



**UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY
REGION IX**
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**STATE OF HAWAII
DEPARTMENT OF HEALTH**
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HONOLULU, HI 96801-3378

February 22, 2022

Sent via Electronic Mail

Rear Admiral Timothy J. Kott
Department of the Navy
Commander, Navy Region Hawaii
850 Ticonderoga Street, Ste. 110
Pearl Harbor, HI 96860-4460

Dear Rear Admiral Kott:

SUBJECT: Groundwater Monitoring Well Network – Installation of Additional Wells

The U.S. Environmental Protection Agency (USEPA) and Hawaii Department of Health (DOH), collectively the "Regulatory Agencies," have reviewed the Figure titled "*Proposed and Existing Monitoring Well Locations Red Hill Bulk Fuel Storage Facility JBP'HH, O'ahu, Hawai'i*" received January 14, 2022, and presented at a recent Red Hill Interagency Drinking Water System Team Aquifer Recovery Working Group meeting. The figure was prepared by the U.S. Department of Navy (Navy) and Defense Logistics Agency (DLA) for the Red Hill Bulk Fuel Storage Facility (Facility) located in O'ahu, Hawai'i. The Facility is located above the Southern O'ahu Basal Aquifer, a sole source aquifer that provides drinking water to the Navy and City and County of Honolulu.

The Navy has proposed the installation of eight (8) additional groundwater monitoring wells and eight (8) piezometer locations within the vicinity of Facility and Red Hill Shaft. These locations were proposed to further investigate the extent of groundwater impacts from both historical and

recent releases. The Regulatory Agencies have reviewed the proposed monitoring well locations and have developed thirteen (13) additional proposed near-field and distal sentinel monitoring well locations as outlined in the attached memo. In discussion with stakeholders through the Aquifer Recovery Working Group, eight (8) groundwater monitoring well locations have been given first priority for installation in 2022 and are highlighted with red circles in the enclosed Figure. Priorities for the remaining proposed groundwater monitoring well locations will be vetted through the Aquifer Recovery Working Group.

As part of the well installation and well screen design process, the Agencies will determine a suite of downhole testing approaches that will be executed prior to the final determination of the location, depth, and number of well screens at each new sentinel well. These data suites will be provided to the Agencies at the end-of-day as obtained by Navy field personnel. Based on these data suites, the Agencies will determine the selected well screen intervals. The downhole data will include geophysical inspection, video and acoustic logging, and aquifer water profiling using a multiparameter sonde. The purpose of these data suites and the multi-level well screens is to assess the groundwater and contaminant behaviors and connectivity between the water table and the deeper basal aquifer from which potable groundwater is produced.

The Agencies are requesting that the Navy proceed expeditiously with the installation of the proposed monitoring wells and include the additional locations as proposed by the Agencies, and may be modified after further discussion with other stakeholders through the Aquifer Recovery Working Group. Sentinel well installation and monitoring (specifically for the Honolulu Board of Water Supply Halawa Shaft) is considered the highest priority and should proceed immediately upon securing access agreements and meeting permitting requirements. The Navy shall continue to host meetings within (5) business days of receipt of this letter with the USEPA, DOH and Aquifer Recovery Working Group to discuss location specifics, schedule for installation, sequencing priority, and other installation considerations.

If you have any questions, please contact Gabriela Carvalho, USEPA Red Hill Project Coordinator at (808) 541-2723 or Fenix Grange, Supervisor, Site Discovery, Assessment and Remediation Section, DOH-Hazard Evaluation and Emergency Response Office at (808) 586-4249.

Sincerely,



Jeff Scott
Director, Land Chemicals and Redevelopment
EPA Region 9



KATHLEEN S. HO
Deputy Director for Environmental Health
State of Hawaii, Department of Health

Enclosures:

1. SSP&A Memo - Comments on Figure “Proposed and Existing Monitoring Well Locations Red Hill Bulk Fuel Storage Facility JBPHH, O'ahu, Hawai'i” and Accompanying Microsoft EXCEL File “Approximate Coordinates for Proposed Wells_20220111.xlsx”
2. Figure

cc: Captain Gordie Meyer, U.S. Navy
Captain Michael Meno, U.S. Navy
Donald Panthen, U.S. Navy
Gabriela Carvalho, USEPA
Nicole Palazzolo, USEPA
Roxanne Kwan, DOH
Fenix Grange, DOH
Ernest Lau, Honolulu Board of Water Supply



February 4, 2022

Gabriela Carvalho
Red Hill Project Coordinator
U.S. EPA, Region 9
Carvalho.Gabriela@epa.gov

Re: Comments on Figure “Proposed and Existing Monitoring Well Locations Red Hill Bulk Fuel Storage Facility JBPHH, O’ahu, Hawai’i” and Accompanying Microsoft EXCEL File “Approximate Coordinates for Proposed Wells_20220111.xlsx”

Dear Ms. Carvalho,

S.S. Papadopoulos & Associates, Inc. (SSP&A) has reviewed two recently distributed document files prepared on behalf of the Naval Facilities Engineering Command (NAVFAC) Defense Logistics Agency (DLA): “Proposed and Existing Monitoring Well Locations Red Hill Bulk Fuel Storage Facility JBPHH, O’ahu, Hawai’i” and an accompanying Microsoft EXCEL file “Approximate Coordinates for Proposed Wells_20220111.xlsx” both received January 14, 2022. Those documents present initial locations proposed for the installation of new piezometers (actually constructed as two inch monitoring wells) and larger diameter (four inches plus) monitoring wells in the vicinity of Red Hill Bulk Storage Facility (RHBSF) and Red Hill Shaft (RHS). This letter provides comments on these initial proposed monitoring well locations presented in the two documents, and provides recommendations regarding well design, construction, and testing. This letter does not provide recommendations regarding the piezometer locations at this time.

At times during the completion of this review and preparation of this letter, SSP&A participated in net-meetings with representatives of and subject matter experts (SMEs) contracted by the United States Environmental Protection Agency (EPA), Department of Health for the State of Hawaii (DOH) (collectively, the Agencies), and the United States Department of the Navy (Navy), among others. During these meetings, it was possible to provide feedback on the initial locations proposed by the Navy and its consultants, and it is expected that final locations and screened intervals will be determined and prioritized through a collaborative effort.

Overview and Objectives

Although knowledge about subsurface conditions in the vicinity of the RHBSF has advanced in recent years, the complex subsurface at and around RHBSF, RHS, and in directions toward potential receptors including the Board of Water Supply (BWS) Halawa shaft, and the Aiea Halawa Shaft (Navy), presents substantial challenges for drilling, characterization, and monitoring. Partly as a consequence, monitoring via wells and piezometers must meet several objectives and must weigh or trade-off near- vs long-term goals and proximal vs distal considerations. As one simple example, consider the initial proposed location RMHWCC – sitting close to the middle of RHBSF between existing wells RHMW-02 and RHMW-03. In the very near term, given the May 2021 release from the upper tank farm area, and the relative ease of access to Navy-owned property for drilling this location appears warranted. However, data from RHMW-02/-03 suggest this location is very likely to be persistently contaminated and that by the time this proposed well is installed, there will be little new to be learned (in this area) about the May 2021 release. Given this, the information likely to be obtained at this location would be of near-term proximal interest but is not likely

to be a high priority for long-term purposes or for distal considerations. Thus, though higher density monitoring within the RHBSF footprint is of interest in the event that other releases occur, it can for the time being likely be reasonably assumed that this area is contaminated and furthermore that obtaining data in this area would not substantially change our perspective on near-field contamination nor provide insight into migration further afield.

In addition, it is likely that standard well completions may not be adequate for purposes of further characterization. With the exception of the WestBay systems, standard well installations at the site are typically screened across or close to the water table. This form of well completion is typically suitable below or close to locations where Light Non-Aqueous Phase Liquid (LNAPL) has been released and migration distances are small, because it provides opportunity to measure for sheen on the water table and also obtain samples from below the sheen if one is present, thereby providing information regarding dissolved phase concentrations. However, this construction becomes less suitable with increasing distance from releases, as contamination can be present deeper below the water table as a result of “plume diving” (**Figure 1**). While noting that plume diving can result from several causes, and that the current evidence for plume diving in and around RHBSF is fairly limited, this lack of evidence results at least in part from a relative lack of deeper-screened intervals at increasing distance from RHBSF. Consequently, we cannot be certain that water table screen completions are suitable moving away at greater distance from release locations (i.e., RHBSF and RHS) toward other potential receptors such as the BWS Halawa shaft, and the Aiea Halawa Shaft (Navy). For this reason, it is recommended that characterization borings be drilled prior to selecting well screen interval(s) at increasing distance from actual and potential sources toward these potential receptors.

Given the foregoing, alternative well construction approaches and designs should be considered, particularly for locations further from releases, preferably nested borings – not Westbay units in this particular instance but rather dual-completions with one screen located at the water table and one screen located at the next encountered transmissive interval. Alternatively, consideration could be given to long-screen completions straddling water table (for LNAPL identification) and enabling snap-samplers or other related methods for saturated zone sampling. It is noted that the longer-screen completion is a less satisfactory option as it may result in ambiguity in the interpretation of sample results. Furthermore, downhole geophysics, hydraulic, and water quality, testing should be considered before well construction is finalized at these locations. This is particularly critical for the lower (i.e., higher depth) interval within a nested (paired) boring construction, to ensure that the screen is completed within a hydraulically connected formation. If it is not technically feasible to conduct testing during drilling to identify the most suitable screen interval for the lower of the two screens (assuming a dual screen completion design), then the default design should comprise an upper screen straddling the water table, and a lower screen that intercepts the next encountered plausibly transmissive material.

Further comments on the locations proposed by the Navy follow below.

Detailed Comments on Navy Recommendations for Proximal Well Locations

Given the foregoing general comments and recommendations, the following are specific comments on the geographic locations of the monitoring wells proposed by the Navy (i.e., RHMW-AA to -HH). A figure is also provided identifying these re-locations as blue dots (**Figure 2**):

- RHMW-AA – move to SE provide coverage with additional well (discussed below)

- RHMW-BB – move a little closer into previous mapped footprint of likely groundwater impact
- RHMW-CC – this location could be considered a lower priority for installation at a later date
- RHMW-DD – consider moving this location further to W for more even spatial coverage
- RHMW-EE – move a little more to SE for even split of RHMW-05 and -09
- RHMW-FF – bring to S unless goal is to tag saprolite. Otherwise, there may be an improve chance of identifying the clinker in this area that intercepts the east end of RHS
- RHMW-GG – small move to S side of road
- RHMW-HH – if possible, recommend awaiting piezometer findings before finalizing this location

Recommendations for Distal Sentinel Well Locations

In addition to proximal monitoring, sentinel monitoring is strongly recommended at locations further beyond the RHBSF and RHS, in the general direction of other potential receptors such as the BWS Halawa shaft, and the Aiea Halawa Shaft (Navy). In particular, sentinel monitoring for potential migration toward BWS Halawa shaft is considered the highest priority and should proceed once access and permitting requirements and agreements have been met. A series of proposed locations is depicted as green dots in **Figure 2**. These locations are selected to provide sentinel monitoring of any potential migration toward the BWS Halawa shaft (together with other attendant data and information such as water levels, stratigraphy, etc.) via both an “upper” (western) potential migration route and a “lower” (eastern) potential migration route. Some of these locations coincides in a broad sense with locations proposed on this, or prior, occasions by the Navy.

Other Considerations

Some of the locations depicted on the attached figures and recommended for installation of monitoring wells may present logistical or other challenges based on property access, topographic slope or grade, obstruction or safety concerns related to utilities, and other factors. These factors need to be considered in identifying final locations for this phase of monitoring well installation. Furthermore, reasonable adjustments in these locations may provide the opportunity for additional data collection to improve knowledge regarding certain features of the overarching Conceptual Site Model (CSM) such as the presence and thickness of saprolite. Given this, discussion between the Navy and Agency SMEs, among others, is recommended before locations and screen intervals for these wells are finalized.

If you have any questions or comments regarding this letter, please do not hesitate to contact me.

With regards,



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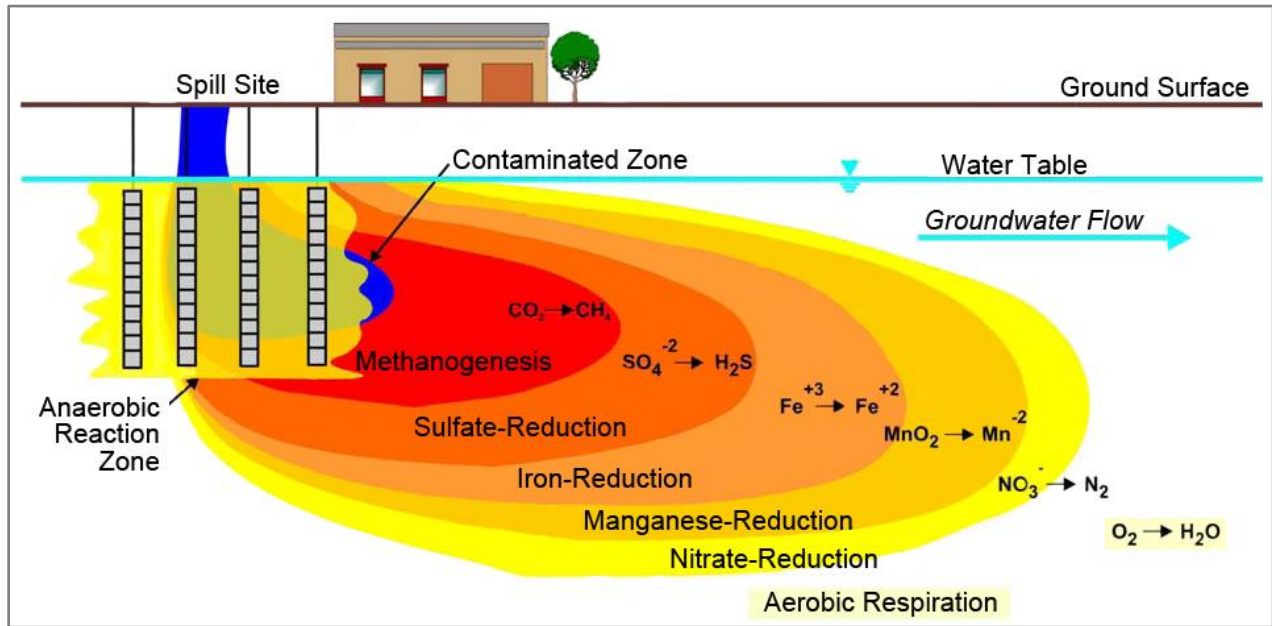


Figure 1 – Schematic Illustration of “Plume Diving”, which is Most Applicable to Dissolved Phase Contamination with Increasing Distance from Source Areas

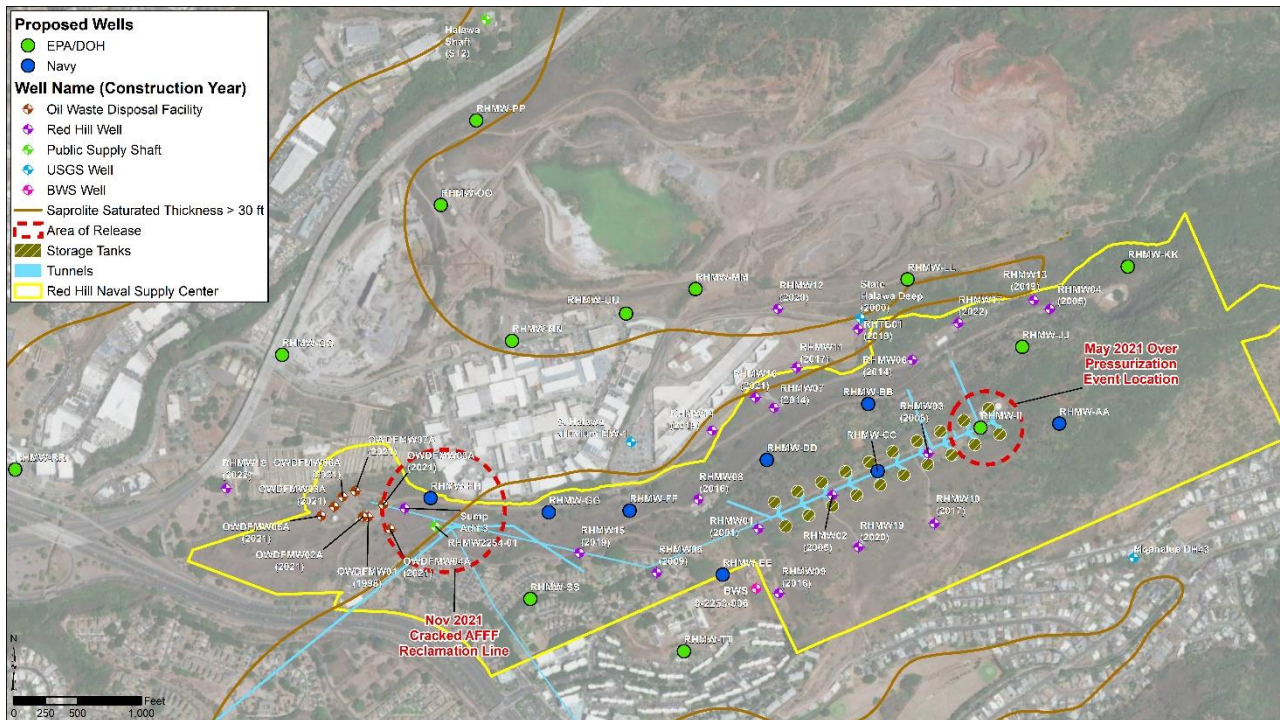


Figure 2 – Depiction of Alternate Proposed Locations for New Near-Field Monitoring Wells (Blue Dots) and Proposed Locations for New Sentinel Monitoring Wells (Green Dots)

Proposed Wells

- EPA/DOH
- Navy
- Previously

Well Name (Construction Year)

- ◆ Oil Waste Disposal Facility
- ◆ Red Hill Well
- ◆ Public Supply Shaft
- ◆ USGS Well
- ◆ BWS Well

