



Extended Drinking Water Monitoring Plan

Joint Base Pearl Harbor-Hickam Public Water
System #HI0000360 and Aliamanu Military
Reservation PWS #HI0000337
O‘ahu, Hawai‘i

October 23, 2024

This page was intentionally left blank.

TABLE OF CONTENTS

1. Introduction..... 1
 1.1 Primary Elements of the Extended Drinking Water Monitoring Plan 1
2. EDWM Sampling Purpose and Implementation..... 6
 2.1 Purpose..... 6
 2.2 Implementation 6
 2.3 EDWM Monthly Sampling..... 6
3. EDWM Sampling Operations 12
 3.1 Sample Site Selection 12
 3.2 Field Sampling Operations..... 14
 3.3 Chemistry And Data Management..... 14
 3.4 DATA Management..... 18
4. EDWM Schedule 19
5. Response To A Detection Or An Exceedance 20
 5.1 Sample Result Exceedance Data Package 20
 5.2 Next Steps After Detection or Exceedance..... 20
 5.3 Remedial Actions..... 24
 5.4 Re-Sampling Method(s)..... 24
6. Completion Report..... 25
7. Reporting and Meeting Schedule..... 26
 7.1 Reporting to the EPA And DOH..... 26
 7.2 Reporting To Resident, Building Manager, And Public 26
 7.3 EDWM Meeting Schedule 27
8. References..... 28
Appendix A: Standard Operating Procedures..... 29

FIGURES

Figure 1-1: JBPHH Water Quality Plan..... 1
Figure 1-2: EDWM Plan Zones 3
Figure 1-3: Overview of the Water Quality Action Team 4
Figure 1-4: Drinking Water LTM Plan Zones 5
Figure 3-1: Chemistry Team..... 15
Figure 3-2: Lab Data Review Process..... 18
Figure 4-1: 12-Month EDWM Sampling Schedule 19
Figure 4-2: 12-Month EDWM Subtasks and Assumed Business Days to Complete 19

TABLES

Table 2-1: Estimate of the Number of Samples by Zone and Month 8
Table 2-2: EDWM Analytical List..... 9
Table 3-1: Location Information for Schools, CDCS, CDHS, and MDV Clinics 12
Table 3-2: Sample Containers, Preservatives, and Holding Times..... 16

ACRONYMS AND ABBREVIATIONS

AMR	Aliamanu Military Reservation
Army	United States Army
CDC	Child Development Center
CDH	Child Development Home
COA	Course of Action
COC	Chain of Custody
DBIDS	Defense Biometric Identification System
DOH	State of Hawaii, Department of Health
DW LTM Plan	Drinking Water Long-Term Monitoring Plan, dated June 2022
EDMS	Environmental Data Management System
EDWM	Extended Drinking Water Monitoring
ELIPS	Extraction Limited Ion Profile Screening
EPA	United States Environmental Protection Agency
EOC	Joint Base Pearl Harbor-Hickam Emergency Operations Center
GC/FID	Gas Chromatograph/Flame Ionization Detector
GC/MS	Gas Chromatograph and Mass Spectroscopy
HCl	Hydrochloric Acid
HNO ₃	Nitric Acid
IDWST	Interagency Drinking Water System Team
JBPHH	Joint Base Pearl Harbor-Hickam
JP-5	Jet Propellant 5
LTM	Long-Term Monitoring
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
MDV	Medical, Dental, and Veterinary
mg	Milligram
mL	Milliliter
MRL	Method Reporting Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NAH	Navy Aiea Halawa
NAVFAC	Naval Facilities Engineering Systems Command
Navy	United States Navy
NIST	National Institute of Standards and Technology
PAH	Polycyclic Aromatic Hydrocarbon
PE	Performance Evaluation
PID	Photoionization Detector
Plan	Extended Drinking Water Monitoring Plan
POC	Point of Contact
PWS	Public Water System
QC	Quality Control
SDWB	Safe Drinking Water Branch, State of Hawaii, Department of Health
S:N	Signal-to-Noise Ratio
SOP	Standard Operating Procedure
System	Public Water System #HI0000360 and #HI0000337
TAT	Turn-Around Time
TIC	Tentatively Identified Compound
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons

TPH-D	TPH-Diesel
TPH-G	TPH-Gasoline
TPH-O	TPH-Oil
TTHMs	Total Trihalomethanes
µg/L	Micrograms per Liter
U.S.	United States
VOA	Volatile Organic Analysis
WQAT	Water Quality Action Team

1. INTRODUCTION

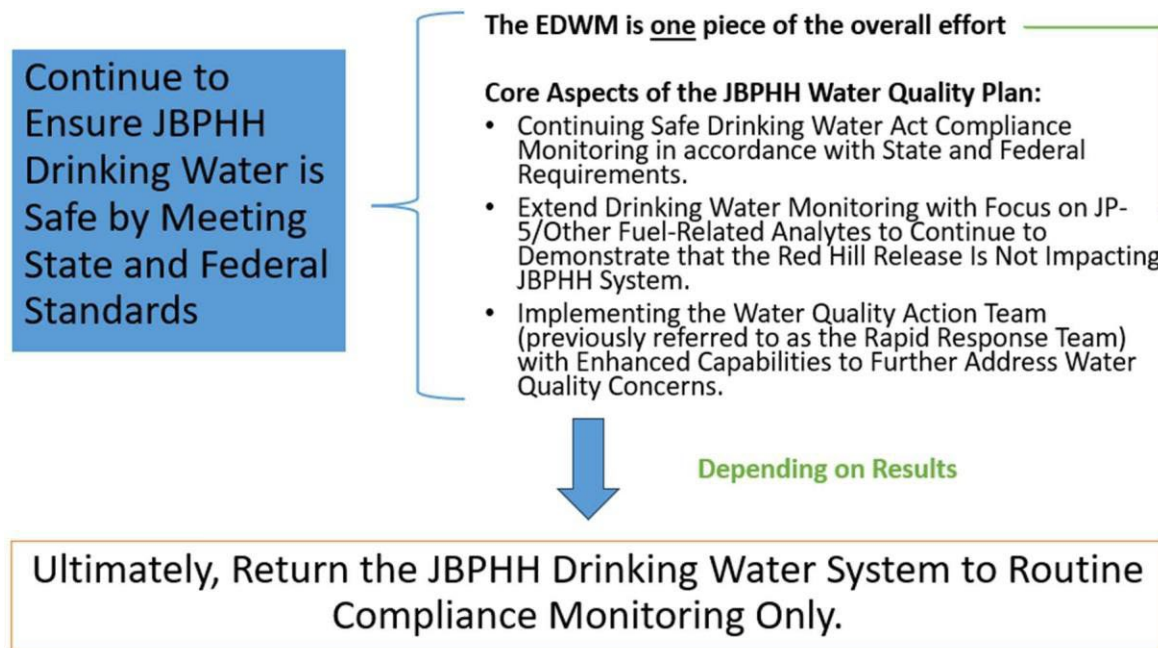
This Extended Drinking Water Monitoring (EDWM) Plan (Plan) was developed jointly by the United States (U.S.) Navy (Navy), the U.S. Army (Army), and a team of technical and subject matter experts. This Plan incorporates substantive comments and input provided by the U.S. Environmental Protection Agency (EPA) and State of Hawaii, Department of Health (DOH). As of March 2024, long-term monitoring (LTM) of the Public Water System (PWS) #HI0000360 and PWS #HI0000337 is complete. LTM was completed in accordance with the advisory requirements presented in the LTM Plan:

- *Drinking Water Long-Term Monitoring Plan for Joint Base Pearl Harbor-Hickam Public Water System #HI0000360 and Aliamanu Military Reservation PWS #HI0000337. O'ahu, Hawai'i, dated June 2022 (Interagency Drinking Water System Team [IDWST] 2022; referred to herein as the DW LTM Plan).*

For the purposes of this Plan, PWS #HI0000360 and PWS #HI0000337 will be considered a single distribution system divided into zones (System).

This Plan incorporates lessons learned from LTM (including refinements to analytical methods) and focuses on JP-5/other fuel-related analytes in order to continue to demonstrate that the Joint Base Pearl Harbor-Hickam (JBPHH) water system has recovered from, and is not impacted by, the November 2021 Red Hill release. Efforts, as summarized in Figure 1-1, continue in addition to, and separately from this Plan to ensure the System meets all State and Federal Standards. A figure explaining the overall JBPHH Water Quality Plan is shown below.

FIGURE 1-1: JBPHH WATER QUALITY PLAN



1.1 PRIMARY ELEMENTS OF THE EXTENDED DRINKING WATER MONITORING PLAN

This EDWM Plan has been implemented since the completion of LTM and reflects the most current sampling procedures and requirements. Beyond this plan, the System continues to meet all State and

Federal drinking water standards.¹ As stipulated in this Plan, the Navy will:

1. Sample the source, distribution lines, and houses/buildings for an additional 12 months to ensure that the drinking water continues to meet the requirements presented in this Plan. The sampling requirements outlined in this Plan will continue through March 2025;
2. Increase the number of zones being sampled from 19 to 20 by including Manana Housing in EDWM Sampling (shown on Figure 1-2);
3. Sample the houses served by the System that were not sampled as part of the original DW LTM Plan (dated June 2022) with the goal to achieve 100% coverage (i.e., 100% of the houses on the System have been sampled at least once either during the original LTM Program or by end of 12-month EDWM Program). The Navy will provide residents with the opportunity to have their homes sampled with the overarching goal of sampling one hundred percent (100%) of all residences. Approximately 65% of residences within each Zone were sampled during LTM, leaving approximately 35% remaining during EDWM. Note: The Navy's objective is to sample 100% of the houses in Manana Housing during EDWM in order to be consistent with all other Zones;
4. Sample hydrants in zones where residences are sampled during the same month;
5. Sample the Waiawa Shaft (pre-chlorination and post-chlorination) and priority buildings (Schools, Child Care Centers, Medical Clinics) every month following EDWM screening process;
6. Sample the inactive Navy Aiea-Halawa Shaft and Red Hill Shaft raw water sources quarterly for general water quality parameters in accordance with the EDWM plan. The Navy is planning to reactivate both shafts, and information relating to the reactivation of these wells is addressed in separate plan documents;
7. Improve the analytical resolution of detections of Total Petroleum Hydrocarbon-Diesel (TPH-D) and TPH-Oil (TPH-O) via EPA Method 8015 by removing residual chlorine by quenching the sample with sodium thiosulfate prior to sample collection, followed exclusively by micro-extraction (EPA Method 3511) prior to analysis via EPA Method 8015 and Method 8260. This plan also includes an approach for performing a detailed, quantitative analysis of petrogenic TPH detections and/or JP-5 Indicator Compounds via Method 524.2/525.2 presented in Table 2-2;
8. Provide monthly and quarterly reports to EPA/DOH and the public/stakeholders (via the <https://jbphh-safewaters.org> website) which detail the status/progress of EDWM in each zone; and
9. Collect EDWM Samples (in conjunction with the Navy's Water Quality Action Team's [WQAT's; formerly the Rapid Response Team]) at locations with consumer concerns regarding water quality. The protocols and procedures of the WQAT will be documented in a separate WQAT plan which will include Standard Operating Procedures (SOPs) for how the WQAT will respond to water quality concerns, collecting and analyzing drinking water samples, and implementing remedial actions (as necessary) based on the sample results. An overview of the Water Quality Action Team is presented in Figure 1-3.²

Note: In addition to the elements presented above, the EPA/DOH may analyze split samples during each month of sampling to independently assess the Navy's results.

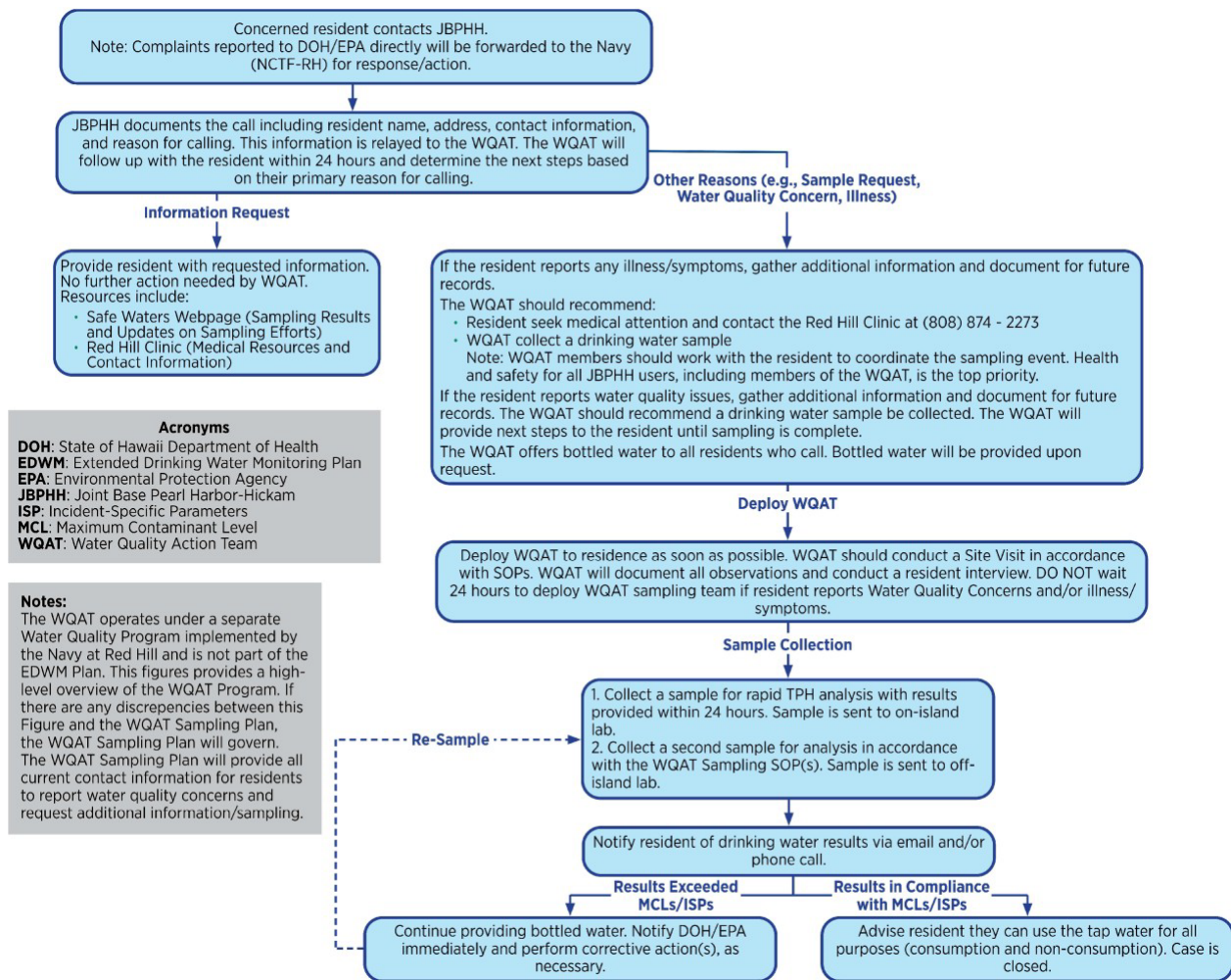
¹ This Plan focuses on JP-5/other fuel-related analytes only to continue to demonstrate that the November 2021 Red Hill release is not impacting JBPHH System. Efforts, as summarized in Figure 1-1, continue in addition to, and separately from this Plan to ensure the System meets all State and Federal Standards, in accordance with Safe Drinking Water Act requirements; one example of this is the Lead and Copper Rule compliance sampling.

² Note: The WQAT operates under a separate Water Quality Action Program implemented by the Navy at Red Hill and is not part of the EDWM Plan. This figure provides a high-level overview of the WQAT Program. If there are any discrepancies between this Figure and the WQAT Sampling Plan, the WQAT Sampling Plan will govern.

FIGURE 1-2: EDWM PLAN ZONES



FIGURE 1-3: OVERVIEW OF THE WATER QUALITY ACTION TEAM



Acronyms
DOH: State of Hawaii Department of Health
EDWM: Extended Drinking Water Monitoring Plan
EPA: Environmental Protection Agency
JBPHH: Joint Base Pearl Harbor-Hickam
ISP: Incident-Specific Parameters
MCL: Maximum Contaminant Level
WQAT: Water Quality Action Team

Notes:
 The WQAT operates under a separate Water Quality Program implemented by the Navy at Red Hill and is not part of the EDWM Plan. This figure provides a high-level overview of the WQAT Program. If there are any discrepancies between this Figure and the WQAT Sampling Plan, the WQAT Sampling Plan will govern. The WQAT Sampling Plan will provide all current contact information for residents to report water quality concerns and request additional information/sampling.

1.2 BACKGROUND

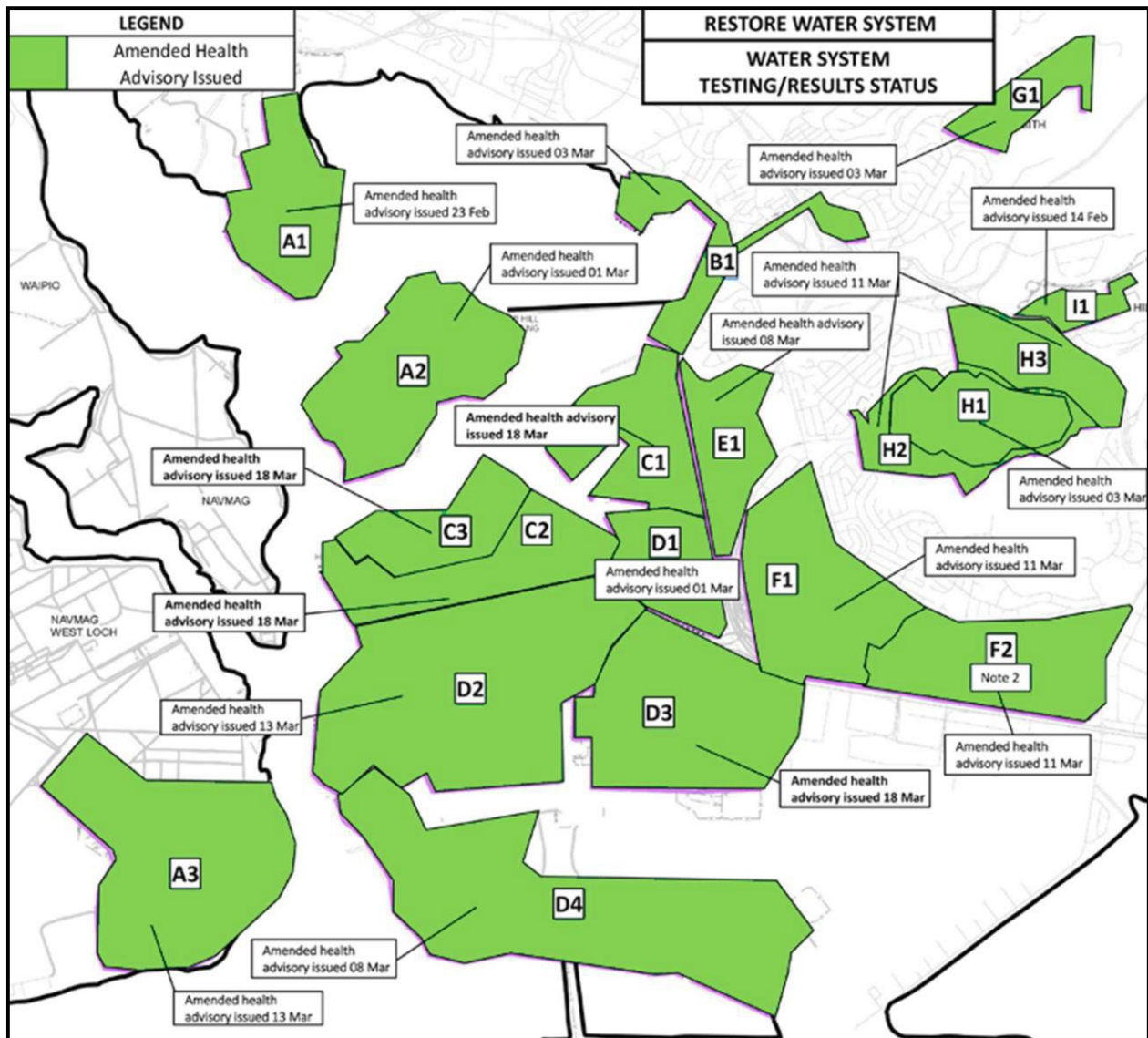
On November 20, 2021, approximately 20,000 gallons of JP-5 (petroleum, jet fuel) were released into the environment in the adit (tunnel) that is located above the Red Hill Shaft. Approximately 15,000 gallons were recovered during the initial emergency response. An unknown quantity of the unrecovered JP-5 migrated into the Red Hill Shaft. Both the Navy and DOH received complaints of a chemical or fuel odor and taste in the drinking water served by the System that serves approximately 93,000 consumers. On November 29, 2021, DOH issued a public health advisory recommending that Navy water system consumers avoid using water for consumption (e.g., drinking, cooking, and oral hygiene). The water distribution system was divided into 19 management zones (shown on Figure 1-2)³ where systematic remedial action was conducted to remove petroleum contamination from the System through comprehensive flushing of the water distribution lines and premise plumbing.

In order for DOH to amend its public health advisory, evidentiary benchmarks were developed, which

³ Manana Housing (the 20th Zone identified in this Plan) was not subject to the Health Advisories issued by DOH because the community was not on the JBPHH System in 2021. Manana Housing was switched to the JBPHH System after the Health Advisories were lifted in March 2022.

included (among other things) sampling for indicators of contamination and response by-products as well as cross-connection surveys to understand the potential for contaminants to spread through the System. Beginning February 14, 2022, DOH began amending the health advisories for individual zones in accordance with the DOH Guidance on the Approach to Amending the Public Health Advisory (IDWST 2022). The health advisory amendment certified that drinking water in that zone was considered safe for consumption. By March 18, 2022, DOH had amended the health advisories for all 19 zones (see Figure 1-4) but had not lifted the health advisory for the entire JBPHH PWS. The Navy began long-term monitoring in accordance with the DW LTM Plan. On March 23, 2023, DOH lifted the health advisory for the entire system based on the results of extensive flushing, sampling, and testing activities performed in all 19 zones. Sampling in accordance with the DW LTM Plan was completed as of March 2024. LTM included the collection of over 9,200 drinking water samples from the source (i.e., Waiawa Shaft), distribution lines, houses/buildings, and conducting additional investigations to ensure drinking water was safe for human consumption (e.g., drinking, cooking, and oral hygiene).

FIGURE 1-4: DRINKING WATER LTM PLAN ZONES



2. EDWM SAMPLING PURPOSE AND IMPLEMENTATION

2.1 PURPOSE

The EDWM is a surveillance tool intended to identify and evaluate potential JP-5/other fuel-related impacts to continue to demonstrate that the Joint Base Pearl Harbor-Hickam (JBPHH) water system has recovered from and is not impacted by the November 2021 Red Hill fuel release. The EDWM is one of the drinking water surveillance efforts that the Navy has implemented (see Figure 1-1). Independent of this Plan, the JBPHH drinking water system continues to meet all State and Federal drinking water standards.

2.2 IMPLEMENTATION

This Plan will be implemented through drinking water sampling.

2.3 EDWM MONTHLY SAMPLING

EDWM samples will be collected every month for 12 months. The EDWM sampling will focus on houses that were not sampled as part of the DW LTM Plan, with the goal of sampling 100% of the un-sampled houses on the System by the end of month 12 of EDWM (see Table 2-1). The Navy will sample the following locations and analyze for the parameters listed in Table 2-2:

- Waiawa Shaft (entry point to the distribution system): every month for most parameters and quarterly for others. Samples of the source water will be collected pre- and post-chlorination prior to distribution into the System.
- Navy Aiea/Halawa (NAH) Shaft and Red Hill Shaft raw, source water (pre-chlorination) quarterly. Note: These shafts **do not** provide drinking water to the JBPHH System and have not since 2021. These samples are collected for information purposes only.
- Houses that were not sampled during the LTM Program will be selected for sampling in each of the 20 zones on the System (shown on Figure 1-2 and Table 2-1). Each home is intended to collect a full drinking water sample from each residence.
 - Approximately 65% of residences within each Zone were sampled during LTM, which leaves approximately 35% remaining to be sampled during EDWM. Note: 100% of the houses in Manana Housing will be sampled during EDWM in order to be consistent with all other Zones. 100% coverage is the overarching goal; however, the Navy will not force residents to have their homes sampled. The Navy will make a thorough effort to arrange sampling for every residence. The Navy will attempt to contact each resident a minimum of three (3) attempts (not exceeding once per week) to arrange sampling of the residence; and after either five (5) documented call attempts without contact the residence, or annotation of resident's decline, the residence will be documented as not sampled.
- Priority Buildings (i.e., Schools, Child Care Centers, Medical Clinics) in all zones every month.
 - These locations were previously selected as part of LTM and were therefore continued in EDWM for consistency.
- Fire hydrants in zones where residences are sampled (fire hydrants in zones where residences were not sampled during the month will not be sampled).

- These locations were previously selected as part of LTM to be representative of the distribution system and were continued in EDWM for consistency.

Note: EDWM Monthly Sampling will be implemented on a geo-spatial basis. Residences will be sampled each month in each zone and the sample locations will be geographically distributed throughout the zone to provide spatial coverage along the water supply lines. Commercial/industrial buildings will not be sampled as part of this Plan.

Additional details on the EDWM sample site selection process are provided in Section 3.1 of this Plan.

In accordance with Section 3.1.1 of this Plan, the Navy will provide a schedule and location of these samples to the EPA/DOH Safe Drinking Water Branch (EPA/DOH SDWB)⁴ for their awareness one day prior to sample collection and will provide resident notification of sample collection. EPA/DOH SDWB may analyze split samples during each month of sampling in order to independently assess the Navy's results.

⁴ The schedule will be provided to EPA/DOH SDWB in PDF format for map(s) of prospective/actual sampling locations and Excel format for chart of prospective sampling locations.

TABLE 2-1: ESTIMATE OF THE NUMBER OF SAMPLES BY ZONE AND MONTH

ZONE Name	ZONE	Residences ¹	CDH ²	CDCs ³	Schools ⁴	MDVs ⁵	Distribution System ⁶	Shaft ⁷	Residences Sampled	Residences Remaining ⁸	Samples ⁹ (M1-M12)	
Pearl City Peninsula	A1	635	1	-	-	1	6	-	423	212	248	
Ford Island	A2	411	-	1	-	1	10	-	303	108	172	
Iroquois Point	A3	1,459	-	-	2	-	8	-	959	500	652	
McGrew/Halawa	B1	227	-	-	-	-	2	-	167	60	68	
Sub Base	C1	-	-	1	-	4	6	-	-	-	96	
Hale Alii Marine Barracks Hospital Point	C2	32	-	-	-	1	7	-	25	7	47	
Shipyard Hospital Point	C3	6	-	-	-	-	2	-	6	-	8	
Hale Moku Hokulani	D1	508	-	2	1	-	6	-	342	166	298	
Hickam Hale Na Koa Officer Field Area Onizuka Village	D2	1,577	-	1	1	2	11	-	1,119	458	610	
Earhart Village	D3	912	-	6	4	1	8	-	615	297	725	
Hawaii Air National Guard	D4	-	-	-	-	1	2	-	-	-	20	
Makalapa	E1	89	-	1	1	-	4	-	84	5	105	
NEX Moanalua Terrace	F1	752	-	1	1	2	8	-	512	240	380	
Catlin Park Maloelap Doris Miller Halsey Terrace Radford Terrace	F2	1,435	1	2	-	-	14	-	976	459	575	
Camp Smith	G1	10	-	-	-	-	1	-	10	-	4	
AMR	H1	918	-	4	-	-	3	-	635	283	391	
AMR	H2	230	-	-	-	-	3	-	150	80	92	
AMR	H3	379	-	-	-	-	3	-	248	131	143	
Red Hill Housing	I1	135	-	-	1	-	1	-	93	42	106	
Manana Housing ¹⁰	J1	168	-	-	-	-	-	-	2	166	166	
Waiawa Shaft	SH	-	-	-	-	-	-	1	-	-	24	
NAH Shaft	SH	-	-	-	-	-	-	1	-	-	24	
Red Hill Shaft	SH	-	-	-	-	-	-	1	-	-	24	
Total		9,883	2	19	11	13	105	3	6,669	3,214	4,954	
Field Duplicates	10%										Normal Samples/Month ⁹	413
Field Blanks / Trip Blanks	480										Field Dups	42
PE Samples ¹¹	300										Requested/RR	21
Requested/RR Samples ¹²	5%										Resamples	21
Split Samples with EPA ¹³	TBD										EPA Split Samples	TBD
Resamples	5%										Samples/Month	499
Samples / Team / Day	7										Samples/Day ¹⁴	25
Working Days / Month	20										# Teams ¹⁵	4
											Total Samples	5,964

Notes:

1. Samples will be taken from the remaining residences in each zone (i.e., residences not sampled in LTM) in order to pursue 100% coverage by the end of the 12-month EDWM.
2. One sample will be taken from each child development home (CDH) each month.
3. Two samples will be taken from each child development center (CDC) each month.
4. Five samples will be taken from each School each month.
5. One sample will be taken from each medical, dental, and veterinary (MDV) clinic each month.
6. One sample will be taken from each hydrant each month where residential sampling is conducted in that zone; sample from previously sampled hydrants. Larger zones may take more than one month to complete sampling. For planning purposes, it's assumed that each hydrant will be sampled twice.
7. The Entry Point to Distribution System is the Waiawa Shaft.

8. Residence locations that were not sampled during the emergency phase or Long-Term Monitoring (LTM Periods 1 through 7).
9. Samples required per month for one year of extended drinking water monitoring.
10. Manana Housing samples will be taken from 100% of the total number of residences.
11. Monthly Blind Performance Evaluation (PE) Samples for JP-5. Two samples per month at each of the following concentrations: 266 µg/L and 80 µg/L.
12. Requested and Water Quality Action Team samples.
13. The EPA/DOH may analyze split samples during each month of sampling in order to independently assess the Navy's results.
14. The number of samples per day assumes 20 working days per month.
15. The number of teams assumes that each team collects seven samples per day.

TABLE 2-2: EDWM ANALYTICAL LIST

Analytical Method	Analyte	CASRN	EPA / DOH Maximum Contaminant Level (MCL; µg/L)	Method Detection Limit (MDL; µg/L)	Method Reporting Limit (MRL; µg/L)	Residential Priority Buildings Sampling	Hydrant Sampling	Waiawa Shaft Sampling Source (Raw) Water / Post Chlorination	NAH Shaft Sampling Source (Raw) Water	Red Hill Shaft Sampling Source (Raw) Water
EPA 524.2	Benzene ¹	71-43-2	5	0.25	0.5	All	M	M/M	n/a	n/a
EPA 524.2	n-Butylbenzene ¹	104-51-8		0.25	0.5	All	M	M/M	n/a	n/a
EPA 524.2	sec-Butylbenzene ¹	135-98-8		0.25	0.5	All	M	M/M	n/a	n/a
EPA 524.2	Tert-Butylbenzene ¹	98-06-6		0.25	0.5	All	M	M/M	n/a	n/a
EPA 524.2	Ethyl Benzene ¹	100-41-4	700	0.25	0.5	All	M	M/M	n/a	n/a
EPA 524.2	Isopropylbenzene ¹	98-82-8		0.25	0.5	All	M	M/M	n/a	n/a
EPA 524.2	n-Propylbenzene ¹	103-65-1		0.25	0.5	All	M	M/M	n/a	n/a
EPA 524.2	Toluene ¹	108-88-3	1000	0.25	0.5	All	M	M/M	n/a	n/a
EPA 524.2	1,2,4-Trimethylbenzene ¹	95-63-6	—	0.26	0.5	All	M	M/M	n/a	n/a
EPA 524.2	1,3,5-Trimethylbenzene ¹	108-67-8	—	0.25	0.5	All	M	M/M	n/a	n/a
EPA 524.2	Xylenes (Total) ¹		10000	0.25	0.5	All	M	M/M	n/a	n/a
	• m,p-Xylenes	1330-20-7	—	0.25	0.5					
	• o-Xylenes	95-47-6	—	0.25	0.5					
EPA 524.2	Total trihalomethanes(TTHM):	TTHMs	80	0.25	0.5	All	M	n/a/M	n/a	n/a
	• Chloroform	67-66-3								
	• Bromoform	75-25-2								
	• Bromodichloromethane	75-27-4								
	• Dibromochloromethane	124-48-1								
EPA 525.2	1-Methylnaphthalene ¹	90-12-0	—	0.25	0.5	All	M	M/M	n/a	n/a
EPA 525.2	2-Methylnaphthalene ¹	91-57-6	—	0.25	0.5	All	M	M/M	n/a	n/a
EPA 525.2	Naphthalene ¹	91-20-3	—	0.25	0.5	All	M	M/M	n/a	n/a
EPA 525.2	Acenaphthylene ²	208-96-8		0.25	0.5	All	M	M/M	n/a	n/a
EPA 525.2	Anthracene ²	120-12-7		0.25	0.5	All	M	M/M	n/a	n/a
EPA 525.2	Benzo[a]pyrene ²	50-32-8	0.2/0.2	0.01	0.02	All	M	M/M	n/a	n/a
EPA 525.2	Benzo[b]fluoranthene ²	205-82-3		0.25	0.5	All	M	M/M	n/a	n/a
EPA 525.2	Benzo[k]fluoranthene ²	207-08-9		0.25	0.5	All	M	M/M	n/a	n/a
EPA 525.2	Benzo[g,h,i]perylene ²	191-24-2		0.25	0.5	All	M	M/M	n/a	n/a
EPA 525.2	Chrysene ²	218-01-9		0.25	0.5	All	M	M/M	n/a	n/a
EPA 525.2	Dibenz[a,h]anthracene ²	53-70-3		0.25	0.5	All	M	M/M	n/a	n/a
EPA 525.2	Fluorene ²	86-73-7		0.25	0.5	All	M	M/M	n/a	n/a
EPA 525.2	Indeno[1,2,3-cd]pyrene ²	193-39-5		0.25	0.5	All	M	M/M	n/a	n/a
EPA 525.2	Phenanthrene ²	85-01-8		0.25	0.5	All	M	M/M	n/a	n/a

Notes:

All: Indicates every location will be sampled, M: Indicates monthly sampling, Q: Indicates quarterly sampling, n/a: Indicates not applicable.

The analytical laboratory will report non-detected results to the MDL. Values between the MDL and MRL will be flagged as estimates ('J' flag).

¹ These analytes are primary components of JP-5 (i.e., these analytes comprise a significant amount [based on their molar fraction in JP-5 samples obtained from Red Hill on July 5, 2023, and their solubility in water] of the composition of JP-5 dissolved in water) and are key indicators of the presence/absence of JP-5 in drinking water samples and will be evaluated per Course of Action 3 (COA 3) for concentrations above the MRL— See section 5.2.3.

² These analytes are potentially associated with other petroleum compounds (e.g., other fuels, oils, and lubricants) and will be evaluated per COA 3 for concentrations above the MRL— See section 5.2.3.

³ Lead and copper concentrations in drinking water regulations do not have MCL's, only Action Levels. Lead and copper are regulated by a treatment technique that requires systems to control the corrosiveness of their water. For the purposes of EDWM sampling, lead and copper concentrations in drinking water will be screened at the regulatory Action Levels, though these are not samples collected for the purposes of compliance with federal and state lead and copper regulations.

Analytical Method	Analyte	CASRN	EPA / DOH Maximum Contaminant Level (MCL; µg/L)	Method Detection Limit (MDL; µg/L)	Method Reporting Limit (MRL; µg/L)	Residential Priority Buildings Sampling	Hydrant Sampling	Waiawa Shaft Sampling Source (Raw) Water / Post Chlorination	NAH Shaft Sampling Source (Raw) Water	Red Hill Shaft Sampling Source (Raw) Water
EPA 525.2	Pyrene ²	129-00-0		0.25	0.5	All	M	M/M	n/a	n/a
EPA 8260 EPA 8015 EPA 8015	JP-5 as Combined Total Petroleum Hydrocarbons (TPH)- Gasoline, Diesel, and Oil Ranges	PCHG PCHD MOIL	—	GRO, DRO, ORO = 50	GRO, DRO, ORO = 80	All	M	M/M	n/a	n/a
EPA 200.8	Copper	7440-50-8	1300 ⁽³⁾	0.5	2	All	n/a	n/a	n/a	n/a
EPA 200.8	Lead	7439-92-1	15 ⁽³⁾	0.13	0.5	All	n/a	n/a	n/a	n/a
EPA 245.1	Mercury	7439-94-7	2	0.025	0.1	All	n/a	n/a	n/a	n/a
SM 5310 B, C or D, or EPA 415.3, Rev 1.2	Total Organic Carbon (TOC)	TOC	—	200	500	All	M	M/M	n/a	n/a
HACH 8021 (Based on SM 4500-Cl G)	Chlorine, Free (Field Test): • Sample Hot Water • Sample Cold Water	7782-50-5	4000	—	—	All	M	n/a/M	n/a	n/a
EPA 170.1	Temperature (Field Test): • Sample Hot Water • Sample Cold Water	TMP	—	—	—	All	M	M/M	Q	Q
EPA 150.3	pH (Field Test)	pH	—	—	—	All	M	M/M	Q	Q
SM 2510 B	Conductivity (Field Test)	CONDUCT	—	—	—	All	M	M/M	Q	Q
SM 2130 B	Turbidity (Field Test)	TURBID	< 5 NTUs	—	—	All	M	M/M	Q	Q
SM 2320 B	Total Alkalinity	TOTAL_AL K	—	—	—	All	M	M/M	Q	Q
EPA 200.7	Cations: • Sodium • Potassium • Calcium • Magnesium • Iron • Manganese	7440-23-5 7440-09-7 7440-70-2 7439-95-4 7439-89-6 7439-96-5	—	51 250 53 31 10 1.1	400 1000 400 200 20 5	n/a	n/a	M/M	Q	Q
EPA 200.7	Silica	7631-86-9	—	320	430	n/a	n/a	M/M	Q	Q

Notes:

All: Indicates every location will be sampled, M: Indicates monthly sampling, Q: Indicates quarterly sampling, n/a: Indicates not applicable.

The analytical laboratory will report non-detected results to the MDL. Values between the MDL and MRL will be flagged as estimates ('J' flag).

¹ These analytes are primary components of JP-5 (i.e., these analytes comprise a significant amount [based on their molar fraction in JP-5 samples obtained from Red Hill on July 5, 2023, and their solubility in water] of the composition of JP-5 dissolved in water) and are key indicators of the presence/absence of JP-5 in drinking water samples and will be evaluated per Course of Action 3 (COA 3) for concentrations above the MRL— See section 5.2.3.

² These analytes are potentially associated with other petroleum compounds (e.g., other fuels, oils, and lubricants) and will be evaluated per COA 3 for concentrations above the MRL— See section 5.2.3.

³ Lead and copper concentrations in drinking water regulations do not have MCL's, only Action Levels. Lead and copper are regulated by a treatment technique that requires systems to control the corrosiveness of their water. For the purposes of EDWM sampling, lead and copper concentrations in drinking water will be screened at the regulatory Action Levels, though these are not samples collected for the purposes of compliance with federal and state lead and copper regulations.

Analytical Method	Analyte	CASRN	EPA / DOH Maximum Contaminant Level (MCL; µg/L)	Method Detection Limit (MDL; µg/L)	Method Reporting Limit (MRL; µg/L)	Residential Priority Buildings Sampling	Hydrant Sampling	Waiawa Shaft Sampling Source (Raw) Water / Post Chlorination	NAH Shaft Sampling Source (Raw) Water	Red Hill Shaft Sampling Source (Raw) Water
EPA method 300.0 Rev. 2.1	Anions: <ul style="list-style-type: none"> • Chloride • Sulfate • Fluoride • Ortho-Phosphate-P • Bromide 	16887-00-6 14808-79-8 16984-48-8 14265-44-2 24959-67-9	— — 4000 — — —	400 400 50 35 25	500 500 100 50 50	n/a	n/a	M/M	Q	Q
EPA method 300.1 Rev. 1.0	Anions: <ul style="list-style-type: none"> • Chlorite • Bromate • Chlorate 	14998-27-7 15541-45-4 14866-68-3	1000 10 —	5 25 5	10 10 10	n/a	n/a	M/M	Q	Q
EPA 504.1	Ethylene Dibromide ²	106-93-4	0.05	0.005	0.022	n/a	Q	Q	n/a	n/a
EPA 8270SIM	2-(2-Methoxyethoxy)-Ethanol ²	111-77-3	—	80	100	n/a	Q	Q	n/a	n/a

Notes:

All: Indicates every location will be sampled, M: Indicates monthly sampling, Q: Indicates quarterly sampling, n/a: Indicates not applicable.

The analytical laboratory will report non-detected results to the MDL. Values between the MDL and MRL will be flagged as estimates ('J' flag).

¹ These analytes are primary components of JP-5 (i.e., these analytes comprise a significant amount [based on their molar fraction in JP-5 samples obtained from Red Hill on July 5, 2023, and their solubility in water] of the composition of JP-5 dissolved in water) and are key indicators of the presence/absence of JP-5 in drinking water samples and will be evaluated per Course of Action 3 (COA 3) for concentrations above the MRL— See section 5.2.3.

² These analytes are potentially associated with other petroleum compounds (e.g., other fuels, oils, and lubricants) and will be evaluated per COA 3 for concentrations above the MRL— See section 5.2.3.

³ Lead and copper concentrations in drinking water regulations do not have MCL's, only Action Levels. Lead and copper are regulated by a treatment technique that requires systems to control the corrosiveness of their water. For the purposes of EDWM sampling, lead and copper concentrations in drinking water will be screened at the regulatory Action Levels, though these are not samples collected for the purposes of compliance with federal and state lead and copper regulations.

3. EDWM SAMPLING OPERATIONS

The EDWM sampling operations are executed by three core teams (further detailed in the subsections below):

- Sampling preparation, supply inventory and management, and sample shipping operations
- Field sampling operations
- Chemists, data managers, and data quality control (QC) managers

Sampling operations-including field operations, sample scheduling and tracking, site notification, sample preparation, sample shipment, and sample transportation to the laboratory are detailed in Section 3.1.

3.1 SAMPLE SITE SELECTION

The quantity and locations of samples will be identified through the guidance in this section and the procedures described in Appendix A, SOP 3. The number of samples by zone and by month are summarized in Table 2-1. Zone, neighborhood, and address information for all associated schools, child development centers (CDCs), child development homes (CDHs), and medical, dental, and veterinary (MDV) clinics are presented in Table 3-1.

3.1.1 SCHEDULING AND SAMPLE SITE SELECTION

The Navy will provide to EPA/DOH SDWB the selected sampling sites for review **at least one day prior** to the commencement of sampling to coordinate split sampling, as needed. The latest resident contact information is obtained through coordination with the Navy & Hickam Housing offices, and the various Public-Private Venture (PPV) entities. The Navy deliberately contacts residents to arrange residential sampling appointments, that is conducive to resident availability. The locations of the priority areas and the hydrants are the same locations utilized for the LTM plan, and were therefore retained for consistency of monitoring. Coordination with the Navy School Liaison officer and Morale, Welfare and Recreation (MWR) department is conducted to confirm the school/CDC contacts are current. The Navy Call center contacts the building representatives to schedule the monthly sampling.

The EDWM sampling will focus on houses that were not sampled as part of the DW LTM Plan. The goal is to have 100% of the unsampled houses served by the System sampled by the end of month 12 of EDWM (see Table 2-1).⁵ Commercial/industrial buildings will not be sampled as part of this Plan.

MDV clinics and compromised communities (i.e., Long-Term Facilities, Retirement Communities, Independent Communities, Residential Care Homes) that service vulnerable populations will be included/listed in the EDWM as priority building sampling locations.

TABLE 3-1: LOCATION INFORMATION FOR SCHOOLS, CDCS, CDHS, AND MDV CLINICS

Zone	Neighborhood / Bldg. Description	Category
A1	Pearl City Peninsula	CDH
A1	BLDG 987- Medical Clinic	MDV
A2	BLDG 55- Medical Clinic	MDV

⁵ Approximately 65% of residences within each Zone were sampled during LTM, which leaves approximately 35% remaining to be sampled during EDWM. Note: 100% of the houses in Manana Housing will be sampled during EDWM in order to be consistent with all other Zones. 100% coverage is the overarching goal; however, the Navy will not force residents to have their homes sampled.

Zone	Neighborhood / Bldg. Description	Category
A2	BLDG 350 – Ford Island CDC	CDC
A3	Iroquois Point Elementary	School
A3	Iroquois Point Preschool	School
C1	BLDG 1655 – Pier Side CDC	CDC
C1	BLDG 1535 – Medical Clinic/SARP – Pearl Harbor	MDV
C1	BLDG 1407 – Naval Station Pearl Harbor Dental & Navy Branch Health Clinic	MDV
C1	BLDG 1514 – Navy Medical Readiness Clinic (MRC)	MDV
C1	BLDG 584 – CNSG MIDPAC Clinic	MDV
C2	BLDG 1750 – Pearl Harbor Navy Shipyard Environmental (Occ. Health) Clinic	MDV
D1	BLDG 204 - Kids Cove 24/7 CDC	CDC
D1	BLDG 930 - Center Drive CDC LE	CDC
D1	Pearl Harbor Kai Elementary School	School
D2	Hickam Elementary	School
D2	BLDG 63H - Hickam Harbor CDC	CDC
D2	BLDG 559H – 15th Medical Group & Hickam Pharmacy	MDV
D2	BLDG 554H – Occupational Health Clinic	MDV
D3	Hickam Main CDC	CDC
D3	Hickam West CDC	CDC
D3	BLDG 1859H – Makai Rec Center	CDC
D3	Pearl Harbor Church of Christ	CDC
D3	BLDG 1330 – Hickam Youth Center	CDC
D3	BLDG 1335H - Hickam School Age Center	CDC
D3	Chester Nimitz Elementary School	School
D3	Holy Family Catholic Academy (Holy Trinity School)	School
D3	Assets School	School
D3	Mokulele Elementary School	School
D3	BLDG 1864H – Public Health Command – Pacific Veterinary Clinic	MDV
D4	BLDG 3365H – Clinical Lab – Epidemiology	MDV
E1	BLDG 81 – Montessori Center	CDC
E1	Hale Keiki School	School
F1	Pearl Harbor Elementary	School
F1	Moanalua Pre-School – Kama'aina Kids	CDC
F1	Hook Orthodontics, Moanalua Shopping Center	MDV
F1	Pearl Family Dental Care, Moanalua Shopping Center	MDV
F2	Catlin School Age Children	CDC
F2	Peltier CDC	CDC
F2	Halsey Terrace	CDH
H1	BLDG 1783 – AMR CDC	CDC
H1	BLDG 1782 – AMR Child Youth Services Center	CDC
H1	BLDG 1795 – AMR Youth Activities Center	CDC
H1	BLDG 1875 – AMR YMCA	CDC
I1	Red Hill Elementary School	School

3.1.2 ALTERNATE SAMPLE SITES AND EVENT CHANGES

Alternate sample site locations may be required for instances such as, but not limited to:

- High ambient photoionization detector (PID) reading
- Vacant location with no water or stagnant water
- Loose pets
- No key available from facility maintenance
- Ill resident in the home
- Unaccompanied minor in home
- Continued missed appointments by the tenant
- Tenants unwilling to support sampling
- Other unsafe conditions

In these instances, an alternate sample location (i.e., a different residence that was not sampled under the previous DW LTM program) and event change are required. Sampling teams have the capability to reprint labels in the field and update field logs to accommodate sample location changes. Sample sites and event changes will be documented to include why a location was not sampled.

3.2 FIELD SAMPLING OPERATIONS

Field staff are responsible for collecting samples each day according to assignments prepared by the scheduling team. Field staff begin their day at the sample staging area to receive their assignments and sample collection kits. The sampling teams end their day at the sample staging area to return the sample collection containers so they can be prepared for transport to the analytical laboratories.

3.2.1 FIELD SAMPLING TEAM STAFFING AND SCHEDULE

Field sampling operations are controlled by a senior operations manager, with assistance from a deputy operations manager. Each sampling team will consist of two (2) staff, a vehicle, and a sampling kit.

Prior to sampling, the field team will inspect all supplies and consumables to ensure they are acceptable for use. EDWM sample collection procedures are detailed in Appendix A Drinking Water Sample Collection SOPs.

3.2.2 EPA/DOH FIELD OVERSIGHT TEAM

The EPA/DOH field oversight team will be provided with Defense Biometric Identification System (DBIDS) access to JBPHH to randomly inspect the field sampling and/or sampling operations for quality assurance. The Navy, U.S. Marine Corps, and Army must provide base access to EPA/DOH personnel engaged in this oversight. Upon receipt of the sampling plan, if EPA/DOH representatives desire to inspect sampling operations, EPA/DOH will submit for DBIDS installation access to allow for two weeks of processing. The Department of Defense must either provide EPA/DOH staff or the EPA/DOH contractor with DBIDS credentials (for the duration of EDWM) or escort upon request.

3.3 CHEMISTRY AND DATA MANAGEMENT

A team of chemists and data managers will track and verify the laboratory data as it is uploaded into EDMS. Dedicated staff and redundant chemist lab coordinators will focus on communicating with each lab. Lab coordinators serve as the primary liaison with the water quality labs, and their daily contact with the labs results in quicker lab processing of samples.

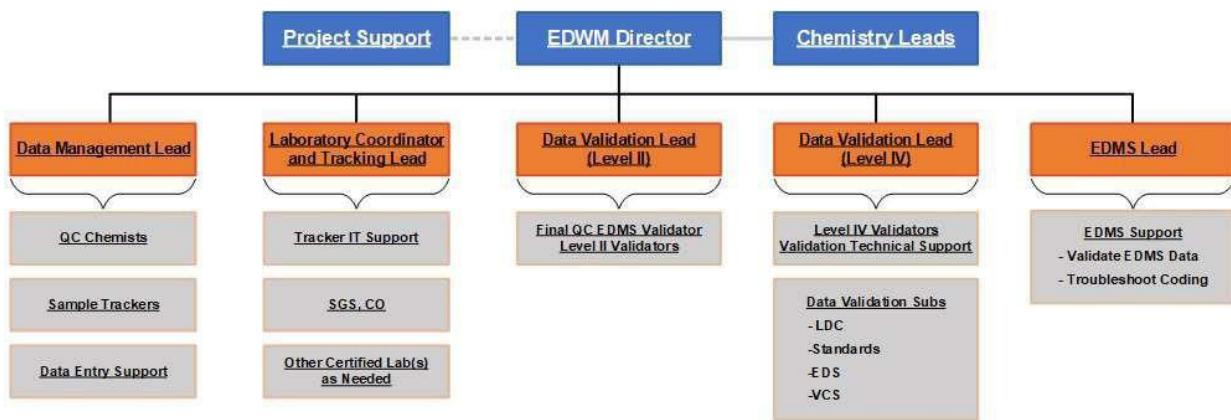
Lab coordinator responsibilities are listed below:

- Coordinate with the lab
- Act as the lab point of contact (POC)
- Input sample status into the tracker
- Check that the lab uploaded data
- Review initial lab data

Additional dedicated staff will serve in support and back-up roles for each of the lab coordinators, in many cases assigning people from the labs or other time zones, to promote full-time coordination.

The team of chemists and data managers is presented in Figure 3-1.

FIGURE 3-1: CHEMISTRY TEAM



3.3.1 LABORATORY ANALYTICAL

Analytical laboratories are currently under contract to provide an expedited turn-around-time (TAT) on sample analytical results. However, there may be instances when the requested TAT is exceeded and will have to be individually managed.

Table 3-2 lists, for each parameter, the sample containers, preservatives, and applicable holding times as required by SW-846 and state and federal drinking water methods. All required analytical supplies, sample containers and preservatives, and shipping supplies will be provided by the analytical laboratory.

TABLE 3-2: SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

Parameter	Analytical Method	Container	Preservative	Holding Times (Extraction/Analysis)
Volatile Organic Compounds (including TTHMs)	524.2	3 x 40 mL Glass VOA	0.5 mL HCl; (Unchlorinated); 25 mg Ascorbic / 3 drops HCl (Chlorinated)	14 days
Synthetic Organic Compounds	525.2	2 x 1 L Amber Glass	2 mL HCl (unchlorinated); 45 mg Sodium Sulfite / 2 mL HCl (chlorinated)	7 days to extraction/ 40 days extraction to analysis
Metals (Copper and Lead Only)	200.8	250 mL Poly	1 mL HNO ₃ , pH<2	6 months
Mercury	245.1	250 mL Poly	1 mL HNO ₃ , pH<2	28 days
JP-5 (TPH-D and TPH- O)	3511 (Hexane) with High Volume Injection)/8015 (Micro-Extraction)	3 x 60 mL Glass VOA	0.5 mL HCl (added in the laboratory). Quench with Sodium Thiosulfate (added to sample container prior to sample collection).	7 days
JP-5 (TPH-G)	5030/8260	3 x 40 mL Glass VOA	25 mg Ascorbic / 3 drops HCl	14 days
TOC	SM 5310	250 mL Amber Glass	Acidify to pH < 2 with H ₂ SO ₄ immediately after collection and cool to ≤ 6°C, but not frozen.	28 days
Chlorine, Free (Field Test)	Hach Method 08021	This parameter will be analyzed in the field.		
Temperature (Field Test)	170.1	This parameter will be analyzed in the field.		
pH (Field Test)	150.3	This parameter will be analyzed in the field.		
Conductivity (Field Test)	SM 2510 B	This parameter will be analyzed in the field.		
Turbidity (Field Test)	SM 2130 B	This parameter will be analyzed in the field.		
Total Alkalinity	SM 2320 B	250 mL Poly	Cool to ≤ 4 °C	14 days
Cations	200.7	250 mL Poly	Acidify to pH < 2 with HNO ₃	6 months
Silica	200.7	250 mL Poly	Cool to ≤ 4 °C	28 days
Anions (Bromide, fluoride, chloride, sulfate)	300.0 Rev. 2.1	125 mL Poly	Cool to ≤ 4 °C	28 days
Anions (ortho-Phosphate-P)	300.0 Rev. 2.1	125 mL Poly	Cool to ≤ 4 °C	48 hours

Parameter	Analytical Method	Container	Preservative	Holding Times (Extraction/Analysis)
Anions (bromate and chlorate)	300.1 Rev. 1.0	250 mL Amber Poly	50 mg/L EDA and Cool to ≤ 4 °C	28 days
Anions (chlorite)	300.1 Rev. 1.0	250 mL Amber Poly	50 mg/L EDA and Cool to ≤ 4 °C	14 days
Ethylene Dibromide	504.1	40 mL Teflon Septum Glass	Sodium Thiosulfate	14 days
2-(2-Methoxyethoxy)-Ethanol	8270SIM (Direct Injection)	2 x 40 mL Glass VOA	Cool to ≤ 4 °C	7 days

Note: All samples will be chilled to $< 6^{\circ}\text{C}$, unless otherwise noted.

EPA Method 8015 is not a drinking water method and is typically run on unchlorinated water samples. However, the JBPHH drinking water samples are chlorinated. Therefore, EDWM samples will be quenched with sodium thiosulfate prior to sample collection to stop reactions from occurring between chlorine, potential analytes, and reagents added to the sample by the laboratory. This is done for drinking water analysis (e.g., drinking water methods 524.2 and 525.2).

COC documentation will be maintained for samples during all phases of sample collection, transport, and receipt and internal transfer within the laboratory.

3.3.2 DATA QUALITY

Field QC samples will be collected during each sampling event to include field duplicates, field reagent blanks, and trip blanks. Field duplicates will be collected at a frequency of 10% of the number of normal samples and field reagent blanks from all Zones. Trip blanks will be collected daily during each sampling event in accordance with the procedures described in Naval Facilities Engineering Systems Command (NAVFAC) Pacific Environmental Restoration Program Project Procedure III-B, Field QC Samples (Water, Soil; Navy 2015) and as specified in the respective drinking water methods. The following additional QC measures will be implemented:

- The number of reagent field blanks will be doubled, and all reagent field blanks will be submitted “blind” to the laboratory (i.e., the sample number and chain of custody will not indicate that the sample is a blank).
- Matrix spike (MS)/matrix spike duplicate (MSD) samples for Method 8015 will be spiked at the MRL (80 $\mu\text{g/L}$) in order to be more consistent with expected results.
- Monthly Blind Performance Evaluation Samples for JP-5 will be submitted to the laboratory. A minimum of 2 samples per month will be submitted to the laboratory at the following concentrations of JP-5: 266 $\mu\text{g/L}$ and 80 $\mu\text{g/L}$.

EPA/DOH may analyze split samples during each month of sampling in order to independently assess the Navy’s results. The analytical laboratory will report non-detected results to the MDL. Values between the MDL and the MRL will be flagged as estimates (‘J’ flag).

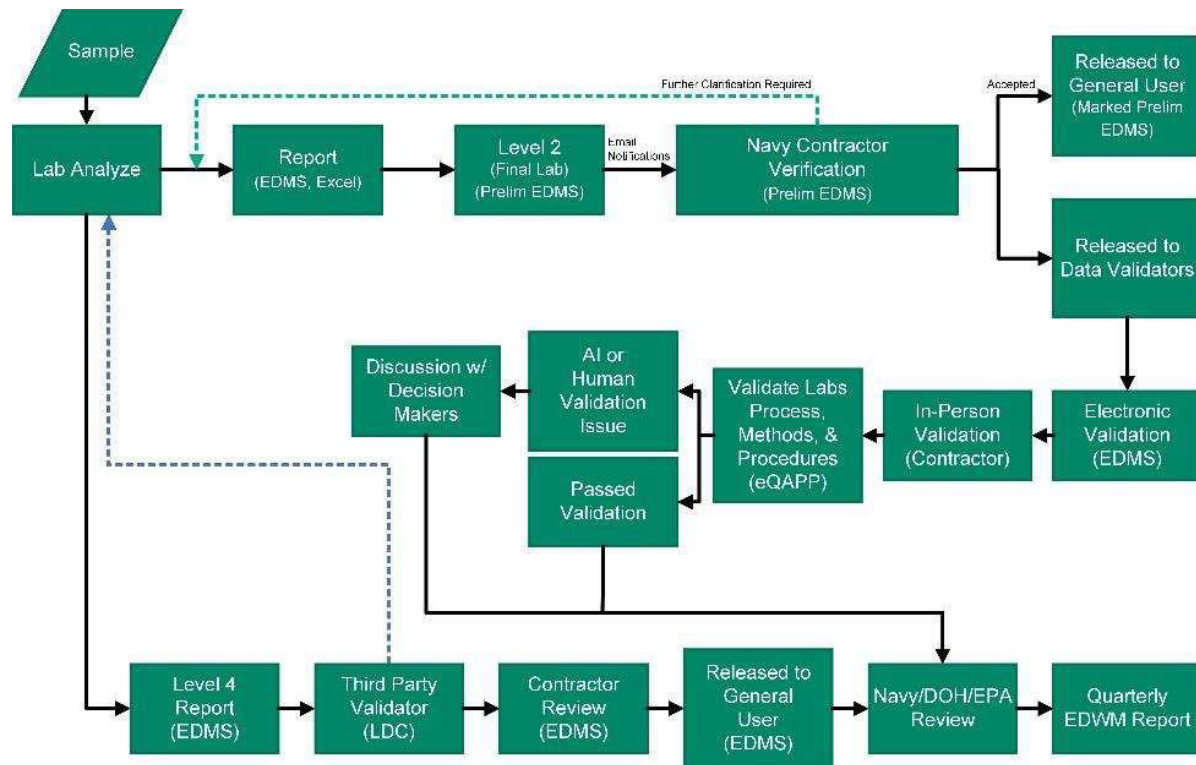
Level 2 and Level 4 data packages will be provided by the laboratory for all EDWM samples that are collected according to the schedule in Figure 4-2. Ten percent of the drinking water compliance samples (randomly selected from all Zones) will undergo Stage 4 data validation by an independent validator (i.e., the validator will be independent of the laboratory that performed the analyses). This percentage of samples undergoing Stage 4 validation is per zone each month and may be increased depending on the number, type, and severity of corrective actions that are identified by the data validator; however, the percentage per Zone in each period can fluctuate to accommodate the number of samples collected. The

remaining samples will undergo Stage 2A data validation.

3.3.3 LABORATORY DATA REVIEW PROCESS

Figure 3-2 illustrates the laboratory data analysis and validation process. As shown in Figure 3-2, once lab data is entered into EDMS and verified, Stage 2A and Stage 4 validation efforts start. Stage 2A validation includes both a computerized validation and manual review/validation by chemists. Both processes generally act together to produce the Stage 2A validation in a timely manner. However, as is the case with any laboratory analyses, some samples will not pass this QC step and will be singled out for further discussion with the Navy/Army Team. A record of the discussion and decision must be memorialized and submitted to EPA/DOH. Stage 4 validation is a separate process that starts with the labs providing Level 4 data packages, which are reports that are hundreds or thousands of pages long. Those packages are validated by a data validator contractor, an independent third-party validator, and further reviewed for approval by the Navy/Army Team.

FIGURE 3-2: LAB DATA REVIEW PROCESS



3.4 DATA MANAGEMENT

Data will be uploaded to EDMS and be available in a comprehensive, full system view, as well as per Zone. All field sample results associated with the EDWM program will also be included in EDMS in accordance with the Interagency Drinking Water System Team – Data Management Plan, dated 24 January 2022 (IDWST 2022)

4. EDWM SCHEDULE

The EDWM sampling will begin in April 2024, one month after the completion of the 24-month LTM Sampling Program (i.e., March 2024), as summarized in Figure 4-1. Sampling will be performed monthly as specified in Table 2-1 and Table 2-2. Analytical data will be evaluated and posted to the <https://jbphh-safewaters.org/> website monthly. Depending on when data validation is complete, results from some samples may not be available/posted on the website until the following month. Quarterly reports that summarize the previous 3-months of EDWM data will be posted on the <https://jbphh-safewaters.org/> website in July 2024, October 2024, and January 2025. The final quarterly report will be included in the Final Report for the entire 12-Month EDWM Sampling Program and will be posted May 2025. The total number of samples collected from month to month will be similar to that presented in Table 2-1, to the extent practicable, in order to ensure laboratory capacity.

FIGURE 4-1: 12-MONTH EDWM SAMPLING SCHEDULE

First Quarter			Second Quarter			Third Quarter			Fourth Quarter			EDWM Complete
1	2	3	4	5	6	7	8	9	10	11	12	
Apr '24	May '24	June '24	July '24	Aug '24	Sep '24	Oct '24	Nov '24	Dec '24	Jan '25	Feb '25	Mar '25	May '25
Sample Per Tables 2-1 & 2-2	Sample Per Tables 2-1 & 2-2	Sample Per Tables 2-1 & 2-2	Sample Per Tables 2-1 & 2-2	Sample Per Tables 2-1 & 2-2	Sample Per Tables 2-1 & 2-2	Sample Per Tables 2-1 & 2-2	Sample Per Tables 2-1 & 2-2	Sample Per Tables 2-1 & 2-2	Sample Per Tables 2-1 & 2-2	Sample Per Tables 2-1 & 2-2	Sample Per Tables 2-1 & 2-2	
Analysis & Monthly Report on Website	Analysis & Monthly Report on Website	Analysis & Monthly Report on Website	Analysis & Monthly Report on Website	Analysis & Monthly Report on Website	Analysis & Monthly Report on Website	Analysis & Monthly Report on Website	Analysis & Monthly Report on Website	Analysis & Monthly Report on Website	Analysis & Monthly Report on Website	Analysis & Monthly Report on Website	Analysis & Monthly Report on Website	
			First Quarterly Report			Second Quarterly Report			Third Quarterly Report			Fourth Quarterly & Final Report

The subtasks and assumed days to complete are presented in Figure 4-2.

FIGURE 4-2: 12-MONTH EDWM SUBTASKS AND ASSUMED BUSINESS DAYS TO COMPLETE

EDWM Subtasks	Sampling	Sample Shipping	Laboratory Analysis	Lab Reports (Level 2 Package)	Stage 2A Data Validation	Level II Packages Available to Navy/ Army	Navy/ Army Data Review	Lab Results (Level IV)	Stage 4 Data Validation	Stage 4 Available Navy/ Army	Analysis and Monthly Update on Website	HIDOH Review	Total Duration
Monthly Sampling	20	2	3	1	3	1	5	7	7	1	3	2	55

5. RESPONSE TO A DETECTION OR AN EXCEEDANCE

5.1 SAMPLE RESULT EXCEEDANCE DATA PACKAGE

In the event monitoring identifies an exceedance of an MCL presented in Table 2-2, the System will provide EPA/DOH an information package on the sample of concern. The information package will include, but not be limited to:

1. Notification to the EPA and DOH SDWB within 24 hours of receipt of a report of an anticipated exceedance from the laboratory (preliminary, DO NOT wait until Stage 2A validation is complete). The resident and/or facility owner/manager will also be notified (if the sample was collected from a residence or priority building);
2. Location address and Zone;
3. Field crew notes (which will be scanned daily and posted to EDMS); and
4. Select information from the Sample Tracker Spreadsheet (or its replacement when the tracker is moved to EDMS).

Proceed to Section 5.2 for the course of action (COA) scenarios the System will execute within five (5) calendar days of reporting the exceedance. The schedules and milestones within Section 5.2 are subject to change with the approval of EPA/DOH.

5.2 NEXT STEPS AFTER DETECTION OR EXCEEDANCE

Following receipt of data indicating a detection or an exceedance of an MCL presented in Table 2-2, additional action will be taken in accordance with the applicable COA provided in this section. Four (4) COAs were developed to cover the following scenarios:

- COA 1: Distribution System (i.e., Fire Hydrant) Exceedance of an MCL
- COA 2: House/Building Exceedance of an MCL
- COA 3: Detection of TPH above the MDL via Method 8015/8260 and/or detections of JP-5 Indicator Compounds/Petroleum Indicator Compounds identified in Table 2-2 (superscripts 1 and 2) above the MRL, via Methods 524.2/525.2
- COA 4: Detection of Other Analytes with No Respective MCL, Except Water Quality Parameters, or at Concentrations Less than the MCL in the Distribution System

The applicable COA is contingent on where (e.g., distribution system, residence, other buildings) the detection/exceedance occurred and what analyte was detected and the threshold that was exceeded. A list of analytes and the associated COA is provided in Table 2-2. The schedules and milestones within this section are subject to change in consultation with EPA/DOH. EPA/DOH SDWB will notify the Navy/Army to request site access should EPA/DOH SDWB decide to collect samples for any of the following COAs. The Navy/Army shall provide for prompt access.

5.2.1 COA 1 – DISTRIBUTION SYSTEM (I.E., HYDRANT) EXCEEDANCE OF AN MCL

This COA applies when monitoring identifies an exceedance of an MCL presented in Table 2-2 within the water distribution system at a hydrant during EDWM. The Navy must inform EPA/DOH SDWB prior to steps 3 through 8 below.

1. Notify EPA/DOH SDWB within 24 hours of receipt of the lab report (preliminary, DO NOT wait until Stage 2A validation is complete).
2. Provide EPA/DOH SDWB an information package consisting of items 1-4 listed in Section 5.1.

3. The Navy will identify a minimum of two (2) bracketing hydrant points in addition to the original exceedance location (3 total).
4. Inspect the hydrant for presence of lubricants that may be present due to routine operation/maintenance, document the findings, and notify EPA/DOH SDWB. If lubricants are found, then the COA may stop at this step. Otherwise, proceed to step 5.
5. Flush each hydrant sufficiently to bring fresh water from the nearest mainline junction.
6. Re-Sample.
7. Analyze for the method(s) specified for each exceeded analyte(s).
8. If the results of re-sampling of the initial hydrant are above MCLs, but results from bracketed samples are below MCLs, repeat sampling of the initial hydrant for the analyte(s) in question.
9. Refer to “Remedial Actions” for different re-sampling result outcomes for the associated response.

5.2.2 COA 2 – HOUSE/BUILDING EXCEEDANCE OF AN MCL

This COA is for analyte exceedance(s) reported within a house/building premise plumbing during EDWM. The Navy must inform EPA/DOH SDWB prior to steps 5 through 10 below.

1. Notify EPA/DOH SDWB within 24 hours of receipt of the lab report (preliminary, DO NOT wait until Stage 2A validation is complete).
2. Provide information package items 1-4 listed in Section 5.1.
3. Provide additional investigator information within 24 hours of a reported exceedance to include the following items, pending availability:
 - a. Available plumbing as-builts; and
 - b. Maintenance records for the subject facility or residence.
4. Notify the house/building tenant and facility owner/manager (if location is a priority building) of the exceedance and provide a recommendation regarding water use.
5. If the Navy/Army team suspects the contaminant of exceedance originated from the fixture, the Navy/Army may elect to: 1) replace the fixture; 2) sample;⁶ 3) flush for a minimum of 15 minutes; and 4) re-sample. If the post-flush confirmation sampling results do not exceed MCLs in Table 2- 2, then the COA may stop at this step. If the post-flush confirmation sampling results exceed MCLs in Table 2-2, proceed to step 6.
6. The Navy/Army will direct sampling for the original fixture location plus a minimum of one additional interior fixture in the subject building.
7. The Navy/Army will consult with EPA/DOH to determine if bracketed sampling (i.e., sampling one house upstream and one house downstream of the subject home) is required based on Steps 1– 6. Re-sample without pre-flushing.
8. Analyze for the method(s) specified for the exceeded analyte(s) from Table 2-2.
9. Once the Navy verifies that the exceedance is cleared with validated laboratory data, the Navy will notify the tenant and EPA/DOH that the house/building can resume water use with no recommended restrictions.
10. Refer to “Remedial Actions” in Section 5.3 for different re-sampling result outcomes for the associated response.

5.2.3 COA 3 – DETECTION OF TPH VIA METHOD 8015/8260 AND/OR JP-5 INDICATOR COMPOUNDS VIA METHODS 524.2/525.2 PRESENTED IN TABLE 2-2

COA #3 under the EDWM Plan is for TPH-G, TPH-D, and/or TPH-O (Total TPHs) detected above the MDL via Method 8015/8260, and/or JP-5 indicator compounds/petroleum indicator

⁶ Pre-flush sampling may be skipped with EPA/DOH approval.

compounds detected above the MRL via Methods 524.2/525.2 as presented in Table 2-2 (identified by superscripts 1 and 2). An initial assessment will be conducted, including an assessment of blank contamination and an assessment of TPH-O. Navy will perform additional, detailed analyses of TPH (detected > MDL), and/or JP-5 indicator compounds/Petroleum indicator compounds detected > MRL as detailed below. Note: Any further analysis beyond the scope of this plan will be determined by Navy, EPA, and DOH as appropriate.

COA 3 is summarized below:

- **Initial Assessment:** This step is to verify the TPH/ JP-5 indicator compounds/Petroleum indicator compounds results reported by the laboratory are not associated with blank contamination (i.e., method blank, field blank, and/or blind blank). If the results are associated with blank contamination, it will be reported. If additional information is needed, that location may be re-sampled and re-evaluated. The initial assessment also evaluates if TPH was detected in the TPH-G, TPH-D, or TPH-O ranges. Note: If the TPH result is associated with TPH- O, then the TPH-O detection will be evaluated in COA 4 because TPH-O is not associated JP- 5/other Fuels and is likely indicative of a location-specific impact (e.g., lubricants used at the location). If the results are not associated with blank contamination (or the results of the re-sample are not associated with blank contamination), and the TPH result is not associated with TPH-O, the evaluation will proceed to Tier 1.
- **Tier 1:** This step includes a detailed review of laboratory method blanks, chromatograms, and Mass Spectral Confirmation to determine if the original Method 8015 TPH extract detection and/or JP-5 indicator compounds/Petroleum indicator compounds detections are due to laboratory contamination, a petrogenic source (i.e., JP-5/other fuel-related analytes), a non-petrogenic source, or inconclusive. The results of this analysis will be documented in a Technical Memorandum.

The detailed SOP for COA 3 is summarized below:

The Navy must inform EPA/DOH SDWB regarding actions to be taken prior to each step below:

- 1) Notify EPA and DOH SDWB within 24 hours of receipt of the lab report (preliminary, DO NOT wait until Stage 2A validation is complete).
- 2) Provide information package items 1-4 in Section 5.1.
- 3) Provide additional investigator information within 24 hours of a reported detection to include the following items, pending availability:
 - a) Available plumbing as-builts; and
 - b) Maintenance records for the subject facility or residence.
- 4) Notify the house/building tenant and/or facility owner/manager (for priority buildings) of the detection and provide a recommendation regarding water use.

Initial Assessment

- 5) Compare the results and chromatograms of the respective method blank, field blank, and/or blind blank. If there is evidence of blank contamination (determined using numerical and pattern recognition), the sample will not be evaluated under Tier 1. If additional information is needed, that location may be re-sampled and re-evaluated. If there is also evidence of blank contamination in the duplicate sample, then flag the results with "B" or "UB" and conclude the result was due to lab contamination.

- *Decision Rule: If the Total TPH result is associated with blank contamination, the evaluation will STOP here, and the findings will be documented in a Tech Memo. If the duplicate result is above the MDL and there is no evidence of blank contamination, then proceed to the next step. If the results of the blank contamination evaluation are inconclusive, then proceed to the next step.*
- 6) Compare the Total TPH chromatograms to chromatograms for TPH-O (using numerical and pattern recognition).
- *Decision Rule: If the Total TPH result is not conclusively identified as TPH-O, then proceed to Tier 1. Note: If the Total TPH result is conclusively identified as TPH-O, then the TPH-O result will be evaluated via COA 4.*

Tier 1: Mass spectral Confirmation

- 7) Analyze the sample from the original Method 8015 extract using full scan Gas Chromatograph and Mass Spectroscopy (GC/MS) via Method 8270. Be sure that the MRL is the same or lower than the MRL (typically 80 µg/L) from Method 8015 (Gas Chromatograph/Flame Ionization Detector [GC/FID]). Evaluate the Total Ion Chromatogram of the sample and its corresponding method blank.
- Step 1: For the sample, retain all peaks that are above a 3:1 signal-to-noise (S:N) ratio.
 - Step 2: For peaks retained from Tier 1: Step 1, retain all peaks that have a response greater than 5 times that found in the method blank.
 - Step 3: Obtain the mass spectrum and perform a background subtraction (including all blank contamination present below the MRL/MDL) for each peak retained from Tier 1: Step 2.
 - Step 4: Perform a Tentatively Identified Compound (TIC) search evaluation on each peak retained from Tier 1: Step 3 by comparing the corrected mass spectrum to a National Institute of Standards and Technology (NIST) mass spectral library.⁷ Retain the top 5 probability matches for each. Retain a list of all TICs with an 80% probability match or higher.
- *Decision Rule: Multiple lines of evidence will be evaluated and the results will be documented in a Tech Memo. Evaluate chromatograms, Extraction Limited Ion Profile Screening (ELIPS), and additional chemistry data from the laboratory to determine if the detected TPH is JP-5/other fuel-related analytes or is associated TPH-O, and/or with “naturally occurring” hydrocarbons. If results are conclusive (i.e., TPH detect is not associated with JP-5/other fuel-related analytes) – the results of the evaluation will be documented in a Technical Memorandum and the COA will STOP here. Note: If the Total TPH result is conclusively identified as TPH-O, then the TPH-O result will be evaluated via COA 4. Note: A detection of the JP-5 Indicator Compounds/Petroleum Indicator Compounds via Methods 524.2/525.2 Presented in Table 2-2 (identified by superscripts 1 and 2) at concentrations greater than the MRL will also typically trigger further evaluation by the Navy.*

5.2.4 COA 4 – DETECTION OF OTHER ANALYTES WITH NO RESPECTIVE MCL, EXCEPT WATER QUALITY PARAMETERS, OR AT CONCENTRATIONS LESS THAN THE MCL IN THE DISTRIBUTION SYSTEM

This COA is for any analyte detected in the System with no respective MCL (including Total TPH results that are conclusively identified as TPH-O during the Initial Assessment step of COA 3) and/or a detection below the MRL of the JP-5 Indicator Compounds/Petroleum Indicator and compounds via Method 524.2/525.2 as presented in Table 2-2 (identified by superscripts 1 and 2) with no respective MCL except water quality parameters, or at concentrations less than the respective MCL.

- 1) Notify EPA/DOH SDWB within 24 hours of receipt of the lab report (preliminary, DO NOT wait until Stage 2A validation is complete).
- 2) Consult with EPA/DOH for next steps (e.g., additional flushing, resampling, additional analysis, no-action).

This COA does not apply to the following Water Quality Parameters presented in Table 2-2:

- | | | |
|-------------------------------|-------------|---------------------|
| • Chlorine, Free (Field Test) | • Cations: | • Anions: |
| • Temperature (Field Test) | ○ Sodium | ○ Chloride |
| • pH (Field Test) | ○ Potassium | ○ Sulfate |
| • Conductivity (Field Test) | ○ Calcium | ○ Ortho-Phosphate-P |
| • Turbidity (Field Test) | ○ Magnesium | ○ Bromide |
| • Total Alkalinity | ○ Iron | ○ Chlorate |
| | ○ Manganese | • Silica |

5.3 REMEDIAL ACTIONS

This section provides response guidance after re-sampling results. Should the re-sample indicate either non-detect or below the MCLs, no further action is needed. Should the re-sample indicate a continuing exceedance, an attempt to provide remedial action will be made within 48 hours of preliminary re-sample results. If the re-sampled exceedance is at the:

- Original Location only – Re-flush house/building/hydrant only, investigate fixture or hydrant.
- Original Location and at the additional interior fixture – Re-flush house/building only, investigate premise plumbing materials.
- Original Location and at the Bracketed samples – EPA/DOH SDWB to direct further actions.
- Additional interior fixture only – Re-flush house/building only, investigate fixture.
- Bracketed samples only – EPA/DOH SDWB will direct further actions.

5.4 RE-SAMPLING METHOD(S)

Table 2-2 provides re-sampling methods required for each detected or exceeded analyte. Detected analyte(s) must be analyzed for according to the specified method(s).

6. COMPLETION REPORT

This sampling and analysis began in April 2024 and will conclude in March 2025. Once all of the residences in a zone have been sampled or all attempts have been made to contact residents to arrange sampling, the zone has met criteria for zone closure. During this time, no more residential sampling will take place as part of EDWM after this milestone has been met. Sampling may continue for any priority locations (CDCs, Schools, etc.) and via the Water Quality Action Team response, as necessary. A zone closure letter will be sent to both DOH and EPA for record upon completion of each zone. Navy will submit a Plan completion report to EPA and DOH within 90 days of the conclusion of this EDWM Plan.

7. REPORTING AND MEETING SCHEDULE

7.1 REPORTING TO THE EPA AND DOH

A monthly EDWM summary report which details the status of each zone will be provided to EPA/DOH SDWB and will be posted on the <https://jbphh-safewaters.org> website. Data included in the monthly report will be exported from EDMS and will, at a minimum, include the following:

- Houses and buildings sampled
- Number of samples collected
- Sampling phase (e.g., EDWM Month 1, 2, 3, ... through Month 12)
- Sample sites that had exceedances and required resampling
- Sample sites with detections of TPH, with a brief summary of the findings
- GIS map of sample sites with location IDs
- QC summary report
- Challenges incurred and recommendations for improvement
- Plan for EDWM for the following month

The monthly EDWM summary report will be submitted to EPA/DOH SDWB and will typically be posted on the <https://jbphh-safewaters.org> website by the 30th day of the month following the month that sampling took place.⁷

A quarterly EDWM summary report which details the status of each zone will be provided to EPA/DOH SDWB and will be posted on the <https://jbphh-safewaters.org> website. Data included in the quarterly reports will be exported from EDMS and will, at a minimum, include the following:

- A summary of the information included in the monthly reports that are included within the quarter (see above)
- Performance benchmarks that provide data trends and the status of system-wide water quality based on sample results
- A comparison of the sampling results to MCLs in tabular form for each Zone – similar to the Stage 5 Reports included in the LTM program

7.2 REPORTING TO RESIDENT, BUILDING MANAGER, AND PUBLIC

7.2.1 LABORATORY RESULTS

With the receipt of the monthly EDWM laboratory reports, the Navy will:

- Provide access to an electronic⁸ copy of validated test results to the resident or building manager where sampling occurred. The electronic test results should be easily accessible via email, download from a website, or other means.
- Ask building managers or their representatives to post a notification that the results are available electronically in a common area of the sampled facility for a period of 30 calendar days. The electronic test results should be easily accessible using the public Safe Waters website.
- Post laboratory reports on the <https://jbphh-safewaters.org> website.

⁷ This applies only if there are no suspected/confirmed sampling/lab errors/artifacts in the dataset. If suspected/confirmed sampling/lab errors/artifacts are identified, then the potentially impacted data will not be posted until the issues have been resolved. The Navy will notify EPA/DOH if there are any suspected/confirmed sampling/lab errors/artifacts in the dataset.

⁸ Hardcopies will be provided upon request of the resident or building manager where sampling occurred

Once the need for EDMS is complete, <https://jbphh-safewaters.org/> may be converted to a static data and public information repository. The functions and features of EDMS are necessary while data and lab reports are being uploaded and managed through the end of EDWM. However, once all data have been validated and the full dataset is complete, the management of data will no longer be necessary, and a much more cost-effective data warehouse can replace the management functionality EDMS provides.

7.2.2 PRESS AND PUBLIC INQUIRIES

The System purveyor (Navy/Army, as appropriate) will be responsible for addressing inquiries/concerns from the public or press.

The System will add the EPA (i.e. Diaz.Alejandro@epa.gov; Marincola.JamesPaul@epa.gov), DOH SDWB (i.e., sdwb@doh.hawaii.gov), and DOH Communications Office (i.e., doh.pio@doh.hawaii.gov) to media release distribution lists.

Customer complaint surveillance monitors customer calls to identify unusual trends in water quality complaints. Calls associated with an unusual trend are further investigated to determine if they are similar in nature and spatially clustered. Customers may often be the first to report loss of pressure, degraded water quality, waterline leaks, and much more.

The System will track complaints and develop a tool to spatially evaluate clusters. These trends will be identified by the System.

7.2.3 PUBLIC NOTICES

Should the System be required to issue a public notice as required by HAR §11-20-18, they will disseminate the notice upon consultation with EPA/DOH. It is the System's responsibility to ensure all affected consumers are notified. For each System, the appropriate method for issuing the public notice must be approved of or suggested by the EPA/DOH SDWB. A copy of the draft public notice must be sent to the EPA/DOH SDWB for approval.

The area affected by the public notice is determined by the System and the EPA/DOH SDWB based on the location of the sampling points and the results of the routine and repeat sampling.

7.3 EDWM MEETING SCHEDULE

The Navy will coordinate all EDWM meetings with EPA, DOH, and Army representatives. Meetings to discuss EDWM will be held quarterly in July and October in 2024 and January and May in 2025, corresponding to the 12-Month EDWM Sampling Schedule presented on Figure 4-1.

The purpose of these meetings will be to:

- Review schedules, data, and deliverables, and
- Discuss issues and possible modifications to EDWM.

Meetings will be held at the DOH's office located at Uluakupu Bldg. 4, 2385 Waimano Home Road, Pearl City, Hawaii, 96782 (or other designated location determined by the attendees), and will include remote attendance via Microsoft Teams (or similar remote meeting platform).

8. REFERENCES

Department of Health, State of Hawaii (DOH). 2022. *DOH's Guidance on the Approach to Amending the Public Health Advisory, Addendum 1*, February. https://health.hawaii.gov/about/files/2022/02/DOH_GuidanceOnApproachToAmendPublicHealth_Advisory.20220212-part-1-signed.pdf

Department of Health, State of Hawaii (DOH). 2017. *Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater, Hawai'i Edition*. Hazard Evaluation and Emergency Response. Revised 2017. Fall. <https://health.hawaii.gov/heer/guidance/ehe-and-eals/>.

Department of the Navy (Navy). 2015. *Final Project Procedures Manual*, U.S. Navy Environmental Restoration Program, NAVFAC Pacific. JBPHH HI: https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/don-ev-man-nerp-201801A.pdf

Department of the Navy (Navy). 2022. JBPHH Water Updates Website: <https://www.cpf.navy.mil/JBPHH-Water-Updates/>. Accessed 8 February.

Department of the Navy (Navy). 2022. Interagency Drinking Water System Team (IDWST) Flushing and Sampling Data Website: <https://jbphh-safewaters.org/>. Accessed 13 March.

Interagency Drinking Water System Team (IDWST). 2021. *Drinking Water Distribution System Recovery Plan*. JBPHH, O'ahu, Hawai'i. December. <https://www.cpf.navy.mil/Portals/52/Drinking-Water-Distribution-System-Recovery-Plan.pdf>; <https://www.cpf.navy.mil/Portals/52/Enclosure-1-UDF-Plan-Public.pdf>; <https://www.cpf.navy.mil/Portals/52/Enclosure-2-Flushing-Report.pdf>; <https://www.cpf.navy.mil/Portals/52/Encl%283%29-Part-1-of-3.pdf>; <https://www.cpf.navy.mil/Portals/52/Encl%283%29-Part-2-of-3.pdf>; <https://www.cpf.navy.mil/Portals/52/Encl%283%29-Part-3-of-3.pdf>.

Interagency Drinking Water System Team (IDWST). 2021. *Single Family Home Flushing Plan Checklist and Standard Operating Procedures*. JBPHH, O'ahu, Hawai'i. December. https://www.cpf.navy.mil/Portals/52/Downloads/JBPHH-Water-Updates/Final%20Home%20Flushing%20Plan%20122321%20signed%20bcastell_seng_dbrixius%20ho.pdf?ver=fopce6jKGA59rpBPxgzObjg%3d%3d.

Interagency Drinking Water System Team (IDWST). 2022. *Final Drinking Water Sampling Plan for JBPHH*. O'ahu, Hawai'i. Version 9, Addendum 2, January. https://www.cpf.navy.mil/Portals/52/Downloads/JBPHH-Water-Updates/Drinking%20Water%20Sampling%20Plan%20Addendum_V6_010422_Final2.pdf?ver=IHgyhCw68Io4cd8FtQAuEA%3d%3d (January 4, 2022 Addendum 1), (January 30, 2022 Addendum 2), (February 25, 2022 Addendum 3)

Interagency Drinking Water System Team (IDWST). 2022. *Final Non-Residential Facility Flushing Plan Checklist and Standard Operating Procedures*. JBPHH, O'ahu, Hawai'i. January. <https://www.cpf.navy.mil/Portals/52/Downloads/JBPHH-Water-Updates/20220104%20FINAL%20NON-RESIDENTIAL%20FLUSHING%20SOP.pdf?ver=S6-CBkQuZq1Z6LZ6BewCZQ%3d%3d>.

Interagency Drinking Water System Team (IDWST). 2022. *IDWST Data Management Plan for JBPHH*. O'ahu, Hawai'i. January.

Interagency Drinking Water System Team (IDWST). 2022. *Drinking Water Long-Term Monitoring Plan for Joint Base Pearl Harbor-Hickam Public Water System #HI0000360 and Aliamanu Military Reservation PWS #HI0000337*. JBPHH, O'ahu, Hawai'i. June. <https://health.hawaii.gov/about/files/2022/08/JBPHH-Drinking-Water-LTM-Plan-FINAL-20220823.pdf>

APPENDIX A: STANDARD OPERATING PROCEDURES

Drinking Water Sample Collection SOP, Part A - Headspace, Sheen Observation and Free Chlorine

Scope – The purpose of this SOP is to ensure the sample collection and observation process is performed in a manner consistent with requests made by both EPA and Hawaii State Department of Health.

- **Procedure** – Prior to the collection of drinking water (residential, hydrant, and source) samples, a headspace, sheen observation, free chlorine test, and water quality parameters test (that includes temperature, pH, conductivity, and turbidity) must be taken.
 - Sink choice –
 - Choose the sink that is highest and farthest from the water distribution source (ex: an upstairs sink). If that sink is too shallow, check for other sinks that are far and high from the source. If those are also too shallow, use a lower-level sink (such as the kitchen sink). If all sinks in the house/building are too shallow, go back to the highest and farthest sink and use a 250 mL unpreserved bottle to transfer water from the sink to the large bottles. The 250 mL unpreserved should have never been used for any other sample and should not be used after for any other sample. If the house/building is single story, use any kitchen or bathroom sink. Document the reason behind deviation from the highest and farthest sink in your logbook if applicable.
 - Check for fixture filters as well as inline filters and water heaters –
 - First, check the sample point water fixture for any filters and remove if present.
 - Then, trace the water lines below the sink to ensure the cold-water source is directly connected to the tap, i.e., there is no inline filter or water heater.
 - If filter cannot be removed or bypassed, choose another sink
 - Isolate cold water –
 - Isolate the cold-water source by closing off the hot water valve. If the sink is not a mixer, the cold-water is already isolated.
 - If unable to isolate the cold-water source, move to a new sample location.
 - If no other sample location is viable, monitor water temperature while taking the sample. Note this in the logbook as “cold water monitored”. If water is not cold and cannot be isolated, contact team support for next steps.
- If sampling from a kitchen sink, check that the dishwasher is not running. If it is running, ask the resident to turn it off for the sample collection.

- Pre-sampling preparation –
 - Clear sampling area of any potential volatile sources (hand soaps, dishwashing soap, air fresheners, etc.) within the immediate vicinity of the tap/spigot and sample bottle staging area. Don a new pair of gloves if they become contaminated.
 - Place several sheets of paper towels or an absorbent pad on a suitable flat surface such as a counter-top or the floor.
 - Place the sample containers on the paper towels/absorbent pad.
- Remove aerator and achieve laminar flow –
- Remove any aerator, spray nozzle, or detachable parts from the sample faucet.
 - To remove simple screen aerators from faucets, begin by twisting off by hand. If the aerator is lodged, protect the aerator from damage by covering it with a paper towel or glove, and use the sample kit pipe wrench to twist off aerator.
 - If a key is required, use the removal tool in the sampling kit. Invert the tool to face the aerator, align the notches, and twist while applying upwards pressure.
 - If the faucet has a sprayer or removable head, pull the hose from the sink and tie a glove around the hose or use a clamp to prevent it from retracting back into the sink. Twist off the head or sprayer.
- Ensure there are no rubber gaskets or pieces left behind. **Note:** The rubber gasket will sometimes stick to the faucet. Remove this before turning water on to prevent it falling down the drain. ‘
- Adjust the flow rate to approximately 500 mL/minute (approximately 0.5 cm diameter stream or the width of a BIC pen). Adjust the faucet stream until the flow is smooth and uniform, with a glassy appearance. The flow should be laminar and should not appear agitated or white with air bubbles.
- Headspace observation –
- Using a calibrated PID, take a PID reading in the vicinity of the drinking water sampling point (within 2 feet) and record the results in the logbook. Record any presence of odor and note any potential sources of the odor. **Consult with a project manager prior to sampling if ambient room reading is ≥ 2.0 ppm.**
- Proceed to Sheen observation.
- Sheen observation –
 - Rinse unpreserved 40-milliliter (mL) VOA vial with water from the drinking water sampling point 3 times.
- After rinsing, fill the VOA vial half-way, avoiding agitating the water inside the vial, and close the vial tightly.
- Lay the VOA vial horizontally on a paper towel and observe the surface of the water. Record sheen and odor observations under “*Initial Observations*” in the logbook— photograph the vial if sheen is present.

- Let the VOA vial rest undisturbed for at least 1 minute before re-observing. Observe the surface of the water, noting sheen or discoloration and record your observations in the logbook under “*Final Observations*”. If a sheen or film is observed, photograph observations and notify the project manager and field manager. Once sheen observations have been noted and photographed, swirl the contents of the VOA vial in gentle circular movements. Observe the behavior of the sheen, take note if it breaks apart or adheres together. The behavior of the sheen can help indicate if the source is petroleum fuel or a biological contaminant. Also, in the “*Final Observations*” section, note whether there was an odor or not after letting the vial rest.
- Once the analysis is concluded, the water can be discarded into the sink. If no sheen is observed, the empty VOA vial can be reused at the next location. If a sheen is observed, dispose of the VOA vial with the discarded PPE.
- Headspace observation –
- Quality control for Headspace and Sheen – In order to have consistency in the headspace and sheen analysis, it is critical to let the sheen VOA vial rest for a minimum of 1 minute. This gives time for any chemicals dissolved in the water to migrate out and float to the surface.

- Free Chlorine Analysis –
 - Review the Safety Data Sheet for the DPD Free Chlorine Reagent Powder Pillows and ensure the proper PPE is in use. Review the colorimeter operator’s manual.
 - Power on the colorimeter.
 - Set the instrument to low range by pressing the up arrow (triangle) button so the triangle is under **LR** on the instrument screen (Low Range).
 - Zero the colorimeter
 - Prior to collecting the Free Chlorine sample, rinse the sample cell and cap 3 times with water from the drinking water sampling point. Discard water into sink each time.
 - Fill the cell to the 10 mL mark and cap the sample cell. Clean and dry the outside of the sample cell with a lint free cloth.
 - Insert the sample into the cell holder ensuring the diamond mark on the cell is lined up with the triangle mark on the meter (facing the meter).
 - Insert the instrument cap over the cell holder.
 - Push **ZERO** (Blue button on the left of the meter), the display should show 0.00.
 - Take the chlorine measurement
 - Remove the sample cell from the meter and place on a flat surface. Remove the cap. Carefully open the DPD Free Chlorine Reagent Powder Pillow and add the entire contents to the sample and close the sample cell with the cap.
 - Invert the sample cell several times for 20 seconds to mix, a pink color will develop if chlorine is present.

- Take a reading within 1 minute.
- While timing the mixture, clean the cell with a lint free cloth and place the cell in the meter making sure the diamond on the cell is lined up with the triangle on the meter.
- Press the green button with the check mark on the righthand side of the meter and record the results in the logbook in mg/L.
- If the chlorine measurement is less than 0.02 mg/L, repeat free chlorine analysis after the 5-minute flush required prior to bacterial (total coliform/heterotrophic plate count) sample collection (see field SOP part B). If it is still less than 0.02 mg/L after a 5-minute flush, record that the free chlorine value is lower than the expected value in your logbook and proceed with sampling.
- If the screen on the meter is blinking, that is an indication the Free Chlorine concentration is greater than 2.0 mg/L and a dilution of the sample is required.
 - Immediately decant the contents of the sample cell and rinse the sample cell and cap 3 times with the water to be analyzed and 2 times with deionized water.
 - Prepare a 1:1 dilution of the sample by decanting 50 mL of sample into a 100 mL beaker and add 50 mL of distilled water, swirl the mixture and decant into the 10 mL cell to the 10 mL mark and repeat the analysis.
 - Take the reading from the meter and multiply the result by 2 and record on the field form.
 - If the analysis is still over range, prepare a 1:4 dilution by adding 25 mL of sample to the beaker and 75 mL of distilled water. Multiply the results by 4 and record on the field form.
- After taking the Free Chlorine Analysis, dispose of solution in sink. Be sure to rinse the bottom of the sink to avoid pink staining. Rinse the sample cell 3 times before stowing as residue can discolor the sample cells.
- Water Quality Parameters Test -
 - Ensure the proper PPE is in use and review the Aqua TROLL 600 Multiparameter Sonde operator's manual.
 - Decontamination
 - Prior to collecting Water Quality Parameters, rinse a 250 ml amber transfer bottle 3 times using tap water from the sample point
 - Unscrew the black cap from the AT600 and remove the sponge, or dump out left over calibration water, from sample cell.

- Rinse the sample cell 3 times using the 250 ml bottle that was decontaminated in the first step discarding water from cell into the sink after each rinse.
- After rinsing, double check no debris is present (ex. sponge particles).
- Power on and Pair the AT600
 - Power on the AT600 either by slightly unscrewing the black portion of the body from the center or by turning it upside down with metal hanger facing up.
 - The screen will turn blue when the device is on, and it is ready to be paired to a smart phone via Bluetooth using the Vu-Situ App.
 - Select the appropriate AT600 serial number prompted in the Vu-Situ App for pairing.
- Take the Water Quality Parameters Measurement
 - In the Vu-Situ app select the “*Live Readings*” option.
 - Once on the “*Live Readings*” page, change the recording mode by selecting the camera image in the bottom left corner—the yellow toggle button on the bottom right corner should read “*Save Single Reading*”.
 - Above the parameters, click on “*Change Location*” and input the sample ID as the name.
 - Set “*Refresh Rate*” to 1 second
- On the parameter screen, check the following measurements and adjust units as needed such that parameters reflect the following:
 - PH
 - Range: 6.5-8.5
 - Specific Conductivity ($\mu\text{S}/\text{cm}$)
 - Range: 50-50,000 $\mu\text{S}/\text{cm}$
 - Turbidity (NTU)
 - Range: <5NTU
 - Temperature ($^{\circ}\text{C}$)
- Fill the sample cell until the brush is fully submerged.
- After filling the sample cell, let 30 seconds elapse before collecting “stabilized parameters”
- If parameters fall outside of the range listed above, rinse your sample cell three times and let the Aquatroll parameters restabilize.
 - If restabilized parameters remain outside of the range listed above, recalibrate Aquatroll sensors as needed. Note in logbooks that the Aquatroll was recalibrated and record new stabilized parameters.

- Once parameters have stabilized, click on the “*Save Single Reading*” button on the bottom right corner. If measurements are outside of the expected range, note this in your logbook.
- Double check parameters have been recorded by clicking on the upper left 3 bars and selecting data files. Parameters should be saved in the Snapshot file associate with the sample date (ex. TeamA_Snapshot – 04/12/2024)
 - At the end of the day, you will save this file and send it to the QC/Intake team. The title will include your team name and date (ex. Team A_20240412)

You are now prepared for sample collection. Refer to Drinking Water Sample Collection SOP, Part B – Sample Collection

Drinking Water Sample Collection SOP, Part B – Sample Collection

Scope – The purpose of this SOP is to ensure the sample collection process is performed in a manner consistent with requests made by both EPA and Hawaii State Department of Health.

Procedure – Once the headspace/sheen observations and free chlorine tests have been performed and recorded according to Part A, samples can be collected for shipment to the designated analytical laboratory. Samples should be collected in the order listed below referencing the required bottle/ware chart on the last page.

Pre-sampling preparation – Place the sample containers to be filled on the towel used in Part A. Check to ensure all required sample preservatives are available for each container. See Bottle Container Checklist (Part B). The 250 ml plastic bottle for metals contains the 1:1 nitric acid preservative, handle with caution. Do not rinse any of the bottles. No bottle/ware should be reopened after filling.

- Collect the samples for EPA Methods **524.2 VOCs** and **524.2 Total Trihalomethanes**
 - Remove cap and tilt the vial so the flow falls on the interior surface of the vial, do not shake or agitate. Fill to the neck of the vial (about 75% full).
 - Add 3 drops of HCl to the vial, then add more sample until a convex meniscus is formed, but do not overfill. Cap the vial.
 - Once the vial has been sealed, turn the vial upside down and look for the presence of bubbles. If any bubbles are present greater than half the size on a pea, re-collect the sample. DO NOT add additional sample. If there are no bubbles, repeat the process until all the vials have been filled.

- Collect the samples for EPA Method **8260 TPH-g**
 - Remove cap and tilt the vial so the flow falls on the interior surface of the vial, do not shake or agitate. Fill to the neck of the vial (about 75% full).
 - Add 3 drops of HCl to the vial, then add more sample until a convex meniscus is formed, but do not overfill. Cap the vial.
 - Once the vial has been sealed, turn the vial upside down and look for the presence of bubbles. If any bubbles are present greater than half the size on a pea, re-collect the sample. DO NOT add additional sample. If there are no bubbles, repeat the process until all the vials have been filled.

- If required, collect the sample for EPA Method **504.1 Ethylene Dibromide**
 - Add 3 drops of HCl to the vial, then add more sample until a convex meniscus is formed, but do not overfill. Cap the vial.
 - Remove cap and tilt the vial so the flow falls on the interior surface of the vial, do not shake or agitate.

- Collect the samples for EPA Method **SM 5310B TOC**
 - Remove cap and tilt the bottle so the flow falls on the interior surface of the bottle, do not shake or agitate.
 - Fill to the neck of the bottle. Place cap on the bottle, tighten, and gently invert several times to mix the preservative.

- Collect the samples for EPA Method **8015 TPH-d/o**
 - Remove cap and tilt the vial so the flow falls on the interior surface of the vial, do not shake or agitate.
 - Fill the VOA vial until the water is flush with the lip of the bottle, but do not overfill. Cap the vial.
 - Zero headspace is not required due to the hard plastic cap.

- Collect the samples for EPA Method **525.2 SOCs** and **525.3 SOCs**
 - Remove cap and tilt the bottle so the flow falls on the interior surface of the bottle, do not shake or agitate.
 - (for **525.2**) Fill the bottle within 1 inch of the top (just below the neck of the bottle) then add 5 mL of 1:1 HCL.
 - (for **525.3**) Fill the bottle until the neck. No preservative will be added in the field.

- If required, collect the sample for EPA Method **8270SIM 2-(2-Methoxyethoxy)-Ethanol**
 - Remove cap and tilt the bottle so the flow falls on the interior surface of the bottle, do not shake or agitate.
 - Fill the bottle to the neck of the bottle. Replace the cap.

- Collect the sample for EPA Method **SM 2320B Total Alkalinity**
 - Remove cap and tilt the bottle so the flow falls on the interior surface of the bottle, do not shake or agitate.
 - Fill the bottle to the neck of the bottle. Replace the cap.

- If required, collect the sample for EPA Method **300.0 Anions**
 - Remove cap and tilt the bottle so the flow falls on the interior surface of the bottle, do not shake or agitate.
 - Fill the bottle to the neck of the bottle. Replace the cap.

- If required, collect the sample for EPA Method **300.1 Anions**
 - Remove cap and tilt the bottle so the flow falls on the interior surface of the bottle, do not shake or agitate.
 - Fill the bottle to the neck of the bottle. Replace the cap.

- If required, collect the sample for EPA Method **200.7 Silica**
 - Remove cap and tilt the bottle so the flow falls on the interior surface of the bottle, do not shake or agitate.
 - Fill the bottle to the neck of the bottle. Replace the cap.

- Collect the sample for EPA Method **200.8/245.1 Metals/Mercury** and **200.7 Cations**
 - This bottle contains 1:1 HNO₃, a corrosive acid that can cause serious injury, therefore when filling the bottle point the opening away from you prior to and during sampling.
 - Remove the cap pointing the open end away from you. Place the bottle under the sample point so the sample runs down the inside the wall of the bottle.
 - Fill the bottle to the neck of the bottle. Replace the cap and tilt the bottle several times to mix the preservative.

Take note of any color or odor associated with the sample and document. Complete the COC. Record the date as MM/DD/YYYY and time using universal (military) time. Affix the sample label to the bottles/vials, affix the custody seal to the bottles/vials, place the bottles/vials in the laboratory provided bubble wrap or equivalent and then place in a zip lock bag. Place the samples into a cooler with ice.

Analysis	Bottle Type and Number	Preservative in Bottle	Preservative Added in Field	RE/Priority Buildings	Resident Requests	Hydrants (Monthly)	Hydrants (Quarterly)	Waiawa Shaft pre and post-chlorination (Monthly)	Waiawa Shaft pre and post-chlorination (Quarterly)	NAH Shaft pre-chlorination (Quarterly)	Red Hill Shaft pre-chlorination (Quarterly)
VOC's (EPA 524.2) - Includes THMs	3 X 40 mL Clear Vial	Ascorbic Acid	HCl	x	x	x	x	x/x	x/x		
TPH-G (EPA 8260)	3 X 40 mL Clear Vial	Ascorbic Acid	HCl	x	x	x	x	x/x	x/x		
Ethylene Dibromide (EPA 504.1)	3 X 40 mL Amber Vial	Sodium Thiosulfate (Na ₂ S ₂ O ₃)	None				x		x		
TOC (SM 5310B)	1 X 250 mL Amber Glass	Sulfuric Acid	None	x	x	x	x	x/x	x/x		
TPH d/o (EPA 8015)	3 X 60 mL Amber Vial	Na ₂ S ₂ O ₃	None	x	x	x	x	x/x	x/x		
SOC's (EPA 525.2)	2 X 1L Amber Glass	Sodium Sulfite	HCl	x	x	x	x	x/x	x/x		
2-(2-Methoxyethoxy)- Ethanol (EPA 8270SIM)	2 X 60 mL Amber Glass	None	None				x		x		
Total Alkalinity (SM 2320B)	1 X 250 Poly	None	None	x	x	x	x	x/x	x/x	x	x

Analysis	Bottle Type and Number	Preservative in Bottle	Preservative Added in Field	RE/Priority Buildings	Resident Requests	Hydrants (Monthly)	Hydrants (Quarterly)	Waiawa Shaft pre and post-chlorination (Monthly)	Waiawa Shaft pre and post-chlorination (Quarterly)	NAH Shaft pre-chlorination (Quarterly)	Red Hill Shaft pre-chlorination (Quarterly)
Anions - Chloride, Sulfate, Fluoride, Bromide, Orthophosphate (EPA 300.0)	1 X 125 mL Poly	None	None					x/x	x/x	x	x
Anions - Bromate, Chlorate, Chlorite (EPA 300.1)	1 X 250 mL Amber Poly	EDA	None					x/x	x/x	x	x
Cu, Pb (EPA 200.8), Hg (245.1)	1 X 250 mL Poly	Nitric Acid	None	x	x						
Cations (200.7)	1 X 250 mL Poly	Nitric Acid	None					x/x	x/x	x	x
Silica (EPA 200.7) - must be collected separately.	1 X 250 mL Poly	None	None					x/x	x/x	x	x

Drinking Water Sample Collection SOP, Part C – Hydrant Sampling

Scope – The purpose of this SOP is to ensure the sample collection process is performed in a manner consistent with requests made by both EPA and Hawaii State Department of Health. The option to collect a sample from the first flush of water from a tap is a deviation of typical State and Federal requirements for the collection of drinking water samples for the generation of definitive-level analytical data.

Procedure –

- 1) Approach hydrant and ensure safe parking is available near hydrant. If not, park in a safe area away from traffic and walk equipment to the hydrant. When working along the street, place cones to demarcate the work zone and use the vehicle as a barrier between traffic and staff.
- 2) Decontaminate the hydrant spigot fitting using isopropyl alcohol. Take special care to rinse the grooves of the fitting. Use distilled water to thoroughly rinse the fitting. After thorough decontamination, change gloves.
- 3) Prepare for hydrant purge by staging two five-gallon buckets underneath the top hydrant outlet port, where water is discharged from. One bucket is needed to measure flow volume and to capture any water discharged during sampling. The purge requirements are 30 gallons over a 10-minute period. This means that a flow rate of roughly 3 gal/min is optimal to achieve the required purge.
- 4) After buckets are positioned correctly, use the hydrant wrench to remove the cover fitting over the top discharge port. Screw the hydrant spigot fitting onto the discharge port. This fitting allows for the flow to be controlled.
- 5) Use the hydrant wrench to slowly open the valve that is opposite the top discharge port. Turning the wrench counterclockwise will open the valve allowing the flow of water to begin. Adjust the flow at either the hydrant valve or the valve on the attached hydrant spigot fitting to achieve roughly 3 gal/min for the purge. Wait until the 5-gallon bucket is full and then switch out the second empty bucket to begin filling. While the second bucket is filling, the first can be dumped onto the ground. Repeat this process until 30 gallons is achieved. Make sure water is not discharged into a storm drain or sewer manhole. Discharge water onto a grassy area.
- 6) Perform and record headspace/sheen observations and free chlorine tests according to Part A – Headspace, Sheen Observation and Free Chlorine.
- 7) Collect samples according to Part B – Sample Collection.
- 8) Upon sampling completion, affix the hydrant wrench to the valve opposite of the top discharge port, and turn clockwise to tighten the valve, stopping the flow of water. Remove the hydrant spigot fitting and place in the hydrant kit along with the hydrant wrench and decontamination supplies. Affix the cover fitting over the discharge port and tighten until snug.