

Draft Monitoring Well Installation Work Plan, Red Hill Bulk Fuel Storage Facility  
 Reviewers: U.S. Environmental Protection Agency  
 and Hawaii Department of Health

0	General	<p>The design for each monitoring well should consider where each lithologic interface lies (e.g., saprolite to fractured rock or valley fill wedge to saprolite) to decide the appropriate depth to place each well screen. In many cases, the stated well screen depth interval within the Work Plan may not accomplish the intended purpose of the well. The U.S. Department of the Navy (Navy) should provide the U.S. Environmental Protection Agency (EPA) and Hawai'i Department of Health (DOH), hereinafter the "Regulatory Agencies" (RAs), with the field data, geophysical logs, etc. with sufficient time to provide input on the depth at which the well screens should be installed.</p> <p>a. For example, Well NMW35 lists a screen interval of 165-195 feet (ft) below ground surface (bgs) and a surface elevation of 195 ft above mean sea level (msl). This proposed well is located in the middle of Halawa Valley where the depth to the saprolite/basalt interface will likely be on the order of 400 to 500 ft bgs, significantly below the bottom of the stated well screen. A well screened at the stated depth will likely not provide critical stratigraphic information or a useable groundwater elevation for regional flow analysis. For example, the previously installed well NMW33 suffers from this issue in that it is screened in the low permeability tuffs and not the basal basalt aquifer.</p> <p>b. In Section 4, the sequence of events outline has monitoring well installation preceding lithologic investigation. Critical information for well screen placement can be gained from the lithologic investigation so it seems that well installation should occur after the lithologic investigation. This sequence will be particularly important for those wells where the basalt aquifer is confined.</p>
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Response:

The Navy intends to continue providing weekly updates to the Regulatory Agencies. These updates include field data and screen depth estimations. Coring first will be prioritized and will also allow sufficient time for the RAs to provide input on the depth at which well screens should be installed in the borehole.

USGS requires up to 90 days to finalize geophysical logs. Therefore, the Navy intends to continue providing geophysical logs via EDMS within 90 days of well completion, as agreed upon in the SMWIWP.

- a. The Navy anticipates that NMW35, and other wells in the surrounding Industrial Complex, may encounter perched or elevated head conditions. If these non-water table conditions are indicated during coring and/or borehole drilling for well installation, then the wells would likely be completed as confined wells. Various techniques such as review of core logs, rate of penetration, and water loss records; bailing, pumping and/or airlifting holes (with or without packers) and monitoring water quality and/or water levels; and/or geophysical logging will be used to determine groundwater conditions. In the MWIWP, Table B-1 and both Figures B-1 and B-2 have been revised to reflect the fact that the depths of these confining units (valley fill, saprolite, or weathered basalt) are not known at this time and will be determined during coring and/or drilling.

The Navy agrees that NMW33 is screened in volcanic tuff that does not appear to be in communication with the basaltic basal aquifer. NMW33A is proposed as a co-located well with NMW33. NMW33A is anticipated to be a confined basal well with a submerged well screen set in basalt at a depth in hydraulic connection with the basal aquifer.

- b. The Navy concurs that it is preferable to obtain lithologic data, in addition to the information listed in the response to comment 1. a., in designing well screen placement. And accordingly, the Navy will perform coring first at each location if practicable.

1	2.1 and 7	<p>The project procedures and references do not include a Quality Assurance Project Plan (QAPP). In Sections 2.1 and 7, specify which QAPP will be followed when conducting this work. If there is no applicable QAPP, advise when a QAPP will be written for this phase of the project.</p>
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Response:

We have referenced the Red Hill *Sampling and Analysis Plan* and *Addendum 01* (DON 2017d; 2017c). The SAP is referenced in Section 2.1, We will also prepare a separate QAPP as requested, that will be submitted in approximately 6 months.

2	3.1	<p>It is stated that the contractor will use only approved materials during well installation. Identify the party that will approve the well materials, such as chemicals, lubricants, and drilling fluid additives to be used during drilling activities.</p>
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Response:

The drillers propose materials for use. These are initially reviewed by AECOM. The Navy then reviews the proposed materials to ensure they are acceptable. This is referenced in Section 3.1 of the WP.

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3	3.2	Clarify why the drilling water needs to be filtered through a granular activated carbon vessel prior to use and its source.
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## Response:

We have removed the discussion of GAC from the WP. The GAC was added at the start of the program to be conservative. Experience has shown the GAC to be unnecessary.

4	4	The text indicates " <i>At each well location, a corehole may be drilled, either before or after the well is advanced.</i> " Coreholes should always be drilled first to conduct reconnaissance, obtain important lithologic information, and to identify the optimal depth intervals for well screens.
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## Response:

The Navy concurs as stated in response to comment #1.b. This is described in Sections 4 and 4.2 of the WP.

5	4.1.1	<p>a. The drilling methods mentioned (i.e., hollow-stem auger, bucket auger, and air rotary) yield a mixture of drill cuttings and may not all allow for the collection of representative field screening samples. Clarify what kind of field screening samples will be taken. Specifically, the RAs request that rock coring be done prior to well installation.</p> <p>b. The RAs should be notified in advance if the Navy decides to install a well using a mud-rotary rig.</p> <p>c. It would be helpful to understand where preferential flow is occurring before screening the wells. Drill deeper than the planned screen interval, then use packers to identify discrete flow intervals.</p>
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## Response:

- a. The following text was added to Section 4.2: "Logged soil cuttings will be screened for volatile organic compounds (VOCs) using a PID in accordance with Procedure I-B-1, Soil Sampling (DON 2015)."
- b. If a mud-rotary rig is used (other than for coring), it will be noted in advance in the weekly drilling updates.
- c. The Navy concurs with the goal of identifying preferential flow zones. Text was added to Sections 4.1 and 4.2 describing this. It is noted that packers may not be used in all situations due to hole stability concerns. .

6	4.1.1 and 4.1.2	In addition to screening perched water, collect samples and analyze them for contaminants of concern.
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## Response:

The following sentence was added to Section 4.4.3: "Perched or elevated head water encountered during drilling will not be sampled or analyzed, except for under Scenarios 3, 4, and 5, as described in Sections 6.3, 6.4, and 6.5." Analytical samples of elevated or perched water is outside of the scope of this investigation except for under Scenarios 3, 4, and 5, as described in section 6.3, 6.4, and 6.5 .

7	4.3.1 and 4.3.2	<p>a. Include a clarifying statement on what steps laid out in Section 4.3.2 will need to be taken if the estimated water level does not stabilize within the specified range indicating the borehole has been drilled in confined conditions.</p> <p>b. When evaluating for confined verses unconfined conditions, in addition to verifying that the groundwater elevation is consistent with that of the basal basalt aquifer, the borehole needs to progress through potentially confining layers (e.g., alluvium and/or tuff) and encounter competent basalt.</p>
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## Response:

- a. If groundwater elevations do not fall within this range, we may not be in water table conditions and then the borehole will be extended and tested until communication with basal aquifer is observed. This is discussed in Section 4.4.2.
- b. Concur. This text was added to Section 4.

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8	4.4.1	<ul style="list-style-type: none"> <li>a. Indicate how close the corehole boring will be located relative to the well.</li> <li>b. Coreholes should precede well installation and should be advanced to -25 ft msl rather than -7 ft msl to provide better reconnaissance and assessment of groundwater conditions.</li> <li>c. Drill the core deeper than anticipated well depth. Then use the initial, adjacent coring to collect geophysics data that will inform well screen placement in the well borehole.</li> <li>d. A sample should be collected for field analysis if visual and/or olfactory evidence indicate signs of potential contamination regardless of if it is outside of the indicated intervals.</li> <li>e. This section proposed to backfill 32 ft of the corehole with sand. Confirm that this is the applicable standard for corehole abandonment.</li> </ul>
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Response:

- a. This distance (~15 feet) is noted in text in Sections 4.0 and 4.2.2.
- b. Concur. Text is revised in Section 4.4.1 and 4.4.2.
- c. Concur. The preference is to core first when possible. Note this may not be practical in all cases. .
- d. Concur. This is referenced in Section 4.0.
- e. Yes. Sand will be placed in the corehole at the planned screen/sand interval in the proposed well. This is discussed in Section 4.1.1.

9	4.4.1 and 6	Provide the rationale as to why a measurement of less than 10 parts per million by volume of volatile organic compounds using a photoionization detector was chosen as the action limit for additional contamination analysis and mitigation actions.
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Response:

DOH Technical Guidance Manual Section 8.4.2 Petroleum (Interim Final – July 2017): “A PID screening level of 10 ppmv is recommended for soils impacted with middle distillate fuels (e.g., diesel and JP-8) or when the fuel type is unknown.”

10	4.6.2	It was stated during previous discussions between the Navy and RAs that casing O-rings were not used during installation, which may have caused grout to enter RHMW12A. Clarify whether O-rings will be used in future well installations, as appropriate measures should be taken to prevent grout from entering the well casing.
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Response:

Yes, manufacturer-provided O-rings will be used on all flush-threaded PVC screen and casing. This is stated in Sections 4.2.1 and 4.6.2.

11	6.2	Clarify what observations will be used to determine that no contamination is observed.
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Response:

Text has been revised to add "visual or olfactory" in Sections 6.3 and 6.4.

12	6.3	<ul style="list-style-type: none"> <li>a. Bullet 3:                         <ul style="list-style-type: none"> <li>i. After, “Soil or groundwater sampling will be conducted,” add “in accordance with” and reference the appropriate QAPP and Sampling and Analysis Plan (SAP).</li> <li>ii. If the sampling results exceed the DOH Environmental Action Levels (EALs), the RAs should be notified within 24 hours of receiving the unvalidated results, not the validated results. Clarify or revise appropriately.</li> </ul> </li> <li>b. Bullet 5:                         <ul style="list-style-type: none"> <li>i. In addition to screening results against DOH EALs, also screen against EPA regional screening levels, or the project action levels specified in the QAPP and SAP.</li> <li>ii. Note that revised draft DOH EALs are now available for review on the Hazard Evaluation and Emergency Response Office website, as well as updated guidance regarding the implementation of DOH EALs for total petroleum hydrocarbons. Once the EALs and updated guidance have been finalized, they will supersede the DOH EALs currently listed in the Work Plan.<sup>1</sup></li> </ul> </li> </ul>
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<sup>1</sup> <https://health.hawaii.gov/heer/guidance/ehe-and-eals/> and <https://health.hawaii.gov/heer/files/2024/04/Use-of-TPH-Action-Levels-HDOH-Draft-March-2024.pdf>

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Response:

- a. Bullet 3:
  - i. The requested language “in accordance with the Red Hill *Sampling and Analysis Plan and Addendum 01* (DON 2017d; 2017c)” was added to Sections 6.3, 6.4 and 6.5”. A QAPP will be developed in approximately 6 months.
  - ii. The following language was added to Sections 6.3, 6.4 and 6.5: “The Navy will notify Regulatory Agencies within 24 hours of receipt of unvalidated results that exceed the current EALs at the time of construction.”
- b. Bullet 5:
  - i. The requested language “in accordance with the Red Hill *Sampling and Analysis Plan and Addendum 01* (DON 2017d; 2017c)” was added to Sections 6.3, 6.4 and 6.5. Project action levels will be specified in a QAPP, which will be developed in approximately 6 months.
  - ii. The Navy agrees to make notification to DOH HEER in response to exceedances of the TPH EALs.

13	Appendix B	<ul style="list-style-type: none"> <li>a. Monitoring well screen interval for RHP08B appears to be in elevation (ft msl) while the stated units are ft bgs.</li> <li>b. The proposed screen interval for NMW35 appears to be 0 to 30 ft msl. This will put the well screen well above the saprolite/basalt interface and in the vertical middle of the alluvial/saprolite wedge. Revise appropriately.</li> <li>c. In the revised Work Plan, indicate which wells are priority wells and which are backup locations. For example, Figures B-1 and B-2 depict three locations for Well KK, but in meetings the Navy indicated that a well will only be placed in one of the three locations.</li> <li>d. There does not appear to be a prioritization for the wells planned for installation. During previous discussions with the Navy, both the RAs and stakeholders have expressed that installing monitoring well(s) to the northwest of the Red Hill Bulk Fuel Storage Facility and in the direction of Halawa Shaft are of importance to demonstrate that risk to potential off-site receptors is currently managed. The table in Appendix B shall be revised to indicate the locations/specifications of potential deep co-located groundwater monitoring wells.</li> <li>e. Include specific details about the installation of deep groundwater monitoring wells at the proposed locations in Figure B-2.</li> <li>f. Provide more information about deep co-located monitoring well locations in Appendix B (i.e., which of the proposed locations presented on Figure B-2 will have co-located deep wells?).</li> <li>g. This letter will be followed by a tech memo describing additional well locations of interest and priorities for discussion at an upcoming special purpose meeting. The well location and prioritization discussions should not delay current work.</li> </ul>
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Response:

- a. Units have been revised to be consistently in feet bgs in Appendix B.
- b. We understand and agree that NMW35 may not be in water table conditions. Accordingly we have added a note in Appendix B to state that depths are unknown at this time, and will be determined during drilling.
- c. The challenge with using priorities 1 and 2, is that it does not consider accessibility of land and permitting challenges. These constraints can result in significant delays. The Navy has and continues to push on all drilling locations in Appendix B and moves forward to drilling when access and permits are granted. If / when original priority one locations become fully permitted, they will be prioritized and drilled first.
- d. Details on potential deep and co-located monitoring wells were added to tables and figures in Appendix B, specifically Tables B-1 and B-2 and Figures B-1 and B-2.
- e. See response to comment d.
- f. See response to comment d above.
- g. Comment noted. The Navy received the referenced June 18, 2024 tech memo from Matthew Cohen and Kelly Ann Lee and have addressed its comments in Appendix B. This was also discussed in the July 10, 2024 SPM.