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October 23, 2020

Captain Gordie Meyer
Commander Navy Region Hawaii
850 Ticonderoga St., Suite 110
Joint Base Pearl Harbor Hickam, Hawaii 96860-5101

**Re: Risk and Vulnerability Assessment ("RVA") Phase 2 Proposed Scope of Work for the
Red Hill Administrative Order on Consent ("AOC") Statement of Work ("SOW")
Section 8, Notice of Deficiency and Opportunity to Cure**

Dear Captain Meyer,

The United States Environmental Protection Agency ("EPA") and the Hawaii Department of Health ("DOH"), collectively the "Regulatory Agencies," have reviewed the report submitted by the U.S. Department of the Navy ("Navy") and Defense Logistics Agency ("DLA") 8.2 *Risk/Vulnerability Assessment Phase 2 Scope of Work, Red Hill Bulk Fuel Storage Facility NAVSUP FLC Pearl Harbor, HI (PRL) ("RVA SOW")*, dated September 6, 2019 and accompanied with a cover letter dated November 19, 2019. Pursuant to Paragraph 7(b)(d) of the AOC, the Regulatory Agencies require modifications to address the Regulatory Agencies' concerns outlined in our September 23, 2019 letter, *Section 8 of the Red Hill Administrative Order on Consent ("AOC") Statement of Work ("SOW") Approval of Section 8.3 and Requirements to Complete Additional Work*.

As you are aware, the Regulatory Agencies have been in discussion with the Navy on how to best complete the work required under Section 8 of the AOC. As indicated in the discussions, the Regulatory Agencies are open to a change in approach from that identified in Phase I of the work. The Regulatory Agencies would like to correct Navy's RVA SOW statement on page 1-1, *"In March 2019, the Regulatory agencies and the Navy agreed to utilize a qualitative approach to the Risk and Vulnerability Assessment over a quantitative one to satisfy the intent of the AOC Scope of Work (SOW)...."* Instead, it should be noted that the Regulatory Agencies agreed to consider a change in the original RVA SOW to a hybrid approach of using both a qualitative and

quantitative approach with proper justification to expedite the RVA final phases without compromising the intent of the original approved RVA SOW.

As discussed in our September 23, 2019 letter, we understood that the approach is to utilize both qualitative and quantitative evaluations. The qualitative phase would utilize qualified subject matter experts to identify key vulnerabilities and prioritize areas for potential risk mitigation. The Navy would prepare expert qualitative evaluations to help assess whether these hazards pose a material risk to the Facility and the environment or determine if they can be eliminated through a screening analysis. Following these qualitative evaluations, expert quantitative analyses will help to assess the level of risk and consequences posed by specific fuel release vulnerabilities or initiating events of concern.

As was discussed during recent scoping meetings, future risk assessment reports need to present risk in terms of environmental consequences. Plausible release scenarios from the full range of initiating events (all Phases identified in the original RVA Scope) should be described in terms of environmental consequences, and if consequences could be great enough to impact drinking water quality or availability, should be analyzed for probability. Those release scenarios should be vetted with the agencies prior to initiating risk evaluations. Tools including but not limited to contaminant fate and transport (CF&T) modeling should be utilized to identify environmental consequences. Environmental consequences should be described in terms of potential contaminant concentrations at existing groundwater extraction locations including, but not limited to Red Hill Shaft, Halawa Shaft, and Moanalua Wells.

We suggest the Navy consider a risk workshop approach to help define the appropriate range of release scenarios for analysis utilizing Navy experts, regulatory agency experts, and stakeholder experts. In addition, the Navy shall provide intermediary submissions, such as after identified milestones, for regulatory agency and stakeholder review and comment. Release scenarios should include rates, volumes, and location of releases. Then the release scenarios should be analyzed to estimate the potential environmental consequences for each release scenario. The fuel release transport characteristics should consider chemical composition associated with a particular release scenario and should also consider the existing fuel mass in-place, as well as the release history at all tanks and associated infrastructure, including the lower tunnel.

Current risk mitigation measures such as release detection and response should be considered as part of the release consequence analysis. However, the reliability of any risk mitigation measure should also be presented in the analysis.

The Regulatory Agencies expect the remaining RVA analysis and deliverables shall include:

1. The comprehensive range of plausible fuel release scenarios and the associated release volumes and rates for each using conservative assumptions. These assumptions and the basis for the assumptions shall be provided and justified.

2. Estimates of potential release rates, volumes, durations, locations and frequencies, and consequences (include cascading scenarios).
3. Evaluation of the likelihood of release events that may result in the release of fuel to the environment that could impact to the quality or availability of drinking water.
4. Identification of potential mitigation measures for identified scenarios with potential to impact drinking water quality or availability.

In accordance with Section 7(d) of the AOC, the Regulatory Agencies are requiring the Navy to revise and resubmit the RVA SOW to address the above deficiencies within 60 days of this letter.

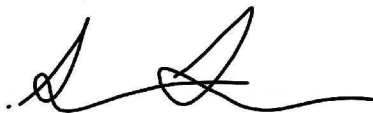
The Regulatory Agencies suggest the Navy look to produce deliverables that characterize risk for a comprehensive range of release scenarios for all appropriate initiating events as expeditiously as practicable. This risk analysis is critical in helping to inform tank upgrade, release detection, operational procedures, maintenance procedure, and repair procedures in order to identify appropriate risk mitigation.

We reiterate that the RVA process should allow for Regulatory Agency, Regulatory Agency subject matter experts, and stakeholder review during various stages of the RVA process. The finished product should be as transparent as possible, and we request early and ongoing input on the table of contents of the planned reporting to be contained in deliverables.

Included for your review and consideration are the Board of Water Supply comments dated January 23, 2020 (Enclosure). We look forward to discussing with the Navy/DLA a path forward to fulfilling the next phase of the RVA.

If you have any questions, please contact us.

Sincerely,



Steven Linder, P.E.
Red Hill Project Coordinator
EPA Region 9



Roxanne Kwan
Interim Red Hill Project Coordinator
State of Hawaii, Department of Health

Enclosure: Honolulu Board of Water Supply (BWS) Comments on ABS Consulting (ABS) document "8.2 Risk/Vulnerability Assessment Phase 2 Scope of Work" dated September 6, 2019 and associated Navy's Cover Letter "Risk and Vulnerability Assessment (RVA) Phase 2 for the Red Hill Administrative Order On Consent (AOC) Statement of Work (SOW) Section 8" dated November 19, 2019.

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January 23, 2020

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and

Ms. Roxanne Kwan
Solid and Hazardous Waste Branch
State of Hawaii
Department of Health
2827 Waimano Home Road
Pearl City, Hawaii 96782

Dear Mr. Shalev and Ms. Kwan:

Subject: Honolulu Board of Water Supply (BWS) Comments on ABS Consulting (ABS) document "8.2 Risk/Vulnerability Assessment Phase 2 Scope of Work" dated September 6, 2019 and associated Navy's Cover Letter "Risk and Vulnerability Assessment (RVA) Phase 2 for the Red Hill Administrative Order On Consent (AOC) Statement of Work (SOW) Section 8" dated November 19, 2019.

The BWS offers our comments to the latest two documents submitted by the Navy under Red Hill Bulk Fuel Storage Facility (RHBFSF) AOC Section 8. The first document is the "8.2 Risk/Vulnerability Assessment Phase 2 Scope of Work" dated September 6, 2019 (Navy 2019a). The second document is the Navy's associated cover letter to the Scope of Work document entitled "Risk and Vulnerability Assessment (RVA) Phase 2 for the Red Hill AOC SOW Section 8" dated November 19, 2019 (Navy 2019b).

Please note that the BWS has submitted letters in the past that commented on various Quantitative Risk and Vulnerability Assessment (QRVA) documents submitted previously by the Navy under RHBFSF AOC Section 8 (Lau, 2016; Lau, 2017a; Lau, 2017b; Lau, 2017c; Lau, 2017e; Lau, 2018c; and Lau, 2019c). We are referencing

these past letters as they provide context and historical perspective to our comments contained herein.

Prior to discussing the Navy's cover letter and the Navy's Proposed RVA Phases 2, 3 and 4 Scope of Work, a brief summary of AOC Section 8 and related documents is provided as follows:

- Section 8 of the AOC SOW requires the Navy to perform a risk/vulnerability assessment of the RHBFSF determine the level of risk to the drinking water aquifer and to inform other AOC decisions (EPA/DOH 2015).
- The original scope of AOC Section 8 included a full QRVA using rigorous engineering methods commonly used for nuclear power plants and other critical infrastructure (NAVFAC 2017). This type of risk assessment employs a comprehensive quantitative engineering evaluation performed by specialty consultants. The first of four phases of that work were completed by ABS in November 2018 and took approximately 17 months to complete (ABS 2018).
- After reviewing the unacceptably high probabilities of large fuel releases from ABS' QRVA Phase 1 results, the Navy disputed its own engineering consultant's findings and proposed that AOC Section 8.3 SOW be "modified" to eliminate the rigorous risk assessment for the remaining QRVA phases in favor of a "qualitative approach" (Navy 2019c).
- Notwithstanding the BWS' objections (Lau 2019c), the U.S. Environmental Protection Agency (EPA) and Hawaii Department of Health (DOH) (collectively, "Regulatory Agencies") approved the Navy's reduced scope but required a plan be submitted that would demonstrate certain minimum requirements would be met (EPA/DOH 2019).
- The Navy RVA Phase 2 scope of work (Navy 2019a), as described in its cover letter (Navy 2019b), does not set forth an approach that meets the minimum requirements placed on the Navy by the Regulatory Agencies as conditions of their approval of the Phase 1 RVA Report (EPA/DOH, 2019).

Given that the Navy's qualitative RVA approach cannot determine the risks of fuel releases or aquifer contamination, cannot meaningfully inform a potential tank upgrade alternative (TUA) decision, and does not even satisfy the minimum requirements set forth by the Regulatory Agencies, the BWS urges the Regulatory Agencies to reject the Navy's RVA Phase 2 scope of work unless and until these flaws are corrected. The BWS' detailed comments on the Navy's cover letter and the proposed RVA Phase 2 scope of work are presented below.

Comments on the Navy's Cover Letter

The Navy's cover letter dated November 19, 2019, (Navy 2019b) to the Scope of Work document entitled "Risk and Vulnerability Assessment (RVA) Phase 2 for the Red Hill AOC SOW Section 8" dated September 6 (Navy 2019a) does not describe a plan that would satisfy the AOC or the Regulatory Agencies' conditions of approval (EPA/DOH, 2019). The proposed work scope falls short in three ways:

1. The Regulatory Agencies' approval letter allows for "an approach utilizing both qualitative and quantitative evaluations developed by qualified subject matter experts" followed by "expert **quantitative analyses** will help to **assess the level of risk** posed by specific vulnerabilities or initiating events of concern" (EPA/DOH, 2019) (emphasis added). However, the Navy's proposed scope as described in the cover letter does not satisfy the Regulatory Agencies requirement to "assess the level of risk" and serve as "an extension to the RVA" Nor does the Navy's proposal meet the stated purpose of the AOC SOW, which requires that RVA work must "assess the level of risk the [RHBFSF] may pose to the groundwater and drinking water aquifers and [] inform ... subsequent development of [TUA] decisions." Instead the Navy proposes that the "targeted quantitative analysis will utilize standard engineering calculations." Standard engineering equations compare simplified, nominal strengths to minimum demands contained in general standards (e.g., a building code) but they are not used to assess levels of risk.
2. The Navy acknowledges the requirement to assess the risk to our irreplaceable groundwater aquifer with only a vague reference to "the required fate and transport model used for evaluation of chemicals of potential concern (COPCs) in groundwater" (Navy, 2019a). The Navy does not indicate that the RVA will "simulate consequences of potential uncontrolled releases" as required by the EPA and DOH (EPA/DOH, 2019). As such, the proposed scope does not satisfy the AOC or the Regulatory Agencies' requirements.
3. In addition to describing a process that falls short of the approval conditions, the cover letter contains complete disregard of the Regulatory Agencies' directive that the Navy and Defense Logistics Agency (DLA) discuss the proposed approach with all stakeholders. Instead the Navy states: "At this time, Navy/DLA do not intend to seek input from external stakeholders.... Comments will be reviewed and considered when the assessment is publicly released." As such, the Navy's cover letter violates both the letter and the spirit of the Regulatory Agencies' conditional approval and prevents a review from all stakeholder subject matter experts (SMEs). This is inexcusable and should not be tolerated. The Navy's decision to adopt such a posture after its unconvincing disavowal of the results from its own consultant's rigorous Phase 1 quantitative risk evaluation

also does not foster transparency or confidence among interested third parties as the Navy conducts its follow-on work associated with AOC Section 8.

Comments on the Navy's Proposed RVA Phase 2 Scope of Work

Consistent with its cover letter, the proposed RVA Phase 2 scope of work fails to describe a process for conducting a technically defensible quantitative RVA or that meets the Regulatory Agencies' minimum additional work requirements.

First, the "targeted quantitative analyses" described in the proposed RVA Phase 2 scope of work will not provide new information to aid in assessing the level of risk posed by specific initiating events of concern. Such analyses are proposed only for selected seismic events and certain accident scenarios affecting the lower access tunnel. More importantly, even when such analyses are undertaken, they will not produce a quantitative estimate of risk. The Navy's proposed scope of work explicitly states that, in such instances, the report "will not include analyses previously included in the full scope QRVA, such as ... Risk Quantification." Such exercises are not conducive to conducting technically sound quantitative risk analyses, targeted to focus on the initiating events of greatest concern, and thus do not meet the Regulatory Agencies' additional work requirements.

In its May 29, 2019 letter to the Regulatory Agencies (Navy 2019c), the Navy summarized its intention to abandon the previously approved approach to the AOC SOW Section 8 risk assessment. Upon review, and as described in their September 23, 2019 letter to the Navy (EPA/DOH, 2019), the Regulatory Agencies have approved of this approach to satisfy AOC Section 8.3 subject to two conditions for additional work.

The first of the Regulatory Agencies' two requirements relates to how opinions would be used in lieu of engineering analysis to determine which risks can be ignored. The approach described by the Regulatory Agencies' conditional approval is one in which a qualitative evaluation involving expert opinion would be used to eliminate some possible damage mechanisms from consideration (screening) but would then be followed by quantitative risk assessment of the unscreened hazards. However, the Navy does not seem to be proposing this at all. The current Navy proposal would most certainly and purposely screen hazards from consideration based on opinion, but the unscreened hazards would be evaluated using standard engineering equations such as those found in a building code. While assessments using standard engineering equations might indeed be quantitative in nature, their use is not applicable for performing quantitative risk assessment. The proposed approach is unsatisfactory because the results of this proposed phase of AOC Section 8 work could not be combined with or otherwise inform the quantitative results of RVA Phase 1, nor could they inform the risks of product releases or aquifer contamination in any meaningful (quantitative) way.

For instance, on Page 3-4 of the Navy proposal we find that the seismic analysis will not include “detailed analysis of facility specific component fragility.” In this context, “fragility” means a curve that quantifies through engineering analysis how the probability of component failure increases with increasing earthquake ground shaking intensity. A fragility curve is a key component of any quantitative risk assessment, and explicitly precluding it is a clear indication that such assessment is not intended. In short, the analysis as described by the Navy proposal cannot lead to meaningful quantitative risk assessment or expand the efforts completed in the Phase 1 work.

Also, contrary to the Regulatory Agencies’ second requirement, the proposed scope of work will not simulate consequences of potential uncontrolled fuel releases—specifically, acute large releases initiated at the tank nozzle and smaller acute releases initiated at the tank liner—to the groundwater and drinking water aquifers. Such work is explicitly excluded from the scope to be undertaken by the Navy’s authorized contractor, ABS, which “[w]ill not quantify or characterize the impact to the water table.” In its cover letter, the Navy does pledge to conduct “vadose zone modeling ... which will help bound our understanding ... for a range of releases ... [and] will provide a basis for developing the source terms that will be used in the required fate and transport model.” However, this general language falls short of a clear commitment to address the specific releases defined by the Regulatory Agencies as the minimum requisite level of modeling effort. Without specific release volumes generated by the AOC Section 8 work, the Navy will have no factual basis with which to model contaminant releases as required by AOC Section 7.

Summary of Comments

The BWS reiterates our insistence for continuing the rigorous **quantitative** risk approach of Phase 1 for Phases 2 through 4 of the RVA. The reduced approach proposed by the Navy is a significant step backwards that should not be tolerated, and fails the explicit requirements recently established by the Regulatory Agencies (EPA/DOH, 2019). Results from the Navy’s proposed qualitative method cannot be used to meaningfully expand the already completed Phase 1 results. Given the Navy’s failure to fulfill the clear directive provided by both the AOC and the Regulatory Agencies, the BWS urges the Regulatory Agencies to reject the Navy’s RVA Phase 2 scope of work and require the Navy to prepare a scope of work capable of quantitatively assessing the level of risk the RHBFSF poses to our critical drinking water resources and informing a subsequent TUA decision as required by the AOC.

In the interest of, transparency the Navy should release an un-redacted version of the Phase 1 QRVA without requiring signature of a non-disclosure agreement by accessing parties.

Mr. Shalev and Ms. Kwan
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Thank you for the opportunity to comment. If you have any questions, please contact Mr. Erwin Kawata, Program Administrator of the Water Quality Division, at 808-748-5080.

Very truly yours,



ERNEST Y.W. LAU, P.E.
Manager and Chief Engineer

CC: Mr. Steve Linder
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