BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
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October 4, 2018

Mr. Omer Shalev
United States Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, California 94105

And

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

Dear Mr. Shalev and Ms. Kwan:

Subject: Board of Water Supply Comments on Meetings Held on August 14 and 15, 2018 Red Hill Administrative Order on Consent (AOC) Statement of Work (SOW) Sections 2, 3, 4, 5, and 8

The Board of Water Supply (BWS) is participating as a subject matter expert (SME) under paragraph 1.1 of the Red Hill Bulk Fuel Storage Facility (RHBFSF) AOC Statement of Work (SOW) by reviewing various work products prepared by the Navy under the AOC and also by attending AOC technical meetings. In this role, BWS attended the half-day meetings held on August 14 and 15, 2018, where the Navy summarized their progress on AOC Section 2 (Tank Inspection, Repair, and Maintenance [TIRM]), AOC Section 3 (Tank Upgrade Alternatives [TUA]), AOC Section 4 (Release Detection), AOC Section 5 (Corrosion and Metal Fatigue), and AOC Section 8 (Quantitative Risk and Vulnerability Assessment [QRVA]). Much of the time reserved for this meeting was spent by the Navy and the Navy's contractors presenting approximately 66 slides on the various AOC Sections. It should be noted that despite numerous previous requests, the Navy and/or its contractors did not provide the BWS with any materials to review prior to the start of the meeting.

Taking our opening statement into consideration, the BWS offers the following comments for your consideration.

Risk Management Activities/Cause and Effect

The nature of potential future releases have been binned by the Navy and Regulators into two broad categories – chronic releases and catastrophic releases. Navy and regulators indicated that performance of the Tank Upgrade Alternatives (TUAs) being considered cannot be differentiated with respect to catastrophic releases. That is, any of the TUAs would do equally well or equally poorly should there be a catastrophic release. The rationale for this opinion was not provided, and the BWS does not agree with it. For instance, one of the catastrophic release mechanisms identified by the Navy (Slide 4 of Navy's presentation) is overfill. Under this scenario, a tank built with secondary containment (tank within a tank) would be able to capture the overfill within the interstice preventing its release to the environment whereas a single-wall tank would not, increasing the probability of it reaching the environment. Similar scenarios can be postulated for other release mechanisms (seismic, terrorism, etc.). Neglecting the potential advantages of some TUAs with respect to catastrophic release has not been justified by the Navy or regulators. Typically, such justification would follow a formal Failure Modes and Effects analysis or equivalent technique.

AOC/SOW Section 2 Update

On a number of occasions, the Navy expressed confidence that the tanks could survive disasters such as earthquakes, blasts, and floods because they are "part of the mountain" or "anchored to the mountain" and that the Navy was comfortable with this "superior design" (Slide 14 of Navy's presentation). While there are certainly advantages to underground construction with respect to extreme loadings, simply because a structure is "anchored to the mountain" does not mean it cannot fail. Such generalities are not a substitute for a full engineering evaluation of the probability of failure. The ability of the facility to maintain containment and functionality goes well beyond how well the steel liner is anchored to the concrete tank. Additional issues that require engineering evaluation include, but are certainly not limited to, the integrity of the tower in sloshing loads; the rigid tank/pipe connections subject to ground strains; bracing of the pipelines for seismic shaking (a potential failure mechanism identified in the 1998 Willbros report) to mitigate the seismic impact on the pipeline racks and supports in the lower access tunnel; and ridgetop amplification/failure under earthquake loads. One would expect a comprehensive engineering assessment of the facility before stating that the design feature "the tanks as part of the mountain" would protect the facility from extreme loads.

It is our understanding that the Navy has concluded that the chief cause of the 2014 Tank 5 leak was the presence of multiple defects in repair welds. It is also our understanding that comprehensive vacuum box testing of those repair welds was not performed, and that the Navy believes such testing would have been effective in finding the defects prior to filling. The BWS is concerned that vacuum testing will not be an

effective means to test future patch plates. If there is no path through the liner (once the vent hole, drilled through the liner as part of the repair, is plugged), then there is no opportunity to draw air through a weld defect, and all such vacuum tests would yield a positive result, regardless of the presence of repair weld defects. Moreover, even if a supply of air were to exist (for instance through an unplugged vent hole, from through-wall corrosion, or from a defect in the plug weld itself), a vacuum test could not identify repair weld root defects that would be susceptible to through-wall extension via corrosion. The BWS recommends that the Navy reevaluate the reliance on vacuum box testing and that weld inspection specifications be reevaluated with respect to their ability to reliably identify root defects in the repair patches.

During the Navy's update on TIRM procedures, the BWS voiced concern about a water main break in the main tunnel could potentially damage the fuel pipelines and flood the control room. The Navy states they believe that the water will run out of Adit 2 and flooding, and that the forces this would imposed on other equipment and piping in the tunnel would not be an issue. The BWS would like to independently review the analysis that supports this conclusion and confirmation from the Navy that this issue has been accounted for in the updated TIRM procedures and evaluated in the risk assessment (AOC Section 8).

AOC/SOW Section 3 Update

The BWS is very concerned that a decision on TUA, and particularly the decision to maintain the status quo with a single-wall tank, is being made before the effectiveness of nondestructive examination (NDE) has been demonstrated. The 20-year cycle, on which the Navy testing, inspection, repair and maintenance plans are based, fully relies on the ability of NDE to identify, with very high reliability, all areas at which there has been sufficient wall thickness loss such that there is significant risk of through-wall corrosion prior to the next inspection. Preventing single-wall tank leakage thereby depends entirely on the accuracy, precision and reliability of the NDE equipment, operators and techniques. Based on the significant differences between the screening and prove-up measurements, and based on our visual examination of the coupons, the BWS has serious concerns and doubts about the NDE effectiveness. The Navy should not propose a single-wall TUA, and the regulators should not approve a single-wall TUA, until the reliability of the NDE process has been comprehensively demonstrated.

AOC/SOW Section 4 Update

Regulators appear to be relying heavily on the accuracy, precision, and reliability of release detection system in their decision whether to approve a single-wall TUA (1A or 1B). The BWS would like to reiterate our concern with equating single-wall release detection technology to the release detection and capture ability of secondary containment systems. While the available technologies demonstrate impressive accuracy considering the volume of product in each tank, any release alarm from these

systems is essentially a notification that product has already escaped the single barrier and now is in the environment. Release detection in a secondary containment system is even more accurate and reliable, as any release passing the primary liner can be monitored and captured even during fuel movements.

Based on our discussions with Navy personnel and contractors during the August 14 and 15 AOC meetings, it appears to BWS that the Navy has not yet decided how any new and improved release detection technologies would be implemented. Even if the required equipment was to be permanently installed in all tanks, it seemed that the Navy is reluctant to commit to incorporating the technology into their daily operations. Instead, the current plan was described as utilizing the new technology on an annual or semi-annual basis to perform tank tightness testing as mandated by the regulators. As stated before, BWS continues to strongly urge the Navy to incorporate continuous, daily monitoring of any new technology that permits earlier detection of smaller releases. Further, it should be made clear to the public that when the Navy discussed release detection, that they also indicate the frequency in which release detection occurs and with that methods. The most responsible and conservative position to take is to assume that releases below the limit of any detection system occurs at the RHBFSF, given the age of the steel liner, on a continuing basis and to implement secondary containment to guard against such releases as the most environmentally protective approach. This is presently not the case. Expressing a commitment to safeguard the groundwater is not the same as taking action to do so. The BWS strongly cautions against the direction being taken now and urges installing secondary containment at the RHBFSF or relocating the tanks away from the aquifer.

BWS has previously commented on how leaks below the detection level can result in the release of large volumes of fuel into the environment if the tank design is not secondarily contained (Lau, 2016a; Lau, 2016b; Lau, 2017a; Lau, 2017b, Lau, 2017c). Given that the Navy currently appears reluctant to utilize the recently demonstrated best available practicable technology (BAPT) for leak detection more than once a year, a considerable amount of fuel could be leaked into the environment before detected by the BAPT for leak detection. BWS understands that the Navy has other means for detecting leaks prior to the annual testing; however, these methods are nowhere as sensitive or reliable. Furthermore, when these less sensitive methods are used, the Navy needs to respond to various alarm levels to confirm if there is an actual leak and then determine when and how to empty the tank. All this takes considerable time during which fuel will escape into the environment unless the tanks are secondarily contained. Furthermore, during times when filling or emptying tanks (dynamic conditions) the minimum detectable fuel release rate is much higher than under static conditions. BWS has asked at previous meetings for the Navy and DLA to describe how much fuel release occurred under these various scenarios (using the current methods for leak detection and inventory control) from the time the leak starts to the time the tanks are empty using worst case (conservative) assumptions. These volumes of fuel released should be factored into the TUA decision and how frequently the BAPT for leak detection should be used.

AOC/SOW Section 5 Update

Based on the recently removed coupons and previous observations, the chief concern regarding corrosion presently is progressive corrosion of the liner from the outside face, with the eventual formation of through-wall pits. The Navy's selection of TUA 1A or 1B includes application of an elastomeric surface coating to the inside face of the 32-inch inlet and at least portions of the inside face of the tank liner. While such a coating may have benefits in terms of minor corrosion of the interior surface or maintaining fuel quality by reducing surface contaminants, it will provide no benefit with respect to the chief corrosion risk (outside-to-inside). Also, based on our experience with ultrasonic thickness testing of steel plate, irregular surfaces due to corrosion, mill scale, debris or coatings can make thickness testing more difficult. The BWS recommends that the Navy verify with the NDE equipment manufacturers that the presence of a 24-mil (24/1000-inch) coating will not adversely affect the already challenging NDE testing evaluation of outside corrosion or crack depth.

The BWS would like to repeat our disappointment with the Navy's decision not to perform more testing and sampling of concrete exposed during the coupon removal. It is our understanding that the sole concrete field-testing consists of surface pH measurement, and that the only sampling consisted of collection of a small powder specimen composed of a mixture of material from the surface to a depth of about one inch. Laboratory test results from such a mixed powder sample are of minimal use. Core samples would have provided the opportunity for comprehensive petrographic examination of the concrete quality and the potential for any progressive degradation with depth.

The Navy and EPA indicated that profilometry work would be conducted on the steel coupons but specific questions regarding this analysis remain unanswered. The BWS requests that any work scope associated with the laboratory analysis of the steel coupons be provided for review. In addition, the Navy and EPA indicated that destructive testing results would likely not be completed until near the end of 2018. This is very close to the date of the recommended TUA decision. The BWS urges expediting the destructive testing reporting so it can be reviewed adequately and considered in the final TUA decision.

AOC/SOW Section 6 Update

The Navy and their contractors provided a high-level summary of the environmental data collected at the RHBFSF and their interpretations of the data. The Navy indicated that they did not feel light non-aqueous phase liquid (LNAPL) was present in monitoring well RHMW02 since the 2014 Tank 5 release. The BWS does not agree and pointed out groundwater monitoring sample results pre- and post-2014 release that indicated whether LNAPL was present based on total petroleum hydrocarbons – diesel range (TPH-d) concentrations exceeding effective solubility levels. The DOH also point out that total naphthalenes has also exceeded effective solubility at RHMW02.

During the AOC/SOW Section 6 update, the BWS reiterated its concern that there are not enough monitoring wells at the RHBFSF (around tanks to characterize the vadose zone) and in the nearby surrounding Halawa and Moanalua valleys. The BWS requests that the Navy install as many monitoring wells as possible to characterize the issues. It was suggested in the meeting that the Navy need only to define the 2014 Tank 5 release. The BWS disagrees with this characterization and believes that the plain language of the AOC makes clear that it covers not only the 2014 Tank 5 release but any other historical releases as well.

During the meeting, the BWS stated that any planned TUA should be combined with active remediation of the existing contamination. The BWS position is that the RHBFSF needs to be remediated immediately and that no future releases occur.

The BWS would like to request that the Navy provide the groundwater monitoring results from the First and Second Quarter (Q1 and Q2) 2018 sampling events. This data has yet to be posted on the DOH website. As you are aware, the BWS is very interested in any environmental data collected at the RHBFSF and it has been several months since the 2018 Q1 and Q2 sampling events. The BWS believes that results should have been received by the Navy as of this date that any reports associated with the 2018 Q1 and Q2 events should be made available.

AOC/SOW Section 7 Update

The BWS will provide comments to the AOC/SOW Section 7 Update in our comment letter for Groundwater Modeling Working Group (GWMWG) Meeting No. 13. GWMWG Meeting No. 13 was held on August 16, 2018 and a BWS comment letter is forthcoming.

AOC/SOW Section 8 Update

The Navy stated that the QRVA Phase I would be released for Final (Public) Release. The Navy is working on executing task orders to start the next three phases of the QRVA: Phase 1 - Sensitivity Studies, Phase 2 - Fire and Flood initiating events, and Phase 3 – Seismic initiating events. It is important to note that the QRVA will not compare the relative vulnerabilities of tank upgrade alternatives, nor will it consider the potential risk to groundwater. In addition, it is our understanding that the Navy is discussing a change to the essential role of the RHBFSF, converting it from bulk storage to a throughput facility going forward. Any such change in operations will likely introduce additional risks the current QRVA will not consider. Any potential TUA decision should be delayed until a QRVA is completed which outlines all potential risks, including and most importantly the risk to the underlying sole-source aquifer.

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, United States Environmental Protection Agency, Region IX
Mr. Mark Manfredi, NAVFAC Hawaii

References

Lau, E. 2016a. Board of Water Supply (BWS) Recommendations for Inclusion into the Red Hill Bulk Storage Fuel Facility Administrative Order on Consent (AOC) Work Plans. Letter to Bob Pallarino, Environmental Protection Agency, Steven Y.K. Chang, State of Hawaii Department of Health, and, Mr. Jimmy Miyamoto, NAVFAC Hawaii. April 25.

Lau, E. 2016b. Board of Water Supply (BWS) Comments Discussed with the United States Environmental Protection Agency (EPA) and Hawaii Department of Health (DOH) at the October 4 and 5, 2016 meeting to discuss the Work Plans Developed under Sections 2, 3, 4, and 8 of the Red Hill Facility Administrative Order on Consent (AOC) Statement of Work (SOW). Letter to Bob Pallarino, Environmental Protection Agency, and Steven Y.K. Chang, State of Hawaii Department of Health. November 4.

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Lau, E. 2017b. Letter to Mr. Roy K. Amemiya, Jr., Managing Director, City and County of Honolulu, Subject: Letter Dated April 25, 2017 from Rear Admiral J.V. Fuller, Regarding the Board of Water Supply (BWS) Website Frequently Asked Questions (FAQ) on the Red Hill bulk Fuel Facility. May 4.

Lau, E. 2017c. Letter to Mr. Bob Pallarino, United States Environmental Protection Agency (EPA) and Mr. Steven Y.K. Chang, State of Hawaii, Department of Health regarding: Board of Water Supply (BWS) Comments to the Red Hill Administrative Order on Consent (AOC) Section 4.5 New Release Detection Alternatives [Report] Scope of Work, dated June 19, 2017. July 14.