

## BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU  
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HONOLULU, HI 96843



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And

Dr. Virginia Pressler, M.D.  
Director  
State of Hawaii  
Department of Health  
P.O. Box 3378  
Honolulu, Hawaii 96801

Dear Mr. Blumenfeld and Dr. Pressler:

Subject: United States Environmental Protection Agency (EPA) and Hawaii Department of Health (DOH) Frequently Asked Questions (FAQ) on the proposed Administrative Order on Consent (AOC) for the Red Hill Fuel Storage Facility

The Honolulu Board of Water Supply (BWS) is pleased to offer the enclosed comments to the subject FAQ prepared by EPA and DOH. For reading ease, the FAQs and its responses are reprinted followed by our comments. We hope you find them helpful to improving our understanding of the issues and situation at Red Hill.

We look forward to receiving your written responses to our comments. If you have any questions, please call me at 808-748-5061.

Very truly yours,

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

Enclosure

cc: Duane Miyashiro, BWS Board Chair

**Honolulu Board of Water Supply  
Comments to the  
U.S. Environmental Protection Agency (EPA) and Hawaii Department of Health (DOH)  
Frequently Asked Questions (FAQ) on the  
Proposed Red Hill Administrative Order on Consent (AOC)**

**Red Hill Bulk Fuel Storage Facility - Frequently Asked Questions**

**1. Why did EPA and DOH negotiate an Administrative Order on Consent with the Navy?**

*EPA/DOH Answer: As a result of the fuel release from Tank 5 at the Red Hill Bulk Fuel Storage Facility in January 2014, EPA and the Hawaii Department of Health (DOH) brought an enforcement action against the Navy and Defense Logistics Agency (DLA) to address past fuel releases and minimize the likelihood of future releases. In general, a negotiated agreement such as an Administrative Order on Consent is appropriate, and the best enforcement tool to solve complex environmental problems since it allows for flexible and innovative solutions. The Administrative Order on Consent also goes beyond the scope of merely complying with the current regulations. The proposed Red Hill Administrative Order on Consent is structured to establish a process for collecting the necessary data and evaluating the optimal technical solutions to address past fuel releases and prevent future releases.*

**BWS Comments:** The BWS does not object to EPA and DOH selecting the AOC and SOW process to address the issues at the Red Hill Facility. However, BWS does not support the AOC and SOW released on June 1, 2015 as written. The content is too vague, lacks the implementation of specific actions within set deadlines and unacceptably ignores in-depth participation by stakeholders and the public. The BWS also does not agree that the AOC goes "beyond the scope of merely complying with current regulations." Another option is to adopt "new regulations" that provide greater enforcement authority to address the Red Hill situation.

**2. What if new information indicates that the Facility poses a much greater risk than current data suggest?**

*EPA/DOH Answer: The proposed Administrative Order on Consent is flexible and work requirements will be tailored to the findings from studies of the Facility and the surrounding environment conducted under the Administrative Order on Consent. In addition, the EPA and DOH each reserve their rights to take additional actions if they determine, together or separately, that the Administrative Order on Consent is not sufficiently protective. Existing regulations require the Navy and DLA to respond immediately to any emergency situation encountered at the Facility.*

**BWS Comments:** The FAQ appears to suggest that the documented presence of petroleum contaminants in the groundwater under the Facility in addition to the wearing of the tanks and concerns about future and catastrophic fuel releases poses no risk to the environment and groundwater. If so, please provide us a copy of the documents that supports this conclusion. Our review of the publicly available information indicates otherwise. Rather, the documents show no evidence that the risk from the Red Hill Facility to the Navy's Red Hill Shaft, our

Halawa Shaft, Moanalua wells, Oahu's Sole Source Aquifer, or the environment has been determined to date. Estimating the risk posed by the Red Hill Facility to human health, our drinking water, and the environment using currently available data is a very important step and could have been very useful during the development of the AOC.

If, as the FAQ suggests, new information indicate the risk is unacceptable, then immediate measures should be taken to secure the facility to protect the underlying aquifer. The AOC and SOW should contain specific risk scenarios that, if determined to exist, should require immediate action to neutralize each risk scenario and prevent any emergency situations from ultimately occurring.

### **3. Why will it take such a long time to implement tank improvements under the proposed Red Hill Administrative Order on Consent?**

*EPA/DOH Answer: The primary goal of the proposed Administrative Order on Consent is to ensure the long-term protection of groundwater resources in the vicinity of the Facility. Implementing the right solution for Red Hill is a significant engineering challenge. It will require technologies and procedures specifically designed for the Facility. The initial phases of the proposed Administrative Order on Consent focus on accomplishing the extremely complex and critical work of evaluating, designing, and selecting cleanup specifics and upgrade technologies for the massive, uniquely engineered tanks, which are believed to be the largest underground fuel tanks in the world. Implementing an effective long-term solution will take time to ensure its success. However, much work will also be conducted within the first two years of the Administrative Order on Consent to ensure that the Facility is operated safely while a long-term solution is implemented. The proposed schedule requires the Navy and the DLA to hit the ground running, submitting within 120 days multiple plans ranging from improving inspection protocols and assessing groundwater contamination risk to addressing cleanup methods and tank upgrade alternatives. In all, the Navy and DLA are to complete approximately 40 tasks within the first three years. EPA and DOH anticipate opportunities to accelerate the current tank upgrade schedule, and the agreement includes penalties for the Navy and DLA if current schedules are not met. Ultimately, tanks not upgraded by the end of the current schedule will have to be taken out of service.*

**BWS Comments:** The FAQ response appears to indicate that the findings and conclusions of past tank studies are inadequate and need further study. We disagree. Available documents from 1998 and 2008 describe prior comprehensive, government funded engineering evaluations, commissioned by the Navy or DLA, of various options for repairing the Red Hill tanks, including options that may provide long-term, i.e., 40-year, life extension (see Enterprise Engineering, Inc. 1998; 2008). The 2008 Enterprise Engineering report estimated that the recommended repair options would require less than 3.5 years to implement for all tanks. What evidence was used by EPA and DOH to decide that these studies, and associated individual tank assessments, are no longer valid? What is the engineering and scientific evidence that the Navy and DLA require at least 22 more years, on top of the previous 17 years of studies and analyses, to determine ways to rehabilitate the Red Hill tanks and pipelines to prevent fuel leaks?

#### **4. Can a double wall be added to the tanks at the Facility now?**

*EPA/DOH Answer: In order to ensure the successful operation of such a major upgrade, further studies of the existing tank structure and engineering feasibility studies are necessary. The size and structure of the tanks at the Facility are unique. If not designed and constructed properly, a tank retrofit could increase the risk of future fuel releases.*

**BWS Comments:** The FAQ response appears to indicate that the findings and conclusions of past tank alternative studies are inadequate and need further study. Where is the evidence to show that previous engineering studies about the feasibility of double wall and other rehabilitation alternatives are no longer valid? A 1998 Navy-commissioned study of repair options for Tank 19 presented the preliminary engineering for a feasible composite tank solution that would cost \$5 to \$6 million per tank that could be completed in less than 3 years (Enterprise Engineering, Inc. 1998). In addition to its obvious advantage in tremendously reducing the risk of fuel releases, a properly designed composite tank would permit more sensitive leak monitoring and allow detection of releases before they exit the facility into the surrounding rock and potentially into the aquifer. In 2008, the Navy commissioned another study (Enterprise Engineering, Inc., 2008) that described two approaches for rehabilitating the tanks. It is difficult to imagine a plausible scenario in which installment of an engineered double wall tank (or composite tank, or tank-within-a-tank) could increase the risk of fuel releases.

#### **5. Is my drinking water safe?**

*EPA/DOH Answer: Yes, the drinking water is safe for human consumption for both Board of Water Supply customers and military communities. The water for Board of Water Supply customers and military communities is being tested every three months to assure the water is safe. Contamination related to the Red Hill Facility has never been detected in the Honolulu Board of Water Supply drinking water sources.*

**BWS Comments:** Tests performed from 2005 to the present show the presence of various fuel chemicals in the groundwater underneath the tanks and at Red Hill Shaft (Battelle and Parsons, 2015; ESI, 2015a, 2015b). Please provide a copy of the documents showing that the levels of fuel chemicals measured in the groundwater are safe for human health.

Please also provide a copy of the documents that shows the historic releases have been delineated and that those releases or any future releases do not threaten water supplies near to the Red Hill tanks (the BWS Halawa Shaft, BWS Moanalua wells, and Navy's Red Hill Shaft) in the near future.

#### **6. What is the likelihood of a future catastrophic release at the Facility?**

*EPA/DOH Answer: A catastrophic release from the Facility into groundwater is very unlikely. The tanks are constructed in solid rock and consist of 2.5 to 4 feet thick reinforced concrete and a steel plate. Major earth movement that would rupture a Red Hill tank is highly unlikely due to the construction of the tanks and the relatively low earthquake threat on Oahu. The most likely*

*catastrophic release scenario would be a piping failure with a release into the lower access tunnel. This vulnerability is being addressed by the Navy and DLA with the installation of oil tight doors in the tunnel system, along with a new fire suppression system to reduce the threat of a release caused by fire. Furthermore, the piping in the lower tunnel system is not buried or concealed and is visually inspected daily.*

**BWS Comments:** The Navy and DLA have not provided any documentation or analysis to indicate that the risk of large releases of fuel is currently at an acceptably low level. In fact, the prior history of leaks from corrosion, weld cracks, and human error argue against the proposition that the risk of a future catastrophic release is "very unlikely." Ongoing corrosion and fatigue processes result in increased damage to the steel liner and associated piping. According to publically-available documents, only some of the tank corrosion and crack damage has been repaired (Weston, 2007). **As damage accumulates, it becomes increasingly likely that leakage will be more frequent and of a larger magnitude.** As we have noted previously, a small (for instance 1/4 -inch diameter) hole in a tank or pipe can release more than 12,000 gallons/day.

Furthermore, the Navy and DLA have not provided sufficient information to show that they can reliably measure the leak rates on all the Red Hill tanks currently in service. Nor have they demonstrated that the threat of a catastrophic release from an earthquake is acceptably low. For instance, on June 28, 1948, a magnitude 4.6 earthquake off the coast of Oahu subjected greater Honolulu to an average shaking intensity of Mercalli Intensity VI (RMTC/URS JV, 2010). According to a May, 1949 report from Bechtel, there was a release of about 35,000 gallons (1,100 barrels) of fuel from Tank 16 between June 28, 1948 (the day of the earthquake) and July 27, 1948 (Bechtel, 1949). Information regarding the nature of that leak is scarce, and it is not known if other Red Hill tanks were also found to be leaking after the earthquake.

The BWS is not aware of any information provided by the Navy and DLA to indicate that the risk of leakage from earthquake ground shaking has ever been addressed. We note that the design ground acceleration for typical commercial and residential buildings in Pearl Harbor, according to the USGS, is about 20%g (peak ground acceleration), or more than 50% higher than the 1948 shaking (USGS, 2015). Therefore, based on the past performance of the Red Hill tanks and the seismic hazard as defined by the USGS, the risk of earthquake-induced leakage at Red Hill cannot be ignored.

Further, the EPA/DOH answer states that "the most likely catastrophic release scenario would be into the lower access tunnel. This vulnerability is being addressed by the Navy and DLA with the installation of oil tight doors." However, no evidence is provided that fuel contained within the tunnel by oil tight doors will not find a preferential pathway from the tunnel down into the underlying subsurface rocks and/or aquifer.

## **7. Has contamination for Red Hill been found in the groundwater beneath the facility?**

*EPADOH Answer: Some contamination has been found in the groundwater immediately below the facility. To date, some of these groundwater samples have exceeded the DOH's screening levels, but no samples have exceeded federal drinking water standards. The characteristics of*

*the geology surrounding the tanks and depth to groundwater (approximately 100 feet) may be significantly limiting the vertical migration of contamination at the Facility.*

**BWS Comments:** Petroleum chemicals have been detected in groundwater at the Red Hill Shaft and all nine monitoring wells near the Red Hill Fuel Facility (Battelle and Parsons, 2015; ESI, 2015a, 2015b). The nine wells with detections include the seven monitoring wells installed as part of investigations at the Red Hill tanks, the Navy's Oily Waste Disposal site well, and a Commission on Water Resources Management (CWRM) well (Battelle and Parsons, 2015; ESI, 2015a, 2015b). Several of these monitoring wells have had petroleum hydrocarbons detected in groundwater at concentrations that are greater than the DOH Drinking Water Toxicity and Gross Contamination environmental action levels (Battelle and Parsons, 2015; ESI, 2015a, 2015b). It is important to note that based on detections of petroleum chemicals in all of these wells, the location (extent) of the leaked fuel and associated petroleum chemicals in the groundwater is unknown and likely extends beyond the Red Hill Facility boundary, as indicated by detections at the CWRM well (Battelle and Parsons, 2015; ESI, 2015a, 2015b).

According to the EPA and DOH, "the characteristics of the geology surrounding the tanks and depth to groundwater (approximately 100 feet) may be significantly limiting the vertical migration of contamination at the Facility". This statement is at best uncertain and it ignores the high likelihood that leaked fuel can travel horizontally large distances away from the tanks. DOH and EPA explicitly state in a comment letter to the Navy and DLA that the draft Tank 5 work plan dated July 2014 does not address the contamination that is likely present in the areas adjacent to the 17 potential release points identified in Tank 5 (DOH, 2014). No borings or monitoring wells have been installed alongside the 250 feet vertical length of the tanks; therefore, very little is known about the characteristics of the geology surrounding the tanks or contamination associated with the 17 potential release points (Battelle and Parsons, 2015). Collecting data (i.e., drilling borings) concerning the geology immediately surrounding the tanks is imperative to understanding where the fuel released in January 2014, and fuel previously, released has traveled and the time it takes for the fuel to travel from one location to another either horizontally or vertically from the release point within the tank.

The physical characteristics of the aa and pahoehoe basalt flows that surround the Red Hill tanks are well known to include potential "fast paths" for migration of fuel and water. Potential "fast paths" include scoriaceous breccias, open lava tubes, and collapsed lava tubes (Hunt, 1996, 2004 and MacDonald, 1972). These well known features make it unlikely that fuel leaking from the tanks will travel only vertically downward from the release points. Instead it is likely that the fuel will follow a winding path along both horizontal and vertical directions, which makes it very unlikely that the few existing monitoring wells will define the location of the leaked fuel or its associated groundwater plume of petroleum chemicals. The fuel that leaked in January 2014 may not yet have had the time to reach groundwater beneath the Facility because of the expected winding pathways. The fuel from the January 2014 and earlier leaks poses a potential major threat to our groundwater because it can act as a long-term source of petroleum contamination to our groundwater by migrating as fuel or slowly leaching petroleum chemicals into infiltrating rainfall.

**8. Is Tank 5 still leaking? Tank 5 released approximately 27,000 gallons of fuel in January 2014.**

*EPA/DOH Answer: No, Tank 5 is not leaking. It is currently not in service. Following the confirmation of a fuel release from Tank 5 in January 2014, the tank was emptied of all fuel and has not been refilled.*

**BWS has no comment.**

**9. Why did Tank 5 leak in January 2014?**

*EPA/DOH Answer: The cause of the release from Tank 5 was poor repair procedures and workmanship during the Navy and DLA's scheduled maintenance of the tank that concluded in December 2013. The EPA and DOH have hired fuel storage tank experts to help review the Navy and DLA's procedures and practices in order to minimize the likelihood of such errors in the future.*

**BWS Comments:** The fact that the January 2014 leak is considered the direct result of human error, not ongoing corrosion or fatigue damage processes, underscores the need for a more comprehensive approach to mitigation of leak risks. The Navy and DLA have been studying and repairing the Red Hill tanks for more than 70 years, yet after all this time and experience working with the tanks, "poor repair procedures and workmanship" led to a large leak. Despite all the efforts to maintain the Red Hill tanks over the last 70 years, fuel leaks have reportedly occurred over the entire lifetime of the tanks. Have the EPA and DOH evaluated whether the tanks are in such poor condition from corrosion to the inside and outside surface of the steel liner, weld defects and fatigue that, no matter what maintenance routine is used and how good the workmanship and supervision, the tanks will continue to leak? Based on the tanks' worsening condition, why shouldn't the Navy and DLA be directed to immediately rehabilitate the tanks?

The AOC and AOC SOW are primarily focused on corrosion of the Red Hill tanks' steel liner and resulting leaks. The BWS has asked that the regulators consider the much bigger picture about the risks posed by Red Hill Facility to our drinking water supplies and environment. Specifically, we asked that any decisions regarding leak mitigation strategies should be based on a multi-hazard risk assessment that considers leaks due to corrosion, earthquake, human error, equipment failure or other hazards that should be determined by a formal risk assessment.

**10. Is the Facility in compliance with federal and state regulations?**

*EPA/DOH Answer: Yes, the Red Hill Bulk Fuel Storage Facility is currently in compliance with state and federal regulations for underground storage tanks. We do not have evidence that the Facility was ever out of compliance, even at the time of the release from Tank 5.*

**BWS Comments:** The key question is "is the risk of a significant leak sufficiently low?" If the Red Hill Facility is in compliance with the present day regulations, and the regulations are supposed to minimize the risks to human health and the environment, how do EPA and DOH

defend the current AOC when there are so many Navy reports describing extensive corrosion of the steel lining from both the inside and outside, resulting in through-lining holes and continued leaks of contaminants? Simply complying with the minimum standards set forth in present-day regulations (which are primarily focused on USTs that pose a much smaller risk than the Red Hill Facility), while continuing to allow an unacceptably high risk to our drinking water and environment, is unacceptable.

**11. Will the fuel already released from the Facility eventually contaminate the Board of Water Supply drinking water sources?**

*EPA/DOH Answer: The migration of existing Facility contamination to the Board of Water Supply wells is unlikely. The predominant direction of groundwater flow beneath the Facility does not appear to be towards the nearby Board of Water Supply Halawa Shaft or the Moanalua wells. Additionally, over time naturally occurring bacteria typically degrade subsurface petroleum into harmless byproducts.*

**BWS Comments:** Given the publically available documents that show there is significant risk of groundwater contamination from past and future fuel leaks at the Red Hill Facility, the EPA/DOH response is far too ambiguous for adequate protection of our sole source aquifer and our drinking water supply. How "unlikely" is the migration of Red Hill fuel contamination toward our drinking water sources? Our review of the available documents reveals that there are far too few data and analyses to support the EPA/DOH response. The EPA and DOH should have directed the Navy and DLA to carry out the necessary investigations to answer the questions about how fast and in what directions fuel contamination and groundwater will move from the Red Hill Facility. The Navy itself appears to have no clear idea about groundwater movement from the Red Hill Facility. It released one report (TEC, 2006) that interpreted groundwater did not move from Red Hill to Halawa Shaft and then released a later report (TEC, 2010) that showed groundwater clearly moving from Red Hill Facility toward Halawa Shaft. The later report also noted that the earlier findings were based on incorrect survey data that led to incorrect estimates of groundwater levels.

Bacteria in our subsurface can degrade some but not all petroleum chemicals. However, the effectiveness of this degradation depends on the amount of fuel and other nutrients and whether groundwater is flowing at a rate that is faster than the degradation rate. As the EPA and DOH well know, there are numerous scientific investigations that can be carried out to determine whether bacterial degradation is occurring at rates that will prevent much of the fuel contaminants from reaching our water supplies. Our review of the available documents and data found no evidence that the appropriate scientific studies have been conducted at Red Hill. Given the potentially large fuel releases from the continuing corrosion of the Red Hill tanks, the EPA and DOH assumption that degradation will prevent contamination of our drinking water supplies is unjustified by actual site-specific data and therefore is not defensible.

**12. If contamination does get to drinking water supply locations, will these supplies be unusable?**

*EPA/DOH Answer: No, petroleum related contamination can be easily and reliably removed from water. In the unlikely event petroleum from the Facility reaches drinking water sources,*



*technologies such as granular activated carbon can be used to remove contamination. Granular activated carbon is a widely utilized technology that has proven effective at removing organic contaminants such as petroleum from water. This technology is currently being used by the Board of Water Supply to remove pesticide-related contamination from water used for drinking water on Oahu. In the unlikely event that fuel from Red Hill reaches drinking water supplies, the Navy and DLA will be liable for the cost of any treatment required.*

**BWS Comments:**

The FAQ response over simplifies the ease with which drinking water supplies can be maintained in the presence of fuel contamination. The response is only appropriate for relatively small amounts of fuel contaminants dissolved into the groundwater, but the current conditions of the Red Hill Facility pose the risk of large releases of fuel. The correct answer is that the usability of a drinking water supply depends on the amount of fuel released and the types of fuel contamination.

If the fuel itself approaches or reaches a drinking water supply, such as the Navy's Red Hill Shaft, making the water safe for drinking can be very complex and expensive, so the drinking water supply may have to be shut down for the months or years needed to design and construct the right kinds of treatment. Each Red Hill tank holds roughly 12 million gallons, so a leak of even a small percentage of the tank volume can result in the fuel itself moving significant distances through the subsurface. There are many different chemicals in the fuels that must be removed before the water is safe for drinking, certainly more than the few pesticides that are currently being removed, resulting in the need to devise more complex and expensive treatment processes. Perhaps more important is the fact that the concentrations of fuel chemicals can be much, much higher than the pesticide concentrations, which means that a treatment system designed for one set of contaminant levels may need to undergo expensive upgrades to safely handle unforeseen higher concentrations from future releases and migration of fuels or fuel chemicals.

The EPA/DOH response also ignores the technical, regulatory, and financial difficulties now facing other communities that have had to treat the contaminated water coming from their drinking water supplies. The Oahu sole source aquifer is our only water supply and the BWS believes that the EPA, DOH, Navy, and DLA should protect this sole water source by committing to put into place capture and treatment systems that will intercept all fuel contamination before it leaves the Red Hill tank vicinity. In our state, groundwater and the environment are held in trust for all people on the island of Oahu as is stated in the Article XI Section 1 (Conservation and Development of Resources) and Section 7 (Water Resources) of the Hawaii State Constitution.

**13. Can fuel released from the Facility be easily found and removed from the subsurface?**

*EPA/DOH Answer: Unfortunately, locating and removing fuel released from the Facility will likely be difficult. The fractured basalt rock geology surrounding the tanks at the Facility is one of the most difficult settings to conduct environmental assessments and cleanup. The rock is difficult to drill into and contamination often flows in hard to find fractures in the rock. In some cases the rock traps the contamination and drilling a well through that location can worsen the problem by*

*allowing contamination to spread from the areas where it is trapped in the rock. EPA and DOH are currently working with experts with experience in fractured basalt geology to identify technologies that may be able to locate and remove or destroy contamination.*

**BWS Comments:** The statement that "locating and removing fuel released from the Facility will likely be difficult" is misleading. Finding the fuel in basalt rock requires drilling an adequate number of borings, which has been done for many other fuel release problems in Hawaii and other places with basalt geology. The potential "fast paths" in the Hawaiian basalts likely require a larger number of borings to find the fuel, making the investigation more expensive than investigations in other geologic settings that do not have such "fast paths". The fuel released from the Red Hill facility can be found, but it will take a careful and well thought out effort. As noted earlier, the DOH directed the Navy and DLA last year to determine whether the areas surrounding the 17 leaks found in Tank #5 through borings and other means, clearly indicating that the DOH approves of such methods to find the leaked fuel. Similar drilling programs have been successfully conducted at other DOD facilities, such as Kipapa Gulch and Waikakalau fuel storage annexes (The Environmental Company, Inc., 2001), and the Army Schofield Barracks site (EPA, 1997).

The statement by EPA and DOH that drilling a well through the contamination can worsen the problem by spreading it implies that drilling wells to find the released fuel may be too risky. It is only too risky if there is a lack of careful planning, supervision, and experience while drilling and constructing the monitoring wells. Exploratory drilling programs have been successfully conducted in our basalt geology, such as the investigation programs at the Del Monte Corp Oahu Plantation (EPA, 1999) and Schofield Army Barracks Superfund Sites (EPA, 1997).

Once the leaked fuel has been found, there are a number of well understood methods for removing it from the rocks above and at the water table and to remove or capture the petroleum chemicals that have dissolved into the groundwater. A number of standard practices could be successfully put in place at Red Hill, including those that were employed at the Del Monte Corp Oahu Plantation and Schofield Army Barracks Superfund Sites (EPA, 1999 and 1997, respectively). In summary, the Navy and DLA can successfully find and clean up the leaked fuel if they carry out a well thought out and careful plan that follows the experience from other contamination problems here on Oahu and elsewhere in Hawaii .

**14. EPA just published new regulations that apply to the Red Hill tanks. What changes will these new federal regulations require?**

*EPA/DOH Answer: On July 15, 2015, EPA finalized revisions to the underground storage tanks regulations that change the regulatory requirements for tanks such as those at Red Hill, known as "field constructed tanks." The regulations include new requirements for leak detection, operator training, inspections, and testing of spill prevention equipment. EPA and DOH are currently evaluating the Navy's leak detection systems, which may already meet the new federal requirements.*

*The new regulations do not require installation of secondary containment at the Red Hill Facility. Secondary containment is only required for new tank systems. Metal corrosion control known as*

*cathodic protection is required under the new regulations in certain circumstances. Because the Red Hill tanks are encased in concrete, cathodic protection is not required or effective at reducing corrosion of the Red Hill tanks.*

*Since Hawaii has a federally-approved underground storage tanks program, the new regulations will take effect when Hawaii changes their rules. Hawaii has up to three years to make the needed changes.*

**BWS Comments:** The FAQ response states that the Red Hill tanks are encased in concrete and cathodic protection is therefore not required under the new federal UST regulations. We would like to point out that several Navy commissioned studies (referenced and described below) state that the Red Hill facility tanks are not metal tanks encased in concrete but, rather, reinforced concrete tanks with metal (steel) liners:

- "Facilities consist of twenty steel lined concrete underground storage vaults; 100 feet in diameter and 250 feet high..." (Bechtel, 1949, p. 147) (Underscore added)
- "It is assumed that the existing shell and concrete outside the liner are in a condition suitable to continue as the primary structural element of the tank." (Enterprise Engineering, Inc., 1998, p. 27)
- "Since the original construction of the Red Hill tanks incorporated a concrete bearing wall (minimum 4 feet thick) behind the ¼ inch steel liner..." (Enterprise Engineering, Inc., 1998, Tab F) (Underscore added)
- "The engineering evaluation was performed in accordance with the applicable sections of API Standard 653 Third Edition December 2001, Addendum 3 February 2008. API 653 has only limited application to this highly custom designed concrete tank with a steel liner." (Enterprise Engineering, Inc., 2008, p. 1) (Underscore added)
- "In addition, the site investigations (Sis) concluded that the aging of the Facility will increase the possibility that such a release could occur as a result of leaks breaching both the steel liners and concrete containment of the tanks. While the tank steel liners have been repaired, the concrete containment cannot be maintained." (TEC, 2008, p. ES-1) (Underscore added)
- "Tank 6 was built in 1942 (completed 1943). Its nominal capacity is 302,000 barrels. The tank, like the others in Red Hill, is an underground concrete tank with a steel liner." (Weston, 2007, p. iii) (Underscore added)
- "Tank 16 [sic] is an underground concrete tank with an internal steel liner." (Weston, 2007, p. 1-2) (Underscore added)

The reinforced concrete shell provides the structural support for the thin steel liner. A steel tank without the concrete support would need to be constructed from much thicker steel or otherwise stiffened to prevent it from buckling. An internal steel liner can be much thinner since much of the load is supported by the thick reinforced concrete tank.

Since these are not *metal tanks*, a literal interpretation of the preamble exemption (Section IV.C.2 of the preamble to 40 CFR Parts 280 and 281) would not apply at Red Hill. Secondly, it appears that the intent of this exemption is to exclude *metal tanks* that are already protected from corrosion by concrete from the corrosion protection requirements in the updated regulations. This is not the case at Red Hill, as the steel tank liners are corroding from the inside (contact with product and impurities including water) as well as from the outside, where the condition of the concrete-to-steel interface is largely unknown.

For example, page 29 the May 1998 report by Enterprise Engineering, Inc., regarding the condition and potential repair of Tank 19 describes both general and pitting corrosion on the outside surface of the steel liner, clearly indicating that the concrete/grout is not protecting the steel liner (Enterprise Engineering, Inc. 1998). This report goes on to suggest a likely mechanism that may explain the non-protective nature of the concrete/grout. This mechanism suggests that beach sand and/or seawater rather than fresh water was used to make the concrete. The presence of chloride in concrete in sufficient quantities will reduce concrete's ability to protect the steel from corrosion. Cracks in the concrete allow water ingress to and along the steel concrete interface, further accelerating the corrosion process. Other mechanisms are also possible that allow the concrete to become non-protective to steel such as carbonation (reducing the alkalinity), diffusion of chloride into the concrete from the ground water, the presence voids at the steel/concrete interface, etc. Nevertheless, whatever the mechanism, the concrete is not protecting the steel liner's exterior surface from corrosion.

This corrosion is known to have caused past fuel leakage on the order of hundreds of thousands of gallons. It seems very unlikely that the intent of this exemption would be to exclude field constructed underground fuel tanks that are known to be corroding and have intermittently leaked since their construction, especially given that the UST regulations are intended to protect human health and the environment (Background section, page 41587 in US EPA, 2015) and remove previous deferrals for these tanks.

Furthermore, there is nothing in the wording of the regulations themselves that would exempt Red Hill from the corrosion protection requirements for deferred (in this case, field-constructed) tanks. Section 280.251 of Subpart K states, in part:

*(c) Except as provided in § 280.252, owners and operators must comply with the requirements of subparts A through H and J of this part.*

The pertinent section in §280.252 that applies to corrosion protection states, in part:

*(1) Corrosion protection. UST system components in contact with the ground that routinely contain regulated substances must meet one of the following:*

Thus, the regulations require that deferred tanks comply with all subparts of §280 except for I, unless some relief is provided in §280.252. However, the pertinent section of §280.252 only provides alternate corrosion protection requirements for components *in contact with the ground* and, thus, would not strictly apply to the Red Hill tank liner. However, the situation at Red Hill is

functionally similar: the interface between the outside face of the steel liner and the concrete tank wall is a corrosive environment causing significant, ongoing corrosion and associated leaks. Again, it seems very unlikely that the intent of the aforementioned §280.252 would be to exclude corrosion protection requirements for tank liners that are known to be corroding on both the inside and outside faces, causing leaks. Any interpretation of the updated regulations that allows exclusion of such corrosion protection from the Red Hill tanks cannot be protective of human health and the environment at the Red Hill Facility.

In summary, a rational reading of these regulations indicates that the Red Hill tanks represent a previously deferred system that would now be required to meet the same requirements, including corrosion protection and leak detection, as other regulated tanks as specified in Subparts A through H and J. In addition, the Board has requested a formal written determination on this point by the EPA's Office of Legal Counsel.

#### **15. Is the Red Hill Facility inspected?**

*EPA/DOH Answer: Yes, the Navy conducts inspections of the Red Hill facility regularly. EPA and DOH with the assistance of fuel storage tank experts are currently working on developing robust inspection procedures for the Facility. New inspections of the Facility by EPA and DOH are expected to begin in the near future.*

**BWS has no comment.**

#### **16. What is Board of Water Supply's role in addressing fuel releases from the Facility?**

*EPA/DOH Answer: Board of Water Supply manages Oahu's municipal water resources and distribution system and is responsible for providing clean and safe drinking water to its customers. The Board of Water Supply is a key stakeholder for work under the Administrative Order on Consent and is listed in the Administrative Order on Consent as a subject matter expert whose technical advice will be routinely sought during implementation of work under the Administrative Order on Consent.*

*DOH is responsible for overseeing drinking water quality and is the agency with expertise in issues related to regulation of fuel storage, environmental assessment and cleanup within the State. EPA is working in partnership with DOH to address issues related to the Facility. Both DOH and EPA have regulatory authority to ensure protection of drinking water resources.*

**BWS Comments:** The Board of Water Supply's role in addressing fuel leaks from the Facility is to protect and preserve the groundwater and to comment when processes and actions to address such leaks are not allaying our concerns. Ultimately, the outcomes of the work, successful or not, will be directly felt by the community in cost and quality of the environment. We believe the entire process should be transparent and embrace the collective effort and involvement by the entire community as the groundwater and environment is held in trust for all people on the island of Oahu, as is stated in the Hawaii State Constitution Article XI Section 1 (Conservation and Development of Resources) and Section 7 (Water Resources).

**17. Where can I find more information on the Facility and the proposed Administrative Order on Consent?**

*EPA/DOH Answer: More information on the Facility and the proposed Administrative Order on Consent, including contact information, can be found at <http://www.epa.gov/region9/waste/ust/redhill/index.html> or <http://health.hawaii.gov/shwb/ust-red-hill-project-main/>. If you would like to receive notices and other information regarding the proposed Red Hill Administrative Order on Consent, you can join our e-mail distribution list by submitting a form at <http://www2.epa.gov/region-9-documents/forms/red-hill-aoc-public-distribution-list>.*

**BWS has no comment.**

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