



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

July 31, 2018

Thomas Wohlford, Closure Manager
Grants Reclamation Project
Homestake Mining Company of California
P.O. Box 98/Highway 605
Grants, NM 87020

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION - COMPLIANCE OF
HOMESTAKE GRANTS, NEW MEXICO SITE WITH 10 CFR 20.1301 AND
10 CFR 20.1302

Dear Mr. Wohlford:

By letter dated February 25, 2015,¹ the Homestake Mining Company of California (HMC) submitted its Semi-Annual Environmental Monitoring Report for July-December 2014, in accordance with U.S. Nuclear Regulatory Commission (NRC) license SUA-1471. The NRC staff reviewed this report and requested that HMC provide additional information by letter dated December 16, 2015.² HMC responded to the NRC staff's request by letter dated January 19, 2016.³ The questions from the NRC staff focused on HMC's compliance with the requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 20.1301, *Dose limits for individual members of the public*, and 10 CFR 20.1302, *Compliance with dose limits for individual members of the public*. After a review of the response and following conversations with HMC, the NRC staff determined that the enclosed additional information request is necessary to complete its detailed technical review.

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).

¹ Agencywide Documents Access and Management System (ADAMS) Accession No. ML15068A205.

² ADAMS Accession No. ML15264B052.

³ ADAMS Accession No. ML16033A407.

T. Wohlford

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If you have any questions regarding this letter, please contact me at (301) 415-4090 or by e-mail to Jeffrey.White@nrc.gov.

Sincerely,

/RA/

Jeffrey A. Whited, Project Manager
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: Distribution List

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION - COMPLIANCE OF
HOMESTAKE GRANTS, NEW MEXICO SITE WITH 10 CFR 20.1301 AND
10 CFR 20.1302, DATED JULY 31, 2018

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REQUEST FOR ADDITIONAL INFORMATION
HOMESTAKE MINING COMPANY OF CALIFORNIA
REVIEW OF SEMI-ANNUAL ENVIRONMENTAL MONITORING REPORT
FOR JULY-DECEMBER 2014
Docket Number: 040-08903
License Number: SUA-1471

By letter dated February 25, 2015,¹ the Homestake Mining Company of California (HMC) submitted its Semi-Annual Environmental Monitoring Report for July-December 2014, in accordance with U.S. Nuclear Regulatory Commission (NRC) license SUA-1471. The NRC staff reviewed this report and requested that HMC provide additional information by letter dated December 16, 2015.² HMC responded to the NRC staff's request by letter dated January 19, 2016.³ The questions from the NRC staff focused on HMC's compliance with the requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 20.1301, *Dose limits for individual members of the public*, and 10 CFR 20.1302, *Compliance with dose limits for individual members of the public*. Specifically, the NRC staff had questions concerning the use of the radon concentration limits as identified in 10 CFR Part 20, Appendix B, *Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage*, Table 2 which are important for determining dose compliance.

After a review of the response and following conversations with HMC, the NRC staff determined that the requests for additional information (RAIs) below are necessary to complete its detailed technical review.

RAI 1

Description

In its Semi-Annual Environmental Report for the second half of 2017, dated February 22, 2018,⁴ HMC made a comparison to inappropriate effluent concentration values for radon values in air with no daughters. Furthermore, in its response to RAI #2 in letter dated January 19, 2016, HMC stated that the comparison of radon concentration in air to effluent concentration values from 10 CFR Part 20 Appendix B, Table 2 is not required and that it would no longer report these comparisons.

¹ Agencywide Documents Access and Management System (ADAMS) Accession No. ML15068A205.

² ADAMS Accession No. ML15264B052.

³ ADAMS Accession No. ML16033A407.

⁴ ADAMS Accession No. ML18066A088.

Enclosure

Basis of Request

According to National Council on Radiation Protection (NCRP) Report No. 97, dated November 1988, short-lived Rn-222 daughters, Po-218, Pb-214, Bi-214, and Po-214, when inhaled, are the radionuclides that deliver the alpha radiation dose to the bronchial tissue that is implicated in radiogenic lung cancer. The influence of the short-lived Rn-222 daughters can be seen in the two concentration limits for Rn-222 in 10 CFR 20, Appendix B, Table 2. The concentration limits for Rn-222 with daughters is 0.1 pCi/L, whereas, the concentration limits for Rn-222 with no daughters is 10 pCi/L. The concentration limits for Rn-222 (with daughters) takes into consideration the short-lived Po-218, Pb-214, Bi-214, and Po-214 radionuclides. It is important to understand that any pure radon released from the facility to the environment will immediately start to produce an ingrowth of daughter products with time and will be present in some quantity or concentration after leaving the facility. Thus, the use of the Rn-222 concentration limits without daughters does not take into account the dose delivered by the Rn-222 daughters. The comparison of actual radon concentrations in air to the 10 CFR 20, Appendix B, Table 2 for Rn-222 concentration with no daughters is not accurate. The comparison of the actual radon concentrations at the air sampling stations to the 10 CFR 20 Appendix B, Table 2 limit implies that we are only concern with the dose from radon without daughters. A comparison of the actual radon concentrations at the air sampling stations to the 10 CFR 20 Appendix B, Table 2 for Rn-222 with daughters is acceptable. This is discussed in further detail in Appendix 1 to Interim Staff Guidance FSME-ISG-01, *Evaluations of Uranium Recovery Facility Surveys of Radon and Radon Progeny in Air and Demonstrations of Compliance with 10 CFR 20.1301*.⁵

Request

The NRC staff requests that HMC no longer report comparisons of measured concentrations in air at perimeter monitoring stations to effluent concentration values from 10 CFR Part 20 Appendix B, Table 2 and use the dose method consistent with 10 CFR 20.1301 and 10 CFR 20.1302.

RAI 2

Description

In its response to RAI #2, HMC stated that it chooses to demonstrate compliance with the public dose limits with 10 CFR 20.1302(b)(1) using monitoring locations HMC-4 and/or HMC-5 to represent the nearest occupied residence, the individual likely to receive the highest dose from the licensed operation.

⁵ ADAMS Accession No. ML13310A198.

Basis of Request

The NRC staff determined that the decision to use the public dose limits with 10 CFR 20.1302(b)(1) is acceptable, but it is not clear what dose conversion factor will be used in determining compliance with the public dose limits.

Request

The NRC staff requests that HMC commit to computing the dose limit where the dose conversion factor is based on the air radon concentration of 10 CFR Part 20 Appendix B, Table 2, with daughters and appropriate equilibrium ratios or provide justification as to why radon concentration without daughters is acceptable. Additionally, it is requested that HMC provide equation(s), equilibrium ratios, occupancy factors, and any other factors it considers appropriate to the NRC staff to demonstrate compliance with the public dose limits and provide any justifications for any changes for future submittals of environmental monitoring reports. These parameters, along with calculated radon release rates from the tailings, can be used in the MILDOS program to compute radiation doses to members of the public.

RAI 3

Description

In its response to RAI #4, HMC indicated that the radon released from the water treatment system are insignificant compared to releases from direct radon emissions from the Large Tailing Pile (LTP) and Small Tailings Pile (STP).

Basis of Request

The NRC staff has determined that there is an insufficient technical basis provided by HMC to support the statement that the radon released from the water treatment system are insignificant. The radiation dose to a member of the public should be based on all release points and justification should be provided in detail to demonstrate if a release source is insignificant.

Request

The NRC staff requests that HMC demonstrate, preferably by measurements from the main release point of the water treatment system, and not at some distant environmental monitoring station receptor point that the radon releases are insignificant.

RAI 4

Description

In a response to RAI #1, Homestake provided justification and reference for an occupancy factor of 0.75 and an equilibrium factor of 0.2 at monitoring stations HMC-4 and HMC-5.

Basis for Request

- a) NUREG/CR-5512, Volume 1, Residual Radioactive Contamination from Decommissioning,⁶ recommends an overall (indoor and outdoor) occupancy factor of 0.75 for a residential scenario. However, when demonstrating compliance with 10 CFR 20.1301, the licensee must understand the occupancy factors for an actual individual member of the public near the site. As such, the NRC staff needs a better understanding of the occupancy factor for residences near HMC.

It is recommended that HMC conduct an occupancy factor survey of the residences near HMC to reflect a more representative occupancy factor, similar to that discussed in NUREG-1736, Consolidated Guidance: 10 CFR 20-Standards for Protection Against Radiation,⁷ or assume an occupancy factor of 1.

- b) HMC referenced the User's Guide for the COMPLY-R Computer Code dated October 1989. The guide states, "With $t = 11.8$ minutes, $F_{out} = 0.2$ which is consistent with the observed equilibrium fraction in mine vents." It further states, "Thus, the outdoor equilibrium fraction at the receptor is 0.2 **plus** the increase that occurs during transit" (highlight for emphasis). The equation used by Homestake and referenced in the COMPLY-R Computer Code appears to be designed for mine vents. The large tailings (LTP) and small tailings pile (STP) are not mine vents.

NCRP Report No. 97, states, "The degree of equilibrium is a critical factor for inhalation exposure and is as important as the radon concentration itself." According to NRC regulations, a licensee is allowed to use adjustment factors (i.e., equilibrium factors) to demonstrate compliance with 10 CFR 20, Appendix B, Table 1 values for Rn-222 (with daughters). NCRP Report No. 97 provides equations for determining the Equilibrium Equivalent Concentration (EEC), expressed in pCi/L, and the Equilibrium Factor to determine the degree of equilibrium. Using radon and radon daughter concentrations (corrected for pCi/L) information from a MILDOS calculation provided by Homestake, NRC staff determined that the degree of equilibrium (or Equilibrium Factor) is 0.34 at HWC-5. This is much higher than the efficiency factor of 0.2 recommended by Homestake. Furthermore, NRC staff has determined that the equilibrium factor must be applied to the 10 CFR 20, Appendix B, Table 1 value for Rn-222 with daughters and not to the value for Rn-222 with no daughters.

Request

Please provide further justification for using an occupancy factor of 0.75 for residence and an equilibrium factor of 0.2.

⁶ ADAMS Accession No. ML010940257.

⁷ ADAMS Accession No. ML013330106.