OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
AUDIT PLAN FOR THE HOMESTAKE MINING COMPANY OF CALIFORNIA
GROUNDWATER FLOW AND CONTAMINANT TRANSPORT MODEL

Docket No. 040-08903

AUDIT PLAN

Licensee: Homestake Mining Company of California (HMC)

Duration: Six to nine months from kickoff meeting

Locations: HMC, Grants Reclamation Project (GRP) office, Nuclear Regulatory Commission (NRC) Headquarters, with other meeting locations to be determined as needed, and the option to hold virtual meetings via Teams.

Audit Team: NRC staff
Department of Energy (DOE) staff and/or contractors
Environmental Protection Agency (EPA) staff and/or contractors as observers
New Mexico Environment Department (NMED) staff as observers

I. Background and Objectives

The licensee requested that the NRC staff conduct an audit of the HMC GRP groundwater flow and contaminant transport model (groundwater model) in a letter to the NRC dated June 10, 2024 (ML24164A317). Additionally, HMC proposed including representatives from the DOE, the EPA, and the NMED in the audit discussions. The NRC staff engaged with DOE, EPA, NMED to ascertain the interest of the agencies in participating in the proposed audit (ML24183A096, ML24183A068, ML24183A114). DOE, EPA, and NMED agreed to participate.

The NRC, DOE, EPA, and NMED ("the agencies") and HMC will use the audit process to undertake a demonstration of the model to identify potential technical concerns. The agencies agreed to a multi-agency evaluation of HMC's groundwater model, with the participation of HMC, because the model may factor into the technical reviews and decision-making of the agencies' staffs. The NRC will coordinate and organize audit team activities among the agencies and HMC consistent with NRC's Licensing Process 111, Rev.1, Regulatory Audits.[1]

The multi-agency audit of HMC's groundwater model and supporting documentation will use an electronic reading room to share model files and documentation pertaining to the model, hold periodic virtual meetings and hybrid meetings in Albuquerque, NM, and if the agencies deem it necessary, conduct an on-site visit to the GRP.

[1] As discussed in this guidance, regulatory audits are a tool available to the staff that can help to efficiently gain understanding, verify information, and/or identify information that will require docketing to support a staff decision. Consistent with the principles of good regulation, as modern, risk-informed regulators, NRC staff are encouraged to use regulatory audits as frequently as is appropriate to improve efficiency and effectiveness in their regulatory activities.

The objectives of this multi-agency audit:

- Conduct a multi-agency audit of the groundwater model with participation of hydrogeologists, geochemists, risk analysts, and other regulatory staff.
- Review the physical and chemical characteristics of the GRP (e.g., precipitation and infiltration, tailings seepage, hydrogeology, back diffusion from low permeability zones, and contaminant transport).
- Assess the assumptions and technical bases of HMC's groundwater model.
- Identify areas of technical agreement among the agencies and HMC.
- Identify aspects of the groundwater model that may be inconsistent with applicable NRC review guidance and regulations.
- Identify elements of the groundwater model that appear to be incomplete for licensing and regulatory decisions, such as where the level of detail appears to be different than what is described in regulatory guidance.
- Identify regulations and current guidance that may be related to an identified issue or information gap.
- Identify significant technical issues that could negatively impact the groundwater model.
- Document the technical bases of resolved issues.
- Identify additional information that may be needed by the agencies to make future licensing and regulatory decisions.
- Develop a framework to address outstanding technical issues. This may include identifying:
    - literature or analog sites of relevance to the HMC site
    - conducting additional modeling sensitivity analyses to better inform regulatory decision-making
    - model inputs that need additional technical bases, which may be supported by more conservative modeling assumptions, additional laboratory studies, and/or additional field studies
- Improve agencies understanding of the groundwater model for more efficient licensing and regulatory decision-making.
- Improve HMC's understanding of what improvements to the current model may be appropriate for licensing and regulatory decision-making as well as what improvements to the model may be appropriate for resolving detailed technical review issues.

The audit team will not make licensing or regulatory decisions during the proposed audit; the audit is an information-gathering and assessment exercise, consistent with the LIC-111 (Sections 4.1 and 4.5). The audit will assist the agencies in understanding the groundwater model, identifying potential concerns, and is expected to provide details that could inform future licensing actions, regulatory actions, and agency reviews. The proposed audit will not replace future requests for additional information on the groundwater model that may arise during future licensing actions or agency reviews. The other agencies of the audit team also reserve the right to disagree with the NRC over any aspects of model interpretations, conclusions, or results with respect to their respective agencies' guiding regulations and future decisions.

II. Regulatory Audit Basis

NRC regulations and guidance:

- Title 10 of the Code of Federal Regulations (CFR), Part 40, Appendix A, I. Technical Criteria, Criterion 5 and Criterion 7.

- NUREG 1620, Rev. 1, “Standard Review Plan for the Review of a Reclamation Plan for Mill Tailings Sites Under Title II of the Uranium Mill Tailings Radiation Control Act of 1978.”
- Office of Nuclear Reactor Regulation, Licensing Process (LIC) 111, Revision 1, Regulatory Audits (ML19226A274).
- Office of Nuclear Reactor Regulation, Licensing Process (LIC) 116, Preapplication Readiness Assessment (ML20104B698).

Other relevant standards may include:

- 20.6.2.3103 NMAC - Standards of for Ground Water of 10,000 mg/l TDS Concentration or Less.
- ASTM D5447-17 Standard Guide for Application of a Numerical Groundwater Flow Model to a Site-Specific Problem.
- ASTM D5981/D5981M-18 Standard Guide for Calibrating a Groundwater Flow Model Application.
- Reilly, T.E., and Harbaugh, A.W., 2004, Guidelines for evaluating groundwater flow models: U.S. Geological Survey Scientific Investigations Report 2004-5038, 30 p.

III. Regulatory Audit Scope

The scope of the proposed audit includes the review of files and documents related to HMC’s groundwater model. To initiate the review of the groundwater model, the agencies request HMC to provide an initial set of model files and documents supporting the model. Additional information may be requested from HMC during the audit as it proceeds. The audit will focus on reviewing the relevant modeling files and documents, as appropriate, for conformance with appropriate supporting documentation guidance and modeling standards (See Section II).

Because this is a multiple-day assessment and will be conducted over multiple technical meetings, the audit team will conduct and document a closing briefing at the end of each technical meeting. The closing briefing shall summarize the status of the audit at the time of the closing and discuss the logistics of upcoming meetings. An exit briefing with HMC (the Licensee) shall be conducted at the conclusion of the final technical meeting, presenting preliminary results, which are subject to agency management review.

The NRC staff will prepare an audit summary report at the conclusion of the audit, in consultation with the audit team, and make the report publicly available on Agencywide Documents Access and Management System (ADAMS) and the NRC’s Homestake webpage. Documents related to the groundwater model provided by HMC that are audited will be listed in the audit summary report.

IV. Information and Other Material Necessary for the Regulatory Audit:

HMC should be prepared to provide documents, reports, calculations, computer code verification, and other material, as applicable, supporting the analyses documented in the groundwater model. The NRC staff requests that HMC make these additional materials available in the electronic reading room for review by the agencies prior to the kickoff meeting. The electronic reading room will allow multiple auditors to examine documents simultaneously. At the conclusion of the audit, the NRC staff will notify HMC that these documents can be

removed from the electronic reading room. Information identified by HMC as proprietary, pursuant to 10 CFR 2.390, will be controlled appropriately by NRC staff during the audit.

V. Special Requests

The agencies may request additional sensitivity analyses from HMC, which would be prioritized by the agencies based upon risk significance. Sensitivity analyses may be completed by HMC at their discretion during the audit. However, if these sensitivity analyses cannot be addressed during the audit, these issues may need to be addressed in a separate preapplication audit or future application review.

Prior to any virtual or in-person meetings, the agencies may request additional documentation from HMC. If HMC could make additionally requested documents available in the electronic reading room prior to scheduled audit meetings that will facilitate the audit process.

VI. Audit Team Assignments

The audit team is expected to consist of the agencies' staffs, which will review the groundwater model. Audit team members may be added or removed, as needed, as the audit progresses.

The audit team, at the publication of this Audit Plan, consists of the following agency participants:
Ron Linton, NRC
George Alexander, NRC
David Esh, NRC
Alec Hillier, NRC
Sai Appaji, EPA
Mark Purcell, EPA
Randall Ross, EPA
Lee Rhea, EPA
Milovan Beljin, EPA
Corey Dimond, NMED
Amber Rheubottom, NMED
Brinson Willis, NMED
Nicole Olin, DOE
Ray Johnson, DOE Contractor
Corey Wallace, DOE Contractor
Peter Schillig, DOE Contractor

Homestake participants include:
Daniel Lattin, HMC/Barrick Gold
Brad Bingham, HMC/Barrick Gold
Adam Arguello, HMC/Barrick Gold
Charlie Andrews, HMC/Barrick Gold
Marinko Karanovic, HMC/Barrick Gold

VII. Logistics

As part of the audit, the agencies' staffs plan to meet with HMC in Albuquerque, NM, to review and assess the model and supporting documents, as well as discuss technical questions and concerns.

In order to facilitate review progress, the participating staffs of the other agencies are encouraged to provide the NRC staff preliminary comments and technical concerns and to identify relevant documents in advance of virtual or in-person meetings. The NRC staff will compile this information, identify the concerns as either acceptance review or detailed technical review issues, and try to provide it to HMC approximately one month in advance of the first technical meeting.

In addition to the proposed meetings below, the agencies' participating staffs may meet internally and may request virtual audit meetings with HMC to discuss questions on the technical material. Meetings will be scheduled based on mutual availability.

Due to the complexity of the site hydrogeology, site history, and the groundwater model, as well as the extensive supporting documentation, the multi-agency team proposes to hold audit team meetings at two-month intervals to allow participants adequate time to prepare.

The audit period may be reduced or extended, depending on the progress made by the agencies' staffs in addressing audit questions. Additional audit activities may be planned as necessary to support the agencies' understanding of the model.

VIII. Deliverables

The NRC staff, in coordination with the other agencies' participating staffs, will generate an audit summary report upon completion of the audit to document its findings. The report shall include the following elements:

- Identify the dates of the audit
- List the audit team members
- List the documents and materials audited
- Describe the audit activities
- Identify technical issues addressed
- Identify technical issues resolved (including the documentation of the bases for resolution)
    - Detailed table of model inputs and/or model design elements on which there is technical agreement
- Identify technical issues unresolved
    - Technical issues for which resolutions are suggested for completeness review
    - Technical issues for which resolutions are suggested for detailed technical review
    - Detailed table of model inputs and/or model design elements for which there are outstanding technical concerns

NRC staff will share the report with the other agencies' participating staffs for review and comment, after which the final report will be provided to HMC. The NRC will send the final audit observations, including any identified technical concerns or major information gaps, to HMC in a publicly available report that will also summarize the scope of the audit.

HMC will consider the observations from the audit while finalizing a future application containing the model and will reevaluate an application submission date based on its evaluation of the time to address the audit observations. The audit summary report will be publicly available in ADAMS and on the NRC's Homestake webpage.

IX. Schedule:

- Fall 2024 - HMC to provide the groundwater model and model files to the agencies.
- December 2, 2024 – Virtual Kickoff Meeting
    - Introduce team members of HMC and the agencies, refine audit goals, objectives, processes and procedures,
    - Describe the risk assessment context (i.e., what is the risk being assessed, why is it being assessed, and what is the scope of the assessment),
    - HMC to provide an overview of the model and supporting documents, and
    - Audit team members to ask HMC high-level questions on the model and its documentation (e.g., location of information, accessing and running the model, model organization).
    - Decide on tentative date for first in-person technical meeting in February (subject to hotel & conference room availability, HMC to provide venue).
    - Discuss possible dates for the second in-person technical meeting in April.
- Clarification teleconference call(s) to be scheduled as necessary.
- February 25-27, 2025 – First hybrid technical meeting (in-person and virtual participation) will be held for the purpose of discussing: site characterization, model construct, design bases, model inputs, boundary conditions, model calibration, conceptual model, and future scenarios. This meeting will be held at the:
    Hilton Garden Inn Albuquerque Airport
    2601 Yale Blvd SE, Albuquerque, NM 87106
- Clarification teleconference call(s) to be held as necessary.
- April 1-3, 2025 – Second hybrid technical meeting (in-person and virtual participation) will be held for the purpose of reviewing: predictive model runs, model verification, model and scenario uncertainty, bounding case analyses, and model validation/model confidence building). This meeting will be held at the:
    Hilton Garden Inn Albuquerque Airport
    2601 Yale Blvd SE, Albuquerque, NM 87106
- Clarification teleconference call(s) to be scheduled as necessary.
- Approximately two months after second technical meeting – Third hybrid technical meeting (in-person and virtual participation) if needed, to review aspects of the model not reviewed in the first two technical meetings or that need follow-up.
- Clarification teleconference call(s) to be scheduled as necessary.
- Approximately two months after final technical meeting – Audit summary report will be published to document audit team findings. Publication either June 2025 or August 2025, depending on either two or three technical meetings.
- Schedule may be modified as agreed to by HMC and the agencies.