

Background & Response to November 2021 Fuel Release

Hawai'i Department of Health Update

Prepared for the Fuel Tank Advisory Committee Meeting
May 13, 2022



Legal Authority

The DOH Safe Drinking Water Branch regulates the Navy's water system.

Pursuant to Chapter 340E, HRS, the Navy is responsible for maintaining a safe and reliable source of drinking water to its customers and providing alternative sources of drinking water for human consumptive uses as deemed necessary.

HRS §340E-4 Imminent hazards.

"The director, upon learning that a contaminant is present in or is likely to enter a public water system or an underground source of drinking water and may present an imminent and substantial danger to the public, may take such actions necessary to protect the health of the public."



Timeline

January 13, 2014: Navy reported release of approximately 27,000 gallons from Tank 5

March 17 & June 2, 2020: Navy notifies DOH of release into surface water at Hotel Pier

May 6, 2021: Navy reported approximately 38 gallons of JP-5 was released into the environment from pipeline releases near Tanks #18 and #20

July 23, 2021: Navy reported release of approximately 150 gallons at Kilo Pier

2014

2015

2016

2017

2018

2019

2020

2021

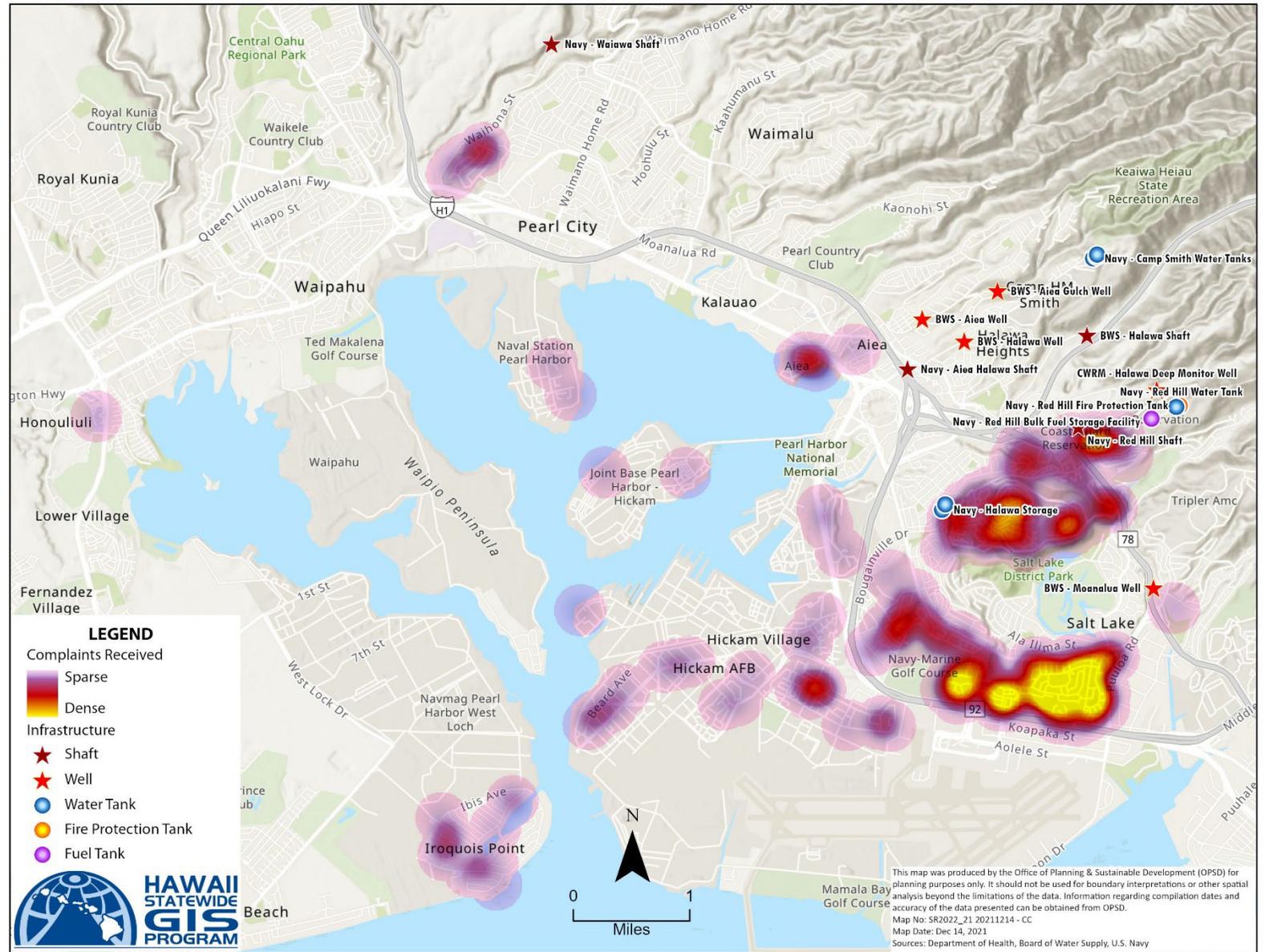
May 2015: DOH, EPA and Navy enter into Administrative Order on Consent

November 20, 2021: Navy reported approximately 14,000 gallons of water and JP-5 were released from a cracked valve in a fire suppression drain line at a location approximately ¼-mile downhill of the bulk fuel tank and contained in a sump located in close proximity to Red Hill Shaft.

November 28, 2021: The Navy and DOH received complaints about fuel-like odors in drinking water.

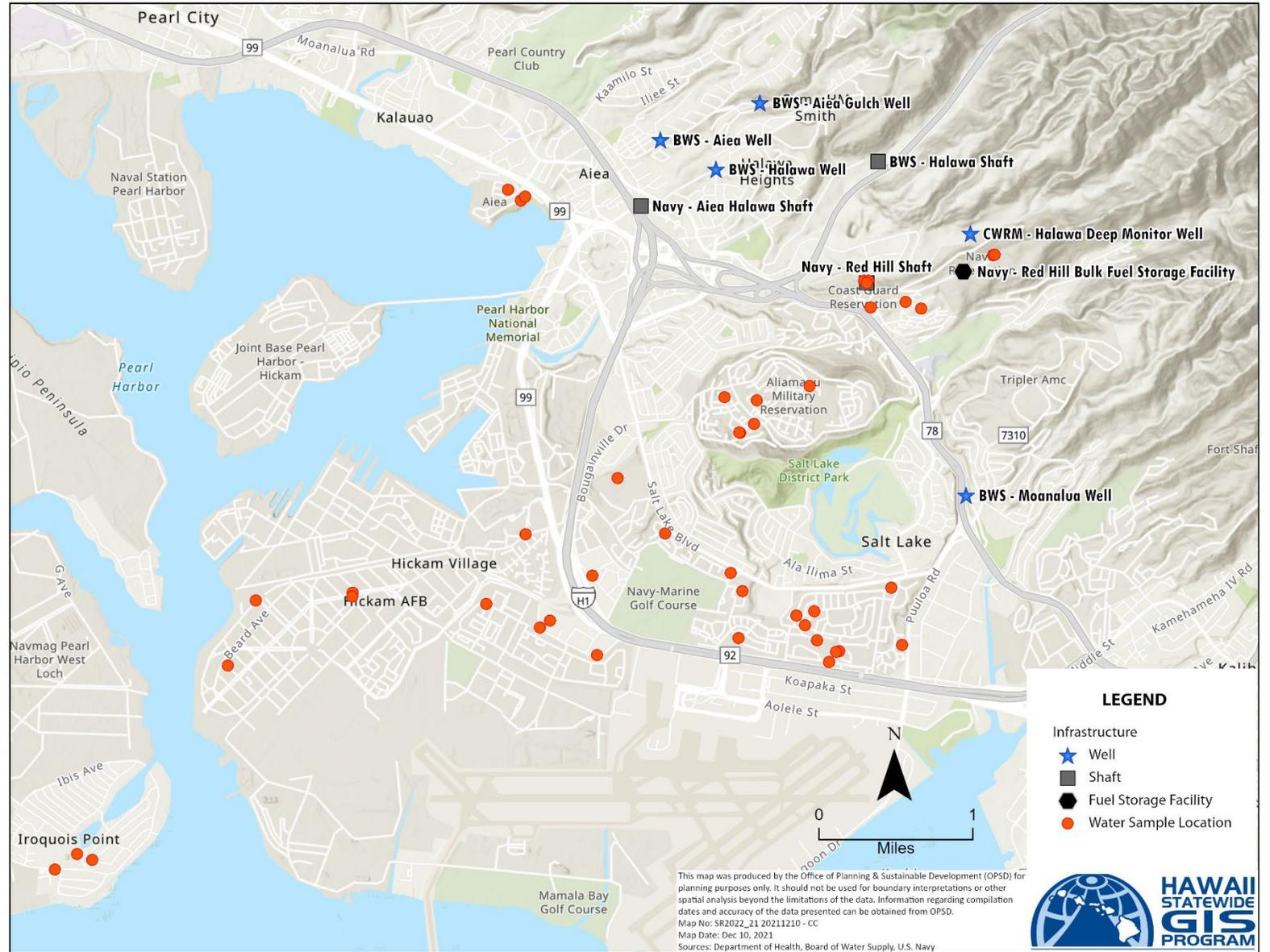


Complaints (12/14/21)



Early DOH Testing (12/10/21)

- UH Lab – presence/absence
- DOH Contract Lab - Total Organic Carbon found to be consistent with baseline
- DOH Contract Lab – TPH mostly non-detect
- DOH Contract Lab - PFAS at Red Hill Housing non-detect
- Thresholds for smell and taste



Red Hill Shaft Samples (12/05/21)

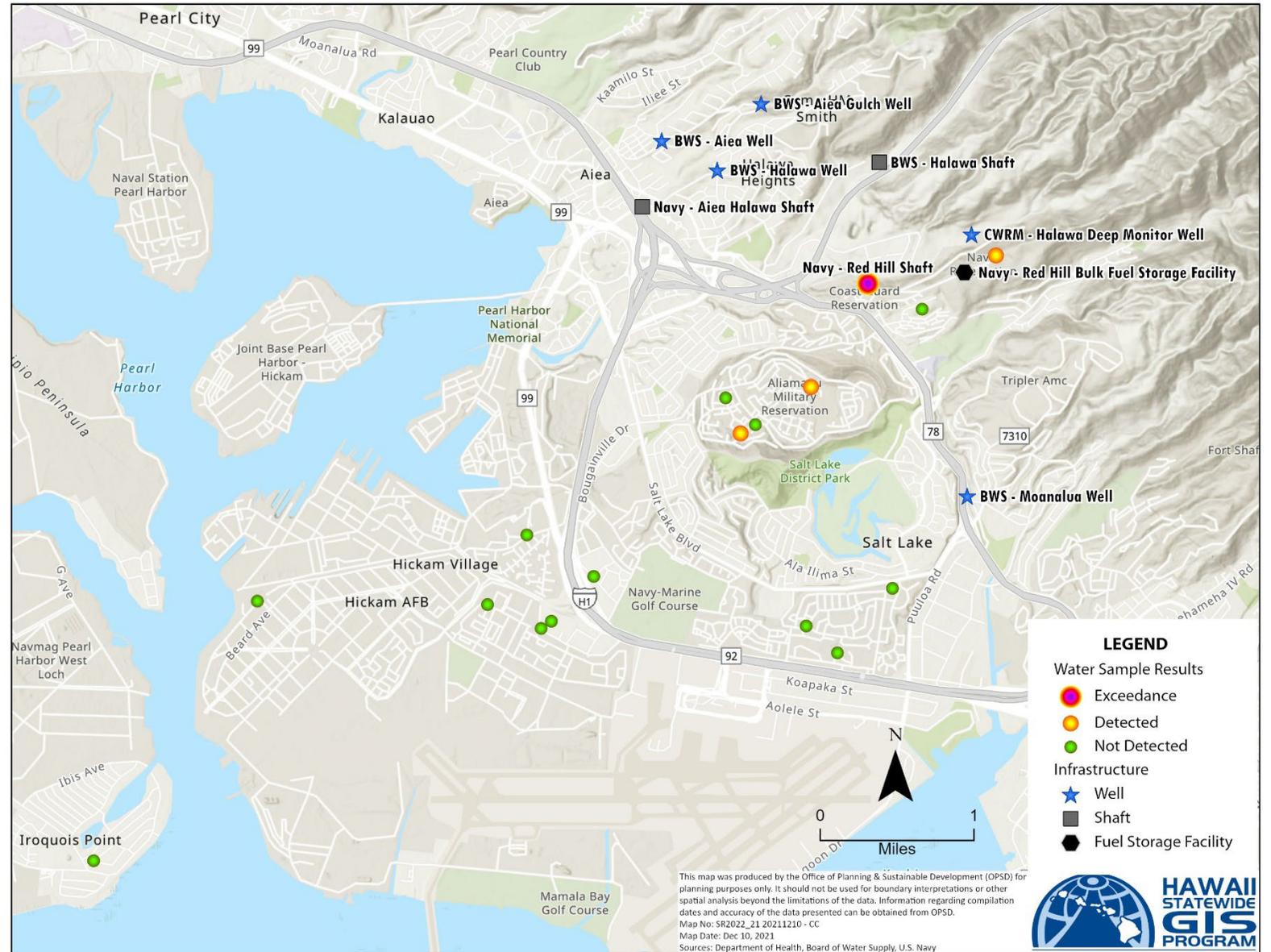
Red Hill Shaft

- TPH-g at 20,000 ppb
- TPH-d at 140,000 ppb

Red Hill Upper Storage Tank

- TPH-o at 49 ppb

<https://health.hawaii.gov/news/newsroom/hawaii-department-of-health-confirms-high-levels-of-petroleum-contamination-in-navys-red-hill-shaft/>



Interagency Drinking Water System Team (IDWST)

- Established on 12/17/2021
- Working group comprised of DOH, U.S. Navy, U.S. Army and U.S. EPA

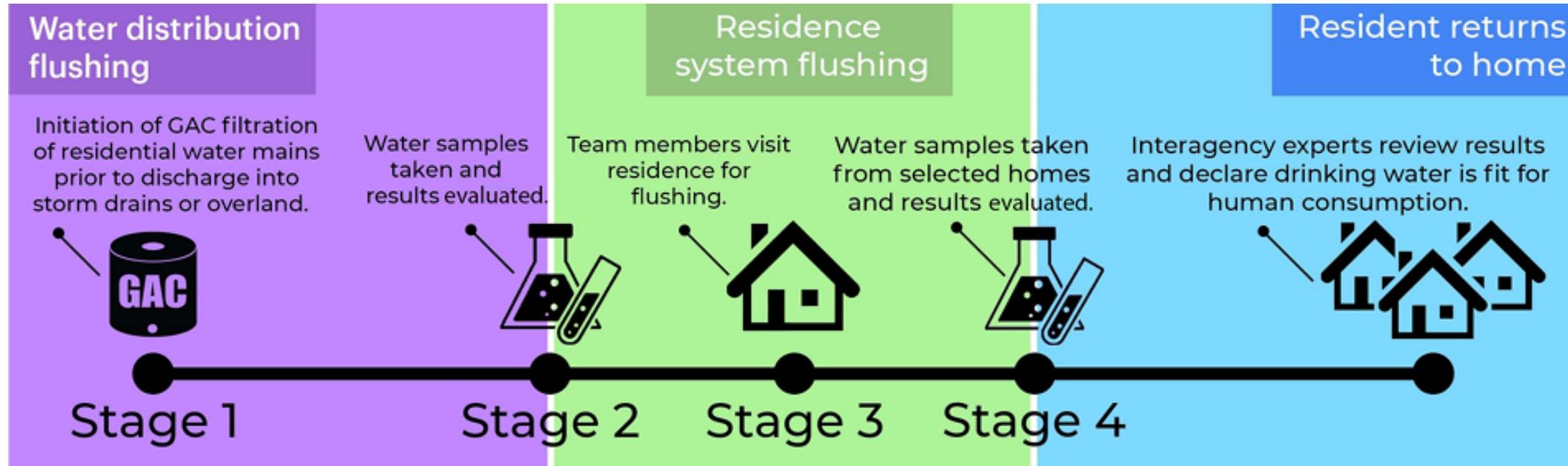


- IDWST goals:
 - 1) Protect public health, safety, and the environment
 - 2) Ensure access to safe drinking water
 - 3) Sample and test drinking water consistent with a jointly agreed upon Sampling and Analysis Plan
 - 4) Monitor and address community concerns at impacted residences
 - 5) Implement flushing activities consistent with a jointly agreed upon Flushing Plan

<https://health.hawaii.gov/news/newsroom/hawaii-doh-navy-army-and-epa-establish-interagency-drinking-water-system-team-sign-water-sampling-plan/>



Drinking Water Distribution System Recovery Plan: Stages 1-4



A Remedial Action Report was prepared for each zone, at the conclusion of Stage 4, documenting the flushing and analytical testing conducted in the distribution system and at buildings and homes. This document included lines of investigation required by the DOH to determine if the advisory for a zone should be amended.



https://www.cpf.navy.mil/Portals/52/Downloads/JBPHH-Water-Updates/Resident_Resources_Guide_V3.pdf

Amending the Advisory by Zone

Lines of Evidence

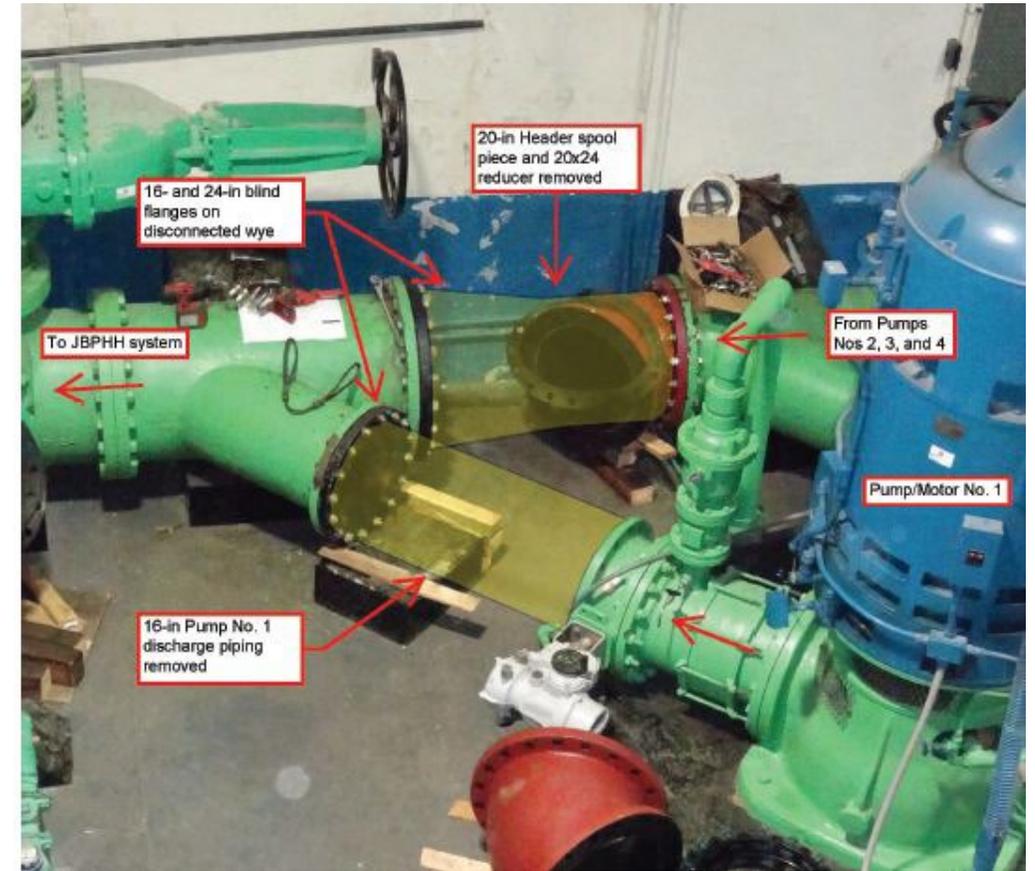
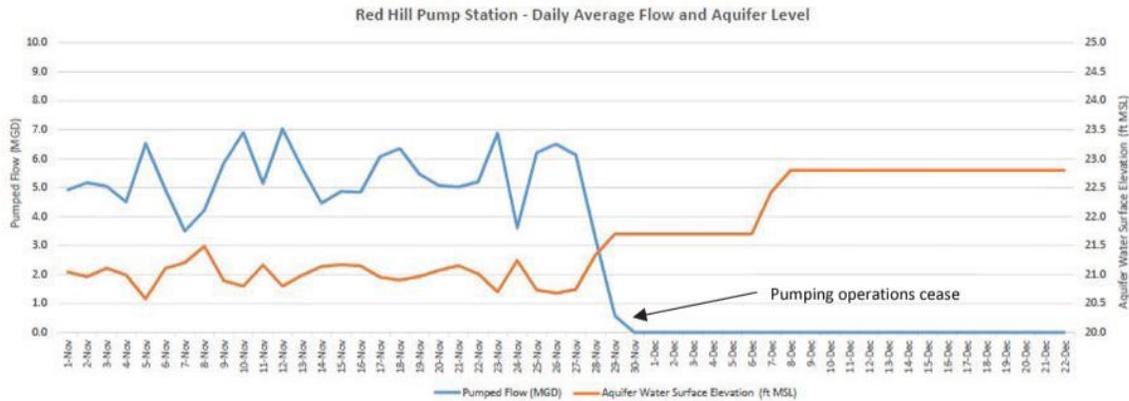
- 1a** – All reported sources of contamination are isolated and contained
- 1b** – Regulated public water system water quality data is compliant
- 1c** – No additional contamination is occurring through the distribution system
- 2a** – Water within the distribution system meets state and federal drinking water MCLs, state EALs and ISPs
- 2b** – Water in premise plumbing of homes/buildings meets state and federal drinking water MCLs, state EALs and ISPs



Amending the Advisory: LOE 1a

1a – All reported sources of contamination are isolated and contained

- Operator logs and supervisory control and data acquisition
- Air gapped section at the pump manifold



RAR Report for Zone A1



Amending the Advisory: LOE 1b

1b – Regulated public water system's water quality data is compliant

- Waiawa Shaft source and entry point to distribution system was tested and found free from contamination and meets water quality standards for a public water system
- The JBPHH water system is currently served by a single source



Google Earth

Amending the Advisory: LOE 1c

1c – No additional contamination is occurring through the distribution system

- Completed record search which confirmed water backflow prevention devices were installed and certified at buildings and locations where petroleum activities take place



POL Activities Backflow Prevention Devices Zone: A1

ASSET NAME	Location (Bldg. #)	Reference Location	Description of petroleum-related activity	BFP Manufacturer	BFP Model	BFP Size	Serial # or VIN #	Installation Date or In Service Date	Changed (Replacement) Date	Last Tested Date	Last Repaired Date
SA-AFW 794	794	Bldg 794 back left of mini mart	NEX Mini-Mart/Gas Station	FEBCO	765	2	H033809	9/1/2000	N/A	2/1/2022	N/A
SA-AFW 12709	PC-051	Sewer lift station near guard shack	AST C-60 / 194 Gal Diesel	WATTS	909M1Q7	1.5	436919	1/1/2000	N/A	8/18/2021	N/A
SA-AFW 1582	994	BLDG 994 near SPAWAR BLDG	AST C-43 / 100 Gal Diesel	WILKINS	975	1	267625	1/1/1994	N/A	8/17/2021	N/A
NO BFP ASSETS, 1 HOSE BIB	8002	BLDG 8002	AST C-44 / 75 Gal Diesel	Hose bibb VB	AVB	0.75	N/A	N/A	N/A	N/A	N/A
NO BFP ASSETS, 2 HOSE BIB	8000	BLDG 8000	AST C-47 / 75 Gal Diesel	Hose bibb VB	AVB	0.75	N/A	N/A	N/A	N/A	N/A
SA-AFW 0395	992	BLDG 992	AST PC-992-SG / 190 GAL DIESEL	CHAMPION	AVB	1.5	N/A	1/1/1994	N/A	8/18/2021	N/A
SA-AFW 11890	987	BLDG 987	AST PC-987-1-SG / 250 GAL DIESEL						N/A		N/A
NO BFP ASSETS, 1 HOSE BIB	987	BLDG 987	PC-987-2-DR / 55 GAL USED OIL	Hose bibb VB	AVB	0.75	N/A	N/A	N/A	N/A	N/A
			PC-987-3-DR / 330 (5@55-GAL DRUM) USED POL								
			PC-989-1-DR / 55 GAL USED OIL								
SA-DWF 989	989	BLDG 989	PC-989-2-DR / 55 GAL USED OIL	WATTS	909	8	625718	1/1/2000	N/A	8/17/2021	N/A
			PC-989-3-DR / 55 GAL USED OIL								
			AST PC-995-1 / 1,000 GAL MOGAS	AST							
			PC-995-2 / 2,000 GAL MOGAS	AST							
SA-DWF 04658P	995	BLDG 995	PC-995-3 / 5,200 GAL MOGAS	WATTS	909	2	882344	1/1/1999	N/A	8/17/2021	N/A
			1-DR / 55 GAL USED OIL	PC-995-							
NO BFP ASSETS, 2 HOSE BIB	1020	BLDG 1020	PC-1020-DR / 110 (2@55-GAL DRUMS) LUBE OIL	PC-	Hose bibb VB	AVB	0.75	N/A	N/A	N/A	N/A
NO BFP ASSETS, 2 HOSE BIB	1012	BLDG 1012	1022-DR / 220 (4@55-GAL DRUMS) HYDRAULIC OIL		Hose bibb VB	AVB	0.75	N/A	N/A	N/A	N/A
			PC-1012-DR / 55 GAL WASTE GASOLINE		Hose bibb VB	AVB	0.75	N/A	N/A	N/A	N/A

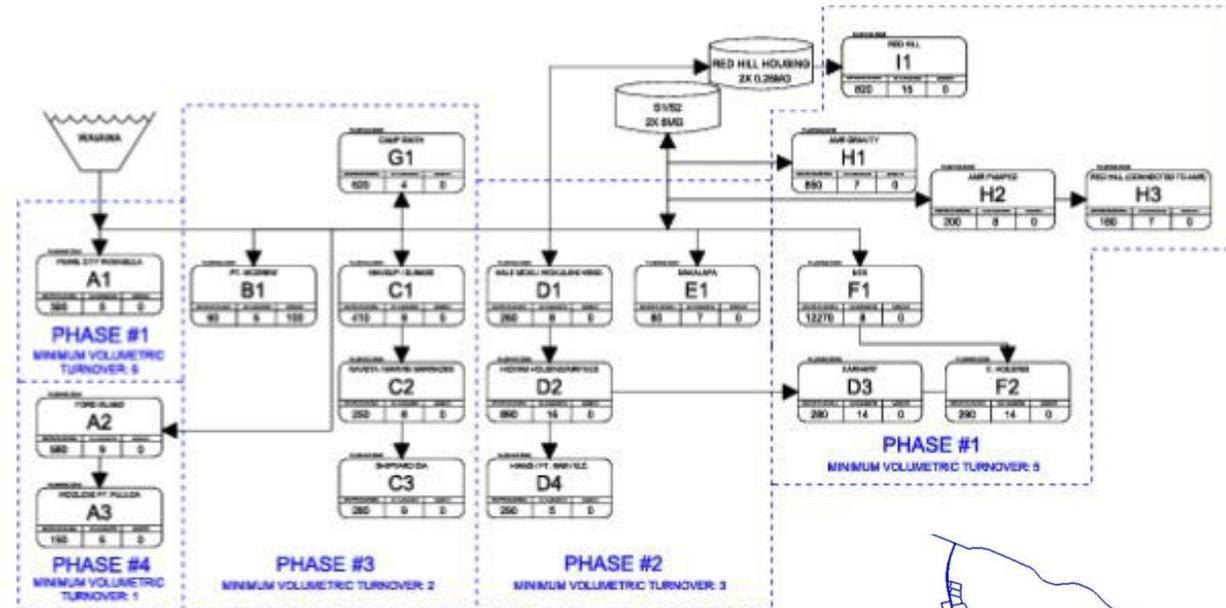
RAR Report for Zone A1



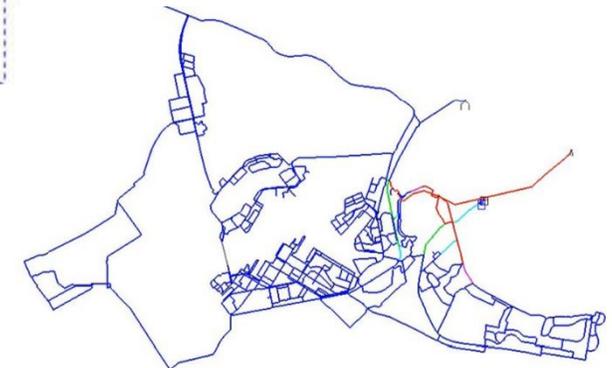
Amending the Advisory: LOE 2a

2a – Water within the distribution system meets state and federal drinking water MCLs, state EALs and ISPs

- Distribution system flushing MFR
 - Hydraulic slug model
 - Basis for zone definition
 - Record of completion
 - Targeted hydrant sampling
- Distribution system analytical testing



RAR Report for Zone A1



Amending the Advisory: LOE 2a

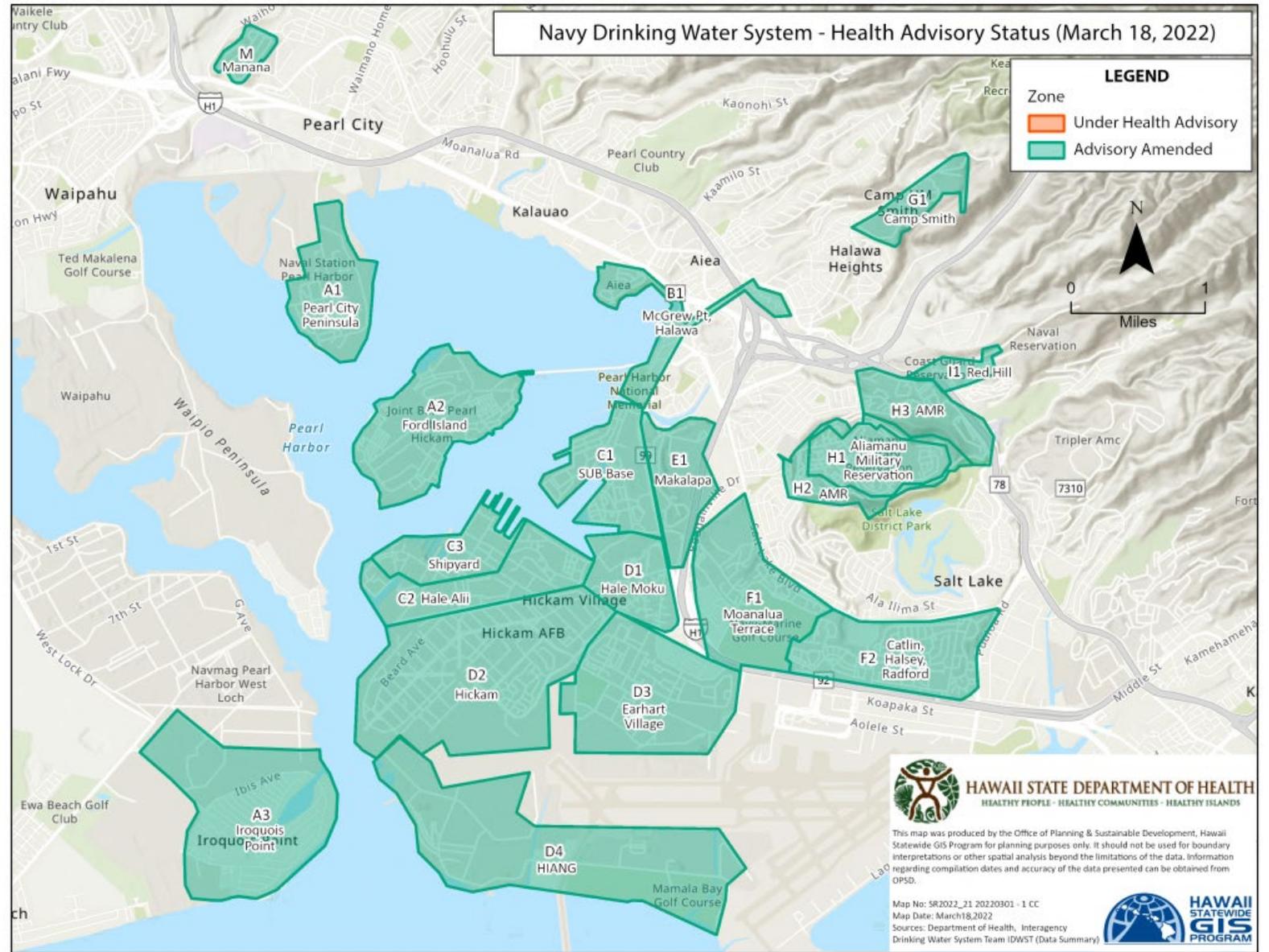
2b – Water in premise plumbing of homes/buildings meets state and federal drinking water MCLs, state EALs and ISPs

- Single Family Home Flushing Plan
<https://health.hawaii.gov/about/files/2021/12/Home-Flushing-Plan-Checklist-and-Standard-Operating-Procedures-FINAL.pdf>
- Non-Residential Flushing Plan
<https://health.hawaii.gov/about/files/2022/01/20220104-FINAL-NON-RESIDENTIAL-FLUSHING-SOP.pdf>
- Water system pressure monitoring during building flushing
- Analytical testing – furthest fixture from the service entry



Navy Drinking Water System – Health Advisory Status (as of 3/18/22)

<https://health.hawaii.gov/about/files/2022/03/SR2022-021-PUBLIC-DOH-IDWST-Water-Flushing-Status-20220318.png>



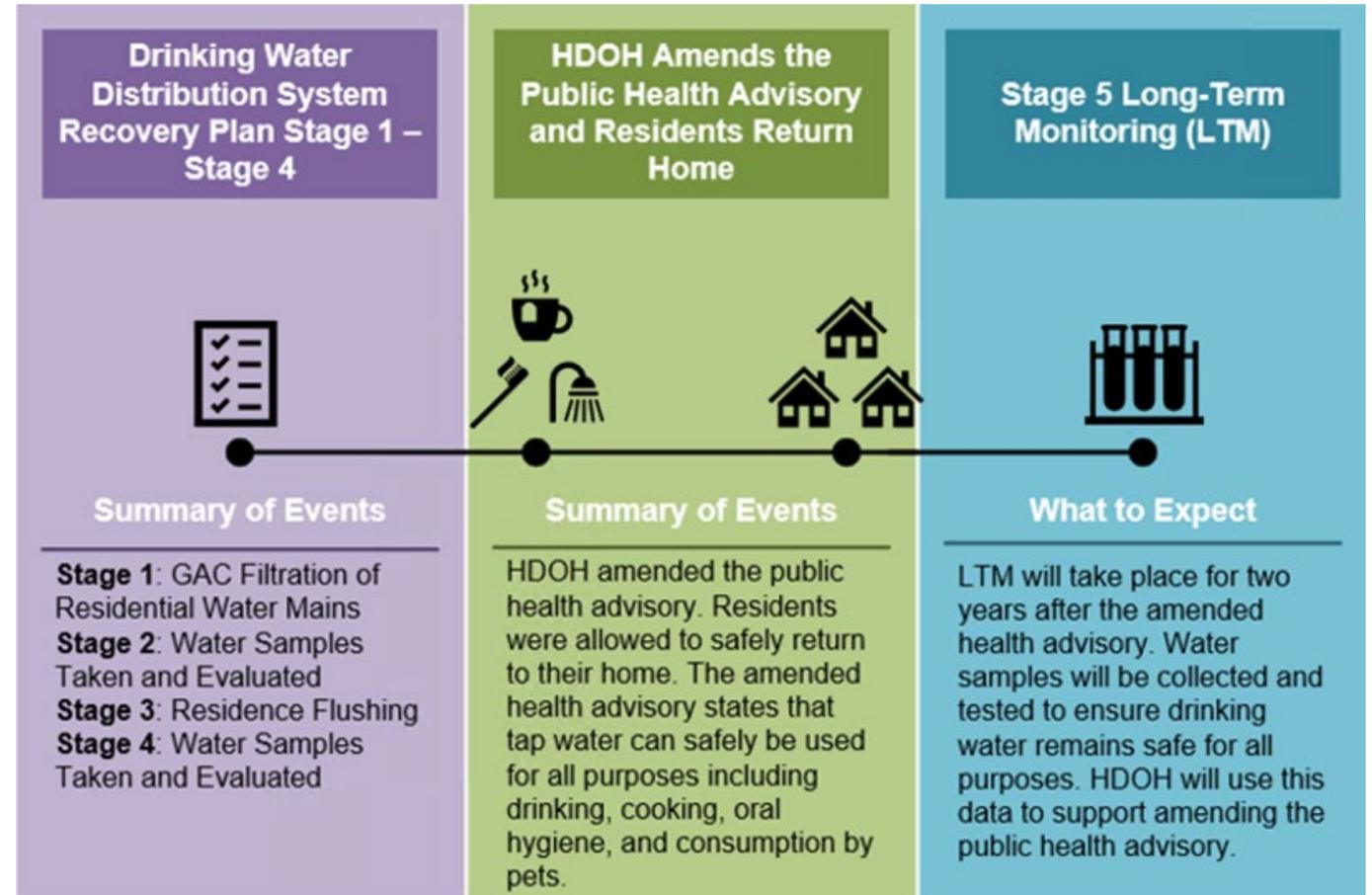
HAWAII STATE DEPARTMENT OF HEALTH
HEALTHY PEOPLE - HEALTHY COMMUNITIES - HEALTHY ISLANDS

This map was produced by the Office of Planning & Sustainable Development, Hawaii Statewide GIS Program for planning purposes only. It should not be used for boundary interpretations or other spatial analysis beyond the limitations of the data. Information regarding compilation dates and accuracy of the data presented can be obtained from OP&SD.

Map No: SR2022_21 20220301 - 1 CC
Map Date: March 18, 2022
Sources: Department of Health, Interagency Drinking Water System Team IDWST (Data Summary)

Stage 5 Long Term Monitoring (LTM)

- LTM months 1, 2, 3 sample an additional 5% homes and buildings per zone per month (15% total)
- LTM months 4-21 sample an additional 1/6 of the homes and buildings, per zone per month for 18 months (30% total)
- LTM months 22-24 sample an additional 1/3 of the homes and buildings, per zone per month for 3 months (10% total)
- Stage 4 and 5 – 65% of all homes and buildings sampled
- Distribution samples, schools, CDC, medical facilities and the EPD sampled in every round



Current Advisory

- All Navy water system users in Zones A1, A2, A3, B1, C1, C2, C3, D1, D2, D3, D4, E1, F1, F2, G1, H1, H2, H3, and Manana Housing may now use water for all purposes, including drinking, cooking, and oral hygiene. This includes consumption by pets.
- **The health advisory for all 19 zones and Manana Housing has been amended and water in these zones is safe to drink.**
- The Drinking Water Long-Term Monitoring Plan is under review by the HDOH, U.S. Navy and U.S. Army. In the interim, LTM sampling is ongoing under the guidelines established under the Stage 4 Sampling Plan.

<https://health.hawaii.gov/news/newsroom/doh-declares-four-navy-drinking-water-distribution-system-zones-safe/>

<https://health.hawaii.gov/news/newsroom/hawaii-department-of-health-advises-navy-water-system-consumers-not-to-drink-consume-tap-water/>



Red Hill Facility Defueling and Closure

Hawai'i Department of Health Update

Prepared for the Fuel Tank Advisory Committee Meeting
May 13, 2022



State Emergency Order Recap

December 6, 2021: DOH issued an Emergency Order which was upheld on January 3, 2022. Key elements:

- Immediately suspend operations of the 20 bulk fuel storage tanks
- Take immediate steps to install water treatment system at Red Hill Shaft
- Submit workplan and schedule to assess the facility to safely defuel, conduct assessment and make necessary repairs.
- Defuel
- Submit workplan and schedule to assess operations and system integrity

February 2, 2022: Navy filed appeals on the Emergency Order in both federal and state courts



State Emergency Order Recap, cont.

March 7, 2022: U.S. Secretary of Defense directs the Secretary of the Navy to “take all steps necessary to defuel and permanently close the Red Hill Bulk Fuel Storage Facility.”

April 20, 2022: Navy withdrew its UST permit application for the facility on the basis that it intends to defuel and close:

- The 20 underground storage tanks (USTs) at Red Hill
- The pipelines used to transport fuel between the tanks and the pumphouse
- The four surge tanks and appurtenant piping

April 22 and 25, 2022: Navy withdrew its appeals on the Emergency Order and the challenges were dismissed in both state and federal courts



State Emergency Order Update

May 6, 2022: To set expectations for safe defueling and closure of Red Hill, DOH issued a new Emergency Order. Key elements:

- Maintain the suspension of operations at Red Hill, except for environmental controls, release detection and release response protocols
- Maintain the groundwater treatment system at Red Hill Shaft and take steps to recover the Red Hill Shaft to drinking water quality
- By May 13, 2022, submit independent contractor's assessment on facility operations
- By June 30, 2022, submit a defueling plan and implementation schedule for DOH review and approval
- By November 1, 2022, submit a plan for closure of the facility for DOH review and approval
- Upon commencement of defueling operations, provide DOH with weekly status reports or briefings
- Submit versions of all documents and material that can be released to the public

<https://health.hawaii.gov/about/files/2022/05/DOH-Emergency-Order-Final-May-6-2022.pdf>



Regulatory Oversight of Red Hill Defueling and Closure

Hawaii Administrative Rules section 11-280.1-71(c) states:

To permanently close a UST or tank system, owners and operators must:

- (1) Empty and clean the UST and tank system by removing all liquids and accumulated sludges;
- (2) Remove the UST or tank system from the ground, fill the UST or tank system with an inert solid material, or close the tank in place in a manner approved by the department; and
- (3) Conduct a site assessment in accordance with section 11-280.1-72.



Red Hill Shaft Discharge to Halawa Stream

Hawai'i Department of Health Update

Prepared for the Fuel Tank Advisory Committee Meeting
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Red Hill Shaft Water Treatment and Discharge



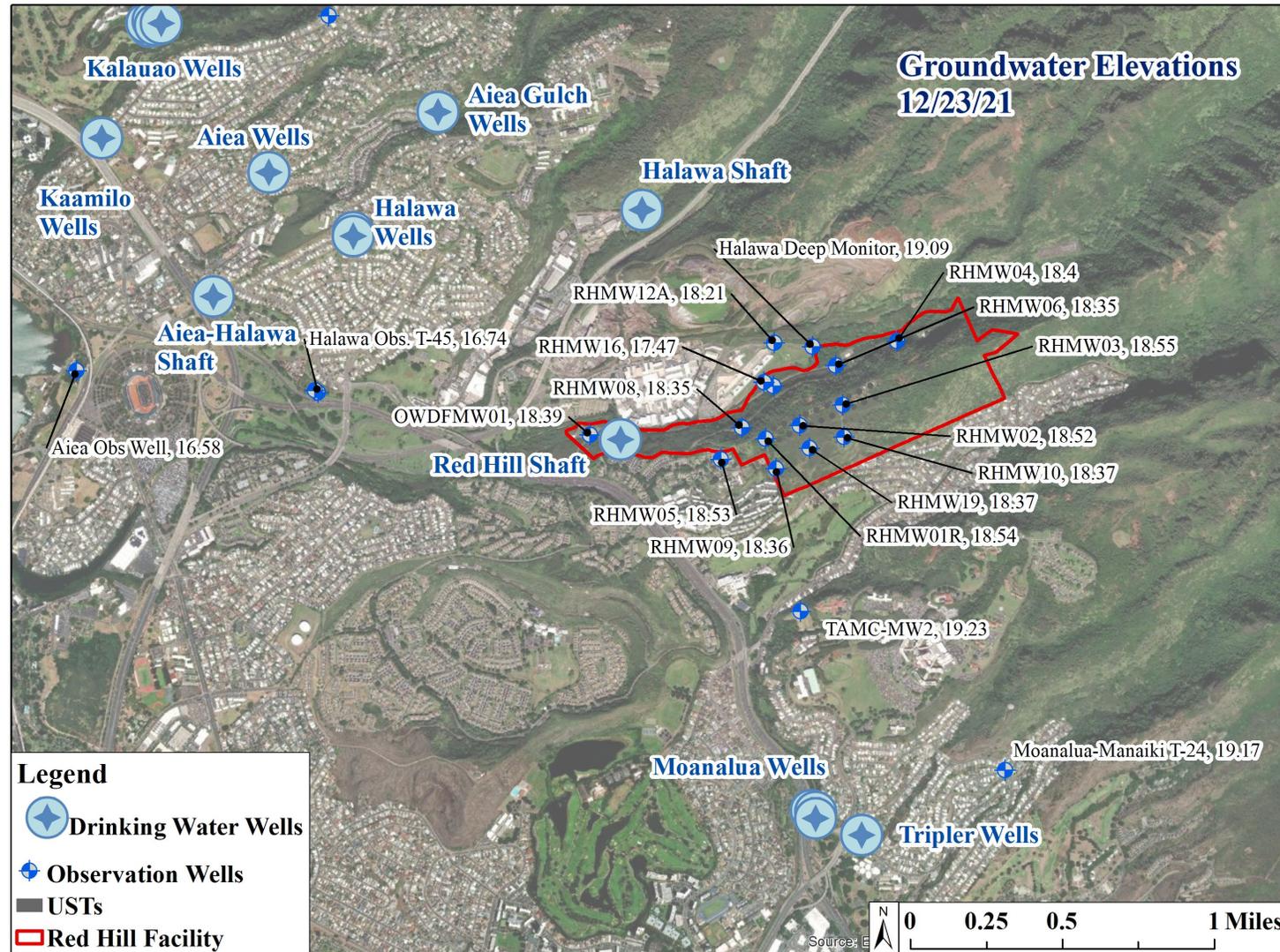
Hybrid Zeolite-GAC Water Treatment System



Treated Shaft Water in Halawa Stream



Protecting Our Water for All



Groundwater and Soil Vapor Monitoring Program

Navy is required to collect environmental data to satisfy the 2014 Administrative Order of Consent (AOC) and HDOH Notice of Interests (NOIs). AOC sampling is to satisfy long-term monitoring requirements and NOI sampling is in response to May 6 and Nov 20, 2021, releases. Data are made available to the public on the HDOH website.

Groundwater Monitoring Requirements

	Pre-May 6, 2021	Post-May 6, 2021	Post-Nov 20, 2021
Program	Long Term Monitoring (LTM)	May 6 Notice of Interest (NOI)	Nov 20 NOI
Frequency	Quarterly	Weekly	Weekly
Status	On-going – Long Term	Superseded by Nov 20 NOI	On-going through July 15, 2022

Soil Vapor Monitoring Requirements

	Pre-May 6, 2021	Post-May 6, 2021	Post-Nov 20, 2021
Program	AOC Soil Vapor Monitoring	May 6 Notice of Interest (NOI)	Nov 20 NOI
Frequency	Monthly	PIDs Weekly Samples Monthly	PIDs Weekly Samples Monthly
Status	On-going – Long Term	Superseded by Nov 20 NOI	On-going through July 15, 2022

Monitoring data is currently posted to DOH website:

<https://health.hawaii.gov/ust/red-hill/update-may-6-2021-release-monitoring-data-posted-weekly/>

<https://health.hawaii.gov/ust/ust-home-test/ust-red-hill-project-main/#technical-docs>



Total Petroleum Hydrocarbons (TPH)

What is TPH? Refers to hundreds chemicals composed of hydrogen and carbon chains from crude oil and refined petroleum products. Not practical to analyze them all, very useful to measure total amount of TPH in samples.

TPH presents toxicity potential that may not be captured by individual chemical compounds. Our analysis today focuses on two key TPH data sets:

- TPH diesel - JP-5 jet fuel is mostly TPH diesel range chemicals - likely fresh release
- TPH oil - detections suggest presence of older fuel releases in the ground being mobilized by fresh releases or impacts of cleaning agents used to clean up spills inside the RH tunnels in May, 2021.



Estimated Contaminant Distributions in Groundwater over Time

- Agencies direct and monitor incoming Navy data, including field parameters, vapor, groundwater, fuel and rock/soil lab analytic results and follow trends and important indicators of aquifer impacts to inform plans to reinstate groundwater production services.
- Maps were prepared for selected time periods to illustrate changes over time:
 - Most periods include multiple sample events: the maximum value for each analyte during the time period was used to prepare the map. This presents a “where contamination has been seen” evaluation.
 - Sample results represent a mix of groundwater sampling methods
- The following time series of groundwater heat maps show the estimated maximum groundwater concentrations from existing monitoring wells over six periods for TPH diesel from year prior to May 6th through end of April, 2022.



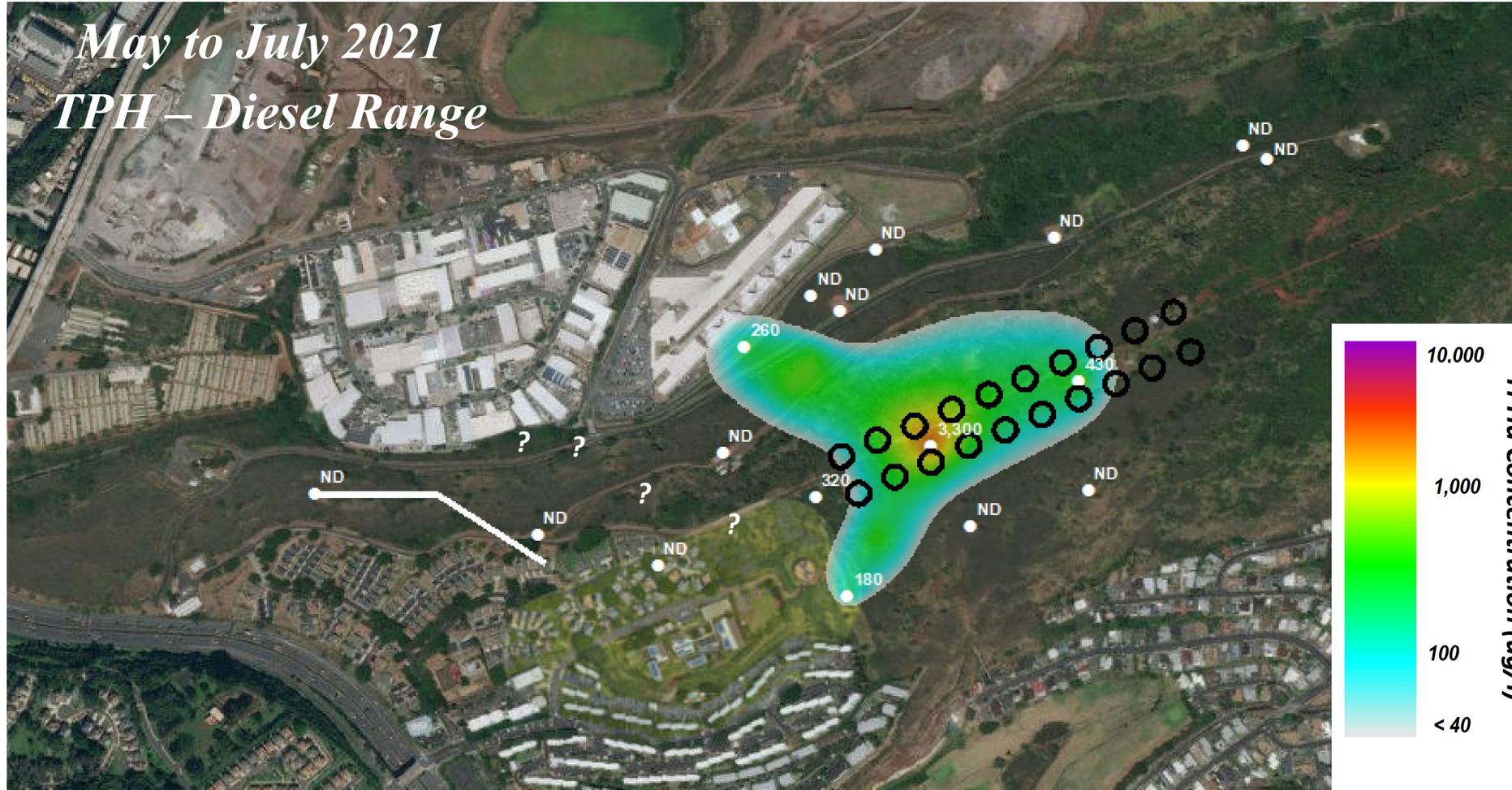
TPH-Diesel Plume Distribution over Time

Prior & following May 2021 Release(s) EAL 400 ug/l



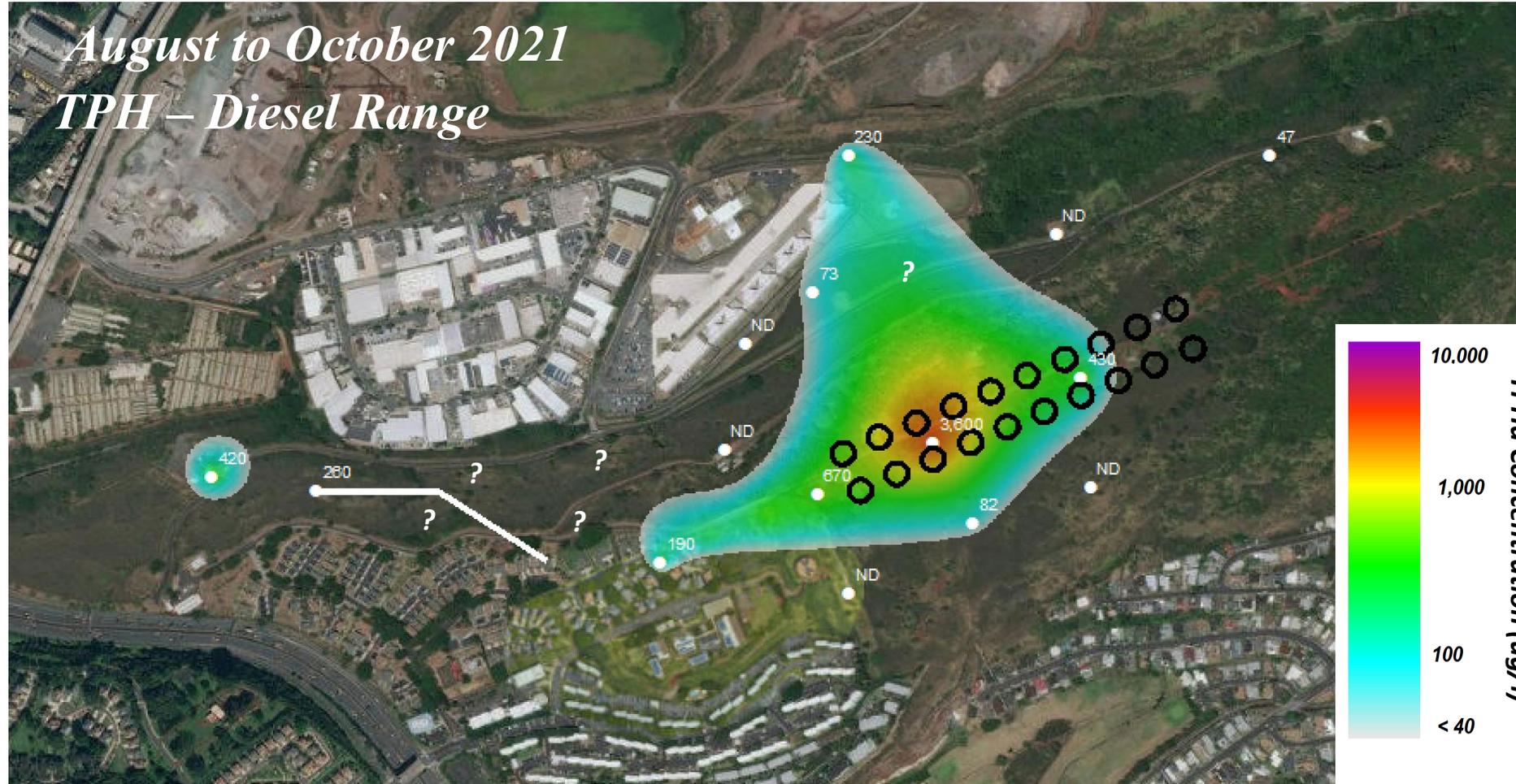
TPH-Diesel Plume Distribution over Time

May to July 2021



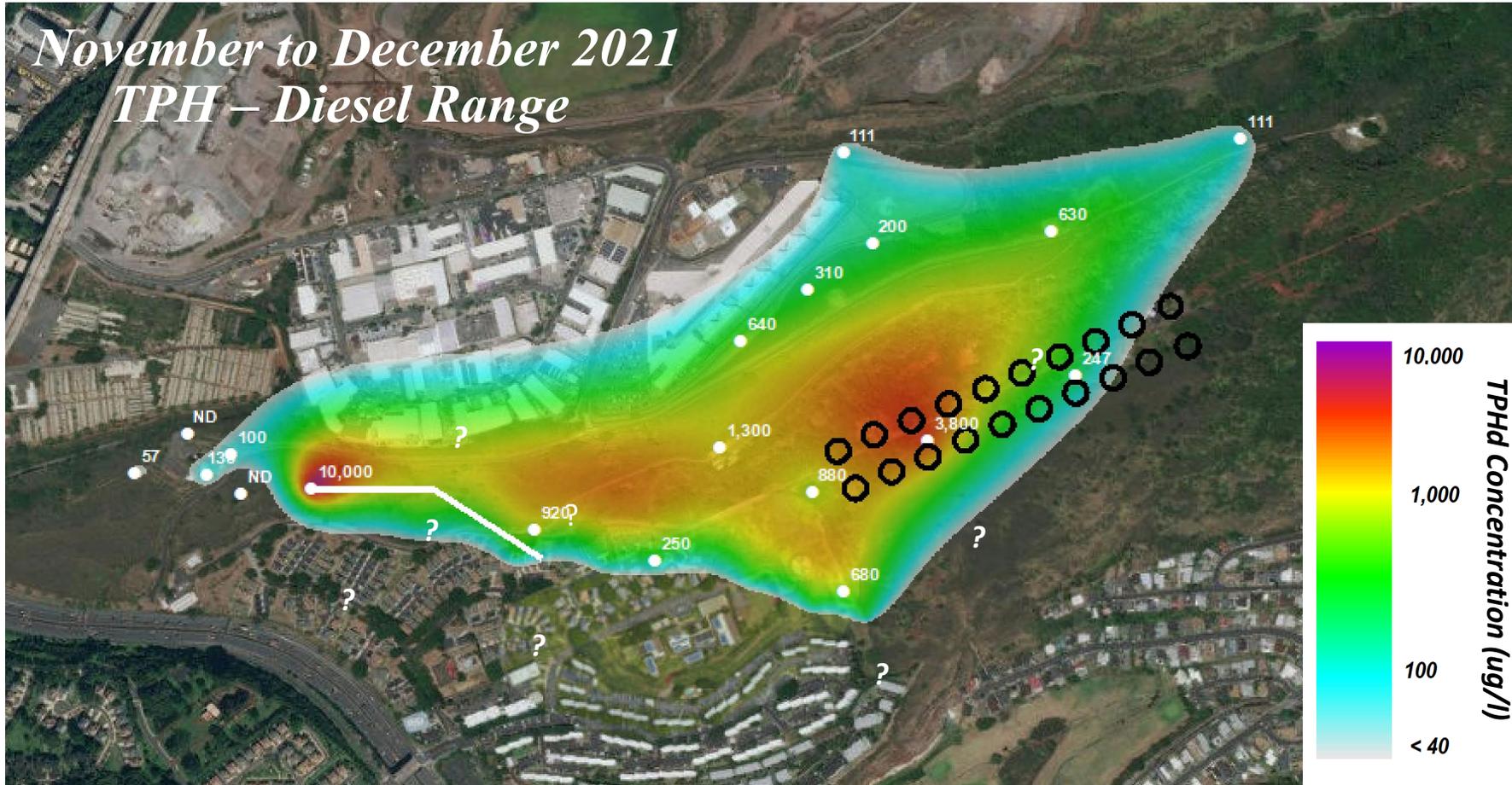
TPH-Diesel Plume Distribution over Time

August to October 2021



TPH-Diesel Plume Distribution over Time

November to December 2021



TPH-Diesel Plume Distribution over Time

February to March 2022



TPH-Diesel Plume Distribution over Time

April 2022



TPH-Oil Plume Distribution over Time

Prepared for the Fuel Tank Advisory Committee Meeting
May 13, 2022



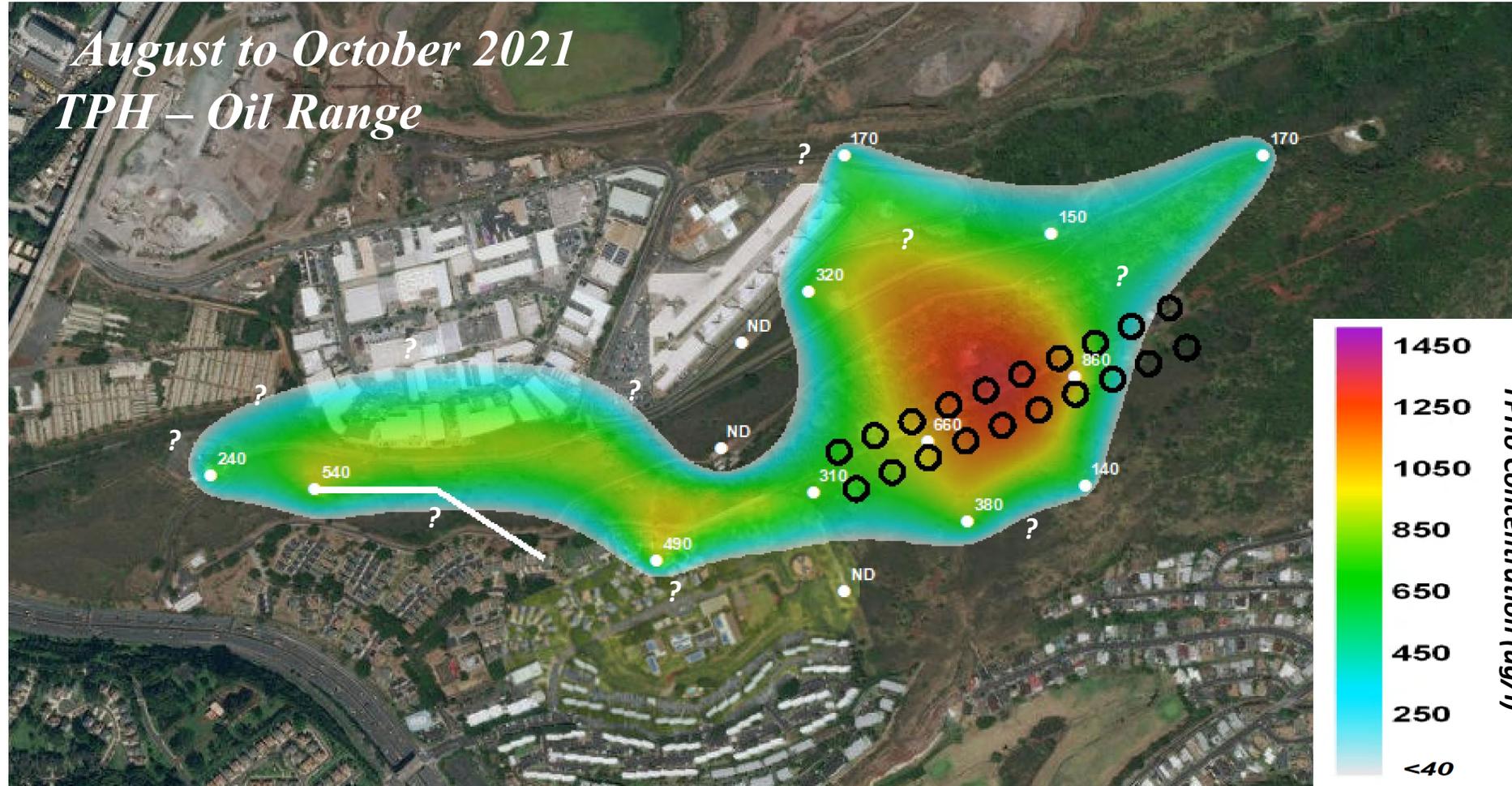
TPH-Oil Plume Distribution over Time

May to July 2021



TPH-Oil Plume Distribution over Time

August to October 2021



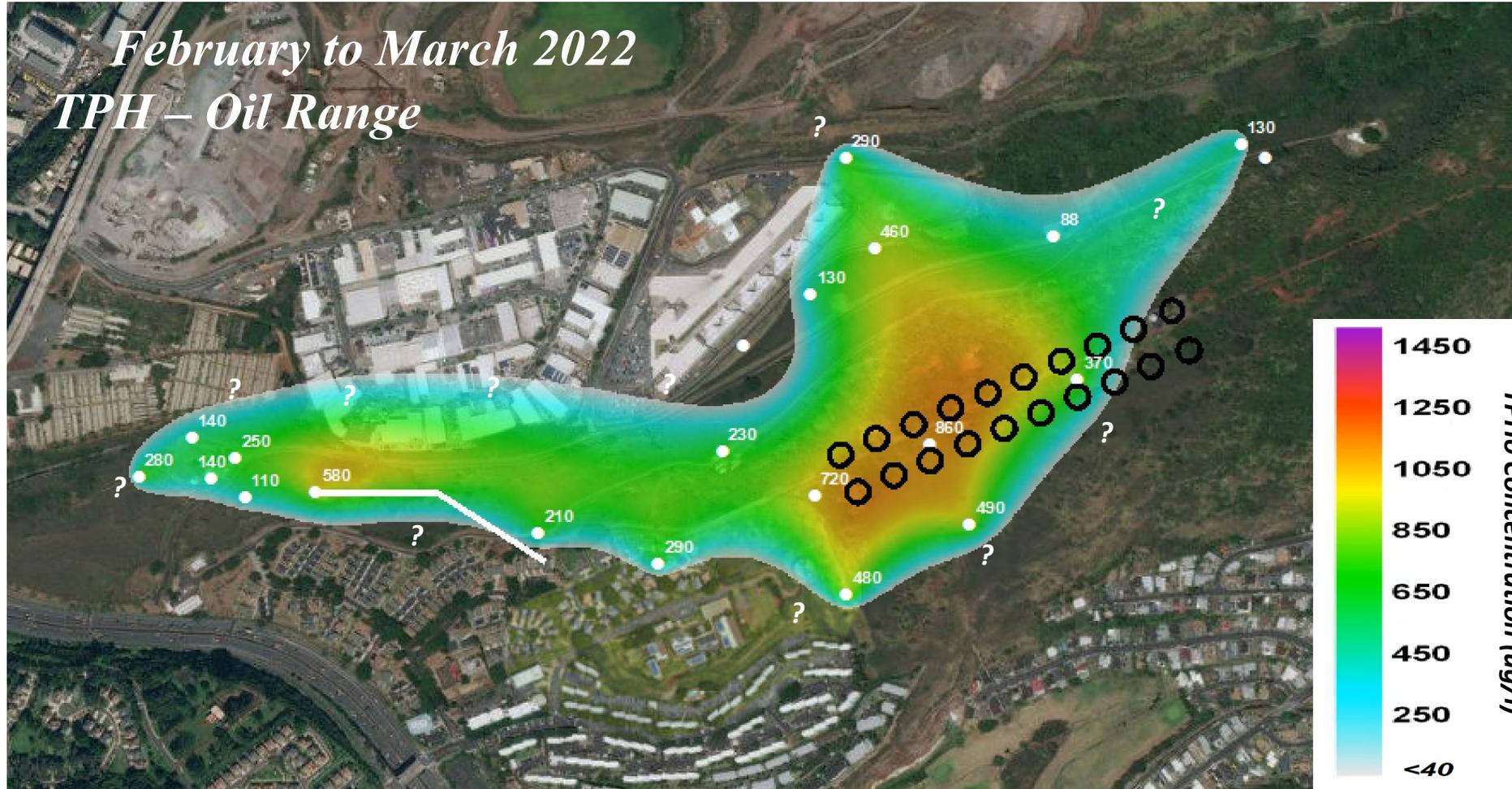
TPH-Oil Plume Distribution over Time

January 2022



TPH-Oil Plume Distribution over Time

February to March 2022



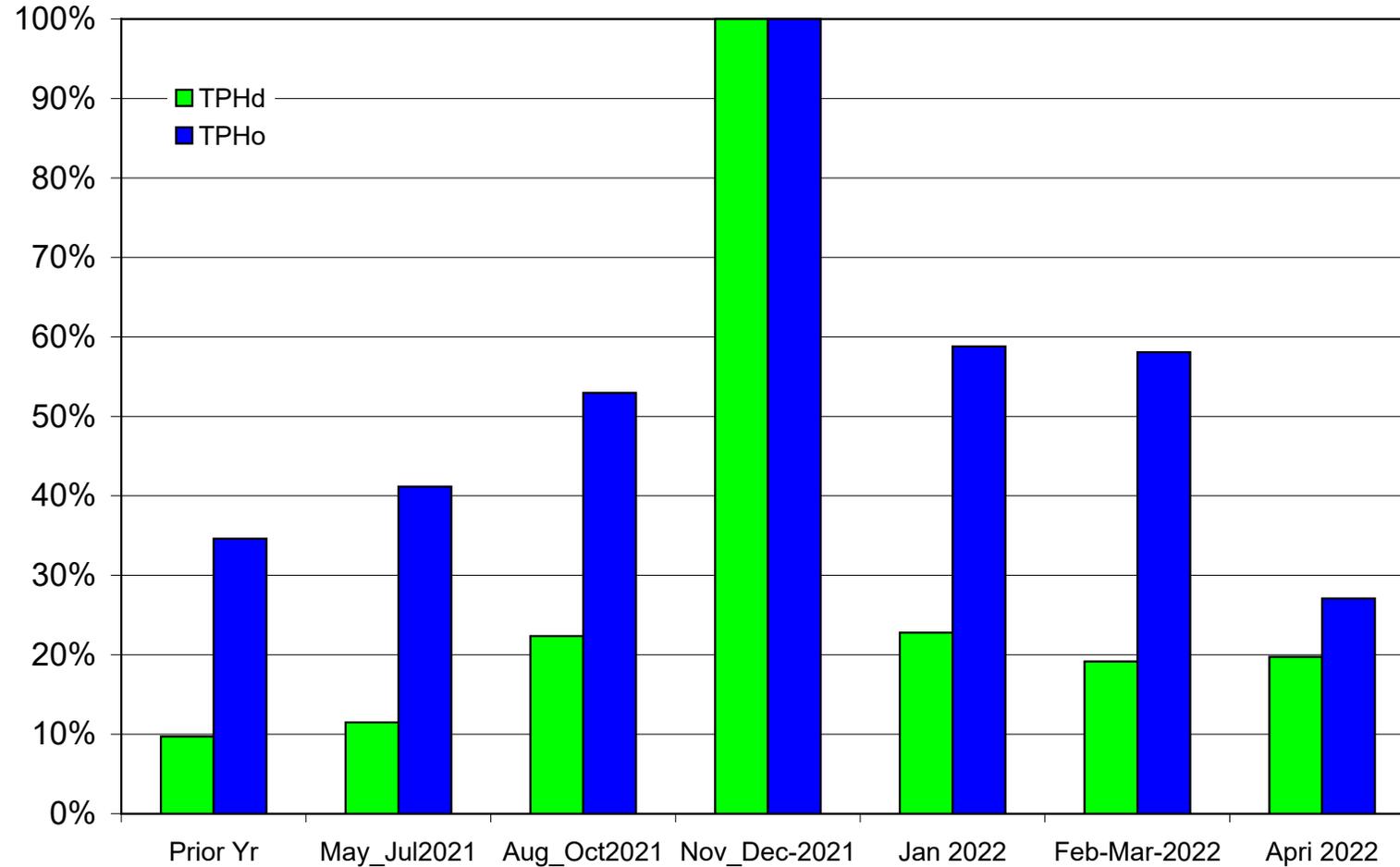
TPH-Oil Plume Distribution over Time

April 2022



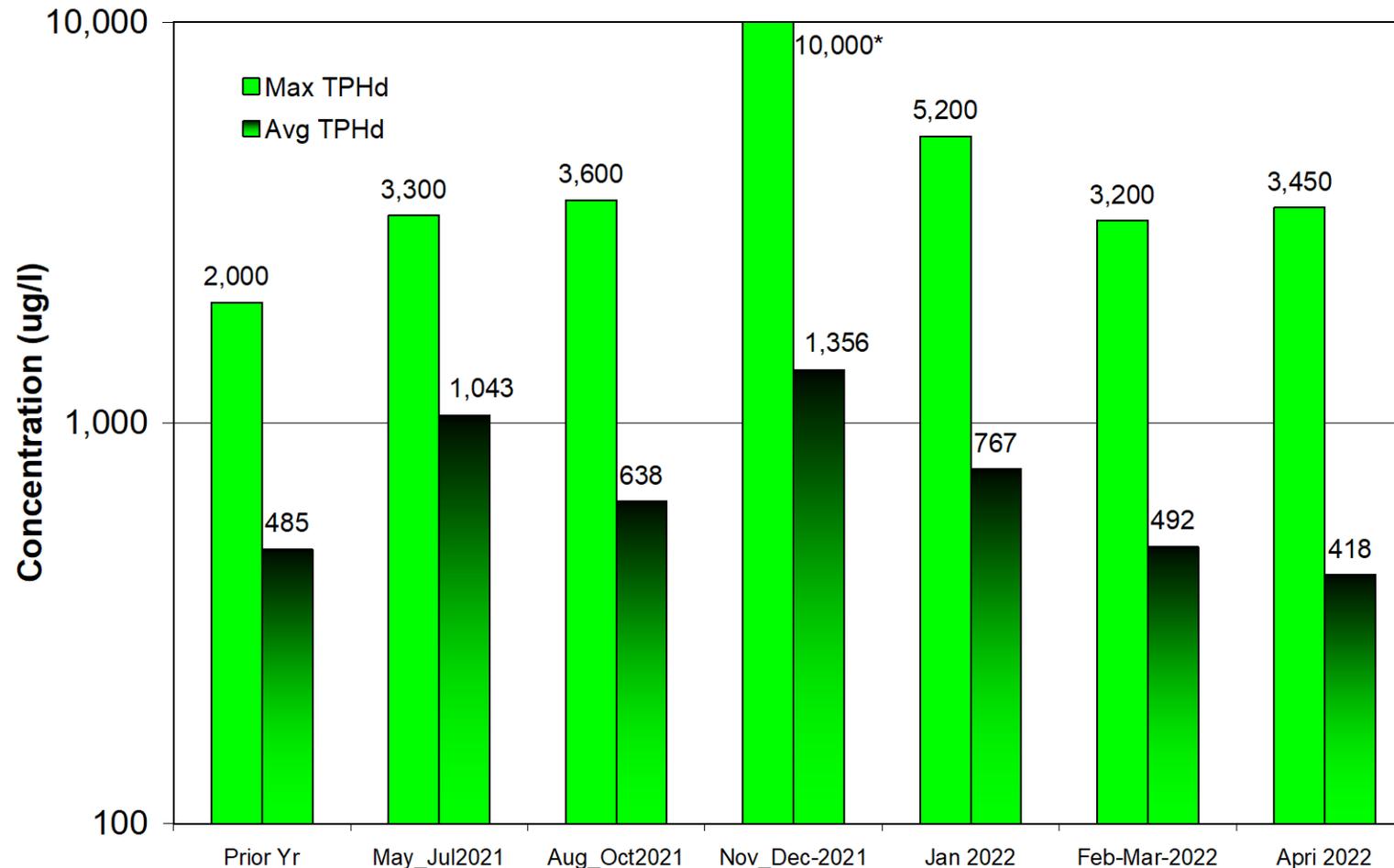
Concentrations As Percent of Maximums

Plume Area Weighted Average Concentrations - Diesel and Oil Ranges
Red Hill Bulk Fuel Storage Facility



Maximum & Average Diesel-Range Detections

Maximum and Average Diesel-Range Hydrocarbon Detections over Time
Navy Red Hill Bulk Fuel Storage Facility



2021 Release Interpretations

Groundwater and soil vapor analytical data indicate petroleum hydrocarbon impacts to the aquifer from the Facility:

- Monitoring wells within the tank farm show persistent contamination prior to the 2014 release.
- Monitoring wells beneath the tanks continue to have elevated groundwater detections above their historic levels since the May and November 2021 releases.

May 2021 release impacted groundwater at the Tank Farm:

- Concentrations appear to be declining at most wells in a manner similar to following the 2014 release.
- TPH-o mobility indicates May release may have mobilized historic contamination in the vadose zone

November 2021 release impacted Red Hill Shaft:

Concentrations in RHS water samples declined rapidly to levels at or below EALs. Free product still observed at surface.

- Impacts beyond RHS are not well understood.
- Free product presence & extent under Adit 3 tunnel is unknown, as is risk to RHS.
- Permanent treatment system needed to restore drinking water.



Interim Conclusions

- Data suggest plumes are stable and contracting
- TPHo-avg near pre-2021 release conditions
- TPHd-avg slightly greater
- Plumes are diminishing in mass
 - And show a relatively stable footprint
- Historic impacts remain in the formation, extent is unknown
 - Stability/status requires ongoing evaluation
- Sentinel wells/robust sampling are key
- RHMW12a is currently our sentinel well
 - Distal location, towards Halawa Shaft
 - ND at last sampling
- Agencies are keeping careful watch & taking action
 - Look for potentially concerning trends
 - Consider spatial implications to groundwater use



Next Steps

- Consult closely with water resource agencies to assess aquifer impact conditions
- Continue Red Hill Shaft pumping to limit further contaminant migration
- Continue and expand monitoring program and data analyses to detect changes
- Rapidly install additional monitoring wells to:
 - Improve confidence in the preliminary interpretation of perimeter detections.
 - Detect for potential migration beyond the historical region of impact.
 - Provide sentinel monitoring to protect public drinking water supplies
- Further evaluate environmental data to:
 - Characterize transport and fate in NAPL, vapor, and dissolved phases.
 - Develop additional lines of evidence to further evaluate the threat posed to public supplies.



Red Hill Remediation and Restoration Action Plan

Fuel Tank Advisory Committee

May 13, 2022

Red Hill Remediation and Restoration Action Plan

Purpose

- ◆ Provides a clear and comprehensive road map for site remediation and aquifer restoration
- ◆ Aligns agency responsibilities, authorities, and actions
- ◆ Creates a simple and accountable plan of action

Approach

- ◆ Comprehensive strategic plan of all environmental work required to remediate contamination caused by Red Hill and restore resources
- ◆ Identifies priorities, timelines, and regulatory authorities for different actions
- ◆ Led by DOH and EPA with full, active cooperation of Navy

Action Plan Objectives

Prevent

- Prevent further releases of fuel or other contaminants from the Red Hill facility

Investigate and Assess

- Investigate and assess the env. condition of the site and impacts of prior releases

Protect

- Protect drinking water and surface water resources

Remediate

- Remediate the contamination

Communicate

- Communicate progress and results to public

Red Hill Remediation and Restoration Action Plan Committee

- ◆ Goal: is to provide a focused and productive way to leverage the collective expertise and capabilities of key water protection public trust agencies to create and execute a technically sound and effective Action Plan
- ◆ Tentative membership: DOH, EPA, Navy, Honolulu Board of Water Supply, Commission on Water Resource Management, U.S. Geological Survey
- ◆ DOH and EPA will convene the Committee meetings