

BOARD OF WATER SUPPLY

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November 17, 2016

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Dear Messrs. Pallarino and Chang:

Subject: Board of Water Supply Comments to the Work Plan / Scope of Work, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, November 5, 2016, Revision 01 Under the Administrative Order on Consent (AOC) Statement of Work (SOW) Sections 6 and 7

The Board of Water Supply (BWS) offers the following comments and recommendations to the subject revised Work Plan. Our goal is to ensure that all work conducted under the final document will produce defensible scientific and engineering results needed to continue to protect our drinking water supplies from past and future fuel releases from the Red Hill Bulk Fuel Storage Facility (RHBFSF).

Summary Comments and Recommendations

The Work Plan (WP) has been revised to address only tasks that will be conducted during the investigation while significant portions of the original WP (May 4, 2016) describing various technical aspects of the project have been omitted. Responses to BWS comments on the original WP were never provided. It is clear in the cover letter of the revised WP that comments forthcoming will only be responded to by the Navy in a

general manner as they relate to 'various issues', and that those responses will be provided with each applicable derivative deliverable. Based on this approach, it is unclear if deliverables will be made available for review by AOC Subject Matter Experts (SMEs) prior to their submittal to EPA. Considering comments made in the WP regarding an iterative and collaborative approach, it is unclear how the SME's comments on the project will be incorporated during the investigation.

Two overarching concerns with the revised WP have to do with the proposed very limited characterization of released fuel or non-aqueous phase liquid (NAPL) in the subsurface, using electrical resistivity only in the vadose zone, and the statement that "...opportunities for remediation of releases will be limited." Without adequately characterizing the NAPL, the success of the remainder of the project, including the ability to predict contaminant migration and to develop a feasible remediation scheme, comes into question.

Several tasks in the revised WP should be revised to achieve defensible scientific results. This includes increasing the length of time for collecting water levels in the aquifer using transducers and reconsidering the choice of the version of the MODFLOW code used in the flow modeling.

Detailed Comments and Recommendations

1. Section 2.1, Lines 8-12: The sentence: "Consideration must be given to avoid exacerbating the movement of contaminants caused by investigation and remediation activities (e.g., create conduits in the vicinity of the tanks by drilling borings through lower permeability soil or rock layers that currently impede the downward migration of fuel); therefore, it is possible that opportunities for remediation of releases will be limited." states the concern that great care must be given to preventing mobilization of contaminants in the subsurface during site characterization and remediation activities. However, fuel contaminants are already migrating past lower permeability intervals as demonstrated by continuing increases in groundwater contaminant concentrations in the groundwater monitoring wells installed by the Navy. Therefore, these units do not appear to "impede the downward migration" in any significant manner and so is not an acceptable reason for not characterizing or remediating NAPLs in the vadose zone or the aquifer underlying the RHBFSF. As previously stated in our comments to the original WP (BWS, 2016), this is a misleading and unsupported statement because monitoring wells and vadose zone monitoring points have been successfully constructed in other basalt environments through proper planning, drilling, and oversight while minimizing the potential for cross-contamination. The WP text should be revised to make this point clear. The BWS fully expects the Navy to use the best technology available to investigate and remediate fuel releases at the RHBFSF.

2. Section 2.4: Lines 9-13 states: “An iterative and collaborative approach will be followed throughout the AOC process to ensure that, consistent with the requirements of the AOC, the AOC Parties (i.e., the Regulatory Agencies, Navy, and Defense Logistics Agency) and AOC SMEs are involved in developing plans to exchange information and data used in the development of each report and their involvement is continued through the decision-making process.” The WP does not describe how the iterative and collaborative approach is to work and must be revised to clearly state when and how the SMEs will be involved. The BWS was surprised and disappointed to read in the cover letter to the revised WP that the Regulatory Agencies no longer require responses to all comments, and that only responses to issues raised in the comments will be provided with the derivative deliverable, contrary to the original disapproval letter. In the absence of more information about when and how the SMEs will be involved and which comments will be addressed and if so, when, the revised WP’s approach is neither iterative nor collaborative. The WP should be revised to clearly describe involvement by the SMEs in developing plans to exchange information and data used in the development of each applicable derivative deliverable.
3. Section 2.4, p. 11: Lines 9-12 states: “The Groundwater Protection Plan (GWPP) update will include response procedures and trigger points in the event that contaminants migrate toward a drinking water supply well.” This WP text statement should be modified to state that the GWPP will not only be updated based on whether contaminants migrate toward a drinking water supply well, but that it will also be updated based on whether results of site characterization and flow and transport modeling indicate that contaminants could potentially migrate towards a drinking water supply well. Further, the risk-based corrective action levels in the GWPP should be updated to reflect corrective action levels that are based on health-risks and not on the solubility of petroleum hydrocarbons in groundwater.
4. Section 4.1, Table 13, item 2: Several of our comments on the original WP (BWS, 2016) made it clear that little is known of the depth and geometry of the Halawa Valley fill and that this poses a significant data gap. BWS is encouraged to see that the revised WP has identified depths of sediments in North and South Halawa Valley as a data gap that leads to significant uncertainty in being able to determine groundwater flow directions and rates, and ultimately contamination pathways, to the northwest of the Red Hill facility. BWS would like to further highlight the importance of collecting data from coring, borehole logging, and monitoring well installation in the valley fill to provide direct evidence of depth, geometry, and properties of the sediments. While geophysical surveys may provide a broader-scale mapping of the valley fill, calibration data from coring

and borehole logging is considered essential in providing accurate and reliable geophysical survey interpretation.

5. Section 3.2: An approach for characterizing NAPL in the basal aquifer is not provided. Given the limitations of electrical resistivity methods, characterization of NAPL in the vadose zone will be impractical beneath the RHBFSF using this method. Known limitations of the electrical resistivity approach include difficulty in distinguishing the geophysical signature of NAPL from other lithologic and fluid variations, and decreasing resolution with depth (Day-Lewis et al., 2008; Stroo and Ward, 2010; EPA, 2016). Due to the expected depths of NAPL beneath the tanks, and the heterogeneous nature of the lithology in the vadose zone and saturated zone, it is unlikely that interpretation of the electrical resistivity survey data for the presence or absence of NAPL, and to quantify the volumetric content of NAPL, will lead to definitive and useful results. This will be exacerbated by the limited access to the zone beneath and adjacent to Tank 5 where the known spill occurred in January 2014. Conducting the survey from the ground surface near the tanks would not be feasible. Access tunnels to the tanks would provide the only means by which to conduct the survey and the tunnels would provide extremely limited access to the bedrock that needs to be evaluated.

Without a clear plan to carefully and successfully characterize the distribution of NAPL that leaked from Tank 5 in both the vadose zone and the basal aquifer, screening of the remedial alternatives as described in Task 7 will have little to no value in the absence of information about the spatial distribution of fuel contamination or the observed rates of migration, and contaminant source terms needed as input to the contaminant fate and transport model as part of Task 5 will be lacking rendering model results suspect. BWS is encouraged to see that the nature and extent of NAPL on the water table is now included as a data gap in the WP, however, none of the data needs identified for determining the nature and extent of NAPL has anything to do with directly measuring NAPL. Given that fluids are already moving relatively freely through the vadose zone to the aquifer based on TPH-d concentrations at RHMW-02, and that carefully controlled coring and installation of vapor monitoring points and monitoring wells using best available technological practices would pose a small and limited risk to NAPL mobilization, coring, vapor monitoring point, and monitoring well installation should be included in the plan to characterize the 27,000 gallons of fuel released from Tank 5.

6. Section 3.4, Water Level Monitoring Study: It is proposed to collect water level measurements for a period of 4 months. Is there any reason to not collect data longer? A full year of data is necessary to capture seasonal variations in precipitation and water supply well pumping rates.

7. Section 3.5.1, p. 28: Line 22 states that MODFLOW 2000 will be used to develop the flow model. The United States Geological Survey (USGS) has stopped supporting all MODFLOW codes earlier than MODFLOW 2005, thus it is recommended that MODFLOW 2005 be used for the flow modeling.
8. Section 3.6.1, p. 30: Lines 1 to 19. This section should be revised to state that the GWPP will be revised to include fuel releases of a wide range of volumes, not just the unjustifiably small volume defined in the current GWPP. The WP should include volumes that range from several tens of thousands of gallons to the entire stored volume.
9. Section 3.6.1, p. 31: Lines 20 to 21. Conservative assumptions for the contaminant, fate and transport (CF&T) should be expanded to include seepage velocities, residence times, and lateral extent of light non-aqueous phase liquid (LNAPL).
10. Section 3.6.1, p. 31: Line 25. The text should be revised to state that only site-specific parameter values should be used. As stated previously in our comments on the original WP (BWS, 2016), the values used in DON (2007) were for NAPL degradation in a sedimentary basin, which has very different seepage velocities and residence times than the basalt aquifer beneath the Red Hill facility, and so are most likely to be non-conservative for the Red Hill system.
11. Section 3.7.1, p. 33: Task 7 involves evaluating remedial alternatives. As brought up previously in comments to the original WP (BWS, 2016), and as is still evident in the revised WP, a viable approach to delineating the distribution of NAPL in both the vadose zone and the basal aquifer has not been provided as part of Task 2 in the WP. This leads to a serious flaw in the entire investigation since without establishing the distribution of NAPL, evaluation of remedial alternatives for NAPL cannot take place. This flaw is glaringly evident in Table 12, Data Deliverable(s) that Provide Subtask Input column, where LNAPL distribution is not part of any of those deliverables listed for assessing the feasibility of potential technologies for remediating NAPL in the subsurface.

Thank you for the opportunity to comment. If you have any questions, please feel free to call me at (808) 748-5061.

Very truly yours,



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Program (SERDP) and Environmental Security Technology Certification Program (ESTCP) for United States Department of Defense.