed

LIST OF ACRONYMS USED