



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064**

December 6, 2000

Roy R. Cellan, Corporate Manager
of Reclamation
Homestake Mining Company
P.O. Box 98
Grants, New Mexico 87020

SUBJECT: NRC INSPECTION REPORT 40-8903/00-01

Dear Mr. Cellan:

On November 13-14, 2000, 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 selective examinations of procedures and representative records, interviews of personnel, independent measurements, and observation of activities in progress. The inspection disclosed that you are appropriately controlling activities in accordance with your NRC license.

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 and its enclosure(s), will be 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 for the NRC Web site at <http://www.nrc.gov/NRC/ADAMS/index.html> (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact Mrs. Judith Walker at (817) 860-8299.

Sincerely,

/RA/

D. Blair Spitzberg, PhD., Chief
Fuel Cycle and Decommissioning Branch

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

Enclosure:
NRC Inspection Report
040-08903/00-01

Homestake Mining Company

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cc w/enclosure:

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	40-8903
License No.:	SUA-1471
Report No.:	40-8903/00-01
Licensee:	Homestake Mining Company
Facility:	Former Grants Mill and Ion Exchange Facilities
Location:	Grants, Cibola and McKinley Counties, New Mexico
Date:	November 13-14, 2000
Inspector:	Judith Walker, Health Physicist (Inspector-in-Training) Fuel Cycle and Decommissioning Branch
Accompanied By:	D. Blair Spitzberg, PhD., Chief Fuel Cycle and Decommissioning Branch
Approved By:	D. Blair Spitzberg, PhD., Chief Fuel Cycle and Decommissioning Branch
Attachment:	Supplemental Inspection Information

EXECUTIVE SUMMARY

Former Grants Mill Facility NRC Inspection Report 040-08903/00-01

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 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 (Section 2).

Operations Review

- 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 (Section 3).

Radiation Protection

- 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 1999 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 (Section 4).

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. 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. Periodic embankment inspections were performed by the licensee in accordance with the conditions of 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 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 completed 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. A final radon barrier has been installed on the side slopes of this impoundment. Settlement monitors still have 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 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 10-12 years.

b. Remediation Activities

Since the last inspection in November 1998, the licensee has continued to conduct remediation operations consisting primarily of groundwater restoration. A reverse osmosis unit has been added to the groundwater restoration program to increase the groundwater cleanup capacity. The licensee continued to operate and maintain environmental monitoring stations and inspect the interim cover and embankments on the tailings impoundment.

c. Financial Surety

License Condition 28 requires the licensee to submit an annual surety update with supporting documentation prior to June 30 of each year. The licensee had submitted the financial surety for the site by letter dated June 8, 2000, which requested that the surety remain at the amount specified in the license.

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 (88005)

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 seven Homestake employees, three contract workers, and various consultants on an as-needed basis. 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 at the site. Three operators reported to the environmental supervisor: a maintenance technician, and two general laborers responsible for various duties in the groundwater corrective action program. Other Homestake employees assigned to the site included a secretary and a senior accountant.

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 1999 and June 2000.

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)**

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.

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. 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 microR per hour ($\mu\text{R/hr}$) near the large tailings impoundment and at a high volume air monitoring station. No hazards were identified during tours of the site properties.

Since the last inspection, the licensee had constructed a reverse osmosis (RO) water treatment plant. The inspector toured the RO plant and observed the operation of the plant. The plant processed water from the groundwater aquifer affected by tailings, and re-injected it after a purification process. The RO plant was operating at a feed rate of about 300 gpm (gallons per minute) and re-injecting product water at a rate of 240 gpm. The licensee is planning to evaluate the effectiveness of the re-injected RO product on the aquifer restoration program. Survey meter readings were noted at 10-12 $\mu\text{R/Hr}$ within the RO plant.

During the inspection, observations were made of job performances in the field. This work required a radiation work permit (RWP) which was the fourth issued in 2000. The work primarily consisted of the contractor preparing to drill for a new monitoring well on top of the large tailings impoundment. The inspector observed that performance was consistent with the RWP.

The inspector reviewed the licensee's daily water inspection logs for evaporation ponds and the collection ponds. 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.

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

b. Employee Exposures

Occupational exposure monitoring requirements were established in License Condition 35(A) which states that the licensee shall implement the monitoring program shown in Table 3, "Homestake Occupational Monitoring Program," of the licensee's January 9, 1995, submittal. Table 3 lists the sample program required for monitoring of occupational workers. The licensee's routine personnel monitoring programs consisted of issuance of thermoluminescent dosimeters (TLDs) to site workers and collection of bioassay samples for analysis by an independent laboratory. Personnel air sampling and the use of respiratory protection equipment were required only on an as-needed basis. The licensee did not assign exposures to site workers based on air sample results because the licensee did not obtain any air samples during 1999.

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 1999. The highest exposure reading recorded on TLDs during 1999 totaled 100 millirems for an individual. For the first quarter of 2000, all issued badges reported no measurable exposure. The licensee obtained and sent to its contractor laboratory a total of 151 urine samples in 1999. None of the sample results exceeded the action level of 15 micrograms per liter ($\mu\text{g/l}$) of natural uranium. From July 1999 - March 2000, 78 urine samples were obtained and sent for analysis. 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. Also, the inspector reviewed bioassay records for personnel performing work

requiring an RWP. None of the sample results exceeded the action level of 15 micrograms per liter of natural uranium.

Based on TLD and urine samples analyzed during 1999 and 2000, 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 Radiation Protection Administrator (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 bi-annual radiation safety officer (RSO) training was due for the site's RPA representative late this fall. The fall course was canceled due to lack of participants and will be rescheduled in the spring of 2001. Based on the existing levels of radiological requirements at the site, project management agreed that the radiation safety program would not be effected and approved the change in the training schedule. The new training schedule for the site's RPA will start in the spring of 2001 and continue bi-annually.

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 1, 2000.

d. Equipment Calibrations

Survey instruments were required by Table 3 to be calibrated on a semi-annual basis. The licensee maintained duplicate survey instruments and rotated the survey meters to ensure that instruments were always operable, calibrated, and available. License Condition 22 requires, in part, that instrument calibration records be maintained. The inspector reviewed the licensee's 1999 and 2000 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.

e. Release of Equipment for Unrestricted Use

Equipment decontamination requirements are provided in Table 3 and in License Condition 14. According to Table 3, potentially contaminated equipment will be surveyed for contamination as required by radiation work permit. Also, License Condition 14 provides guidance related to the release of equipment from the site. The licensee's equipment release records for 1999 and 2000 were reviewed. Drilling trucks were the primary equipment being released from the site. None were identified with radioactive material that exceeded the NRC's guideline values for release of equipment for unrestricted use.

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 1999 and 2000 annual ALARA audit reports were submitted to the NRC on November 3, 1999, and July 26, 2000, respectively. Both reports were submitted within the 30-day limit. The audits were performed by a contractor.

The ALARA audit report was conducted in accordance with NRC Regulatory Guide (RG) 8.31, "Information Relevant to Ensuring That Occupational Exposure At Uranium Mills Will Be As Low As Reasonably Achievable." 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 and was noted to be comprehensive and thorough.

g. 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 four RWPs for 2000 which were reviewed during the inspection. The RWPs were primarily for well drilling on top of tailings. No RWPs were written in 1999. The RWPs were noted to include appropriate radiological restrictions, special instructions and worker authorizations.

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 year 1999 and 2000 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 License Condition 32(C) and 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 1999 annual status report for the tailings embankments was submitted in the semi-annual environmental report as required. Also, the inspector reviewed the licensee's embankment inspection logbook for 1999 and 2000. It was noted that the last embankment inspection was in March of 2000. 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. 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 semi-annual reports for the first and second halves of 1999, dated August 24, 1998, and February 24, 2000, respectively. Also, the inspector reviewed the report for the first half of 2000 dated August 8, 2000. 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. The results indicated that all radionuclides were less than the concentration limits established in 10 CFR Part 20, Appendix B, Table 2. For 1999 the natural uranium concentrations were 23 percent of the limit or less (Class Y) at sample station HMC-5. HMC-5 was located nearest to public residences. The thorium-230 and radium-226 concentrations were less than 1 percent of the limits at all sample stations during 1999.

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 2.0 E-9 microcuries per milliliter ($\mu\text{Ci}/\text{ml}$), measured at sample station HMC-1 during 1999. HMC-1 was located north of the site. This sample result was 20 percent of the limit (1 E-8 $\mu\text{Ci}/\text{ml}$, without daughters) established in 10 CFR Part 20. The background radon concentration was noted to be 11 percent of the limit during the same period. All other sample results were less than 20 percent of the 10 CFR Part 20 limit so far in 2000.

Cumulative gamma doses were measured at seven sample stations using environmental TLDs that were replaced on a semi-annually basis. The area background was 24.7 millirem per quarter (mrem/qr) during the period December 15, 1998 - July 20, 1999. Sample station HMC-5, located nearest to a residence, measured 0 millirem for the same period. For the first half of 2000, area background was 26.0 mrem/qr. Sample station HMC-5 measured 30.9 mrem/qr, which was 4.9 millirem above background measurements. The Homestake site gamma dose values were well below the annual 10 CFR 20.1301 limit of 100 millirem.

In the semi-annual report for the second half of 1999, the annual effective dose equivalent to the nearest site residence was estimated to be 60 millirems per year, below the 10 CFR 20.1301 limit of 100 millirems. The licensee included the appropriate potential pathways in the estimated exposure.

During the site tour, the inspector observed an operating environmental monitoring station that included a continuous 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.

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 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 1999 and the first half of 2000 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, vanadium, and selenium in the POC wells. The radionuclide constituents above the limits included thorium-230 and natural uranium.

The licensee has implemented an in-situ anaerobic biological treatment pilot test to gather sufficient data to determine whether the groundwater standards can be met using this method. The treatment would remove molybdenum, uranium, and selenium from the local alluvial aquifer. After 6 months of study, the licensee will present future plans and proposals if any.

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

6 **EXIT MEETING SUMMARY**

An exit meeting was conducted on November 14, 2000. 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

State of New Mexico Environmental Department

S. Miller, Environmental Specialist

INSPECTION PROCEDURES USED

IP 83822	Radiation Protection
IP 87654	Decommissioning Inspection Procedure for Uranium Mill Sites
IP 88005	Management Controls and Controls
IP88020	Operations Review
IP 88035	Radioactive Waste Management
IP 88045	Environmental Protection

ITEMS OPENED, CLOSED AND DISCUSSED

<u>Opened</u>	None
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<u>Closed</u>	None
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<u>Discussed</u>	None
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LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
GPM	gallons per minute
IFI	Inspection Followup Item
µCi/ml	microcuries per milliliter
µR/hr	microRoentgens per hour
mrem/qr	millirem per quarter
RWP	Radiation Work Permit
PDR	Public Document Room
POC	Point of Compliance (well)
RG	Regulation Guide
RPA	Radiation Protection Administrator
TLD	thermoluminescent dosimeters