

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
URANIUM RECOVERY FIELD OFFICE
REGION IV

Inspection Report: 40-8903/94-01

Operating License: SUA-1471

Licensee: Homestake Mining Company
P.O. Box 98
Grants, New Mexico 87020

Facility Name: Grants Mill

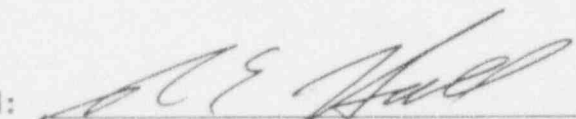
Inspection At: Grants, New Mexico

Inspection Conducted: May 10, 1994

Inspectors: P. Garcia, Senior Project Manager
R. Gonzales, Senior Project Manager

Accompanying Personnel: L. Carson, NRC Region IV
R. Evans, NRC Region IV
K. Hooks, NRC Headquarters

Approved:


Edward F. Hawkins, Deputy Director
Uranium Recovery Field Office
Region IV

5/31/94
Date

Inspection summary

Areas Inspected: Routine, unannounced inspection of the uranium mill decommissioning operations and radiation safety program including: Management Organization and Controls/Operations Review; Operator Training/Retraining; Radiation Protection; and Radioactive Waste Management.

Results:

The licensee's mill decommissioning and tailings reclamation activities were being conducted in accordance with license requirements. No areas of concern were identified during the inspection.

Summary of Inspection Findings:

No violations or deviations were identified during the inspection.

Attachment:

Attachment - Persons Contacted and Exit Meeting.

DETAILS

1 SITE STATUS AND TOUR

The Homestake Mill was in an active state of tailings reclamation at the time of the inspection. The licensee completed placement of an interim soil cover over all exposed tailings at the site in April 1994. Activities ongoing at the time of the inspection included placement of radon barrier soils on the outcrops of the tailings pile and the removal of contaminated soils on and near the county road north of the pile. The licensee is also rebuilding the county road following the contamination removal activities. Mill decommissioning activities, which were ongoing at the time of the previous inspection in December 1993, were completed in March 1994.

The licensee also continues to implement a ground-water corrective action program which involves the injection of about 600 gallons per minute (gpm) of fresh water into the impacted alluvial aquifer and the collection of approximately 260 gpm of contaminated water. The collected water is discharged into a lined evaporation pond. Additionally, a contractor was being used to quarry basalt from an onsite open pit mine. This material will be used as cover material for the Homestake tailings piles and for tailings piles at three other local facilities. The licensee has not placed the radon barrier on the large tailings pile because the pile has not yet achieved 90 percent of primary consolidation.

A thorough tour of the facility was performed on May 10, 1994. A Ludlum Model 19 survey meter was used to measure radiation exposure rates at locations throughout the facility. Background exposure readings were about 20 microRoentgens/hour ($\mu\text{R/hr}$). The highest measured exposure rate was 1300 $\mu\text{R/hr}$ at the southern end of the small tailings pile. This area was identified by the licensee as open (to the atmosphere) tailings. This open area of tailings is being used to conduct radon flux tests for the purpose of calibrating the model used to calculate the amount of radon barrier soil required for final reclamation. The southern end of the large tailings pile, an area where the pile had not been reworked by the contractors, measured 200 $\mu\text{R/hr}$ in select locations. No other areas of elevated exposure rates were noted.

The licensee's short term, future plans include installation and operation of a 6 gallons per minute reverse osmosis test pilot plant and the construction of a second evaporation pond. The licensee planned to submit a license amendment request in the near future to allow for the construction of another evaporation pond in the summer of 1994. These two actions are planned in an attempt to accelerate the water cleanup process at the facility.

2 MANAGEMENT ORGANIZATION AND CONTROLS/OPERATIONS REVIEW (88005/88020)

The licensee described the organizational structure in effect at the site. The Resident Manager (GM) also serves as facility Radiation Protection Administrator (RPA). The GM/RPA, who is responsible for implementation of the facility radiation safety program, is assisted by a staff of six health and safety technicians. At the time of the inspection, the licensee's staff

consisted of about 70 employees, including 13 Homestake employees, 55 contractors, 4 soil quality control technicians, 4 laborers, and 5 security personnel.

All work activities involving mill decommissioning were conducted under Radiation Work Orders (RWOs) issued by the GM/RPA. The inspectors reviewed a representative sample of the RWOs issued for mill decommissioning and noted that they adequately described the job to be performed and the radiation safety practices to be followed to minimize worker exposure during the job. No items of concern were identified during the review of the RWO program.

The inspectors also reviewed Standard Operating Procedures (SOPs) established for all routine site activities. The SOPs appeared to contain adequate detail to describe the activities, and had been reviewed and approved by the GM/RPA on an annual basis. The inspectors did identify deficiencies concerning several SOPs which address calibration of site radiation survey instrumentation.

The inspectors noted that the procedure which addressed calibration of alpha survey meters appeared to describe a function check rather than a full calibration. The inspectors did note that the survey meters had been sent to a vendor for a full calibration within the past six months, as required by the license, although discussions with licensee personnel indicated that the licensee was considering substituting the function checks described in the SOP for vendor calibrations. The inspectors stressed that the procedure described in the SOP constitutes a check and not a calibration, and strongly recommended that full calibrations be performed to assure compliance with license requirements. The inspectors also recommended that the SOP addressing calibration of alpha survey meters be revised to describe full calibrations of the survey instruments.

The inspectors noted that the procedure addressing maintenance of the multi-channel analyzer used to count soil samples also did not appear to describe a true calibration of the equipment. The inspectors recommended that manufacturer's instructions for the unit be reviewed to assure that the SOP reflects the recommended calibration methodology. This is very important for this unit, as it is being used to verify the adequacy of soil cleanup in accordance with Criterion 6 of Appendix A to 10 CFR 40. Deficiencies in the maintenance of the equipment could invalidate data obtained using the equipment.

The inspectors noted that access to the restricted area was controlled by a fence which was posted. The inspectors also noted that employee notices required by 10 CFR 19.11 were posted near site access points.

The inspectors concluded that the licensee's programs in this area were being conducted in accordance with license requirements.

3 OPERATOR TRAINING/RETRAINING (88010)

The inspectors reviewed records of radiation safety training provided to the employees and contractors. The GM/RPA provided training to all Homestake and contractor employees. The content of the course was as recommended in Regulatory Guide 8.31. All restricted area female workers were given training in prenatal radiation exposure as recommended in Regulatory Guide 8.13. A written test was given to all workers and a 70 percent correct score was needed to attain a passing grade. If any worker failed the test, they were retrained until they achieved a passing score. If workers were unable to pass the test, employment was denied at the site.

The inspectors concluded that the licensee's training program was conducted in accordance with license requirements.

4 RADIATION PROTECTION (83822)

4.1 Internal Exposure Determination

The inspectors reviewed records of the internal exposure determination program implemented at the facility. Personal air samplers were used to determine airborne concentration to which workers were exposed. A personal air sampler was assigned each day to at least one individual in each work crew performing decommissioning activities. In addition, personal air samplers were placed on equipment operators involved in tailings reclamation work on a weekly, rotating basis. The samplers were calibrated to draw approximately 2 liters per minute of air using a Teledyne Hastings-Raydist flow meter, which was itself calibrated in June 1993. Calibrations of the air sampling pumps were done prior to each sampler's use and the sampler was normally checked during the work shift for operability and proper air flow by a radiation safety technician.

A review of the airborne concentration data collected during reclamation and decommissioning activities indicated that uranium levels were small percentages of the maximum permissible concentration. Exposures were therefore very low. The very low exposures indicate that dust suppression activities and work practices were adequate to keep exposures ALARA. In addition, the mill has been completely demolished and disposed and the tailings have been covered with a soil cover. Future exposures should therefore be extremely low.

4.2 Bioassay and Respiratory Protection

The inspectors reviewed the bioassay program in effect at the site. All employees performing work with the potential for exposure to radioactive materials were routinely sampled monthly. In addition, additional samples were collected after certain RWP jobs having a significant potential for exposure to radioactive materials. Finally, baseline and termination samples were collected from all workers included in the urinalysis program.

Samples were sent to an offsite vendor laboratory for analysis. Spiked and blank samples were included with each batch of samples sent for analysis. A

review of bioassay data revealed that all specimen samples were less than the lower limit of detection of 5 $\mu\text{g/l}$ uranium, with the exceptions of one value of 6 $\mu\text{g/l}$ and a value of 17.3 $\mu\text{g/l}$ which was just over the initial action level of 15 $\mu\text{g/l}$. The resample showed a result less than the LLD.

The inspectors reviewed the licensee's respiratory protection program. Half mask respirators were required for certain mill demolition jobs, although no credit was taken for their use in calculating employee exposures. Powered air purifying respirators were required for workers involved in demolition of the yellowcake precipitation building. Respiratory protection credit was taken for use of the positive pressure respirators. In addition, respirators were made available to all workers if they chose to wear one.

Issuance records were maintained in a log book. All respirators were cleaned after each days use and surveyed for removable alpha contamination. The respirators were cleaned by a contractor employee whose job consisted of cleaning the change room and eating area, and cleaning respirators. Respirator surveys were performed by a member of the Homestake staff. Fit testing and medical certification records were reviewed and found to be acceptable.

4.3 External Exposure and Contamination Control

The licensee's program for the determination of external exposures consisted of the issuance of thermoluminescent dosimeters (TLDs) to all employees working within the restricted area. The TLDs were exchanged and read quarterly. A review of data for the period of mill decommissioning revealed that quarterly exposure was 53 mRem.

Control of personnel contamination was achieved by requiring all workers to monitor prior to leaving the restricted area. Periodic spot checks and visual observation of personnel leaving the site were performed by the radiation safety department. Records indicate that the licensee performed a daily performance check on all site friskers.

The licensee performed weekly contamination surveys of the change room, some office areas and 7 lunch areas. Other areas such as the respirator issuance room, maintenance shop and guard house were also surveyed. The surveys were performed to determine the levels of fixed and removable contamination. The licensee uses an action level for removable contamination of 250 dpm/100 cm^2 . A review of the data collected indicated that no areas exceeded the action level since the last inspection.

4.4 Conclusion

The inspectors concluded that the licensee's radiation safety program was being conducted in accordance with license requirements, and was appropriate for the current status of the facility.

5 RADIOACTIVE WASTE MANAGEMENT (88035)

5.1 Construction Observations

Prior to observing the construction activities currently in progress, a licensee representative summarized the decommissioning and reclamation work that has been completed. The mill has been disassembled and buried on site. Reclamation is proceeding on the larger of the two tailings impoundments which consists of two cells. The embankment outslopes of the two cells have been cut back to 5H:1V and a 1-foot thick interim soil cover has been placed on the tops of both cells. Settlement monitoring continues to indicate that both cells are still in a primary settlement mode with the greatest magnitude of settlement occurring in the west cell. To improve the efficiency of the ground-water corrective action program, a reverse osmosis unit is being installed. This unit will be operational in about a week. In addition, the licensee is drilling new wells on top of the tailings cells to accelerate water removal and settlement.

Current construction activities observed included placement of radon attenuation barrier on the south slope of the west tailings cell embankment, and cleanup of windblown tailings from the county road north of the site. Radon barrier material is moisture conditioned in the borrow areas before it is transported by scrapers to the embankment outslopes. Once the material is placed on the outslopes, it is spread to the specified depth by a road grader and then compacted by specially designed sheepsfoot rollers. The licensee is also rebuilding the county road north of the site as the road was disturbed in the process of picking up windblown materials.

The approved reclamation plan requires an 8-foot thick radon attenuation barrier on the large impoundment. Since that plan was approved, the licensee performed additional tests on soils and tailings. Based on test results, the licensee proposes to reduce the required radon barrier thickness from 8 feet to 4.7 feet. The new design has been submitted to the NRC for review and approval. The NRC, however, has not yet approved the new design.

The licensee has also constructed several test areas with varying thicknesses of radon attenuation barrier. Radon emanation will be measured and the data will be used to calibrate the RADON computer model.

5.2 Quality Control

The quality control (QC) testing is being performed by Knight Piesold & Co., a contractor that is independent of the construction contractor. The construction quality control program was inspected by selective examination of records and procedures. Compaction test results, daily logs, and summaries were reviewed. The inspectors examined the radon attenuation barrier placement and testing records.

The QC contractor has organized the construction compaction records by lift. The entire disposal area has been divided into 100 by 100 foot grids. These grids are used to identify each QA test by a northing-easting designation and the tests are consecutively numbered. Each test is also identified by a

letter to indicate the type of material placed. For example, "R" indicates radon barrier material and "I" indicates interim cover material. When a test fails to meet the approved specifications, the retests use the same test number followed by a letter. The first retest is identified by an "A", the second retest by a "B", etc.

The specifications require that radon barrier material be placed in lifts (layers) not greater than 6 inches thick. Therefore, the volume of material placed in each 100-foot by 100-foot grid is about 185 cubic yards (cy). During the early phases of radon barrier material placement, the QA contractor performed one field density (sand cone) test per grid or one test per 185 cy. This testing frequency more than met the approved specification of one test per 500 cy. Once the uniformity of the soil borrow area was determined the licensee reduced the testing frequency to at least one test per 500 cy. A review of the records indicated that an adequate number of field density tests met both the density requirement of 95 percent of Proctor density and the moisture requirement of ± 2 percent of optimum moisture. The QA contractor is also using a nuclear density gauge to supplement the sand cone tests. However, since an acceptable correlation between the sand cone and the nuclear gauge has not yet been established, as required in the specifications, the licensee is not considering the results of the nuclear gauge when determining the number of field density tests required.

In addition to field density tests, the specifications require gradation/classification tests and laboratory (Proctor) density tests. The specified testing frequency is one gradation/classification test per 1000 cy, one full Proctor test per 5000 cy, and one one-point Proctor test per 2500 cy. A review of the daily testing records indicated that the number of tests performed met or exceeded the testing requirements in the specifications. The gradation/classification records also showed that the radon barrier material met the approved specifications in that the soil contained at least 25 percent passing the No. 200 sieve, and the Atterberg Limits plotted above the "A" line on a Plasticity Chart.

5.3 Conclusion

The inspectors concluded that the licensee is performing reclamation of the tailings retention system in accordance with license requirements. The inspectors did note that the proposed revision to the radon barrier design has not yet been approved by the NRC. However, the issue of the radon barrier thickness should be resolved well before the licensee approaches the proposed 4.7 foot thickness.

6 FOLLOWUP (92701)

No items requiring followup were identified during the previous inspection.

ATTACHMENT

1 PERSONS CONTACTED

1.1 Licensee Personnel

- *F. Craft, Resident Manager/Radiation Protection Administrator
- M. Mazon, Environmental Technician
- A. Venable, Environmental Technician

1.2 Contractor Personnel

- A. Kuhn, AK GeoConsult, Inc.
- D. Jameson, Knight Piesold & Co.

1.3 NRC Personnel

- *L. Carson, Radiation Specialist
- *R. Evans, Radiation Specialist
- *K. Hooks, Project Manager

In addition to the personnel listed above, the inspectors contacted other personnel during the inspection.

*Denotes personnel that attended the exit meeting.

2 EXIT MEETING

An exit meeting was conducted at the conclusion of the inspection on May 10, 1994. During this meeting, the inspectors reviewed the scope and findings of the inspection. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspectors.

IFS Data Entry Form

Reviewed By: _____

Date: 6/2/94

Site/Name: Homestake Mining Co.

Report Transmittal Date: 1/1

Lead Inspector: PBG Responsible Org. Code: 4302

Report End Date: 1/1

Region: 4

Report NBR: A 94-01
 Docket NBR: 40-8903

B _____
 C _____

Materials Only
 License NBR
SWA-1471

*Docket Name

Update? (Y/N): _____ Opened IR/LER/P21 LOG/IFS Number: _____

***Sequence NBR: 01 Item Type: _____ **Severity: _____ **Supplement: _____

Status	*UPD I/R	*Proj. Closeout	*Actual Closeout	Materials Only		
				10 CFR	License Cond.	Tie Down
A	_____	____/____/____	____/____/____	_____	_____	_____
B	_____	____/____/____	____/____/____	_____	_____	_____
C	_____	____/____/____	____/____/____	_____	_____	_____

Title: _____ (55 character width)

*Closeout Org: _____ *Closeout EMP: _____ *Contact EMP: _____ *Procedure: _____ *Functl Area: _____
 *Cause CD: _____ **EA Number: _____ **NOV/NNC Issue Date: ____/____/____

Text: _____

Update? (Y/N): _____ Opened IR/LER/P21 LOG/IFS Number: _____

***Sequence NBR: 02 Item Type: _____ **Severity: _____ **Supplement: _____

Status	*UPD I/R	*Proj. Closeout	*Actual Closeout	Materials Only		
				10 CFR	License Cond.	Tie Down
A	_____	____/____/____	____/____/____	_____	_____	_____
B	_____	____/____/____	____/____/____	_____	_____	_____
C	_____	____/____/____	____/____/____	_____	_____	_____

Title: _____ (55 character width)

*Closeout Org: _____ *Closeout EMP: _____ *Contact EMP: _____ *Procedure: _____ *Functl Area: _____
 *Cause CD: _____ **EA Number: _____ **NOV/NNC Issue Date: ____/____/____

Text: _____

* Optional Fields.
 ** Severity, Supplement, and NOV/NNC only applicable for Violations; EA Number only applicable for Apparent Violations.
 *** Sequence NBR is not applicable for docket related/P21, LER, or non-docket related items.

ITEMS CONTINUED? (Y/N): N