DAVID Y. IGE
GOVERNOR OF HAWAII

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Dep
WQ

BRUCE S. ANDERSON, Ph.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File: 2018-315- RB

October 22, 2018

Mr. Ernest Y.W. Lau, P.E.
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

RE: Honolulu Board of Water Supply (BWS) Request to Hawaii Department of Health (DOH) for an Explanation of the Basis for the Increase in the Environmental Action Levels (EALs) for Total Petroleum Hydrocarbon Middle Distillate Fraction (TPH-d)

Dear Mr. Lau,

Thank you for your letter dated August 20, 2018, requesting clarification of the basis of 2017 updates to the Hawaii Department of Health's (HDOH) Environmental Action Level (EAL) for Total Petroleum Hydrocarbons (TPH) in groundwater that serves as a source of drinking water. Your question was specific to compounds associated with releases of middle distillate fuels such as diesel (TPHmd). Dr. Roger Brewer, Senior Environmental Scientist with the Hazard Evaluation and Emergency Response Office, has provided the following detailed technical response to your inquiry.

As discussed in the 2017 update of our office's EAL guidance, the increase in the HDOH drinking water action level for TPHmd from 0.10 mg/L to 0.40 mg/L was based on a review of original reference documents and a more up-to-date understanding of the physiochemical and toxicological nature of TPH-related compounds in groundwater following a release of fuel. Our office considers this action level to be highly conservative for screening of groundwater data at the majority of petroleum-release sites overseen by HDOH. Considerations incorporated into development of the TPHmd drinking water action level include:

- Use of an ingestion-based toxicity factor that reflects the most conservative value of recently published research for hydrocarbon compounds and their degradation products;

- Assumed continuous use of petroleum-impacted water source 350 days a year for a period of six years, reflecting the USEPA default, conservative exposure scenario for assessment of noncancer health hazards;
- No allowance for likely mixing and dilution of impacted groundwater with unimpacted groundwater as it is drawn into a production well.

The TPHmd action levels were revised to reflect the fact that hydrocarbon compounds measured in groundwater under this test method as well as related, biological degradation products are not significantly volatile. This negates the need to consider the risk posed by the inhalation of petroleum-related vapors during the use of tapwater.

The basis for this update was two-fold. "Diesel range" hydrocarbon compounds, typically considered to include compounds with 10 to 24 carbon molecules are, by definition, not considered to be significantly "volatile." This is why laboratory "extraction" methods are used to test for these compounds in groundwater (e.g., Method 8015-DRO). A focus of drinking water action levels for compounds collectively reported as "TPHmd" on ingestion only (i.e., drinking the water) is therefore appropriate. It is important to note that additional exposure via dermal absorption while bathing is insignificant in comparison to ingestion-based exposure.

"Gasoline range," volatile hydrocarbon compounds, normally characterized by having less than 10 to 12 carbon molecules, are collectively tested for and quantified as "TPHg" using "purge and trap" laboratory methods (e.g., Method 8015-GRO). Middle distillate fuels can contain small amounts of these compounds which, under some scenarios, can pose vapor emission concerns (Brewer et al. 2014). This requires that both TPHg and TPHmd be tested for at middle distillate release sites. Related volatile, degradation compounds, if present, would be captured by the same test method and incorporated into the reported concentration of TPHg. The HDOH drinking water action level for TPHg therefore considers inhalation of vapors during the use of tapwater for bathing, dishwashers, etc., in addition to direct ingestion of these compounds in drinking water (HDOH 2017; refer to Appendix 1, Section 6.6).

Hydrocarbon compounds are also highly susceptible to biological degradation once dissolved into groundwater and can be expected to rapidly degrade to oxidized, low-volatility "metabolites." These compounds will subsequently be reported as part of the non-volatile, TPHmd component of the impacted groundwater. This is why relatively high concentrations of TPHmd are often reported for groundwater samples collected at weathered, gasoline-only release sites and why both TPHg and TPHmd range contaminants should likewise be tested for under these scenarios. Degradation rates can be also expected to be enhanced in Hawaii in comparison to most areas of the mainland due to the relatively high, year-round temperature of the groundwater.

As one example, data for groundwater samples collected from immediately beneath the Red Hill Tank Farm complex tested with and without silica gel cleanup consistently indicate that the majority of TPH-related compounds present are heavily degraded (NAVFAC 2016, 2017, 2018). Volatile compounds collectively reported as TPHg were rarely detected in samples, and even when detected comprised less than 10% of the total, TPH-related compounds present.

It is possible that a higher percentage of dissolved-phase, volatile compounds could be present in groundwater immediately following a significant release of fuel, as you suggested in your letter. If so, then these compounds would again be captured and assessed as part of the TPHg data. In such cases it is important to consider and calculate the combined health risk posed by both TPHmd and TPHg, since cumulative risk is not considered in the individual action levels.

In conclusion, it is our opinion that drinking water action levels for both TPHg and TPHmd presented in the 2017 edition of the HDOH EAL guidance are highly protective of potential exposure to petroleum-impacted groundwater. HDOH staff are currently working with local experts and experts on the mainland to identify better test methods to quantify the "TPHmd" component of heavily degraded, petroleum-related compounds. Additional guidance on this subject will be forthcoming.

Should you have questions or require further technical clarification, please contact Dr. Brewer or Fenix Grange at the Hazard Evaluation and Emergency Response Office at (808) 586-4249 or by email at roger.brewer@doh.hawaii.gov or gabrielle.grange@doh.hawaii.gov.

Sincerely,

BRUCE S. ANDERSON, Ph.D.
Director of Health

c: Steven Linder, United States EPA Region IX
Mark Manfredi, NAVFAC Hawaii

Attachment: Board of Water Supply letter dated August 20, 2018

References

Brewer, R., Nagashima, J., Kelley, M. and M. Rigby, 2013, Risk-Based Evaluation of Total Petroleum Hydrocarbons in Vapor Intrusion Studies: International Journal of Environmental Research and Public Health, Volume 10, pp 2441-2467.

HDOH, 2017, *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater* (Fall 2017 and updates): Hawai'i Department of Health, Office of Hazard Evaluation and Emergency Response.

NAVFAC, 2016, Fourth Quarter 2016 – Quarterly Groundwater Monitoring Report, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii: Naval Facilities Engineering Command, December 2016.

NAVFAC, 2017, Third Quarter 2017 – Quarterly Groundwater Monitoring Report, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii: Naval Facilities Engineering Command, October 2017.

NAVFAC, 2018, First Quarter 2018 – Quarterly Groundwater Monitoring Report, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii: Naval Facilities Engineering Command, July 2018.

USEPA, 2017, Screening Levels for Chemical Contaminants: U.S. Environmental Protection Agency, June 2017, prepared by Oak Ridge National Laboratories.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843
www.boardofwatersupply.com

August 20, 2018

Dr. Bruce S. Anderson
Director
State of Hawaii
Department of Health
1250 Punchbowl Street
Honolulu, Hawaii 96813

Dear Dr. Anderson:

Subject: Honolulu Board of Water Supply (BWS) Request to Hawaii Department of Health (DOH) for an Explanation of the Basis for the Increase in the Environmental Action Levels (EALs) for Total Petroleum Hydrocarbon Middle Distillate Fraction (TPH-d)

In November 2017, the DOH raised its groundwater EALs for TPH-d. The TPH-d EAL based on health protection was increased from 160 micrograms per liter (µg/L) to 400 µg/L and the EAL based on odor or taste was increased from 100 µg/L to 500 µg/L (DOH 2016, 2017).

These EALs are amounts of TPH-d in water that DOH considers to be "safe" for drinking water and household use of tap water. An increase in TPH-d EALs means that DOH is now allowing more TPH-d in tapwater at what it regards as a safe level.

The BWS considers these EALs for certain constituents that do not have drinking water standards to help ensure that the water we provide our customers is safe and free of objectionable qualities. Consequently, the BWS respectfully requests a detailed explanation of the scientific basis of these changes in TPH-d EALs. This will greatly assist us in responding to public comments and concerns regarding the safety and quality of our water.

The DOH (2017) report (Volume 2, Appendix 1, Section 6.6, p. 6-12, pdf page 66) states that the reason for the EAL increase is because:

> *...petroleum-related compounds reported in this range will be dominated by non-volatile, degradation compounds or "metabolites" of biogenic origin (Zemo*

et al. 2013, 2016). The resulting action level is therefore based on ingestion only and does not incorporate an inhalation pathway.

In other words, DOH is assuming that TPH-d in tapwater will be almost entirely changed into a form that will stay in the water such that it will not be released into the air nor will it be absorbed through the skin. DOH thus appears to assume TPH-d will not get into the human body by breathing it or by taking it up through the skin while showering, bathing, or washing dishes. By assuming less exposure from these sources, DOH is effectively allowing more TPH-d in drinking water at the higher EAL concentration. However, the studies used to support this assumption (Zemo et al. 2013, 2016) are studies of historical TPH release sites on the mainland.

The BWS has concerns about using TPH-d analyses from the mainland in the establishment of a TPH-d EAL for use in Hawaii. TPH-d in local groundwater may travel faster from a release to drinking water wells because of Hawaii's more hydraulically conductive volcanic soils and rock. As a result, there may also be less time for TPH-d to degrade into forms that stay in the water, particularly for sites with recent or ongoing releases.

The BWS would like to know whether the DOH considered in its evaluation the unique subsurface conditions in Hawaii that differ from those at petroleum release sites on the mainland. Please provide your data and analyses from sites in Hawaii, including those with recent or ongoing releases, that support DOH's key assumption of near 100% change of TPH-d into a form that results in less exposure.

Thank you for your assistance with this request. 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

Hawaii Department of Health (DOH). 2016. Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater. Summer.

2017. Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater. Fall.

Zemo D.A., O'Reilly K.T., Mohler R.E., Tiwary A.K., Magaw R.I. and K.A., Synowiec. 2013. Nature and estimated human toxicity of polar metabolite mixtures in groundwater quantified as TPHd/DRO at biodegrading fuel release sites. Groundwater Monitoring Remediation 33(4):44–56.

Zemo, D.A., O'Reilly, K.T., Mohler, R.M., Magaw, R.I., Espino Devine, C., Ahn, S. and A.K. Tiwary. 2016. Life Cycle of Petroleum Biodegradation Metabolite Plumes, and Implications for Risk Management at Fuel Release Sites. Integrated Environmental Assessment and Management. DOI: 10.1002/ieam. 1848.

BOARD OF WATER SUPPLY

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August 20, 2018

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Director
State of Hawaii
Department of Health
1250 Punchbowl Street
Honolulu, Hawaii 96813

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Thank you for your assistance with this request. 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

Hawaii Department of Health (DOH). 2016. Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater. Summer.

2017. Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater. Fall.

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Zemo, D.A., O'Reilly, K.T., Mohler, R.M., Magaw, R.I., Espino Devine, C., Ahn, S. and A.K. Tiwary. 2016. Life Cycle of Petroleum Biodegradation Metabolite Plumes, and Implications for Risk Management at Fuel Release Sites. Integrated Environmental Assessment and Management. DOI: 10.1002/ieam. 1848.

DAVID Y. IGE
GOVERNOR OF HAWAII

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BRUCE S. ANDERSON, Ph.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

September 14, 2018 U0911RT

Mr. Ernest Y.W. Lau, P.E.
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Lau:

SUBJECT: BWS Letter Dated July 19, 2018

The Department of Health (DOH) has received your letter dated July 19, 2018. You made a request for increased monthly frequency of groundwater sampling at the Navy's Red Hill Shaft to eliminate or improve imprecision and uncertainty in laboratory analytical methods. From April 2016 to October 2017 there were 13 groundwater sampling events at Red Hill Shaft, including 10 consecutive monthly groundwater sampling events from October 2016 to July 2017.

Total Petroleum Hydrocarbons as diesel (TPH-d) were detected at 14 ug/L (parts per billion [ppb]) in the December 2016 sample and 65 ppb with a duplicate sample that was non-detectable for TPH-d in October 2017. TPH-d was non-detectable in all other Red Hill Shaft water samples during these 13 sampling events. In addition, TPH-d was non-detectable in both the primary and duplicate samples of March 2018. Therefore, the DOH concludes that additional monthly sampling is unwarranted at this time.

Regarding your request for the detailed rationale used by the DOH to increase the taste and odor threshold of TPH in drinking water, including data, the DOH refers you to a detailed discussion in Section 6.6 of the Fall 2017 Environmental Hazard Evaluation guidance, available on our website:

HIDOH, 2017, *Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater – Hawaii Edition* (Fall 2017): Hawai'i Department of Health, Office of Hazard Evaluation and Emergency Response.
http://eha-web.doh.hawaii.gov/eha-cma/Leaders/HEER/EALs.

Technical assistance and review of this document was provided by members of the TPH Risk Group of the *Interstate Technology and Regulatory Council*, a national group of regulators and consultants concerned with the preparation of technical guidance on the assessment of petroleum contamination in the environment.

Your questions on the Navy's 2018 Consumer Confidence Report for Joint Base Pearl Harbor-Hickam will be forwarded to them for comment.

If you have any questions, please contact Ms. Roxanne Kwan of the Solid and Hazardous Waste Branch at (808) 586-4226.

Sincerely,

BRUCE S. ANDERSON, Ph.D.
Director of Health

c: Mr. Steven Linder, Environmental Protection Agency
Mr. Stephen Anthony, U.S. Geological Survey
Mr. Mark Manfredi, NAVFAC Hawaii

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
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July 19, 2018

Dr. Bruce S. Anderson
Director
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801-3378

Dear Dr. Anderson:

Subject: United States Navy (Navy) Calendar Year 2017 Fourth Quarter (2017 Q4) Groundwater Monitoring Well Test Results - Department of Health (DOH) Letter dated June 18, 2018

Thank you for your June 18, 2018 letter (DOH, 2018) in response to our letter dated April 26, 2018 (Lau, 2018). The subject of these letters is the Department of the Navy (Navy) 2017 4th Quarter (Q4) groundwater monitoring results from monitoring wells in and around the Red Hill Bulk Fuel Storage Facility (RHBFSF). The Q4 results show the level of total petroleum hydrocarbon as diesel (TPH-d) in Red Hill Monitoring Well No. 2 (RHMW02) increased to 1,600 parts per billion (ppb) compared to the previous quarter. Increases in TPH-d levels were also recorded in RHMW03 (210 ppb) and Red Hill Shaft (65 ppb) in addition to the oily waste disposal facility monitoring well No. 1 (OWDFMW01) site (110 ppb). Red Hill Shaft sample designation is RHMW2254-01.

In your letter dated June 18, 2018, the DOH stated "the concentration of TPH-d detected at Red Hill Shaft of 65 ppb in October 2017 does not meet or exceed the DOH environmental action level or federal drinking water standards. In addition, a duplicate groundwater sample was collected from this source at the sampling event and TPH-d was not detectable with a 25 ppb minimum detection limit. Therefore, the DOH is not requiring additional action from the Navy at this time."

The Honolulu Board of Water Supply (BWS) has reviewed the analytical results from the primary and the duplicate groundwater samples collected from Red Hill Shaft during Q4. The tables indicate the primary and duplicate samples (designated as ERH409 and ERH 410, respectively) were both collected on October 24, 2017. The Navy stated in their report "The field duplicate imprecision indicate that sampling bias may exist in the collected sample volumes, but that the exact nature of the bias (high or low) cannot be determined due to the nature of the Relative Percent Difference (RPD) exceedance

(RPD = 200%). Due to this imprecision, there is uncertainty in the true concentrations of the TPH-d for this sample." (Navy, 2018). The Navy provided further comments in the DOH letter, stating the 2018 Q1 results for Red Hill Shaft were also non-detects (DOH, 2018).

The BWS strongly recommends collecting and testing additional samples to resolve the sampling bias, imprecision and uncertainty issues expressed by the Navy. The collection and testing of additional samples is a best practice for reconciling the presence or absence of contaminants. If those subsequent tests confirm the contaminant is present, then increasing the testing frequency is prudent (i.e. monthly) to track any long-term changes in the values.

The Navy's fourth quarter 2017 cumulative groundwater results show past detections of TPH-d in Red Hill Shaft. On June 28, 2005, three samples were collected and recorded TPH-d levels of 43 ppb, 67 ppb and 58 ppb. On September 8, 2005, 43 ppb was detected. On December 6, 2005, two samples detected 38 and 24 ppb respectively. On January 20, 2016, 20 ppb was detected. We believe these historical detections warrant monthly testing given Red Hill Shaft is an important drinking water source to Joint Base Pearl Harbor Hickam (JBPHH). On December 13, 2016, the BWS sent a letter to DOH transmitting the results of two independent studies the BWS commissioned to determine screening levels for TPH-d in drinking water. Both studies calculated values that were very consistent with DOH's TPH-d gross contamination (taste and odor threshold) environmental action limit (EAL) of 100 ppb and TPH-d Drinking Water Toxicity EAL of 160 ppb. In Fall 2017, the DOH relaxed these EALs by raising them to 500 ppb and 400 ppb, respectively. The BWS would like to know the detailed basis DOH used to relax the EAL standard and receive a copy of the data used to make its decision. The BWS believes the previous DOH EALs were protective of the environment, and human health and relaxing the EALs is a backsliding that is not in the best interest of our community. The BWS urges the DOH to reconsider and reinstate the 100 ppb and 160 ppb EAL values.

Finally, the Navy's 2018 Consumer Confidence Report (CCR) for JBPHH reports 65 ppb as the highest level of TPH-d detected in Red Hill Shaft for voluntary testing performed in 2017, on page 4 of the CCR (copy enclosed for reference). Where did the 65 ppb value come from? Did it come from the duplicate sample collected on October 24, 2017? This is the only detection recorded in calendar year 2017 based on the Navy's fourth quarter 2017 cumulative groundwater results shown on the DOH website. However, the Navy states, "there is uncertainty in the true concentrations of the TPH-d for this sample." (Navy, 2018). If so, then why does a Navy CCR report imprecise results to the Navy's customers? If not, is the Navy reporting a precise 65 ppb result in its CCR that was not included in the Navy's fourth quarter 2017 cumulative groundwater results report? Can you please clarify?

Thank you for the opportunity to comment. If you have any questions, please call 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. Stephen Anthony, United States Geological Survey
Mr. Mark Manfredi, NAVFAC Hawaii, Red Hill Regional Program Director/Project Coordinator

Enclosure

References

Board of Water Supply (BWS). 2018. United State Navy (Navy) Calendar Year 2017 Fourth Quarter (2017 Q4) Groundwater Monitoring Well Test Results available on the Department of Health (DOH) Web Site dated January 19, 2018. Letter from Mr. Ernest Y.W. Lau to Dr. Virginia Pressler, M.D. April 26.

Department of Health (DOH). 2018. U.S. Navy, 2017 Fourth Quarter Groundwater Monitoring Well Test Results. Letter from Dr. Bruce S. Anderson, Director of Health to Mr. Ernest Y.W. Lau. June 18.

Department of the Navy (Navy). 2018. Final Fourth Quarter 2017 – Quarterly Groundwater Monitoring Report, Red Hill Bulk Fuel Storage Facility. Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i, DOH Facility ID No.: 9-102271; DOH Release ID Nos.: 990051, 010011, 020028, and 140010. Naval Facilities Engineering Command Hawaii (NAVFAC Hawaii). Contract Number N62742-12-D-1829, CTO 0053. January.

Kriebel, David; Tickner, Joel; Epstein, Paul; Lemons, John; Levins, Richard; Loechler, Edward L.; Quinn, Margaret; Rudel, Ruthann; Schettler, Ted; and Stoto, Michael (Kriebel et al.). 2001. *The Precautionary Principle in Environmental Science.* Environmental Health Perspectives. Volume 109. Number 9. September.

2018 Annual

Water Quality Report

Joint Base Pearl Harbor-Hickam Water System

(Waiawa, Halawa & Red Hill Sources)

This report meets federal and state requirements for Consumer Confidence Reports. This report is updated annually and reflects monitoring data collected up to Dec. 31, 2017.

The Navy is pleased to provide you with this year's annual Water Quality Report for the Joint Base Pearl Harbor-Hickam Water System.

This pamphlet provides information about the water that has been delivered to you over the past year. It describes where your water comes from, what it contains, and how it compares to standards for safe drinking water.

Our goal is, and always has been, to provide you safe and dependable drinking water.

Water Provider

The Naval Facilities Engineering Command (NAVFAC) Hawaii owns and operates the water system servicing your area. As the Navy water provider in the state, NAVFAC Hawaii primarily supplies water to military housing and installations.

Drinking Water Standards

The Environmental Protection Agency (EPA) and State of Hawaii regulations require us to test your water for contaminants on a regular basis, making sure it is safe to drink, and to report our results accordingly.

To ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration does the same for bottled water.

In the latest compliance monitoring period, we conducted tests for over 70 contaminants that have potential for being found in your drinking water. Tables 1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 1-7, and 1-8 show the levels of concentrations of regulated contaminants found in your water. In all cases, the levels measured met both EPA and State requirements for safe drinking water.

We are continually working to protect your drinking water from contaminants. The State of Hawaii's Department of Health completed the Source Water Assessment in 2004. This document identifies the susceptibility of your water supply to contamination. The source water assessment is available for review by contacting NAVFAC Hawaii, Public Affairs, at 808-471-7300.

Source of Water

Your drinking water comes from three ground water sources: Waiawa, Halawa, and Red Hill. Ground water is naturally filtered as it travels from the surface to the aquifer below ground. The water is pumped up from the aquifer, disinfected, fluoridated, and piped into the distribution system.

The Radford Terrace Eastern Housing was temporarily supplemented with water from the Honolulu Board of Water Supply's (BWS) Kalauao Wells and Punanani Wells for a brief portion of the year.

The Manana housing area is supplemented with water from the Honolulu Board of Water Supply's (BWS) Pearl City Shaft and Well 1.

Possible Source of Contaminants

The sources of drinking water (both tap water and bottled water) include: rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals. It can also pick up other substances resulting from the presence of animals or human activity. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk.

More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline at 1-800-426-4791.

Potential Contaminants

Contaminants that may be present in your source water include:

Microbial contaminants – such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Inorganic contaminants – such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

Pesticides and herbicides – which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.

Organic chemical contaminants – including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

Radionuclide contaminants – which can be naturally-occurring or be the result of oil and gas production and mining activities.

Lead – If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. NAVFAC Hawaii is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at: *http://www.epa.gov/safewater/lead*.

Navy Water Requirements

In accordance with Navy policy, we add chlorine and fluoride to your water supply. These items are added to your drinking water after it is pumped from the ground. We try to maintain the Navy's recommended concentration of approximately 0.7 ppm for fluoride and 0.2 ppm for chlorine throughout the distribution system.

In January 2014, a fuel release from Tank #5 at the Red Hill Underground Fuel Storage Facility was reported. As a proactive measure, we have been conducting testing at the Red Hill Drinking Water Shaft above what is required by regulation for several years. Table 1-8 shows the levels of concentrations that were detected at the Red Hill Drinking Water Shaft and groundwater monitoring well for 2017. All concentrations are below applicable EPA and State regulatory and action levels and the drinking water is safe. We continue to conduct this voluntary testing and our data will be included in future Water Quality Reports.

Concerns/Additional Copies

NAVFAC Hawaii does not have routine meetings about the water system. For questions, information about the water system, or additional copies, please contact the NAVFAC Hawaii Public Affairs (808-471-7300).

Please share this information with all other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, schools, and businesses).

Owner of Water System

Naval Facilities Engineering Command, Hawaii
400 Marshall Road, JBPHH HI 96860-3139

Printed June 2018

Water Quality Data Table

The following tables list contaminants which were detected during the latest round of sampling required by EPA and State of Hawaii regulations. The water samples were collected from either the source water or distribution system and analyzed by the State, BWS and/or NAVFAC Hawaii. The presence of contaminants does not necessarily indicate that the water poses a health risk. You may obtain more information about contaminants and potential health effects by calling the EPA's Safe Drinking Water Hotline 1-800-426-4791 or the State of Hawaii's Department of Health at 808-586-4258.

Contaminants in the Navy's Source Water — Table 1-1

Contaminants (units)	MCL (Allowed)	MCLG (Goal)	Highest Level Detected	Range of Detection	Year of Sample	Typical Sources of Contaminants	Violation
Inorganic Contaminants							
Chromium (total) (ppb)	100	100	2.1	nd – 2.1	2017	Naturally-occurring	No
Fluoride (ppm)	4	4	0.86	nd – 0.86	2017	Erosion of natural deposits; water additive which promotes strong teeth	No
Nitrate (ppm)	10	10	2.5	nd – 2.5	2017	Runoff from fertilizer use; Erosion of natural deposits	No
Barium (ppm)	2	2	0.02	nd – 0.02	2017	Erosion of natural deposits	No
Organic Contaminants							
Heptachlor epoxide (ppt)	200	0	20	nd – 20	2017	Breakdown of heptachlor (banned pesticide)	No
Chlordane (ppb)	2	0	0.36	nd – 0.36	2017	Residue of banned termiticide	No
Unregulated Contaminants[2]							
1,4-dioxane (ppb)	n/a	n/a	0.35	nd – 0.35	2013[1]	Synthetic industrial chemical	n/a
Chlorate (ppb)	n/a	n/a	37	nd - 37	2013[1]	Byproduct of drinking water disinfection	n/a
Chromium-6 (ppb)	n/a	n/a	2.3	0.93 – 2.3	2013[1]	Naturally-occurring	n/a
Dieldrin (ppb)	n/a	n/a	0.05	nd – 0.05	2017	Residue of banned insecticide	n/a
Sodium (ppm)	n/a	n/a	124	26 – 124	2017	Naturally-occurring	n/a
Strontium (ppb)	n/a	n/a	260	40 - 260	2013[1]	Naturally-occurring	n/a
Sulfate (ppm)	250	n/a	48	nd – 48	2017	Naturally-occurring	n/a
Vanadium (ppb)	n/a	n/a	32	14 – 32	2013[1]	Naturally-occurring	n/a

Contaminants in the BWS' Source Water (serving Radford Terrace) — Table 1-2

Contaminants (units)	MCL (Allowed)	MCLG (Goal)	Highest Level Detected	Range of Detection	Year of Sample	Typical Sources of Contaminants	Violation
Regulated Contaminants							
Barium (ppm)	2	2	0.011	0.009 – 0.011	2017	Erosion of natural deposits	No
Chromium (ppb)	100	100	1.5	1.1 – 1.6	2017	Naturally-occurring	No
Nitrate (ppm)	10	10	0.45	0.34 – 0.45	2017	Runoff from fertilizer use; Erosion of natural deposits	No
Fluoride (ppm)	4	4	0.059	0.059 – 0.059	2017	Erosion of natural deposits; water additive which promotes strong teeth	No
Unregulated Contaminants[2]							
Chloride (ppm)	n/a	n/a	94	90 - 94	2017	Naturally-occurring	n/a
Chlorate (ppb)	n/a	n/a	40	37 – 40	2017	Byproduct of the disinfection process	n/a
Chromium, hexavalent (ppb)	n/a	n/a	1.5	1.3 – 1.5	2017	Naturally-occurring	n/a
Sodium (ppm)	n/a	n/a	34	33 – 34	2017	Naturally-occurring	n/a
Strontium (ppb)	n/a	n/a	140	140 – 140	2017	Naturally-occurring	n/a
Sulfate (ppm)	250	n/a	13	13	2017	Naturally-occurring	n/a
Vanadium (ppb)	n/a	n/a	12	10 – 12	2017	Naturally-occurring	n/a

Contaminants in the BWS' Source Water (serving Manana Housing) — Table 1-3

Contaminants (units)	MCL (Allowed)	MCLG (Goal)	Highest Level Detected	Range of Detection	Year of Sample	Typical Sources of Contaminants	Violation
Regulated Contaminants							
1,2,3-Trichloropropane (ppb)	0.6	0	0.05	0.04 – 0.06	2017	Fumigant previously used in agriculture.	No
Barium (ppm)	2	2	0.004	0.004 – 0.004	2017	Erosion of natural deposits	No
Chromium (ppb)	100	100	1.5	1.2 – 1.5	2017	Naturally-occurring	No
Nitrate (ppm)	10	10	0.9	0.7 – 0.9	2017	Runoff from fertilizer use; Erosion of natural deposits	No
Fluoride (ppm)	4	4	0.08	0.07 – 0.08	2017	Erosion of natural deposits; water additive which promotes strong teeth	No
Unregulated Contaminants[2]							
Chloride (ppm)	n/a	n/a	64	38 - 64	2017	Naturally-occurring	n/a
Chlorate (ppb)	n/a	n/a	33	22 – 33	2017	Byproduct of the disinfection process	n/a
Chromium, hexavalent (ppb)	n/a	n/a	1.3	1.2 – 1.3	2017	Naturally-occurring	n/a
Dieldrin (ppb)	n/a	n/a	0.014	0.011 – 0.020	2017	Residue of banned pesticide	n/a
Sodium (ppm)	n/a	n/a	40	40	2017	Naturally-occurring	n/a
Strontium (ppb)	n/a	n/a	85	58 – 85	2017	Naturally-occurring	n/a
Sulfate (ppm)	250	n/a	14	9.8 - 14	2017	Naturally-occurring	n/a
Vanadium (ppb)	n/a	n/a	15	14 – 15	2017	Naturally-occurring	n/a

Contaminants in the BWS' Source Water (serving Navy Red Hill Housing) Table 1-4

Contaminants (units)	MCL (Allowed)	MCLG (Goal)	Highest Level Detected	Range of Detection	Year of Sample	Typical Sources of Contaminants	Violation
Regulated Contaminants							
Barium (ppm)	2	2	0.012	0.012 – 0.012	2017	Erosion of natural deposits	No
Chromium (ppb)	100	100	1.9	1.8 – 2.0	2017	Naturally-occurring	No
Nitrate (ppm)	10	10	0.54	0.54 – 0.54	2017	Runoff from fertilizer use; Erosion of natural deposits	No
Fluoride (ppm)	4	4	0.058	0.058 – 0.058	2017	Erosion of natural deposits; water additive which promotes strong teeth	No
Unregulated Contaminants[2]							
Chloride (ppm)	n/a	n/a	110	110 – 110	2017	Naturally-occurring	n/a
Chlorate (ppb)	n/a	n/a	21	21 – 21	2017	Byproduct of the disinfection process	n/a
Chromium, hexavalent (ppb)	n/a	n/a	1.8	1.8 – 1.8	2017	Naturally-occurring	n/a
Sodium (ppm)	n/a	n/a	36	36 – 36	2017	Naturally-occurring	n/a
Strontium (ppb)	n/a	n/a	180	180 – 180	2017	Naturally-occurring	n/a
Sulfate (ppm)	250	n/a	25	25 – 25	2017	Naturally-occurring	n/a
Vanadium (ppb)	n/a	n/a	11	11 – 11	2017	Naturally-occurring	n/a

Contaminants in the Distribution System Table 1-5

Contaminants (units)	Action Level	90th Percentile Value	No. of Samples Above Action Level	Year of Sample	Typical Sources of Contaminants	Violation
Copper (ppm)	1.3	0.09	0	2016[1]	Corrosion of household plumbing systems; erosion of natural deposits	No

Disinfection Agent Table 1-6

Contaminants (units)	MRDL (Allowed)	MRDLG (Goal)	Highest Average	Range of Monthly Average	Year of Sample	Typical Sources of Contaminants	Violation
Residual Chlorine (ppm)	4	4	0.5[3]	0.4 – 0.6	2017	Water additive used to control microbes	No

Disinfection Byproducts Table 1-7

Contaminants (units)	MCL (Allowed)	MCLG (Goal)	Highest Level Detected	Range of Detection	Year of Sample	Typical Sources of Contaminants	Violation
Total Haloacetic Acids (ppb)	60	n/a	1.2	nd – 1.2	2017	By-product of drinking water disinfection	No
Total Trihalomethanes (ppb)	80	n/a	8.6	2.2 – 8.6	2017	By-product of drinking water disinfection	No

Red Hill Shaft – 2017 Voluntary Testing Table 1-8

Contaminants (units)	MCL (Allowed)	MCLG (Goal)	DOH EAL	Highest Level Detected	Range of Detection	Violation
Lead (ppb)	AL = 15	0	15	1.3	nd – 1.3	No
TPH-d (ppb)	n/a	n/a	100	65	nd – 65	No

Table Definitions:

AL **Action Level.** The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
DOH EAL **Department of Health Environmental Action Level.** Risk-based levels published by DOH for compounds that do not have promulgated MCL values.
MCL **Maximum Contaminant Level.** The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
MCLG **Maximum Contaminant Level Goal.** The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
MRDL **Maximum Residual Disinfectant Level.** The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
MRDLG **Maximum Residual Disinfectant Level Goal.** The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contamination.
TPH-d Total Petroleum Hydrocarbons as diesel fuel.

Table Abbreviations:

n/a not applicable.
nd not detectable at testing limits.
ppb parts per billion or micrograms per liter.
ppm parts per million or milligrams per liter.
ppt parts per trillion or nanograms per liter.

Table Notes:

1. The State and EPA require us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. The date of the oldest sample collected is as indicated.
2. These results are for informational purposes. There are no set standards. EPA will use this data to help determine where certain contaminants occur and whether it needs to regulate these contaminants. At this time, these contaminants do not have MCLs or MCLGs.
3. After each quarter, a running average is calculated using the preceding 12 months of data. The posted amount is the highest running average for the year.
4. Only one sample collected.

Note: Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the EPA's Safe Drinking Water Hotline 1-800-426-4791.