UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 20, 2020

David Pierce, Closure Manager
Grants Reclamation Project
Homestake Mining Co. of CA
P.O. Box 98/Highway 605
Grants, NM 87020

SUBJECT: HOMESTAKE MINING COMPANY OF CALIFORNIA, REQUEST FOR ADDITIONAL INFORMATION, FINAL STATUS SURVEY AND DISPOSITION SURVEY REPORT FOR PIPING MATERIALS, DOCKET NO. 04008903, LICENSE SUA-1471, EA-16-114

Dear Mr. Pierce:

On March 28, 2017, the U.S. Nuclear Regulatory Commission (NRC) issued a Confirmatory Order (CO) to the Homestake Mining Company of California (HMC) (Agencywide Documents Access and Management System [ADAMS] Accession No. ML17061A455). In accordance with Conditions 14 and 15 of the CO, HMC developed a Land Application Assessment Report and a Final Status Survey (FSS) Report to demonstrate that the radiological doses and non-radiological risks in the land application area are below NRC-approved remedial action levels.

HMC submitted the requested Land Application Impact Assessment Report, dated September 25, 2017 (ADAMS Accession No. ML17270A066), as required by the CO. HMC submitted the requested FSS Report, dated July 2, 2018 (ADAMS Accession No. ML18186A568), as required by the CO to demonstrate that the concentrations of constituents of concern (COC) in soil across the land application irrigation areas do not exceed the proposed criteria for unrestricted release as specified in the Land Application Impact Assessment Report.

The NRC staff evaluated the results in HMC's FSS Report in order to determine if concentrations of COCs in soil meet the cleanup criteria for land in accordance with the requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 40, Appendix A, Criterion 6(6). By letter dated August 17, 2018, the NRC staff requested additional information (RAI) on the FSS Report (ADAMS Accession No. ML18205A460). HMC responded to the RAI in a letter dated September 20, 2018 (ADAMS Accession No. ML18269A123). Included with the RAI responses was a previous-prepared report titled "Disposition Survey Report for Piping Materials," dated December 2014, that documented HMC's survey of the piping used to transport water in the land application irrigation areas as part of the groundwater irrigation program (ADAMS Accession No. ML18269A124).

After reviewing HMC's responses to NRC RAI and the Disposition Survey Report for Piping Materials, the NRC staff has follow-up RAIs to address open issues generated from HMC's September 20, 2018, RAI responses and submission of the Disposition Survey Report for Piping Materials (ADAMS Package Accession No. ML18269A194). These RAIs need to be resolved

for NRC staff to complete its review of the FSS Report and the Disposition Survey Report for Piping Materials to evaluate completion of CO Conditions 14 and 15. The NRC staff requests a response to these RAI's by July 31, 2020.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records 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).

If you have any questions regarding this letter, please contact me at (301) 415-7777 or by e-mail to Ron.Linton@nrc.gov.

Sincerely,

Ron C. Linton

Digitally signed by Ron C. Linton
Date: 2020.04.21 10:28:56 -04'00'

Ron C. Linton, Project Manager
Uranium Recovery and Materials
Decommissioning Branch
Division of Decommissioning, Uranium Recovery and Waste Programs
Office of Nuclear Materials Safety and Safeguards

Docket No. 040-08903
License No. SUA-1471

Enclosure:
NRC Request for Additional Information

cc: via ListServ
K. Vollbrecht (NMED)
C. Burrus (OSE)
M. Purcell (EPA)
B. Tsosie (DOE)

SUBJECT: HOMESTAKE MINING COMPANY OF CALIFORNIA, REQUEST FOR ADDITIONAL INFORMATION, FINAL STATUS SURVEY AND DISPOSITION SURVEY REPORT FOR PIPING MATERIALS, DOCKET NO. 04008903, LICENSE SUA-1471, EA-16-114, **DATE: April 20, 2020**

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ADAMS Accession No.: ML20107J517 ***via e-mail**

Office	DUWP	DUWP	DUWP	DUWP
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REQUEST FOR ADDITIONAL INFORMATION
HOMESTAKE MINING COMPANY OF CALIFORNIA
Docket Number: 040-08903
License Number: SUA-1471

RAI No. 1:

Description of Deficiency

There is insufficient clarity on the disposition of piping associated with the land application program.

Basis for Request

In its letter dated September 20, 2018 (Agencywide Documents Access and Management System [ADAMS] Package Accession No. ML18269A194), Homestake Mining Company of California (HMC) responded to a request for additional information (RAI) from the Nuclear Regulatory Commission (NRC) staff for details on the disposition of piping associated with the land application program. In its response to RAI 1, HMC stated that the polyvinyl chloride (PVC) irrigation pipe will be disposed of in the designated disposal areas in the small tailings pile. However, in its response to RAI 2, HMC stated that disposition of the surveyed PVC piping has not been decided.

Request for Additional Information

Please provide a clear description of the disposition of the PVC piping material associated with the land application program.

RAI No. 2:

Description of Deficiency

There is insufficient clarity on the release limits applied to the surveys performed on piping associated with the land application program.

Basis for Request

In its letter dated September 20, 2018 (ADAMS Package Accession No. ML18269A194), HMC responded to a request from NRC staff for details on surveys performed on piping associated with the land application program. In its response to RAI 2, HMC stated that the surveys for the PVC piping were conducted consistent with License Condition 14 of SUA-1471 (ADAMS Accession No. ML18354B131). However, in the same response, HMC also stated that the release criteria for unrestricted use were consistent with those specified in NRC Regulatory Guide (RG) 8.30, Health Physics Surveys in Uranium Recovery Facilities. The stated release criteria applied to the PVC piping were gross alpha activity (determined from scans), removable alpha activity (determined from large area wipes), and gamma radiation levels not to exceed twice established background.

HMC provided additional detail on its release criteria applied to PVC piping associated with the land application program in Attachment 1 (Disposition Survey Report for Piping Material (Survey Report), ADAMS Accession No. ML18269A124) to its September 20, 2018 response to RAI. In the conclusion section of this attachment, HMC stated that "…the piping material can be considered for release with unrestricted use consistent with Condition 14 of SUA-1471".

The criteria applied to the radiological surveys performed on PVC piping associated with the land application program do not appear to meet the release limits established in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials," (the Guidelines), dated September 1984. For example, HMC applied a gamma count rate limit of twice background levels for the external scans of PVC piping using a Ludlum Model 44-10 sodium iodide detector. It is not clear to the NRC staff how this criterion was established or its relationship to NRC release requirements.

In addition, HMC did not address beta surveys or the exposure rate criteria specified in the Guidelines. The NRC staff previously provided HMC with a history of the Guidelines and stated that the Guidelines are the only generally acceptable Commission-approved procedures for releasing material for unrestricted use for materials licensees (ADAMS Accession No. ML19256B148).

Request for Additional Information

Please provide survey results for PVC piping that address the release limits established in the Guidelines or provide a justification why the release criteria applied to PVC piping address the release limits established in the Guidelines.

RAI No. 3:

Description of Deficiency

There is insufficient clarity regarding the survey methods used for determining removable surface contamination levels on the inside of PVC piping.

Basis for Request

The requirements in 10 CFR 20.1501 address survey and monitoring programs. HMC provided details on its survey methodology for determining removable surface activity levels on PVC piping in its September 20, 2018, RAI response and the attached Survey Report.

In Section 4.1 of the Survey Report, HMC stated that it used a large area cloth to wipe the interior opening of each side of the pipe and then used a plastic scintillator detector to determine the activity on the cloth. HMC provided a formula for determining the surface activity of the PVC piping based on the total counts on the cloth underneath the detector, the area of the detector, and other factors.

However, it is not clear to the NRC staff how the activity on the cloth is related to the surface activity of the PVC piping.

Request for Additional Information

Please provide the following information related to the use of the cloth for determining removal surface activity levels on the PVC:

a) Please provide the dimensions of the large area cloth used to wipe the inside of the piping and what percentage of the area of the large area cloth was placed under the detector during the sample counting time.

b) Please describe how the activity measured on the large area wipe is related to any 100 square centimeters (cm^2) area of the inside of the piping, including total surface area wiped and the assumed fraction of surface radioactivity transferred from the piping to the large area wipe.

RAI No. 4:

Description of Deficiency

There is insufficient clarity on the methods used for the determination of the minimum detectable activity (MDA) [and the related minimum detectable concentration (MDC)] for the survey equipment used to release PVC piping.

Basis for Request

The requirements in 10 CFR 20.1501 specify that a licensee shall ensure that instruments and equipment used for quantitative radiation measurements are calibrated periodically for the radiation measured.

HMC did not address expected radionuclide mixtures at the site and did not provide an appropriate formula for determining the scan (i.e., slowly moving) MDA. The formula provided by HMC for scan MDA is essentially the same formula that it used for static (i.e., stationary) surveys.

In response to a license amendment request by HMC dated June 9, 2019 (ADAMS Accession No. ML19183A432), the NRC staff provided comments (ADAMS Accession No. ML19256B148) on HMC's standard operating procedures related to equipment release surveys. These comments included a discussion on the lack of consideration of the mixture of radionuclides expected at the Homestake facility in determining survey equipment MDA and the lack of an appropriate scan MDA determination. Additional detailed information on an example of incorporating mixtures of radionuclides and scan MDA (or MDC) as they related to equipment release, and related references, can be found in ADAMS Accession No. ML15295A045.

In Table 5 of the Survey Report, HMC provided the MDA for several of the instruments used in the piping surveys. The MDA for the Geiger-Mueller (GM) arrays ranged from 3,910–4,998 disintegrations per minute (dpm)/100 cm^2.

License Condition 32 of SUA-1471 requires HMC to follow the guidance in RG 8.30, Health Physics Surveys in Uranium Recovery Facilities. Table 3 in RG 8.30 provides the lower limit of detection (LLD) for various surveys. The LLD is closely related to the MDA and for all practical purposes is the same for scan surveys. For equipment release surveys, Table 3 specifies an LLD (MDA) of 500 dpm/100 cm^2. This inconsistency between HMC's MDA requirements and those specified in RG 8.30 was documented in NRC staff's October 4, 2019 letter to HMC (ADAMS Accession No. ML19256B148).

Request for Additional Information

Please provide the following information related to the determination of MDA for survey equipment used to release PVC piping materials as described in the Survey Report:

a) Please provide a description of the expected potential radionuclide mixture remaining on the deactivated PVC piping materials.

b) Based on the response to (a) above, please provide counting efficiency calculations that consider the potential radionuclide mixture remaining on the deactivated PVC piping materials.

c) Please provide an appropriate methodology for determining scan MDA or provide a justification for why the equation in Section 3.2.2 in the Survey Report is acceptable.

d) For alpha and beta (as appropriate) surveys, please provide a demonstration that the calculated static and scan MDAs meet regulatory requirements. Please include a discussion on how scan speed, distance between detector and potentially contaminated surface, and detector orientation will be controlled during surveys (see discussion in ADAMS Accession No. ML15295A045 and ML16050A513).

e) For the gamma arrays, please provide the following:

   i. Please clarify whether the GM tubes are the Ludlum model 44-9 (as stated in Section 3.1 of the Survey Report) or an LND GM tube (as stated in Table 2 of the Survey Report). If the LND GM tube is used, please specify the model number.

   ii. The MDA for two of the gamma arrays is close to the release limit of 5000 dpm alpha/100 cm^2 and is impacted by the background radiation during scanning measurements. Please clarify the number of work days the scanning measurements were performed on the PVC piping and whether MDA was recalculated at certain intervals or if a single MDA calculation was performed and applied to all measurements.

   iii. Please provide a brief description on how the MDA for each GM array was calculated.

RAI No. 5:

Description of Deficiency

HMC has proposed leaving PVC buried in place after releasing land application areas for unrestricted use. The NRC staff has not seen a specific survey proposal or results of the proposed survey in order to make a determination as to whether this would be acceptable.

Basis for Request

Condition 14 of the Confirmatory Order EA-16-114 requires HMC to assess any impacts due to the use of the irrigation water containing byproduct material to past, current, or foreseeable future uses of the land application areas.

The NRC staff requires additional information on the methods and criteria used for surveying land application piping. Therefore, no determination can be made at this time as to the status of the piping that has been removed or is proposed to be left in place. As a result, assessment of impacts is not complete at this time.

Request for Additional Information

Please provide a schedule for submitting specific surveys for buried PVC piping proposed to be left in place in the land application areas.

RAI No. 6:

Description of Deficiency

There is insufficient clarity on HMC's basis for determining that Th-230 is not a potential constituent of concern in the land application areas.

Basis for Request

10 CFR 40, Appendix A, Criterion 6(6), requires, in part, that byproduct material containing concentrations of radionuclides other than radium in soil must not result in a total effective dose equivalent exceeding the benchmark dose. In addition, if more than one residual radionuclide is present in the same 100-square-meter area, the sum of the ratios for each radionuclide of concentration present to the concentration limit will not exceed "1".

According to HMC, Th-230 was not included in the benchmark analysis because this radionuclide was not found in applied irrigation water at levels significantly different than background in local groundwater.

Request for Additional Information

Please provide additional information on the determination that Th-230 was not found in applied irrigation water at levels significantly different than background in local groundwater. Please include any potential impact from any individual well(s) exceeding background Th-230 values.

RAI No. 7:

Description of Deficiency

There is insufficient clarity on reported surface soil sample concentration values of Ra-226 in Tables 5, 7, 9, and 11, in the Final Status Survey Report. Specifically, it is not clear to the NRC staff if these reported values include background contribution (gross values) or if these values represent background-corrected values (i.e., net activity).

Basis for Request

10 CFR 40, Appendix A, Criterion 6(6), requires, in part, that concentrations of radium in land, averaged over areas of 100 square meters, does not exceed the background level by more than 5 picocuries per gram of Ra-226.

Request for Additional Information

Please specify whether the reported surface soil sample concentration values of Ra-226 in Tables 5, 7, 9, and 11, in the Final Status Survey Report include background contribution (i.e., gross values) or if these values represent background-corrected values (i.e., net activity).