

Radiation Protection Consultant

Noel Savignac, Ph.D.

ALARA AUDIT
OF THE
RADIATION SAFETY AND ENVIRONMENTAL
MONITORING PROGRAMS
AT
HOMESTAKE MINING COMPANY
GRANTS, NEW MEXICO

BY

NOEL SAVIGNAC
RADIATION PROTECTION CONSULTANT

Audit Conducted: December 17, 1996

Report Date: January 9, 1997

Re: Source Materials License SUA-1471

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ALARA AUDIT FINDINGS

An "as Low As Reasonably Achievable" (ALARA) audit of the radiation safety and environmental monitoring programs was conducted on December 17, 1996 at the Homestake Mining Company uranium mill site near Grants, New Mexico. The audit was conducted by Noel Savignac, Radiation Protection Consultant, with the assistance of Roy Cellan, Radiation Safety Officer and Corporate Manager of Reclamation, Adrian Venable, Radiation Technician, and Joe Vigil. Each of the items in the audit report represents conditions observed during the audit, is based on records present at the time of the audit, and does not reflect corrective actions implemented by Homestake Mining Company between the time of the audit and the receipt of this audit report.

The ALARA audit evaluated the radiation protection and environmental monitoring programs based on the recommendations contained in the Nuclear Regulatory Commission (NRC) Regulatory Guide 8.31, "Information Relevant to Insuring that the Occupational Radiation Exposures at Uranium Mills will be as Low as Reasonable Achievable." Other documents that provided a basis for the audit are the 1995 ALARA Audit Report, and the Source Materials License SUA-1471. The audit is intended to serve as the 1996 annual review of the radiation protection program content and implementation required under 10 CFR 20.1101(c). The audit findings presented below are divided into Corrective Actions, Recommended Actions, and Observations:

CORRECTIVE ACTIONS

1. STANDARD OPERATING PROCEDURES

Observation - Standard operating procedures and the date of their last review are presented below:

EM-1	01-31-96	HP-7	06-05-95
EM-2	08-10-96	HP-8	02-28-96
EM-3	11-22-96	HP-9	Deleted
EM-4	02-27-96	HP-10	04-09-96
HP-1	02-27-96	HP-11	02-27-96
HP-2	06-05-95	HP-12	06-05-95
HP-3	02-27-96	HP-13	Deleted
HP-4	02-27-96	HP-14	02-27-96
HP-5	11-22-95	HP-15	11-22-95
HP-6	02-28-96	HP-16	02-28-96

Regulatory Position - Source Material License SUA-14-71 Condition 23 states:
"... In addition, the RPA shall perform a documented review of all existing operating procedures at least annually."

Finding - Five of the 18 standard operating procedures had not been reviewed within the last year. Two of the procedures had been deleted.

Corrective Action - Review the standard operating procedures that have not been reviewed in the last year. To help ensure that the reviews are conducted at least annually, review all of the procedures at one time. Schedule the review to occur at the same time each year. Other modifications can be made throughout the year as needed. After all of the procedures have been reviewed copies of the procedures manual possessed by Adrian Venable and Joe Vigil should be updated.

2. SITE RECLAMATION SCHEDULE

Observation - The final radon barrier has not been placed on top of the Large Impoundment because the settlement of the tailings had not reached the required 90 percent of the expected settlement. On December 18, 1996 a letter was submitted to the Nuclear Regulatory Commission (NRC) requesting a revised completion date for the installation of the final radon barrier on the Large Impoundment.

Regulatory Position - Source Materials License SUA-1471 Condition 36 states: "The licensee shall complete site reclamation in accordance with an approved reclamation plan. The ground-water corrective action plan shall be conducted as authorized by License Condition No. 35. All activities shall be completed in accordance with the following schedules... A (3) To ensure timely compliance with target completion dates established in the Memorandum of Understanding with the Environmental Protection Agency (56 FR 55432, October 25, 1991) the licensee shall complete reclamation to control radon emissions as expeditiously as practicable, considering technological feasibility, in accordance with the following schedule: ... (3) Placement of final radon barrier designed and constructed to limit radon emissions to an average flux of no more than 20 pCi/m²/sec For the Large Impoundment which has no evaporation ponds - December 31, 1996.

Finding - The final radon barrier will not be placed on the Large Impoundment by December 31, 1996.

Corrective Action - After the audit the letter requesting a new completion date for the installation of the final radon barrier on the Large Impoundment was submitted to the NRC.

3. QUALITY CONTROL PROGRAM FOR SOIL VERIFICATION

Observation - Reports of the radiological analyses of soil samples including quality assurance samples were received from Energy Laboratories throughout the year and most of the reports were initialed by the Homestake Radiation Protection Administer as the reports were received. Knight Piesold Corporation and Alan

Kuhn conducted specific quality assurance and quality control assessments for the soil cleanup verification program which is now complete. A spot check of the number of quality assurance analyses using wet chemical or gamma spectrometry analyses compared to the total number of analyses indicated that the quality assurance samples accounted for 28% of the total number of samples. Wet chemical quality control analyses account for 15% of the total number of samples analyzed.

Regulatory Position - Source Material License SUA-1471 Condition 29.E states: "The licensee shall implement a quality control (QC) program for the soil cleanup verification program which consists of recounting using offsite gamma spectroscopy equipment or chemical analysis by a vendor laboratory of at least 15 percent of all soil samples collected. In addition, a minimum of 5 percent of the QC samples shall be chemically analyzed. Results of the QC program shall be evaluated by the Radiation Protection Administrator and the evaluation documented at least monthly during the [soil cleanup] verification sampling program."

Finding - The Radiation Protection Administrator did not provide the formal monthly documented evaluation of the quality assurance program for the soil cleanup verification program. However he did review the soil sampling results. In addition he contracted two consultants to perform specific quality control assessments and processed a larger percentage of quality control samples than was required. Those additional actions appear to compensate for the lack of a formal monthly evaluation of the quality control program.

Corrective Action - No corrective action is recommended at this time.

RECOMMENDATIONS

1. TAILINGS EMBANKMENT INSPECTIONS

Observation - The last tailings impoundment inspection was conducted December 15, 1996.

Regulatory Position - Source Materials License SUA-1471 Condition 12 states: "Periodic embankment inspections of the large and small tailings embankment shall be conducted by a knowledgeable individuals who are familiar with the site and mining operations. An annual status report shall be included in the Semi-Annual Environmental Report for the second half of the year."

Finding - The tailings impoundment inspection is due.

Recommendations - Homestake or contractor personnel who are familiar with the site and mining operations should inspect the large and small tailings embankments preferably within a month of the last annual inspection. The inspection report is to be included in the Semi-Annual Environmental Report for the second half of the year.

2. SAMPLING AND MONITORING PROGRAM REDUCTIONS

Observation - In 1996 Homestake had 66 uranium in urine bioassay analyzed of which 61 were for terminated employees or contractors. The highest uranium in urine result was 5 µg/L.

In the first quarter of 1996 personnel and environmental gamma radiation levels were determined using 52 thermoluminescent dosimeters (TLDs). The highest gamma dose measured was 0 mrem/quarter. During the final quarter 1996 36 TLDs were used.

During 1996 radon was measured at 42 sampling locations around the mill site.

Regulatory Basis - Source Materials License SUA-1471 Condition 24 states: "The licensee shall be required to use a Radiation Work Permit (RWP) for all work or nonroutine maintenance jobs where the potential for significant exposure to radioactive material exists and for which no standard written procedure already exists. The RWP shall be approved by the RPA or his designee, qualified by way of specialized radiation protection training, and shall at least describe the following:

- A. The scope of the work to be performed.
- B. Any precautions necessary to reduce exposure to uranium and its daughters.
- C. The supplemental radiological monitoring and sampling necessary prior to , during, and following completion of the work."

Source Materials License SUA-1471 Condition 35 states: "The licensee shall implement a compliance monitoring program containing the following:

- A. Implement the monitoring program shown in Table 2 of the licensee's September 2, 1993 submittal and Table 3 of the licensee's January 9, 1995 submittal."

Table 2 specifies that gamma radiation will be monitored at 7 locations and that radon gas will be monitored at 8 locations.

Finding - The uranium in urine sampling program, the TLD gamma monitoring program, and the radon monitoring program are all in compliance with the Source

Materials License. However all three programs appear to contain more sampling and monitoring than is justified by the low levels measured in each program.

Recommendation - Implement a minimal but adequate sampling and monitoring programs as presented below:

Uranium in urine - Collect urine samples only from those employees and contractors that come into contact with uranium mill tailings, those employees and contractors that terminate employment or a job assignment that required participation in the urinalysis program, or as determined by the RPA. Terminate the routine semi-annual urinalysis program for employees.

TLD gamma monitoring - Provide TLDs only to those individuals who spend a majority of their work time on top of the uncovered mill tailings pile. Representative workers may be selected to wear TLDs from each category or worker on top of the pile. TLDs are needed at only 6 locations around the mill and at the designated background location. Delete gamma monitoring at the other locations around the mill.

Radon monitoring - Track etch detectors are needed at only 7 locations around the mill and at the designated background location. Delete radon monitoring at the other locations around the mill.

3. SOURCE MATERIAL LICENSE CONDITIONS - UPDATE

Observation - The following Source Material License SUA-1471 Conditions need to be updated as indicated below for the reasons specified: (Strikeouts indicate deleted test. Highlights indicate inserted test.)

Condition 9: Authorized Place of Use: The licensee's uranium mill located in Cibola County, New Mexico ~~and the licensee's auxiliary ion exchange facility located in McKinley County, New Mexico.~~

Recommendation - The ion exchange facility has been removed from the site during 1990-1991. A letter requesting the deletion was submitted to Joseph Holonich with the NRC on December 15, 1996. Follow-up contacts with the NRC are recommended.

Condition 29.E: ~~The licensee shall implement a quality control (QC) program for the soil cleanup verification program which consists of recounting using offsite gamma spectroscopy equipment or chemical analysis by a vendor laboratory of at least 15 percent of all soil samples collected. In addition, a minimum of 5 percent of the QC samples shall be chemically analyzed. Results of the QC program shall be evaluated by the Radiation Protection Administrator and the evaluation~~

~~documented at least monthly during the [soil cleanup] verification sampling program.~~

Recommendation - The soil cleanup verification sampling program has been completed and submitted to the NRC December 18, 1995. Deletion of license condition 29.E is recommended.

Condition 32.A: The licensee shall comply with the following:

~~A. The quantity of air sampled and the method of analysis shall result in a lower limit of detection (LLD) for all in-plant air sampling of at least 10 percent of the respective maximum permissible concentration for restricted areas.~~

Recommendation - In-plant air sampling is no longer conducted since the mill is no longer in existence. Deletion of license condition 32.A is recommended.

Condition 35.A: The licensee shall implement a compliance monitoring program containing the following:

~~A. Implement the monitoring program shown in Table 2 of the licensee's September 2, 1993 submittal and Table 3 of the licensee's January 9, 1995 abmittal. the attached Tables 1, 2, and 3.~~

Recommendation - License condition 35.A does not list the environmental Monitoring program presented in Table 1. The vegetation and soil monitoring programs were deleted from Table 1 with the approval of license amendment 24 on June 30, 1996. Thus to avoid confusion license condition 35.A should be modified and Tables 1, 2, and 3 attached to all copies of the license.

Condition 36: The licensee shall complete site reclamation in accordance with an approved reclamation plan. The ground-water corrective action plan shall be conducted as authorized by License Condition No. 35. All activities shall be completed in accordance with the following schedules... A (3) To ensure timely compliance with target completion dates established in the Memorandum of Understanding with the Environmental Protection Agency (56 FR 55432, October 25, 1991) the licensee shall complete reclamation to control radon emissions as expeditiously as practicable, considering technological feasibility, in accordance with the following schedule: ... (3) Placement of final radon barrier designed and constructed to limit radon emissions to an average flux of no more than 20 pCi/m²/sec. For the Large Impoundment which has no evaporation ponds - ~~December 31, 1996. Insert new date.~~

Recommendation - Negotiate a new date for the placement of the final radon barrier on the Large Impoundment and insert the new date into license condition 36.

Condition 37.B: The radon barrier for the small impoundment shall be ~~14 feet thick~~
... Insert new thickness.

Recommendation - Negotiate a more realistic thickness of radon barrier and insert the thickness into license condition 37..

3. LOWER LIMITS OF DETECTION

Observation - The lower limit of detection (LLD) for the uranium in urine analyses was not available during the audit. However the following day a 1993 letter from Energy Laboratories was found in the files that stated the LLD was 5 µg/L.

Regulatory Position - Source Materials License SUA 1471 Condition 32.B states:
"Analysis of urine samples shall utilize an LLD of at least 5 µg/L uranium."

Finding - The LLD for uranium in urine was provided and met the requirements of License Condition 32B.

Recommendation - A request should be submitted to Energy Laboratories to provide the LLDs for all analyses on each data report issued to Homestake Mining Company - Grants.

OBSERVATIONS

1. Fences around the mill site and tailings area were intact and posted with Caution Radioactive Materials signs.
2. All uranium mill tailings were present on the site are owned by Homestake Mining Company. No tailings samples were removed from the site in 1996.
3. The qualifications of Roy Cellan to serve as Radiation Protection Administrator (RPA) were compared with the requirements in Regulatory Guide 8.31. Roy Cellan appeared to be qualified to serve as RPA.
4. Twenty nine radiation work permits were issued during 1996.
5. The radiation level from the cabinet used to store radiation check sources was 13 µR/hr at 30 cm.
6. Reminder - A copy of the 1996 ALARA Audit Report is to be submitted to the NRC within 30 days of the completion of the audit. Since the ALARA audit was

conducted on December 17, 1996, this report should be submitted by January 17, 1996.