



**UNITED STATES ENVIRONMENTAL  
PROTECTION AGENCY  
REGION IX**  
75 Hawthorne Street  
San Francisco, CA 94105



**STATE OF HAWAII  
DEPARTMENT OF HEALTH  
KA 'OIHANA OLAKINO**  
P. O. BOX 3378  
HONOLULU, HI 96801-3378

February 6, 2023

*Sent via Electronic Mail*

Captain Cameron Geertsema  
NAVFAC Hawai'i  
850 Ticonderoga Street, Suite 110  
Joint Base Pearl Harbor-Hickam, HI 96860

**Subject: Red Hill Groundwater Flow Model Deliverable Deadlines**

Dear Captain Geertsema:

The U.S. Environmental Protection Agency (EPA) and Hawai'i Department of Health (DOH), collectively the "Regulatory Agencies," have met with the U.S. Department of the Navy (Navy) multiple times to discuss improvements to the Red Hill groundwater flow model (GWFM) necessary to satisfy the requirements of Section 7.1 of the 2015 Administrative Order on Consent Statement of Work ("AOC SOW") for the Red Hill Bulk Fuel Storage Facility ("Facility").

In a letter dated August 30, 2022, the Regulatory Agencies listed our expectations for the Navy's next steps to bring the GWFM into compliance. These expectations included that the Navy would proceed with efforts outlined in its 60-day submittal, which included submitting a Geologic Conceptual Site Model (CSM) Addendum, GWFM Addendum, Vadose Zone Modeling Addendum, and Groundwater Contaminant Fate and Transport Technical Memorandum, as well as interim modeling runs and copies of draft numerical model files for regulatory review.

The Regulatory Agencies have met with the Navy regularly to discuss changes to the model needed to address the deficiencies identified in the March 2022 disapproval letter. We have discussed key model inputs, assumptions, and approaches (e.g., geologic "dip and strike" values, how best to represent the highly complex Red Hill geology, model calibration) and other modeling topics. The Navy submitted a Geologic CSM Addendum on January 13, 2023 (amended January 26, 2023), but has not yet submitted the GWFM Addendum or Vadose Zone Modeling Addendum, which the Navy's 60-day submittal proposed for completion by December 2022. Since November 2022, the Navy has summarized its ongoing efforts in Weekly Modeling

Updates and Meeting Summaries. We understand, based on our discussions and the materials we have received, the Navy is working simultaneously on a local (to Red Hill Facilities) and larger (“regional”) scale models.

In order to allow the Regulatory Agencies to assess progress made to date, the Navy shall submit for review the materials listed below on or before the dates provided below. **As previously asked, the Navy shall provide any and all model files, which include, but are not limited to, the items listed below that are now available, by February 10, 2023 or sooner. We acknowledge that the materials submitted by February 10, 2023, will represent work-in-progress rather than final work products.**

1. Regional model: The development of regional grid(s) to test the flexibility to represent reasonable geometric variation for major features (volcanics, saprolite, caprock, other).
  - Review materials: Three-dimensional model grid(s) in electronic format (GroundWaterVistas, GroundWaterDesktop, EVS, 3D-SHP, or other common format in use by modelers) together with initial parameterization (i.e., geometrically, not specific values) of major hydro-stratigraphic features (i.e., basalt, tuffs, saprolite, etc.).
  - Deadline: As soon as available, but no later than February 10, 2023.
2. Regional model: Parameterization of the regional model based upon initial steady-state calibration efforts to regional groundwater elevation data, spring flows, and other indicators of correspondence to regional water budgets and/or flow fields.
  - Review materials: Initial parameterization of model grid, information indicating initial calibration progress/results and sensitivities.
  - Deadline: As soon as available, but no later than February 10, 2023.
3. Local model: Integration of local training data sources (barrel logs, borings, etc.) and calibration of the local flow model to transient water levels and responses (likely using locally specified boundaries).
  - Review materials: Example parameterized model(s) with example calibration results in accessible format(s).
  - Deadline: As soon as available, but no later than February 15, 2023.
4. Local model: Particle tracking to evaluate the patterns and sensitivity of local scale dissolved phase transport paths, and the zone of contribution to Red Hill Shaft, to reasonable variations in intra-basalt parameterization and lateral boundary conditions.
  - Review materials: Example particle tracking results, including depictions of the Red Hill Shaft zone of contribution as determined using forward (not reverse) tracking, and sensitivity indications.
  - Deadline: As soon as available, but no later than February 22, 2023.

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5. Regional model: Parameterization of the regional model based upon initial transient calibration efforts.
  - Review materials: Current parameterization of model grid, information indicating calibration progress/results and sensitivities.
  - Deadline: As soon as available, but no later than March 1, 2023.
6. Both models: Example(s) of the linkage or co-execution of local and regional models, thereby providing boundaries to the local model derived from the regional model.
  - Review materials: To be determined. Anticipated to be based on the review materials for Items (1)-(4) above.
  - Deadline: As soon as available, but no later than March 1, 2023.
7. Both models: Initial calibration, sensitivity analyses, and particle tracking, as precursors to planning for and execution of mass-conservative transport calculations.
  - Review materials: To be determined. Anticipated to be based on the review materials for Items (1)-(5) above.
  - Deadline: As soon as available, but no later than March 15, 2023.

In future Weekly Modeling Updates, please describe progress made in responding to the actions listed above. Please indicate which actions are related to the local model, the regional model, or both.

If you have any questions, please contact Wayne Praskins, EPA, Land, Chemicals, and Redevelopment Division, at (415) 972-3181 or Gabrielle Fenix Grange, DOH Hazard Evaluation and Emergency Response Office, at (808) 586-4248.

Sincerely,

/s/  
Gabriela Carvalho  
Red Hill AOC Project Coordinator  
U.S. EPA Region 9

/s/  
Kelly Ann Lee  
Red Hill Project Coordinator  
Hawai'i Department of Health

cc: Donald Panthen, Director, Red Hill Program Management Office  
Sherri Eng, Environmental Director, Navy Region Hawai'i [via email only]  
CAPT James Sullivan, Red Hill Officer in Charge, NAVFAC Hawai'i [via email only]  
LCDR Travis R. Myers, CEC, P.E., Red Hill Aquifer Recovery Team Lead, NAVFAC Hawai'i [via email only]  
Michael (Mike) T. Klapac, P.E., Supervisory Environmental Engineer, Red Hill Monitoring and Sampling, NAVFAC Hawai'i [via email only]  
Grant Scavello, Interim EPA Red Hill Project Coordinator [via email only]