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

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

September 29, 2023

Rear Admiral Stephen Barnett
Commander, Navy Region Hawaiʻi
850 Ticonderoga St., Ste. 110
Joint Base Pearl Harbor Hickam, HI 96860-5101
(Sent via Electronic Mail)

Subject: Limited Utility of the 2023 Best Available (Groundwater Flow) Model

Dear Rear Admiral Barnett:

The Hawaiʻi Department of Health (DOH) and U.S. Environmental Protection Agency (EPA), collectively the Regulatory Agencies (RAs), have reviewed the *Groundwater Flow Model Technical Memorandum*, received on June 28, 2023, and accompanying files ("Best Available Model"). The intended purpose of the 2023 Best Available Model was to support planning and decisions for defueling, as well as responses to potential releases. The RAs find that the submitted 2023 Best Available Model is insufficient to accurately understand groundwater flow patterns and the effects of heterogeneity, or to reliably or conservatively predict where contamination may migrate in the subsurface. It is therefore critical that the U.S. Department of the Navy (Navy) collect real-world data during defueling to assess potential risks to receptors at and around the Red Hill Bulk Storage Facility (Facility), as described in the August 31, 2023, joint RA letter, "Comments on the *Groundwater Protection Plan Update – Defueling Revision, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, Oʻahu, Hawaiʻi,* dated June 26, 2023." Comments in this letter do not require action by the Navy or Joint Task Force – Red Hill prior to defueling, and no changes need to be made to the Integrated Master Schedule.

In letters dated March 17, 2022; August 30, 2022; and February 6, 2023; the RAs detailed required updates to earlier versions of the groundwater flow model and provided deadlines that the Navy should meet to remedy identified deficiencies. The RAs have also provided informal comments during technical meetings as the Navy was developing the current versions of the Groundwater Flow Model, Vadose Zone Model, and Contaminant Fate and Transport Model.

While the Navy has submitted some of the required updates, the 2023 Best Available Model still does not contain information that will allow the combined models to reliably simulate groundwater flow patterns, represent the impacts arising from past releases, and aid the Navy and RAs in predicting where contamination might migrate (e.g., where, how rapidly, and how far) in the event of a future release. Elements of the 2023 Best Available Model appear non-conservative, adding further concerns regarding their reliability or utility should a future release occur. Therefore, it is critical for the Navy to collect real-world data throughout the defueling process, as described in the August 31, 2023 joint RA letter, "Comments on the *Groundwater Protection Plan Update – Defueling Revision, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, Oʻahu, Hawaiʻi*, dated June 26, 2023."

Information that is missing from the 2023 Best Available Flow Model includes, but is not limited to:

- The model does not incorporate basalt heterogeneity. This was a key critique delivered in the March 17, 2022, disapproval letter and earlier RA SME comments. Without this information, the Navy's model oversimplifies groundwater flows and likely contaminant transport patterns and does not reasonably represent conditions in the region encompassing Red Hill Shaft (RHS) and the Facility.
- The model does not accurately reproduce groundwater level differences as calculated from measured data and does not simulate groundwater contributions to RHS as arising from two different intervals. Without this information, the RAs cannot verify the patterns and rates of groundwater flow into RHS, the Navy's modeled "capture zone," or the modeled patterns of groundwater flow and contaminant migration toward other receptors.
- The model does not incorporate all available data. For instance, one purpose of installing wells RHMW15 and RHP07 was to determine drawdown from pumping at RHS. However, the model does not reproduce the water levels obtained at these wells, nor the hydraulic gradients determined using these water levels. The lack of correspondence between the data obtained at these wells and the modeled values suggests that groundwater flow and contaminant migration patterns in proximity to RHS are both poorly understood and not accurately represented by the model.

Additional technical comments will be provided under a separate cover at a later date. Please note that it is difficult to assess the utility of Navy's modeling approaches until a final suite of models is delivered that addresses the complete list of RA comments to date.

References:

EPA and DOH. 2022. Letter. Disapproval of the Groundwater Flow Model Report. March 17.
EPA and DOH. 2022. Letter. Response to Navy's May 20, 2022 and June 15, 2022 Submittals, Red Hill Groundwater Flow and Contaminant Transport Modeling. August 30.
EPA and DOH. 2023. Letter. Red Hill Groundwater Flow Model Deliverable Deadlines. February 6.

Navy. 2023. Groundwater Flow Model Technical Memorandum, Red Hill Bulk Fuel Storage Facility. JBPHH, O‘ahu, Hawai‘i. Prepared for NAVFAC Hawai‘i by AECOM Technical Services Inc. May 17.

EPA and DOH. 2023. Letter. Comments on the Groundwater Protection Plan Update – Defueling Revision, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O‘ahu, Hawai‘i, dated June 26, 2023. August 31.

If you have any questions regarding this letter, please contact Grant Scavello, EPA Red Hill Project Coordinator, at Scavello.Grant@epa.gov or (415) 972-3556; or Kelly Ann Lee, DOH Red Hill Project Coordinator, at KellyAnn.Lee@doh.hawaii.gov or (808) 586-4226.

Sincerely,

KENNETH DIXON
Digitally signed by KENNETH DIXON
Date: 2023.09.29 15:28:52 -07'00'

for Grant Scavello
Red Hill Project Coordinator
U.S. Environmental Protection Agency, Region 9

Kelly Ann Lee
Digitally signed by Kelly Ann Lee
Date: 2023.09.29 12:34:31 -10'00'

Kelly Ann Lee
Red Hill Project Coordinator
State of Hawai‘i, Department of Health

cc: VADM John Wade, Commander, Joint Task Force – Red Hill
Sherri Eng, Environmental Director, Navy Region Hawai‘i
Donald Panthen, Red Hill PMO Director, Navy Region Hawai‘i
Joshua Stout, Red Hill PMO Deputy Director, Navy Region Hawai‘i
CAPT James Sullivan, Commanding Officer, NAVFAC Hawai‘i
CDR Benjamin Dunn, Red Hill Environmental OIC, NAVFAC Hawai‘i
LCDR Travis Myers, Aquifer Recovery Team Lead, NAVFAC Hawai‘i
Dr. Donald Thomas, Director of Center for the Study of Active Volcanos, UH – Hilo