BOARD OF WATER SUPPLY
KA 'OIHANA WAI
CITY AND COUNTY OF HONOLULU

630 SOUTH BERETANIA STREET • HONOLULU, HAWAI'I 96843
Phone: (808) 748-5000 • www.boardofwatersupply.com

April 16, 2024

NOTICE

The Board of Water Supply, City and County of Honolulu, Regular Meeting will be held on Monday, April 22, 2024, at 2:00 p.m. in the Boardroom, Public Service Building, 630 South Beretania Street, Honolulu, HI 96843.

Limited seating will be available for in-person testifiers in the Boardroom. The public may also view the livestream of the meeting from the lobby of the Board of Water Supply, Public Service Building, 630 S. Beretania St., Honolulu, HI 96843.

TESTIMONY

Testimony may be submitted as follows:

- Written testimony should include the submitter's address, email address, and phone number. Testimony should be received by Monday, April 22, 2024, at noon. Submit written testimony by:
  - Email to board@hbws.org
  - Online at boardofwatersupply.com/testimony
  - Mail to Board of Water Supply, 630 S. Beretania St., Honolulu, HI 96843
  - Fax to (808) 748-5079
- Oral testimony will be accepted remotely and in person during the meeting. Pre-registration is encouraged to facilitate as much remote and in-person testimony as reasonably possible during the time allotted. Testifiers should also consider submitting a written version of their oral testimony.
  - To testify remotely by phone or video using the Zoom videoconferencing platform, please submit your request by:
    - Email to board@hbws.org
    - Online at boardofwatersupply.com/testimony

    Zoom registration instructions, as well as participant guidelines, will be sent to the contact information provided. Once confirmed as registered, testifiers will receive an email containing the links and instructions to join the Zoom session. Submit your request to testify remotely by Friday, April 19, 2024, at noon.
  - To testify in person at the Board of Water Supply, Public Service Building, 630 S. Beretania St., Honolulu, HI 96843, please pre-register by submitting your request by Monday, April 22, 2024:
    - Email to board@hbws.org
    - Online at boardofwatersupply.com/testimony

    In-person testifiers should check in with building security and then with testimony staff located in the lobby. Testifiers will be escorted to and from the Board Room. On-site registration will be available for walk-in requests. **Please note that parking at the Board of Water Supply will be limited. Metered street parking may be available offsite or at the Frank F. Fasi Municipal Building Civic Center.**

Testimony is limited to two (2) minutes and shall be presented by the registered speaker only. Testimony submitted in writing or orally, electronically or in person, for use in the meeting process is public information. All testimony will be included as part of the approved meeting minutes at boardofwatersupply.com/boardmeetings.

MATERIALS AVAILABLE FOR INSPECTION

Meeting materials ("board packet" under HRS §92-7.5) are accessible at www.boardofwatersupply.com/boardmeetings.

VIEWING THE MEETING

The meeting will be viewable via live streaming on the BWS website: www.boardofwatersupply.com/live. Video will appear on screen. You may have to click the arrow on video to start it. You may have to unmute audio as muted audio tends to be the default setting.

SPECIAL REQUESTS AND ACCOMMODATIONS

If you require special assistance, an auxiliary aid or service, and/or an accommodation due to a disability to participate in this meeting (i.e., sign language interpreter, interpreter for language other than English, or wheelchair accessibility), please call Joy at (808) 748-5172 or email your request to board@hbws.org **at least three business days prior to the meeting date**. If a response is received after the requested three business days before the meeting date deadline, we will try to obtain the auxiliary aid/service or accommodation, but we cannot guarantee that the request will be filled.

Upon request, this notice is available in alternate formats such as large print, Braille, or electronic copy.

The agenda for the April 22, 2024, Regular Meeting of the Board of Water Supply is as follows:

ITEMS REQUIRING BOARD ACTION

1. Approval of the Minutes of the Regular Meeting Held on March 25, 2024

2. Authorizing a Public Hearing to Consider the Proposed Fiscal Year 2024-2025 Operating and Capital Improvement Program Budget

ITEMS FOR INFORMATION

1. Update on the Board of Water Supply's Response to the Potential Impacts of the Red Hill Fuel Contamination

2. Recruitment Status

3. Status Update of Groundwater Levels at All Index Stations

4. Water Main Repair Report for March 2024

EXECUTIVE SESSION

1. Approval of the Minutes of the Executive Session Meeting Held on November 27, 2023

MINUTES

To watch the recording of this meeting, please click on the following link: https://vimeo.com/bwshonolulu/apr-22-2024. Closed captioning is available.

THE REGULAR MEETING OF THE
BOARD OF WATER SUPPLY

April 22, 2024

At 2:04 PM on April 22, 2024, in the Public Service Building Board Room at 630 South Beretania Street, Honolulu, Hawai'i, Board Chair Nā'ālehu Anthony called to order the Regular Meeting.

Present:
Nā'ālehu Anthony, Chair
Kapua Sproat, Vice Chair via Zoom
Bryan P. Andaya, Board Member via Zoom
Jonathan Kaneshiro, Board Member
Gene C. Albano, Ex-Officio via Zoom

Also Present:
Ernest Lau, Manager and Chief Engineer
Erwin Kawata, Deputy Manager
Patrick Chun, Acting Program Administrator, Capital Projects Division
Jewel Pharms, Assistant Program Administrator, Customer Care Division
Kathleen Elliott-Pahinui, Information Officer, Communications Office
Raelynn Nakabayashi, Executive Assistant I, Executive Support Office
Jason Nikaido, Program Administrator, Field Operations Division
Kaliko Lum Kee, Assistant Waterworks Controller, Finance Division
Michele Thomas, Executive Assistant I, Human Resources Office via Zoom
Henderson Nuuhiwa, Program Administrator, Information Technology Division via Vimeo
Michael Matsuo, Land Administrator, Land Division
Barry Usagawa, Program Administrator, Water Resources Division via Zoom
Kevin Ihu, Program Administrator, Water System Operations Division
Kathy Mitchell, Administrative Services Officer via Vimeo
Kimberly Kuwaye, Manager Secretary
Joy Cruz-Achiu, Board Secretary
Keoni Mattos, Information Specialist II, Communications Office

Stella Bernardo, Information Specialist II,
Communications Office via Zoom
Michele Harman, Community Relations Specialist I,
Communications Office via Zoom
Wayne Maria, Information Specialist II,
Communications Office
Joyce Lin, Civil Engineer IV,
Office of the Manager and
Chief Engineer

Others Present: Jeff Lau, Deputy Corporation Counsel
via Zoom
Jessica Wong, Deputy Corporation Counsel
via Zoom

Absent: Edwin H. Sniffen, Ex-Officio

Chair Nāʻālehu Anthony opened the Board meeting with an ʻolelo noʻeau:

Aloha mai kākou e nā hoa makamaka mai ka lā hiki a ka lā kau. Welina nui me ke aloha!

Mahalo nui no kēia ʻākoakoa ʻana o kākou no ka pono o ka lāhui, no ka pono o ka ʻāina, a no ka pono o ka wai nō hoʻi. Eia he ʻōlelo noʻeau e kālele ana i ke koʻikoʻi o ka wai.

He Ali'i ka 'Aina, He Kaua ke kanaka. The land is the chief, and the people are the servants.

Chair Anthony welcomed everyone to the April 22, 2024, Regular Meeting of the Board of Water Supply (BWS). He stated that the Board of Water Supply is dedicated to providing safe, dependable, and affordable supply of water now and into the future.

Before continuing the meeting, Chair Anthony stated that a recording would be played to share reminders for public participation and the virtual meeting regulations required by law.

The recording played: Goals for this meeting under Hawai'i Revised Statutes, Section 92-7.5 are accessible at www.boardofwatersupply.com/boardmeeting. The public may attend this meeting in person at the Public Service building located at 630 South Beretania Street. The public may also view a live stream of today's meeting on our website at www.boardofwatersupply.com/live. We have been accepting written or oral testimony for today's meeting. Instructions and an online submittal form are available at boardofwatersupply.com/testimony. The deadline to submit advance written testimony has passed. Testimony received by noon today has been distributed to the board members. We will continue to accept written testimony today through our online form. Oral testimony in person or remotely will be accepted during today's meeting. To facilitate as much in-person and remote testimony as reasonably possible during the time allotted, preregistration and submittal of a written version of testimony at boardofwatersupply.com/testimony is strongly encouraged. To testify in person, please register using our online form or come to the public service building at 630 South Beretania Street. We have a representative in the lobby to provide intake and further instructions. To request to testify remotely, please complete the online form at boardofwatersupply.com/testimony. Requestors will receive an email containing links and instructions to join the Zoom session. Testifiers will have two minutes to state their position. A timekeeper will alert testifiers when there is one minute remaining. Once the two minutes are up, please summarize to allow time for questions from the Board. Then, make room for the next testifier. Board members attending any board meeting remotely must be visible to the public to be considered, present, and meet quorum guidelines. Board members participating remotely must also disclose their location and anyone present at their location during roll call. Meeting participants who are calling or video conferencing in, please mute your microphone when you're not speaking. If you have a question, comment, or wish to enter or second a motion on an action item, please unmute your microphone and identify yourself before continuing to speak. If you encounter technical issues during today's meeting, please use the Zoom chat to send a direct message to our support team. Their names are listed in the message to all participants. To open the chat window, please click the text Bubble icon on the Zoom Toolbar.

MOTION TO RECESS	Jonathan Kaneshiro and Kapua Sproat motioned and seconded, respectively, to move into recess.

At 2:09 PM Chair Anthony recessed the Board meeting due to technical difficulties.

At 2:24 PM, Chair Anthony called the Board meeting back to order.

Chair Anthony requested a roll call for the Regular Meeting. He asked those participating remotely to give the appropriate disclosures up responding.

Vice Chair Kapua Sproat joined via Zoom, responded aye, and disclosed that she was alone at her location; Board Member Bryan Andaya joined via Zoom, responded aye, and disclosed that he was alone at his location; Board Member Jonathan Kaneshiro responded aye, and was present in the Board room; and Board Member Gene Albano joined via Zoom, responded aye and disclosed that he was alone at his location. Chair Anthony was present in the Boardroom. Board Member Edwin Sniffen was absent.

Chair Anthony introduced those in the Boardroom: Manager Ernest Lau, Deputy Manager Erwin Kawata, Board Secretary Joy L. Cruz-Achiu, Manager Secretary Kimberly Kuwaye, and Information Specialist II Keoni Mattos and Wayne Maria. Deputy Jeff Lau and Deputy Jessica Wong joined via Zoom from the City and County Corporation Counsel.

REGULAR MEETING

APPROVAL OF MINUTES — Approval of the Minutes of the Regular Meeting Held on March 25, 2024.

MOTION TO APPROVE — Jonathan Kaneshiro and Bryan Andaya motioned and seconded, respectively, to approve the Minutes of the Regular Meeting Held on March 25, 2024.

In lieu of a roll call vote, Chair Anthony requested a voice vote on the motion and requested that Board Members in favor of the motion say "Aye." The Board members present responded with a verbal "Aye." Chair Anthony then inquired if any Board Members would like to object or vote "Nay" on the motion. There were no objections or "Nay" votes. Vice Chair Anthony announced that the motion was unanimously carried.

THE MINUTES OF THE REGULAR MEETING HELD ON MARCH 25, 2024, WERE APPROVED AT THE APRIL 22, 2024, BOARD MEETING			
	AYE	NO	COMMENT
NĀʻĀLEHU ANTHONY	X		
KAPUA SPROAT	X		
BRYAN P. ANDAYA	X		
JONATHAN KANESHIRO	X		
EDWIN H. SNIFFEN			ABSENT
GENE C. ALBANO	X		

"April 22, 2024

AUTHORIZING A PUBLIC HEARING TO CONSIDER THE PROPOSED FISCAL YEAR 2024-2025 OPERATING AND CAPITAL IMPROVEMENT PROGRAM BUDGET

Chair and Members
Board of Water Supply
City and County of Honolulu
Honolulu, Hawai'i 96843

Chair and Members:

Subject: Authorizing a Public Hearing to Consider the Proposed Fiscal Year 2024-2025 Operating and Capital Improvement Program Budget

We recommend that the Board authorize a public hearing to be held at 2:00 p.m. on Monday, May 28, 2024, to consider the resolution to adopt the proposed Operating and Capital Improvement Program Budget for the fiscal year beginning July 1, 2024, and ending June 30, 2025. A Budget Workshop is scheduled on Monday, May 6, 2024, at 2:00 p.m.

Attached is the draft of the "Notice of Public Hearing" to be published prior to the hearing date.

Respectfully Submitted,

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

Attachment"

DISCUSSION: Raelynn Nakabayashi, Executive Assistant I, Executive Support Office, gave the report.

MOTION TO APPROVE: Jonathan Kaneshiro and Gene Albano motioned and seconded, respectively, to Authorize a Public Hearing to Consider the Proposed Fiscal Year 2024-2025 Operating and Capital Improvement Program Budget.

Ms. Cruz-Achiu conducted a roll call vote: Vice Chair Kapua Sproat, aye; Board Member Bryan Andaya, aye; Board Member Jonathan Kaneshiro, aye; Board Member Gene Albano, aye; and Chair Nā'ālehu Anthony, aye. Board Member Edwin Sniffen was absent

Ms. Cruz-Achiu announced that the motion passed with five ayes.

AUTHORIZING A PUBLIC HEARING TO CONSIDER THE PROPOSED FISCAL YEAR 2024-2025 OPERATING AND CAPITAL IMPROVEMENT PROGRAM BUDGET WAS APPOVED ON APRIL 22, 2024			
	AYE	NO	COMMENT
NĀʻĀLEHU ANTHONY	X		
KAPUA SPROAT	X		
BRYAN P. ANDAYA	X		
JONATHAN KANESHIRO	X		
EDWIN H. SNIFFEN			ABSENT
GENE C. ALBANO	X		

NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN that the BOARD OF WATER SUPPLY (BWS), CITY AND COUNTY OF HONOLULU, will hold a PUBLIC HEARING in the Board Room, Public Service Building, 630 South Beretania Street, on Tuesday, May 28, 2024, at 2:00 p.m. or soon thereafter, where all interested persons shall be afforded the opportunity of being heard on the adoption of the Proposed to the Fiscal Year (FY) 2025 Operating and Capital Improvement Program Budget of the Board of Water Supply, beginning July 1, 2024, and ending June 30, 2025.

Limited seating will be available for in-person testifiers in the Board Room. The public may also view the livestream of the meeting from the lobby of the Board of Water Supply, Public Service Building, 630 S. Beretania St., Honolulu, HI 96843.

TESTIMONY CAN BE SUBMITTED AS FOLLOWS:

- Written testimony should include the submitter's address, email address, and phone number. Testimony should be received by Tuesday, May 28, 2024, at noon. Submit written testimony by:
  - Email to board@hbws.org
  - Online at boardofwatersupply.com/testimony
  - Mail to Board of Water Supply, 630 S. Beretania St., Honolulu, HI 96843
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- To testify in person at the Board of Water Supply, Public Service Building, 630 S. Beretania St., Honolulu, HI 96843, please pre-register by submitting your request by Tuesday, May 28, 2024:
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BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

ITEM FOR INFORMATION NO. 1

"April 22, 2024

UPDATE ON THE BOARD OF WATER SUPPLY'S RESPONSE TO THE POTENTIAL IMPACTS OF RED HILL FUEL CONTAMINATION

Chair and Members
Board of Water Supply
City and County of Honolulu
Honolulu, Hawai'i 96843

Chair and Members:

Subject: Update on the Board of Water Supply's Response to the Potential Impacts of the Red Hill Fuel Contamination

Joyce Lin, Civil Engineer IV, Office of the Manager and Chief Engineer, will give an Update on the Board of Water Supply's Response to the Potential Impacts of the Red Hill Fuel Contamination.

Respectfully Submitted,

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

Attachment"

The foregoing was for information only.

DISCUSSION:

Joyce Lin, Civil Engineer IV, Office of the Manager and Chief Engineer, gave the report.

Board Member Gene Albano commented that polyfluoroalkyl substances (PFAS) were recently designated as toxic, and some states and utilities may be eligible for the Superfund. Will the BWS be pursuing the Superfund?

Manager Ernest Lau explained that funding to address emerging contaminants like PFAS is available from the Bipartisan Infrastructure Law that passed a few years ago but is not part of the Superfund program. He further explained that the Environmental Protection Agency (EPA) is working to finalize drinking water regulations maximum contaminant levels (MCL) for PFAS under the Safe Drinking Water Act. Manager Lau also shared that a separate effort is being taken by the EPA to designate Perfluorooctanoic Acid (PFOA) and Perflurooctane Sulfonic Acid (PFOS) as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA.

Board Member Albano mentioned reading a recent article on PFOA and PFOS.

Manager Lau responded that the article discussed the issues and requirements for disposing of chemicals designated as hazardous waste.

Chair Anthony mentioned listening to a podcast discussing the PFAS designation, including its history, persistence, and being ubiquitous.

Manager Lau stated that PFAS had been around since the 1940s.

Chair Anthony shared that five members of the BWS had a meeting with the Navy on Friday, April 19, 2024, and requested more information to better understand the Navy's technical notes explaining the low-level Total Petroleum Hydrocarbons (TPH) detections.

Manager Lau shared that the Navy is expected to publicly release an explanation for the low-level detections in the Joint Base Pearl Harbor Hickam (JBPHH) water system. He stated that it is difficult for the BWS to comment until the BWS has had the opportunity to see and review the Navy's technical report.

Chair Anthony commented that with numerous questions regarding the Navy's water tests and test results, it is essential that discussion and conversations continue to understand whether the Navy's water is safe to drink. Although it is uncertain whether the Navy's drinking water is safe, Chair Anthony affirmed that the BWS's drinking water is safe and continues to be monitored and tested.

Manager Lau commented that the Department of Health (DOH) and the EPA's assessment of the Navy's technical report would be important once released.

Chair Anthony commented that, hopefully, the Navy's technical report will clarify what happened. It is a vital piece of the puzzle for the BWS's safety and security in keeping its water safe. He also mentioned that on Friday, April 19, 2024, House Bill (HB) 2690 Conference Draft (CD) 1, there was an amendment to the Senate Draft (SD) 1 due to questions raised on whether or not it was constitutional to pass with the three reading rule. As the week progresses, the Legislature will be busy with various bills, including HB 2690. Chair Anthony suggests that everyone interested in HB 2690 contact their representative. He explained that HB 2690 is an important bill as it may be an opportunity for Hawai'i to receive financial assistance with Red Hill and to show unity as a state. Chair Anthony asked Vice Chair Sproat if she had any comments.

Vice Chair Kapua Sproat thanked Chair Anthony for elevating the Red Hill situation and Ms. Joyce Lin's report. She acknowledged Chair Anthony's explanation of HB 2690 and its extraordinary importance. Vice Chair Sproat further explained that HB 2690 would create a special fund that would enable a neutral entity to move it forward. Without the special fund, the state may not be able to access federal money that would otherwise be available. She remains hopeful that Senate and House conferees will work it out for the people of Oahu and those affected by the Red Hill Crisis. HB 2690 is also important for Lahaina and the Commission of Water Resources Management (CWRM) ability to deliver

water for temporary emergency housing. Vice Chair Sproat encourages everyone to follow HB 2690.

Manager Lau shared that one of the aspects of HB 2690 is the idea of greater independence for the CWRM, especially the deputy director, who is currently an appointee and make it an executive director. Similar to the BWS, where the Board of Directors hires the Manager and Chief Engineer, the CWRM should hire an executive director reporting to the commission and reduce the influence on that position as an appointee. He stated water is important, Ola Ika Wai.

Chair Anthony commented on the importance of remediating contaminants in the aquifer before it reaches the BWS wells rather than waiting until after the contaminants reach the wells and installing filtration to remove it from the water. Ensuring the BWS has the proper instruments to monitor contamination in the aquifer and employing remediation techniques is less costly than building long-term treatment systems, given the construction cost right now.

Vice Chair Sproat thanked Manager Lau, Deputy Manager Erwin Kawata, and previous Deputy Manager Ellen Kitamura for leading the way on the Red Hill issue. She emphasized the importance of discovering the extent of the contamination and the type of contaminant present so the BWS can begin remediation. Vice Chair Sproat stated that the BWS has taken steps to proactively install monitoring wells. The BWS needs more state and federal financial support and not rely on ratepayers when the Navy is responsible for the Red Hill mess.

Board Member Jonathan Kaneshiro referred to Ms. Lin's presentation on page three and noticed that the numbers ranged from 0.005 micrograms per liter (ug/L) to 400,000 ug/L. He inquired about the next step and whether the high numbers surprised the BWS.

Dr. Roger Brewer's estimated findings on JP-5 fuel exposure levels within the Joint Base Pearl Harbor's drinking water system following the November 21, 2021, fuel release event.

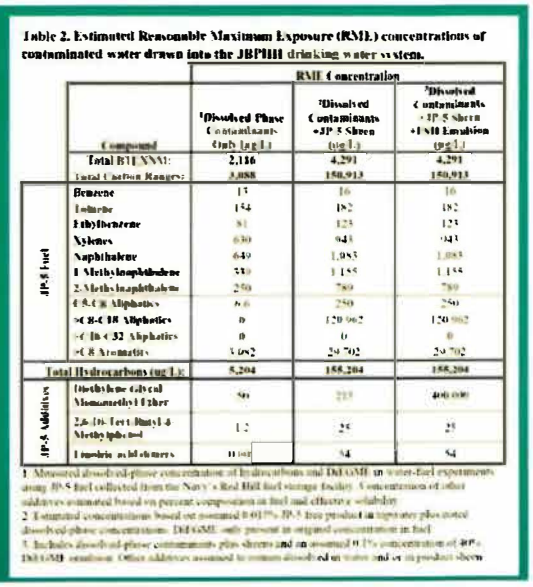


Table 2. Estimated Reasonable Maximum Exposure (RME) concentrations of contaminated water drawn into the JBPHH drinking water systems.

		RME Concentration		
	Compound	[1]Dissolved Phase Contaminants Only (ug/L)	[2]Dissolved Contaminants +JP-5 Sheen (ug/L)	[3]Dissolved Contaminants +JP-5 Sheen +DMF Emulsion (ug/L)
	Total BTEX/N:	2,116	4,291	4,291
	Total Carbon Ranges:	3,088	150,913	150,913
JP-5 Fuel	Benzene	13	16	16
	Toluene	154	182	182
	Ethylbenzene	81	123	123
	Xylenes	630	943	943
	Naphthalene	649	1,083	1,083
	1-Methylnaphthalene	330	1,155	1,155
	2-Methylnaphthalene	250	780	780
	C9-C16 Aliphatics	6.6	250	250
	>C8-C16 Aliphatics	0	120,062	120,062
	>C16-C32 Aliphatics	0	0	0
	>C8 Aromatics	3,082	29,702	29,702
Total Hydrocarbons (ug/L):		5,204	188,204	188,204
JP-5 Additives	Diethylene Glycol Monomethyl Ether	80	333	400,000
	2,6-Di-Tert-Butyl-4-Methylphenol	12	25	25
	Lubricity Improvers	0.08	54	54

1. Measured dissolved-phase concentrations of hydrocarbons and DiEGME in water-fuel experiments using JP-5 fuel collected from the Navy's Red Hill fuel storage facility. Concentrations of other additives estimated based on percent composition in fuel and effective solubility.
2. Estimated concentrations based on assumed 0.017% JP-5 free product in aquifer plus noted dissolved-phase concentrations. DiEGME only present in original concentration in fuel.
3. Includes dissolved-phase contaminants plus sheens and an assumed 0.1% concentration of 40% DiEGME emulsion. Other additives assumed to remain dissolved in water and not in product sheen.

Manager Lau stated that the affected community faced many medical challenges shortly after the Thanksgiving 2020 spill and throughout 2021. The affected community suffered from exposure to unknown chemicals and complained of the smell of fuel in the water and throughout the living areas. They also observed sheen and foamy substances in the water, where no samples were collected immediately after the spill. Therefore, without any information, Roger Brewer, PhD, Environmental Health Administration, Hawai'i Department of Health, attempted to estimate the amount of JP5 (Jet Propellent 5), additives, deicing agents, and other substances that were present in the water based on the conditions that people were observing in their homes. Dr. Brew's calculation was derived through experimentation, testing, and his analysis to help guide medical professionals in assessing the exposure and causes of the various health symptoms the community continues to experience.

Chair Anthony referred to the top set of numbers, Total BTEXNM, on Dr. Brewer's chart and asked if that number reflects the different substances parts per billion (ppb).

Manager Lau responded that the estimated amounts are shown in ppb for different chemicals in JP5 fuel. He then explained each column represents the different water scenarios by category: water without visible sheen with odor; water with sheen and dissolved contaminants; and water with sheen, dissolved contaminants, and emulsion or foam-like substance.

Board Member Kaneshiro inquired if Dr. Brewer's estimated findings surprised the BWS.

Manager Lau replied that the numbers were high but did not surprise the BWS. The questions the BWS continues to ask are what additives were used in the spilled fuel, how it affected the environment, where the contamination traveled, and whether it reached the aquifer. The cleanup and remediation of the contamination will be critical, and the Navy must be held accountable for restoring our land and water to their pristine condition. He shared that it saddens him that so many continue to be affected by the contamination.

There was in-person testimony:

Susan Pcola-Davis	*She shared and explained her 10-page presentation, "Messing Around With Data," and prepared for a Ohana Nui Circle workshop. She stated that the contamination affected not only military homes but also other public areas that the Navy supplies water to, such as the Moanalua Center located in the Valkenburg area. She also provided the 21 pages from the FTAC presentation and her 30-page transcription from the FTAC meeting.*

Chair Anthony pointed out that pages six through nine show some exceedances before the November 2021 spill.

Ms. Susan Pcola-Davis asked if someone from the BWS could explain how the monitoring wells relate to the spill.

Chair Anthony commented that these spills have no boundaries and don't stay only within federal property. Therefore, more monitoring wells are needed past Navy property to better understand what is happening beyond.

Manager Lau responded to Ms. Pcola-Davis and stated that monitoring wells is crucial to the investigation, remediation, and cleanup. Monitoring wells help define what type of contaminants have traveled and how far they have traveled. He commented that the water system contamination is just one component of the sad and preventable situation. Manager Lau stated that the BWS has been sounding the alarm bells since 2014, when the BWS began seeing data.

Manager Lau stated that what is happening today is no surprise to the BWS. However, the Navy began installing monitoring wells in the early 2000s and slowly expanded its monitoring well network. The BWS advocated that an extensive amount of monitoring wells be quickly installed to map underground movement in the aquifer. The actions of the Navy are consistent with what the BWS has seen and experienced over the past ten years.

Ms. Pcola-Davis asked if there was any chance there may have been false positives due to contaminated gloves in the laboratory.

Manager Lau responded that he did not believe there were any false positives.

Ms. Pcola-Davis inquired if all sampling methods were the same.

Manager Lau replied that the TPH and groundwater contamination sampling methods are identical. He shared that the Navy's technical report that will be released will explain the increasing numbers from multiple samples taken from their water system.

Ms. Pcola-Davis commented that knowing what is happening in the monitoring wells and the drinking water is important.

Manager Lau stated that the monitoring wells and the drinking water are connected because everyone pumps water from the same aquifer. He shared that the EPA, the DOH, and the Navy are leading the remediation investigation and discussions. The BWS joins these meetings to share mana'o and requests that the community be informed of any new findings or proposed remediation efforts.

Manager Lau added that the issue is not just with the Navy's water system. It also includes the impact of the 80-year-old Red Hill Bulk Fuel Storage facility and the leaks and spills that have occurred over its lifetime.

Chair Anthony and Manager Lau expressed their appreciation for Ms. Pcola-Davis's work.

There was remote testimony:

Jamie Simic	*Commented that she believes the leaks before 2014 culminated in the major 2014 spill when she began falling ill while pregnant with her children and requested that information before 2014 be looked into and shared. She shared her presentation of map detection clusters throughout the Navy water system based on the information given and gathered.*

Manager Lau shared that Ms. Jamie Simic was correct. Tank number five leaked in January 2014, and the estimated leak was 27,000 gallons of JP-8, which leaked through holes drilled through the tank liner while repairing the tanks but were not completely sealed and plugged. And, as Ms. Pcola-Davis shared, there was also a similar leak from tank number two. In response to the environmental contamination Ms. Simic mentioned, Manager Lau stated that the Navy tested three locations around the JBPHH area, with test results indicating severe contaminations.

Ms. Simic mentioned three other locations outside the JBPHH that were also tested. She shared that Dr. Brewer did a study and had it published, which led to higher Environmental Action Levels (EAL). During this time, the DOH also announced different health advisories. Ms. Simic mentioned a submarine base at Cape Hatteras, North Carolina, where, in the early 2000s, an underground fuel storage tank leaked, and are still receiving reports of fuel pods washing onshore. The pipelines on the shorelines leading into the ocean were exposed during the last hurricane. Ms. Simic said she would happily share any information and data she had.

Manager Lau stated that he wasn't aware of the North Carolina situation.

Chair Anthony and Manager Lau thanked Ms. Simic for her time.

There was written testimony:

Meredith Wilson	*Sent questions and requested that they be answered during the meeting so it could be on record.*

1. *Has the BWS or HIDOH received a response from the March 1st request for further PFAS testing of the Navy?*

   Deputy Manager Erwin Kawata replied no; the BWS has not received a response yet but continues to make the request.

2. *Can you explain the rationale of how Groundwater test results would not further reflect Drinking Water System results? For example, the troublesome RHMW02 measured an exceedance of TPH-d as recent as 3/15/24 at 1,380ppb – how can the public be assured that this will not migrate to their drinking water?*

   Deputy Manager Kawata explained groundwater or monitoring well test results give an understanding of what is in the environment. The drinking water system's results start with the water source. Therefore, monitoring both the monitoring well and the drinking water system is important. He commented that in the Red Hill case, what is happening at the source and the monitoring well may not be the same but could be related or have relationships.

3. *What are the implications of keeping on or removing an aerator during the sampling of Drinking Water within a home?*

   Deputy Manager Kawata responded that when sampling, the aerator should be removed to eliminate turbulence that the aerator creates. He explained that when taking a water sample for volatile substances, leaving the aerator on will cause turbulence in the water, allowing

volatile substances to evaporate or be released from the water and skewing the water sample. Deputy Manager Kawata advised collecting water samples from a steady stream of water flow.

4. *What is the expected "background level" or "noise" of TPH in groundwater or drinking water sampling?*

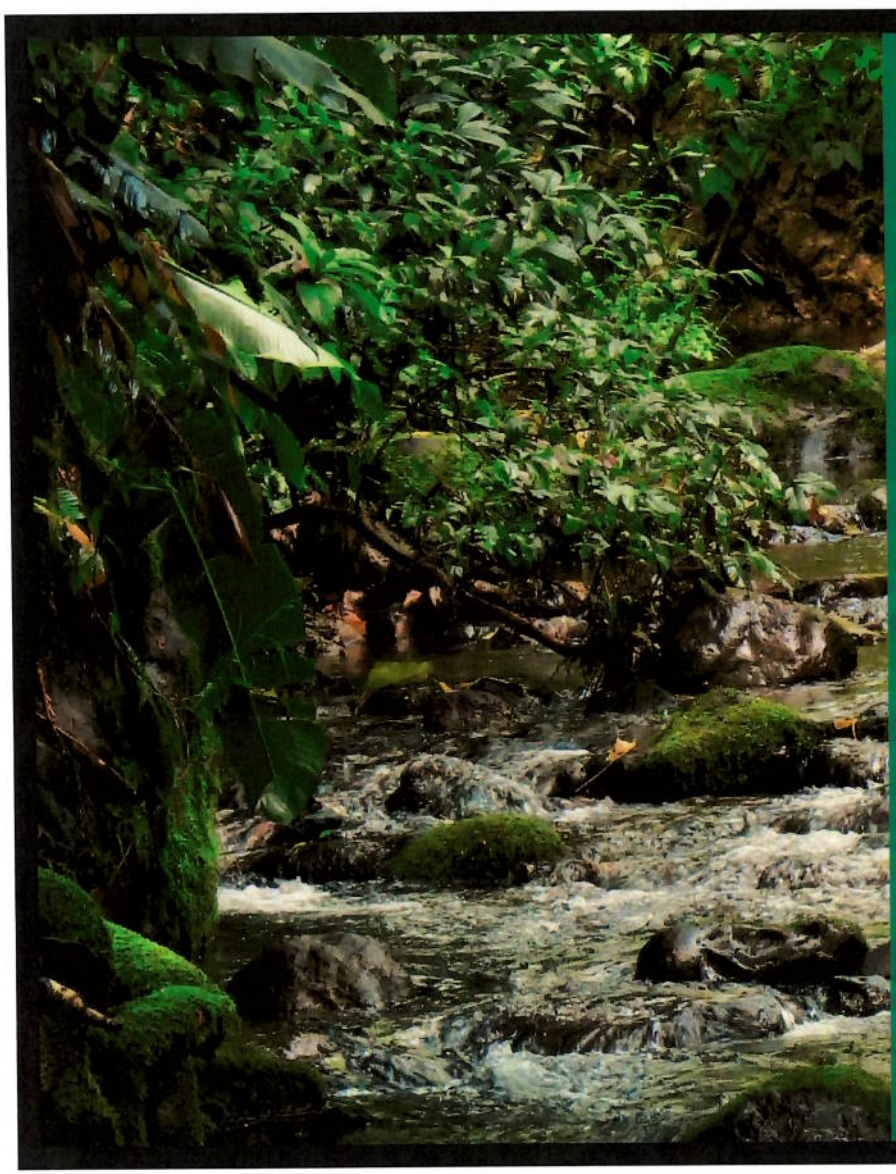
   Deputy Manager Kawata explained that "background noise" occurs when we ask the instrument to measure at extremely low levels, that it may be unable to do. When testing for such low levels of TPH contamination with an instrument that cannot measure it, it becomes difficult to know the difference between noise and what is real. Therefore, it is important to do a minimum reporting limit, which is the lowest level that can be measured where noise does not interfere. Then, check the analysis regularly to ensure the minimum reporting limit can be reproduced to ensure the data being collected is valid.

5. *Do you think that the Red Hill Shaft should or even could ever be put back into service? Can BWS withstand the indefinite closure of the Halawa Shaft due to Red Hill? Navy officials seem adamant that re-opening the Red Hill well is their eventual goal.*

   To answer the first part of the question, Deputy Manager Kawata stated that the BWS has no jurisdiction over the Navy's Red Hill Shaft. The decision to turn Red Hill Shaft on is up to the Navy and the regulators. To answer the second part of the question, Deputy Manager Kawata stated that the BWS shut down the Halawa Shaft in response to the Red Hill contamination crisis. Before the BWS can determine whether it would be appropriate to turn the Halawa Shaft back on or keep it shut down, the BWS would need more data about the characterization and an understanding of what is occurring in the subsurface of the aquifer. Due to the time, it will take to complete the study and receive results, the BWS has proceeded to look for alternate sources and drill new wells to replace the capacity lost from shutting down Halawa Shaft, Halawa Well, and Aiea Well.

6. *DOH has posted a Draft of updates to their Environmental Health Evaluation (EHE) guidance as early as April 4th on their website (albeit without fanfare and hard for average public to find). Has BWS seen and/or reviewed these document? It contains exhaustive information, but so far, it seems as if the future land use of the Red Hill site has a great dictation for the level of cleanup to be required. This is why the Reuse and Repurposing report that is yet to be finalized is so crucial.*

   Deputy Manager Kawata replied that the BWS has seen the EHE and the EAL, which the DOH has made some draft changes. The BWS is in the process of reviewing the information and will prepare comments and make them available when they're finalized.



APRIL 2024
RED HILL UPDATES

April 22, 2024

boardofwatersupply.com

RECENT EVENTS

4/8

- Community Representation Initiative – Our Water Our Future Workshop

4/9

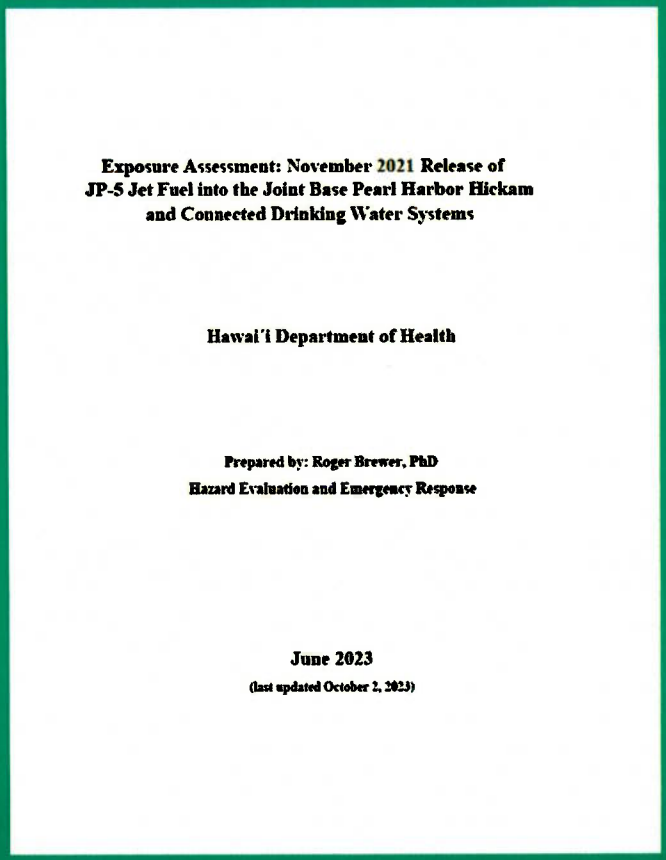
- Defense Health Agency –Red Hill Public Health Webinar
- Meeting with Department of Health – Dr. Roger Brewer

4/11

- Red Hill Remediation Roundtable

4/19

- Quarterly Meeting with RDML Steve Barnett and staff



Exposure Assessment: November 2021 Release of JP-5 Jet Fuel into the Joint Base Pearl Harbor Hickam and Connected Drinking Water Systems

Hawai'i Department of Health

Prepared by: Roger Brewer, PhD
Hazard Evaluation and Emergency Response

June 2023
(last updated October 2, 2023)

Copy of the Report

Dr. Roger Brewer's estimated findings on JP-5 fuel exposure levels within the Joint Base Pearl Harbor's drinking water system following the November 21, 2021, fuel release event.

Table 2. Estimated Reasonable Maximum Exposure (RME) concentrations of contaminated water drawn into the JBPHH drinking water system.

		RME Concentration		
	Compound	[1]Dissolved-Phase Contaminants Only (µg/L)	[2]Dissolved Contaminants +JP-5 Sheen (µg/L)	[3]Dissolved Contaminants +JP-5 Sheen +FSII Emulsion (µg/L)
	Total BTEXNM:	**2,116**	**4,291**	**4,291**
	Total Carbon Ranges:	**3,088**	**150,913**	**150,913**
JP-5 Fuel	**Benzene**	13	16	16
	Toluene	154	182	182
	Ethylbenzene	81	123	123
	Xylenes	630	943	943
	Naphthalene	649	1,083	1,083
	1-Methylnaphthalene	339	1,155	1,155
	2-Methylnaphthalene	250	789	789
	C5-C8 Aliphatics	6.6	250	250
	>C8-C18 Aliphatics	0	120,962	120,962
	>C18-C32 Aliphatics	0	0	0
	>C8 Aromatics	3,082	29,702	29,702
Total Hydrocarbons (ug/L):		**5,204**	**155,204**	**155,204**
JP-5 Additives	**Diethylene Glycol Monomethyl Ether**	50	215	400,000
	2,6-Di-Tert-Butyl-4-Methylphenol	1.2	25	25
	Linoleic acid dimers	0.005	54	54

1. Measured dissolved-phase concentration of hydrocarbons and DiEGME in water-fuel experiments using JP-5 fuel collected from the Navy's Red Hill fuel storage facility. Concentration of other additives estimated based on percent composition in fuel and effective solubility.
2. Estimated concentrations based on assumed 0.015% JP-5 free product in tapwater plus noted dissolved-phase concentrations. DiEGME only present in original concentration in fuel.
3. Includes dissolved-phase contaminants plus sheens and an assumed 0.1% concentration of 40% DiEGME emulsion. Other additives assumed to remain dissolved in water and/or in product sheen.

HOUSE BILL 2690, HD2, SD1
"A BILL FOR AN ACT RELATING TO WATER"

Highlights of the measure:

- Establishes the position of Red Hill Water Alliance Initiative (WAI) Policy Coordinator within the Office of the Executive Director of the Commission on Water Resource Management (Commission);
- Establishes a Red Hill Remediation Special Fund to be administered by the WAI Policy Coordinator
- Establishes and appropriates moneys for positions within the Office of the Chairperson of the Board of Land and Natural Resources for purposes of WAI policy coordination; and
- Authorizes the Commission to declare a water emergency in certain circumstances;
- Establishes fines for certain water use offenses and violations of the Commission's orders; and
- Clarifies the Commission's authority to declare a water shortage and the requirements for providing public notice of the declared water shortage.

FINAL PFAS NATIONAL DRINKING WATER REGULATION

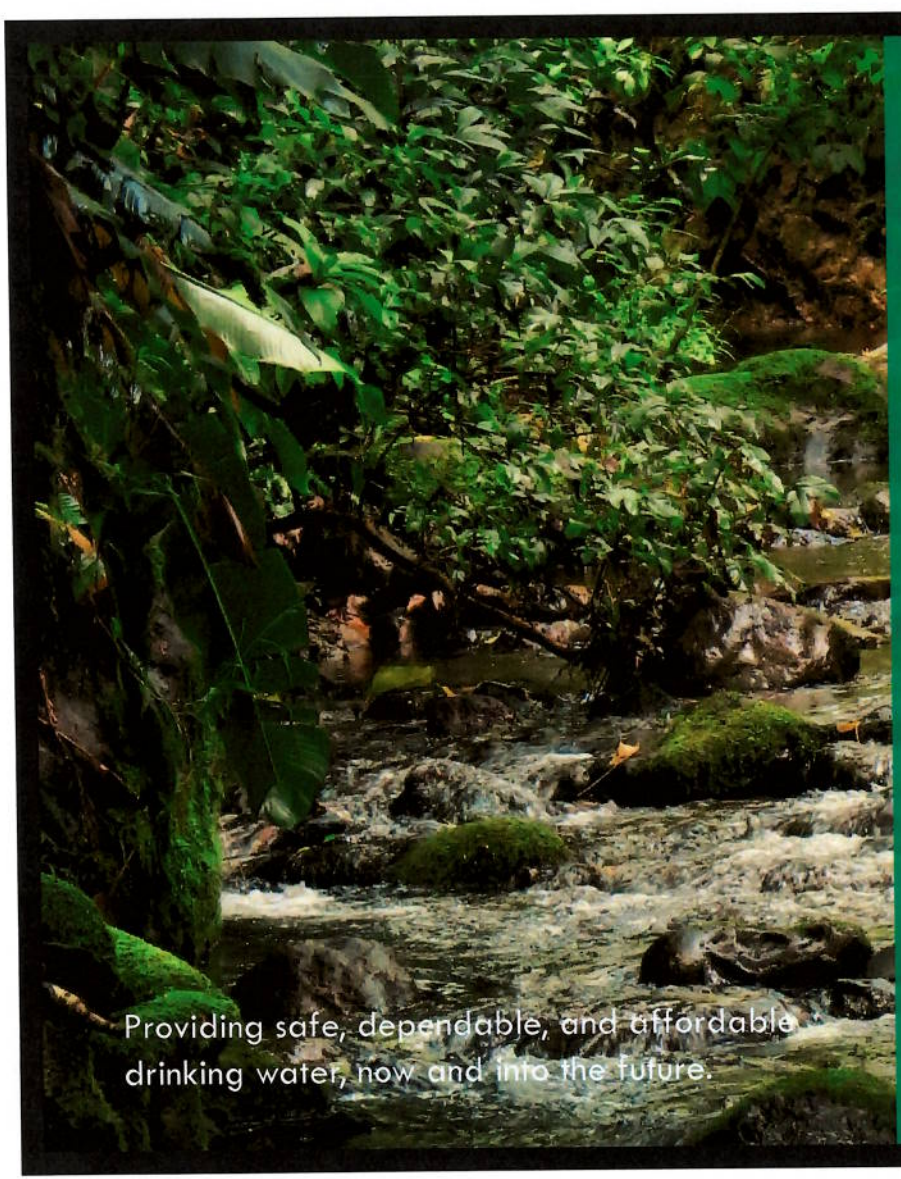
Proposed Drinking Water Standards	Critical Health Endpoint	BAT	MCLG (ppt)	MCL (ppt)
Perfluorooctanoic acid (PFOA)	Cancer	Granular Activated Carbon (GAC)	0	4.0
Perfluorooctanesulfonic acid (PFOS)	Cancer		0	4.0
Perfluorohexanesulfonic acid (PFHxS)	Thyroid Effects	Ion Exchance (IX)	10	
Perfluorononanoic acid (PFNA)	Developmental Effects		10	
Hexafluoropropylene dimer acid (HFPO-DA) and its ammonium salt	Liver Effects	Nanofiltration (NF)	10	
Perfluorobutanesulfonic acid (PFBS), PFHxS, PFNA, and HFPO-DA and their salts	Multiple	Reverse Osmosis (RO)	Hazard Index of 1	

Best Available Technology (BAT): The best available technology to reduce contaminants.
Maximum Contaminant Level Goal (MCLG): : The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.
Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.
ppt: parts per trillion.
Hazard Index (HI): The Hazard Index is a long-established approach that EPA regularly uses to understand health risk from a chemical mixture (i.e., exposure to multiple chemicals). The HI is made up of a sum of fractions. Each fraction compares the level of each PFAS measured in the water to the health-based water concentration.

FINAL PFAS NATIONAL DRINKING WATER REGULATION

Final rule requirements include:

- Public water systems must monitor for these PFAS and have three years to complete initial monitoring (by 2027), followed by ongoing compliance monitoring.
- Water systems must also provide the public with information on the levels of these PFAS in their drinking water beginning in 2027.
- Public water systems have five years (by 2029) to implement solutions that reduce these PFAS if monitoring shows that drinking water levels exceed these MCLs.
- Beginning in five years (2029), public water systems that have PFAS in drinking water which violates one or more of these MCLs must take action to reduce levels of these PFAS in their drinking water and must provide notification to the public of the violation.



Providing safe, dependable, and affordable drinking water, now and into the future.

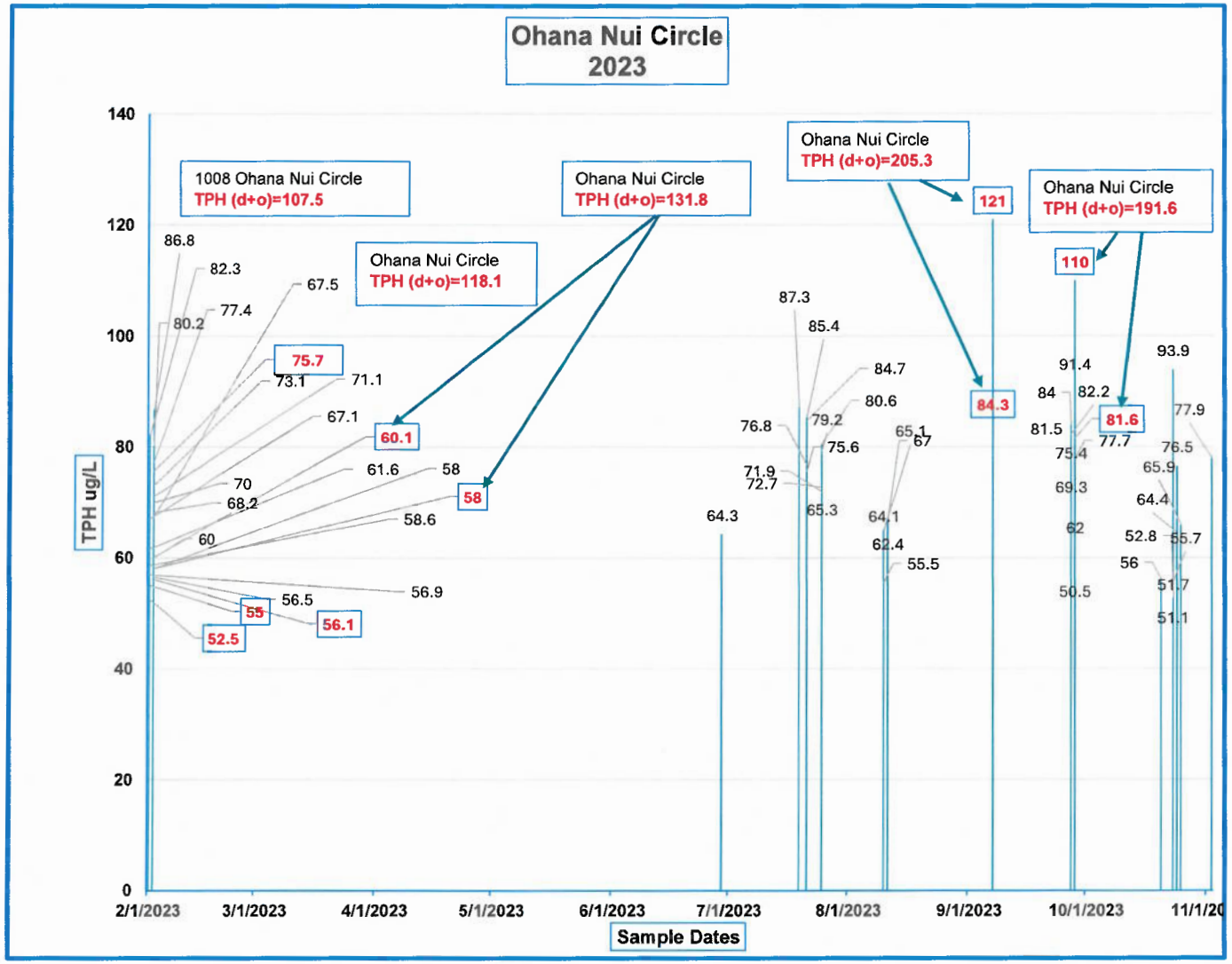
MAHALO!

April 2024 Red Hill Updates

MESSING AROUND WITH DATA

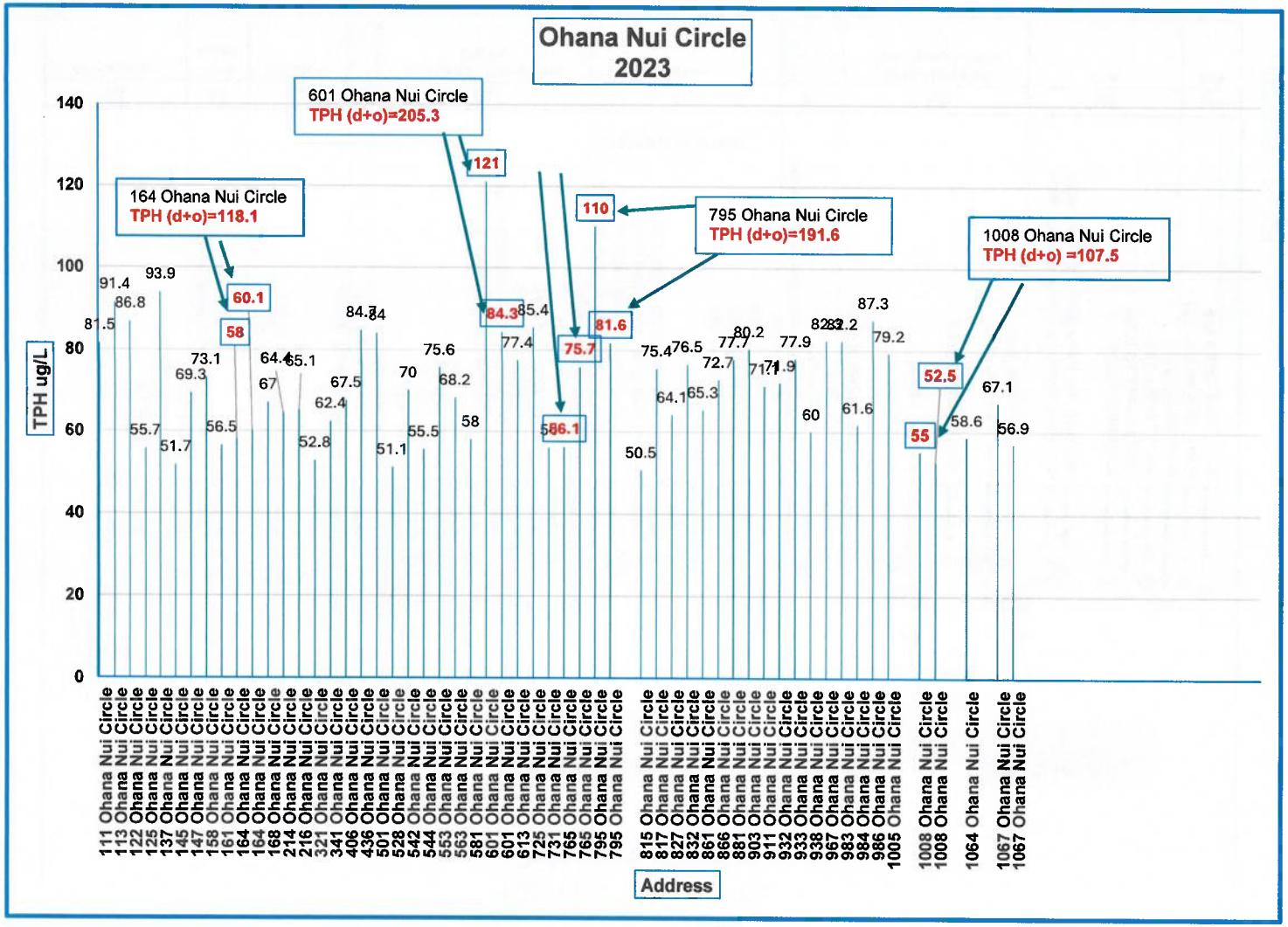
Susan A. Pcola-Davis

UN-safe Waters



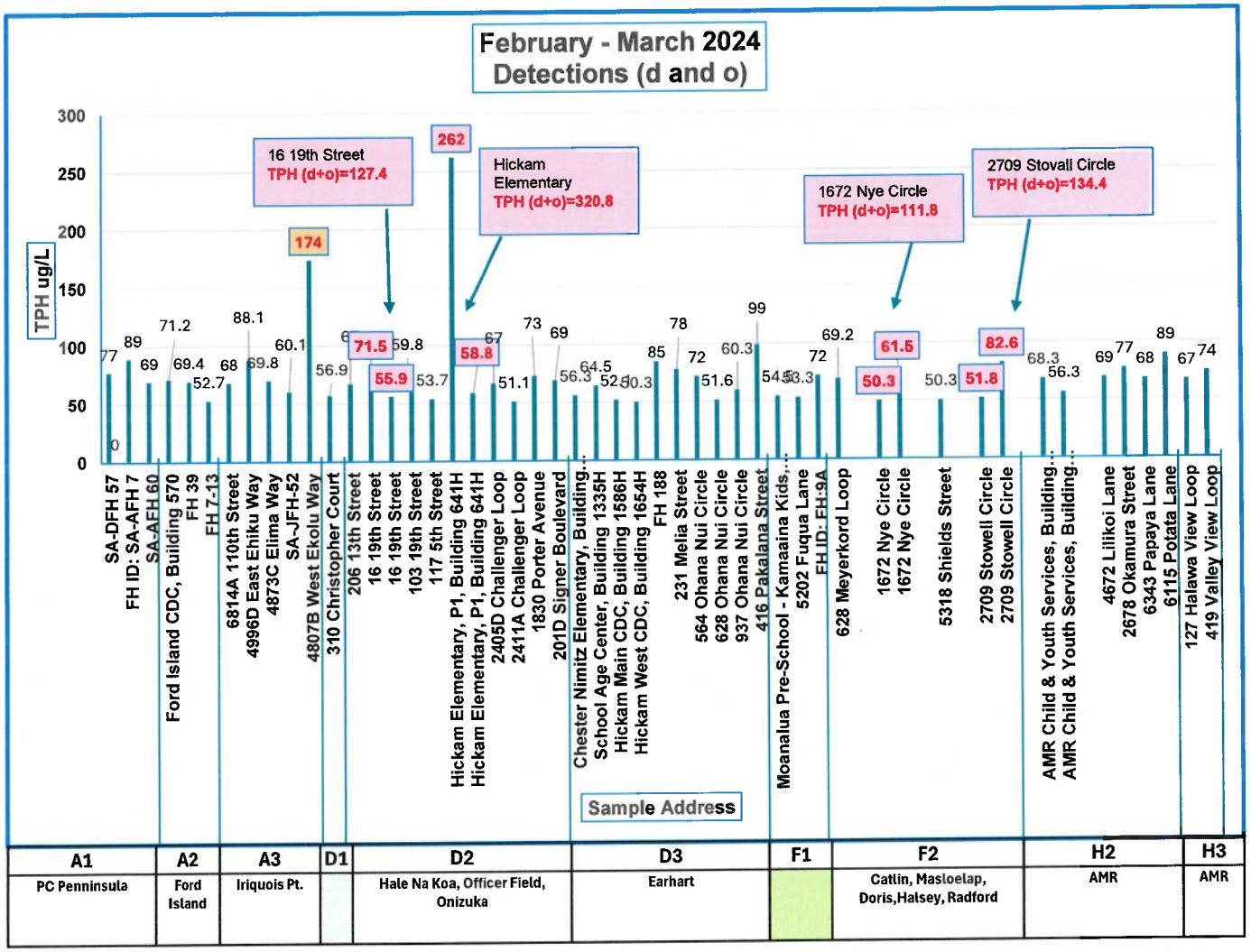
61 Detections

DATE	TPH (d+o)
1-Feb	55+52.5=107.5
2-Feb	58+68.1=118.1
2-Feb	56.1+75.7=131.8
7-Sep	121+84.3=205.3
28-Sep	110+81.6=191.6



61 Detections

ADDRESS	TPH (d+o)
1008 Ohana Nui Circle	55+52.5=107.5
164 Ohana Nui Circle	58+68.1=118.1
765 Ohana Nui Circle	56.1+75.7=131.8
601 Ohana Nui Circle	121+84.3=205.3
795 Ohana Nui Circle	110+81.6=191.6

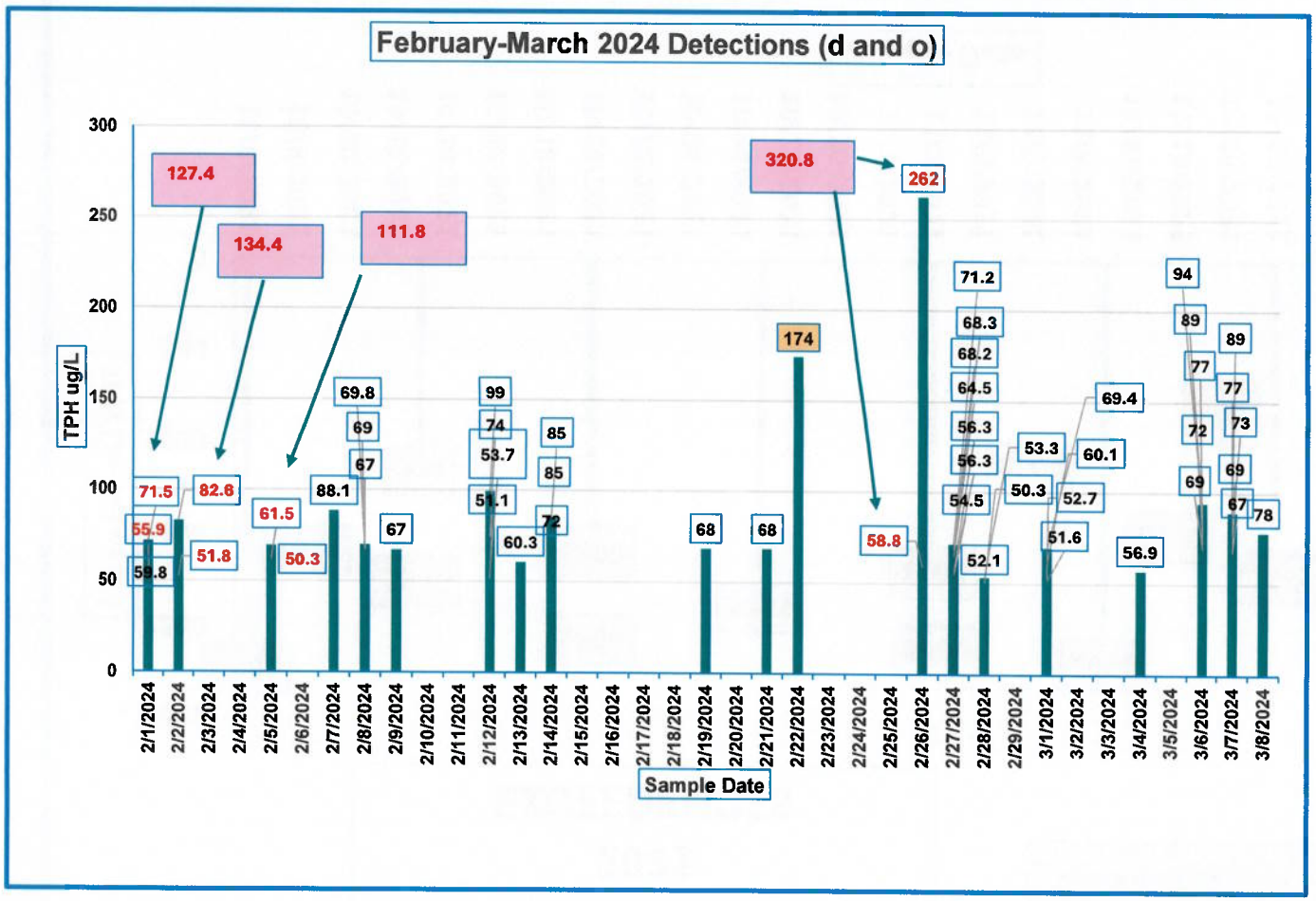


54 Detections

Zone	Address	TPH (d+o)
D2	16 19th Street	127.4
D2	Hickam Elementary, P1, Building 641H	320.8
F2	1672 Nye Circle	111.8
F2	2709 Stowell Circle	134.4

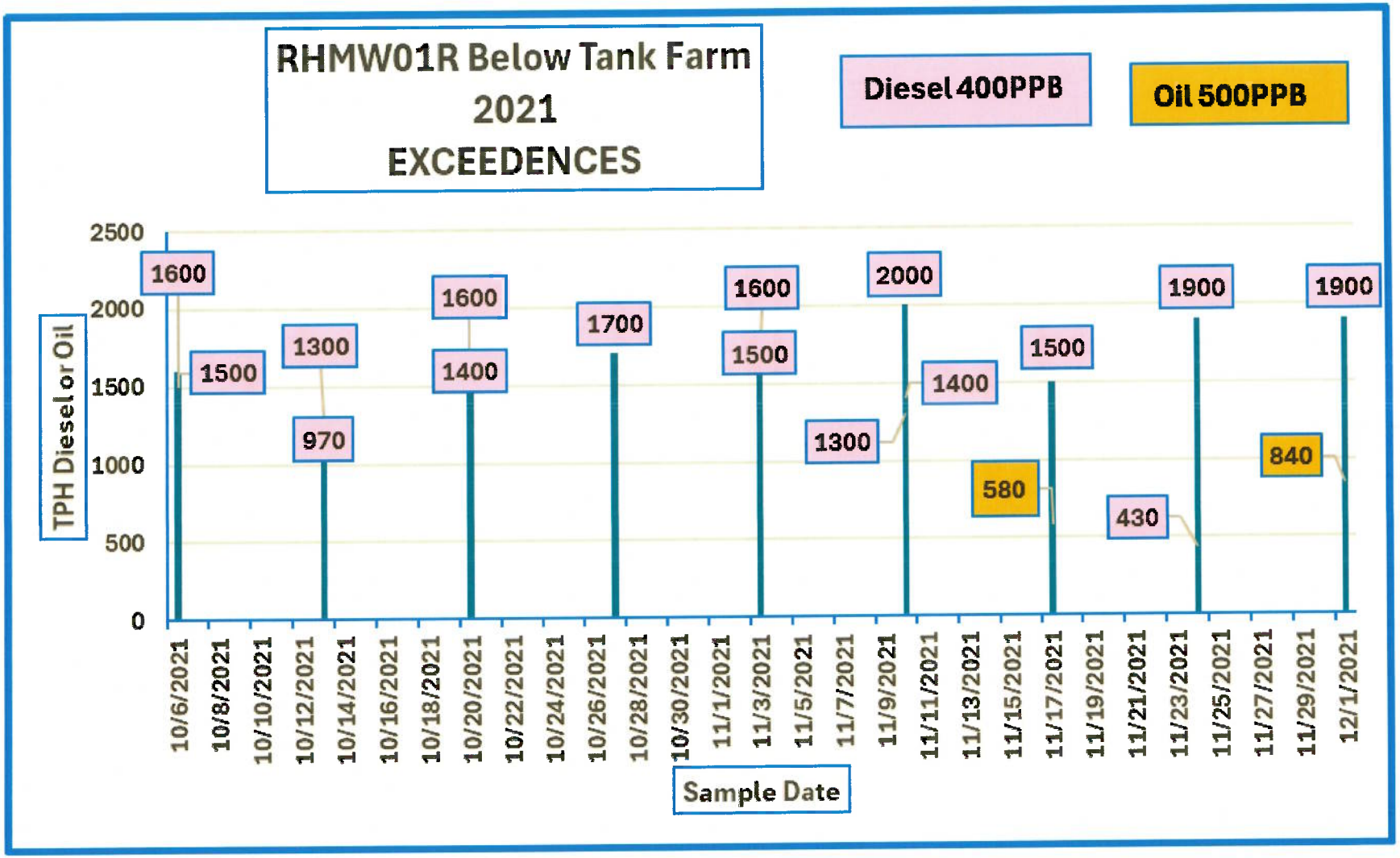
D1: Hale Moku, Hokulani

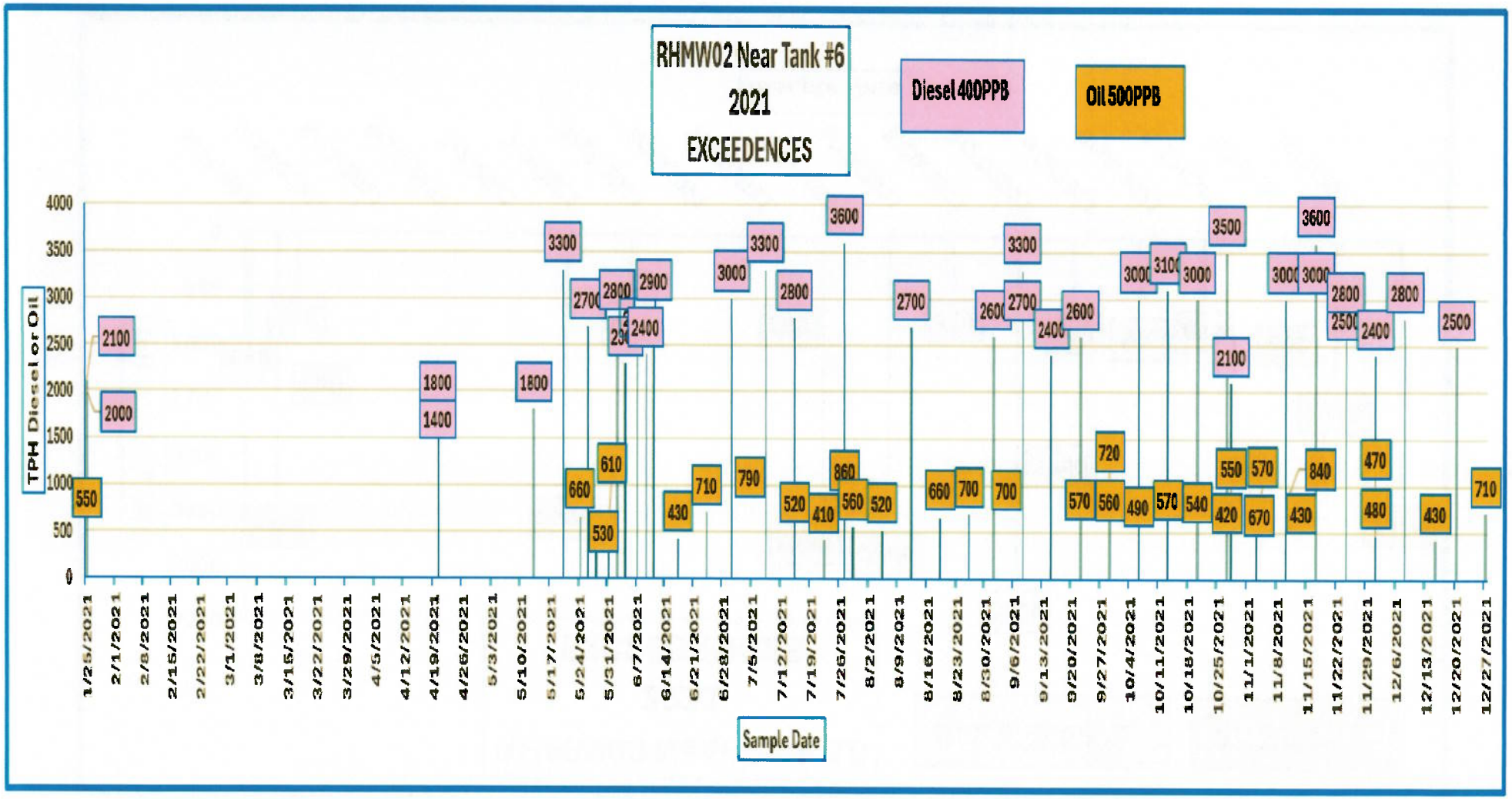
F1: NEX, Moanalua Terrace Hale Moku, Hokulani



54 Detections

Date	TPH (d+o)	Zone
1-Feb	127.4	D2
2-Feb	134.4	F2
5-Feb	111.8	F2
26-Feb	320.8	D2


RHMW01R Below Tank Farm
2021
EXCEEDENCES
Diesel 400PPB
Oil 500PPB
TPH Diesel or Oil
2500
2000
1500
1000
500
0
1600
1500
1300
970
1600
1400
1700
1600
1500
1300
2000
1400
580
1500
430
1900
840
1900
10/6/2021
10/8/2021
10/10/2021
10/12/2021
10/14/2021
10/16/2021
10/18/2021
10/20/2021
10/22/2021
10/24/2021
10/26/2021
10/28/2021
10/30/2021
11/1/2021
11/3/2021
11/5/2021
11/7/2021
11/9/2021
11/11/2021
11/13/2021
11/15/2021
11/17/2021
11/19/2021
11/21/2021
11/23/2021
11/25/2021
11/27/2021
11/29/2021
12/1/2021
Sample Date


RHMW02 Near Tank #6
2021
EXCEEDENCES
Diesel 400PPB
Oil 500PPB
TPH Diesel or Oil
Sample Date
4000
3500
3000
2500
2000
1500
1000
500
0
1/25/2021
2/1/2021
2/8/2021
2/15/2021
2/22/2021
3/1/2021
3/8/2021
3/15/2021
3/22/2021
3/29/2021
4/5/2021
4/12/2021
4/19/2021
4/26/2021
5/3/2021
5/10/2021
5/17/2021
5/24/2021
5/31/2021
6/7/2021
6/14/2021
6/21/2021
6/28/2021
7/5/2021
7/12/2021
7/19/2021
7/26/2021
8/2/2021
8/9/2021
8/16/2021
8/23/2021
8/30/2021
9/6/2021
9/13/2021
9/20/2021
9/27/2021
10/4/2021
10/11/2021
10/18/2021
10/25/2021
11/1/2021
11/8/2021
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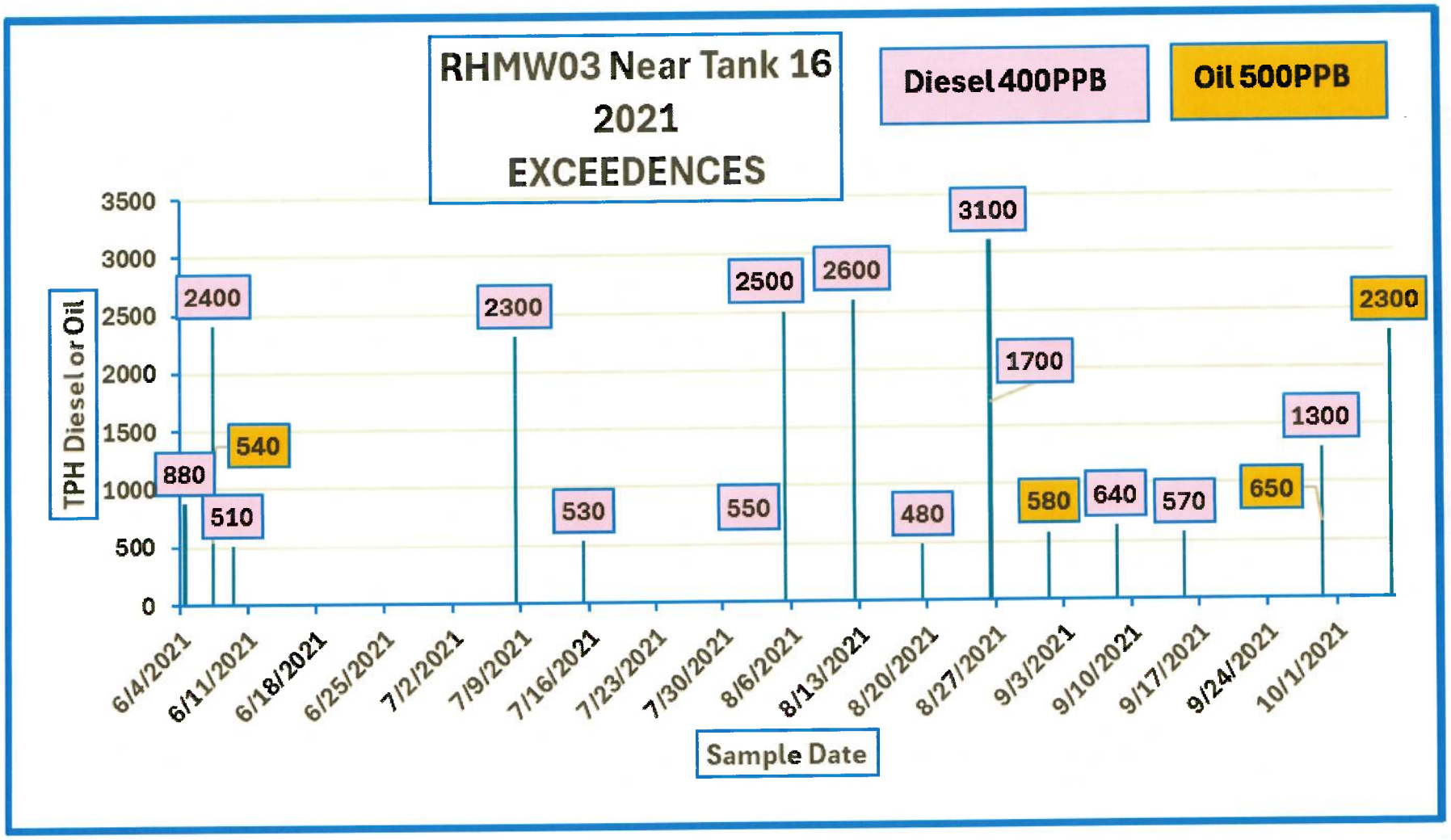
12/20/2021
12/27/2021


RHMW03 Near Tank 16
2021
EXCEEDENCES
Diesel 400PPB
Oil 500PPB
TPH Diesel or Oil
3500
3000
2500
2000
1500
1000
500
0
2400
880
540
510
2300
530
2500
550
2600
480
3100
1700
580
640
570
650
1300
2300
6/4/2021
6/11/2021
6/18/2021
6/25/2021
7/2/2021
7/9/2021
7/16/2021
7/23/2021
7/30/2021
8/6/2021
8/13/2021
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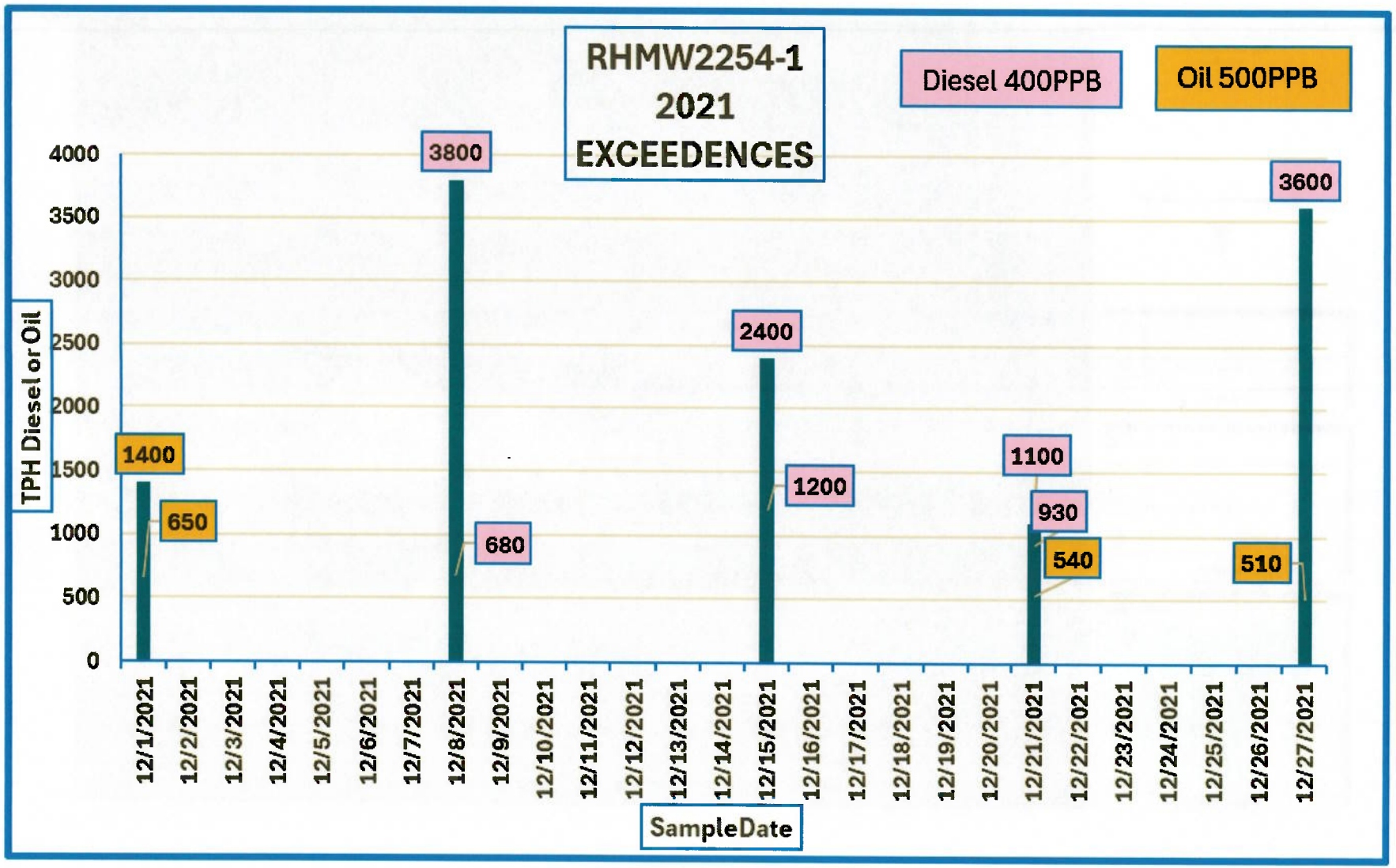
9/17/2021
9/24/2021
10/1/2021
Sample Date


RHMW2254-1
2021
EXCEEDENCES
Diesel 400PPB
Oil 500PPB
TPH Diesel or Oil
4000
3500
3000
2500
2000
1500
1000
500
0
1400
650
3800
680
2400
1200
1100
930
540
510
3600
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SampleDate

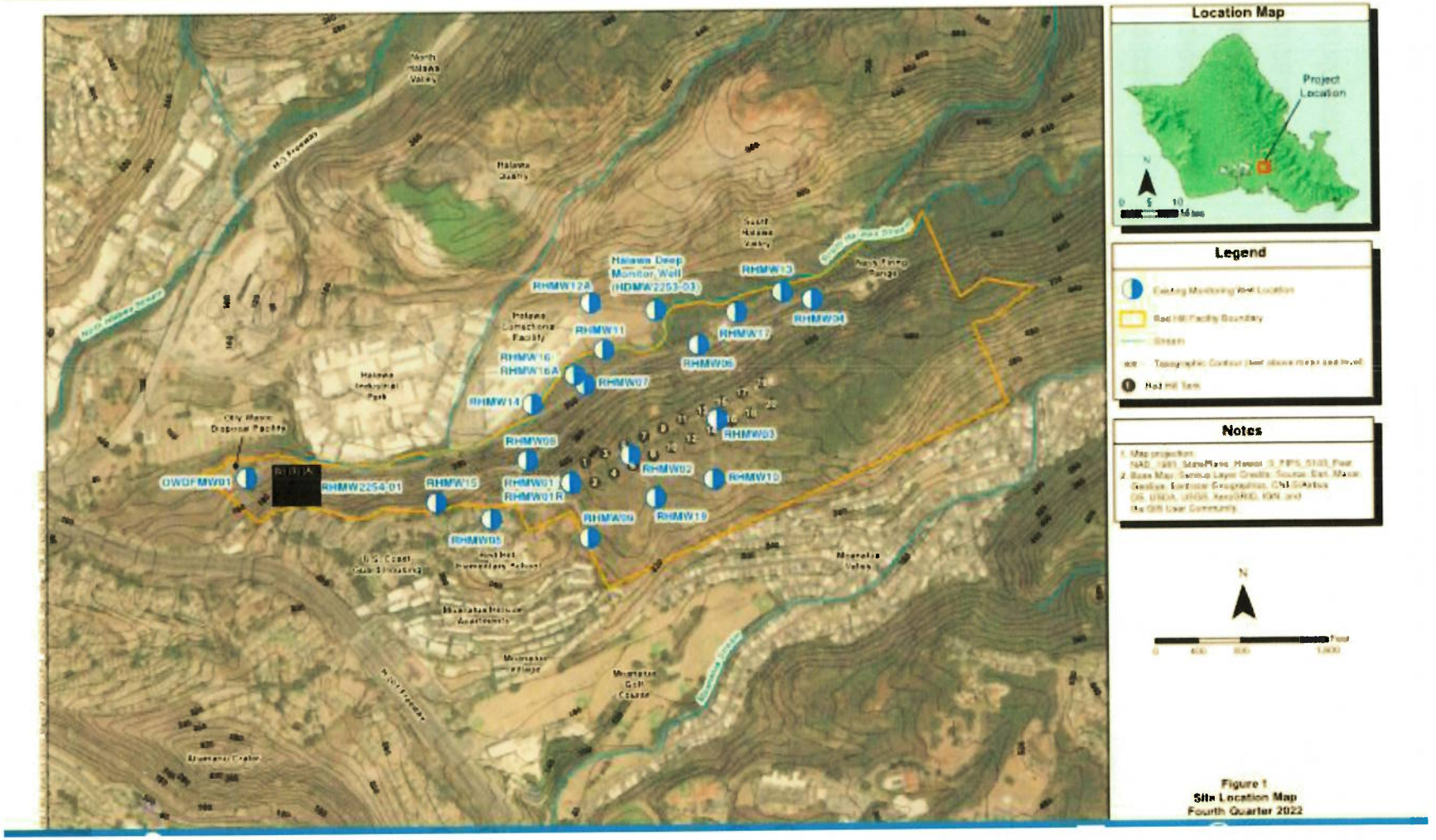

Figure 1
Site Location Map
Fourth Quarter 2022

1:55:28 Host
Just a a bit of a warning this next chapter this next set of topics will be probably a little longer than planned because of new information, very detailed information that will be presented. But let's start first with the response to complaints in the Navy's drinking water system and I'd like to turn it over to somebody from yeah.

1:55:46
CAPT Sullivan (Commander NAVFAC)
Good afternoon, if we go to the
next slide

The intent of this presentation I'm going to cover several items as well as introducing you to someone much smarter than me to get into really the details of everything. First I will I'll cover a couple slides that talk about the status of the long-term monitoring um as well as talk about all of the complaints any concerns that have been addressed.

And then we're going to get into and I'll apologize upfront, very detailed discussion that's going to talk about the low level of the TPH detections that we had across the system throughout period 7.

The importance of going into that detail we do not want to just cover you know a very generic statement we want to make sure there's been a lot of questions on this and there's been a lot of folks that want to have a clear understanding.

We want to show all our math this is what we found this is the process that we went through and this is the way forward.

So that's why it is going to be a little bit more detailed and a little bit more time consuming than was originally planned. Then I'll focus back on some of the actions that the Navy has; to summarize the actions the Navy has taken as well as talk about what is the JBPHH water quality plan going forward. If you can go to the

next slide

1:57:08
I know that this is a slide that many of you seen in the past this just covers the two-year period that was the drinking water long-term monitoring we are currently in Period 7 of seven periods which was a 2-year program we've conducted over 8,000 samples to date.

It is important to note in every single period we test every medical facility every school every Child Development Center in each of those periods and at the completion of the two-year period which ends in March 2024.

This month we will be completing this overall two-year period 65% of the overall residents of JBPHH will have been tested during this long-term monitoring.

1:57:52
If you look at the bottom right hand corner that is just the graphic to get to our website. The Safe Waters website I know we've talked about that many times in the past but again continue to look at that site to give us any feedback that you might have.

I know in past settings engagements the Board of Water Supply have given us a lot of great recommendations of how we can continue to improve that website. So we are always open to that feedback.

next slide

This jumps into an issue that we've been talking about for the last several months

This chart shows you that from period to period across the LTM for the last two years the percentage of detections that we've had. While it's important to note, we've had no exceedances of the ISP. We are and have continued to have detections of TPH really in Period 6 is where it culminated in 60% of the Period 6 samples resulted in a detection, again not an exceedance but a detection. So obviously something that we wanted to dig into to understand what is going on.

Admiral Barnett directed that we bring in all of the subject matter experts that we have in the Navy for drinking water, the Navy medical health facility, the Regulators bring everybody together and try to figure out what could possibly be causing these TPH detections that seem to increase.

As we've gone through you will note that on the far right we are in Period 7, we've already done 1,000 samples and we have dropped back down to 19% of our overall samples that were taken from January 1st through the 16th of February.

1:59:42
Have been had detections in **it drastically a reduction** and we're going to get into the details of why that is happening and what we found in the next couple of slides.

1:59:56
I want to start off by making it crystal clear that every single concern that we get we take very serious. If a resident has calls in with a medical concern with a Sheen that they are seeing in a water with really any question or any concern, we will and have immediately reacted.

But we had work to do to continue to improve what is our response for those actions and I'll talk a little bit later about how we've adapted from what was a rapid response team really focused on making sure and finding out is there any TPH is there JP-5, is there anything in the fuel, in the house, the resident that is causing a concern. And maybe not looking at the entire house to see if it's not this what else possibly could it be.

We've changed that approach to make sure that we are looking at the entire house for all water quality, bacterial, biological, water heater, temperatures. We'll talk

2:00:54
about the premise Plumbing investigation in some of the future slides. But just focusing on the we want people to call if they have any concerns. Please continue to call the EOC as well as I realize that there are some people that are still not comfortable coming to the Navy and have been going to The Regulators. I ask that you come to the Navy but if you're not comfortable please continue to reach out to them and they are getting us that information so that we can immediately address any concerns that you might have.

Next slide
Actions taken to date for the Navy this is really a layered approach just like everything else. The first one is compliance monitoring. Compliance monitoring of all drinking water systems is done across the world, the Navy, Board of Water Supply has their compliance monitoring. We continue to do that outside of all of the long-term monitoring efforts that we've done as a result of the Red Hill crisis. The rapid response team that we put together has shifted now to the water quality action team.

Again focusing away just from trying to prove that it's not TPH or JP-5 and instead holistically look at that house and try to figure out what could be going on.

2:02:06
The third one is improved communication again that's been a goal that Admiral Barnett and Admiral Wade have been working for the last couple years to continue to improve and we are committed to following through with everything that Admiral Barnett said and following the actions of the JTF to continue to improve communication.

2:02:24
Premise Plumbing assessment. This was conducted initially started with 10 residents in the water heaters but we have continued to move forward with that including dissecting a water heater to where we went to the house that had the highest TPH detection of all of the JBPHH water system. We took that water heater out we cut it up we look we Department of Health and the EPA were invited to participate and to make sure that there was nothing unusual going on we've documented that and we've taken samples from that water heater.

That are currently being processed performing a root cause analysis as part of the SWARM effort when we realized, when we saw the trend and the increase of TPH detections in Period 6. Pulled again the (SMEs) the subject matter experts and they performed a root cause analysis to try to figure out what could be causing those detections.

And that's what we're going to get into a couple slides from now. Those details and then the final one is the development of what we call the EDWM, the extended drinking water monitoring plan.

This is the commitment that Admiral Barett made several months ago that when LTM expires at the end of March 2024 the Navy is not

stopping our sampling. We will continue to monitor the system to ensure the safety of it and that plan, that we are calling EDWM, extended drinking water monitoring plan. We're developing that right now, finalizing it with the regulators and intend to begin implementation of that immediately at the completion of LTM at the end of this month. So at this point I'm going to turn it over to

2:04:07
Chris Waldren, he is a drinking water subject matter expert and he was one of the leaders of the SWARM effort to get into a lot of details on the science of what we found.

Next Slide.
2:04:32
[?Please water hydr CB?] so thanks for the opportunity to speak with today. It's a very important topic and I think it's been foreshadowed. I have quite a few slides so I apologize for that. I will try to move through them quickly but as a warning there's quite a bit of chemistry but I sure you we'll get through it together.

2:04:58
So for some of you might have nightmares from chemistry class, I'll try not to recreate those here. So what are hydrocarbons? So hydrocarbons are comprised of carbon and hydrogen atoms. Okay very simple in concept there's just carbon and just hydrogen.

But the unique part about it is that there are hundreds of different combinations of carbon and hydrogens that make up petroleum hydrocarbons and they're just arranged differently. They're in shorter chains, longer changes, and they can also be assembled in rings. One of the key questions that I want to kind of address today just as a baseline level is.

You know are all hydrocarbons total petroleum hydrocarbon? TPH that acronym and the answer to that is no. There are many sources of hydrocarbons. One of the primary sources of hydrocarbons that you see are indeed from petroleum. That's the one we know most about because we hear about it, surrounds us in our everyday lives. So crude oil, JP-5, gasoline, diesel, home heating oil, all that all those things that you're very familiar with and then things that you're not.

But what you might not be aware of is that there are naturally occurring versions of hydrocarbons, we call those biogenic but essentially that's just saying that they originate from a mixture of organic compounds that are synthesized by living organisms. So some algae produce hydrocarbons, bacteria can produce hydrocarbons, etc.

So when we talk about hydrocarbons and we talk about TPH we have to dig a little bit deeper in terms of what are we actually speaking about. What are we discussing, what are the things that we're analyzing? Because we use it as general term and often times what happens is that there ends up being confusion about what it is. There's also another form of hydrocarbon that's formed by combustion. We call those pyogenic so associated with combustion.

So and here's where you know us as scientists, I don't think that we've done ourselves the greatest favor in terms of this the method that we use to analyze for hydrocarbons. It is called method but the title of it is total petroleum hydrocarbons but the method is not specific to Total petroleum hydrocarbons. It will actually return petroleum hydrocarbons, naturally occurring hydrocarbons, biogenic. It will also return pyrogenic.

It's not specific so we call that a non-specific method. Unfortunately the name is kind of a misnomer. So you'll hear people talk about results and they'll say well the result is TPH, it's total petroleum hydrocarbon.

Well that's what the lab says that's what it says on the actual printout but in fact that isn't exactly what it is it, can be, but it can also include these other things. So it that becomes more important as we talk later so just want to make sure that that folks understand that it is confusing, because of the terminology.

But that's a base line thing that I want everybody to be aware of.

One of the other things that's been brought up here is that as part of the drinking water investigation effort that was associated with the Red Hill release and then following that with long-term monitoring. We also sampled for indicator compounds and I think those were brought up earlier by EPA. And we looked for other individual compounds that are unique or indicators of fuel, so things like benzene, toluene, ethylbenzene, xylene. Those were all tested for individually. We also tested for 1- napthalene to methylnapthalene and other constituents. Those are key constituents because they represent a significant component of TPH.

So if we're actually talking about fuels, gasoline, or jet fuel; those are compounds that you would typically expect to see individually, as well as, this overall method. So again are all, hydrocarbons TPH? Well you saw in the previous Slide, the quick answer is no.

So I just wanted to give you kind of a pictorial here. So one of the things that we do when we ship these off to the lab, and this is a bit of chemistry, is we get a chromatogram. That's what these pictures are that you see up in front of you right now. It's a chart essentially and what it does is we put the sample into an instrument, and then it separates the individual compounds in that sample into different Peaks, that come out on the instrument.

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Okay ordinarily when we do this we're only looking at a single compound. So like with Benzene, we're just looking for one Peak. And the way that we can tell whether or not it's Benzene is where it comes out on this x axis, the bottom part of that there's a time, and Benzene will come out at a specific time. And if we had a peak then we know we've got Benzene. It's a little bit more complicated and a little bit it's a lot more complicated with petroleum hydrocarbons or hydrocarbons in general is that there are hundreds of them and so instead of getting a single Peak we

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get multiple Peaks so you can kind of think of this like a fingerprint okay where we do pattern

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Matching. We're looking for similarities and differences in patterns when we look at hydrocarbons. So I wanted to give you a couple examples so what does diesel look like. Now this is a neat, meaning it's a relatively fresh Diesel and it gives us the first chromatogram which is at the top.

You can see it's got a variety of different peaks in that that go around. It comes out relatively early in the overall x-axis. So it's closer to the left hand side. You can see that it's not as far out. The next one is

2:11:21
manufactured gas plant tar, so this is another petroleum hydrocarbon. You can see it has a different pattern. It's distinctly different than the diesel pattern above it. It has fewer Peaks and it's spread out longer over the entire axis. Go down the next one we've got lube oil that's a heavier hydrocarbon. Which means that it typically has more carbons and more hydrogens involved in it. And it comes out later. So same y-axis

and same x-axis. There it doesn't have a lot of the lighter fractions which would come out earlier, it's going to wait, and then it comes out later. And so you can see kind of that hump with some Peaks there, towards the end. And then the last

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one I put up there is just an example of biogenic matter. So this is plant and

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bacterial and you can see where it comes out later in the run there on the chromatogram. And then it's got a series of Peaks and it looks different. So again key take-home message is that not all hydrocarbons that are returned by the TPH method are actually petroleum related. All of these would be

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quantified under a TPH method even though they're not all total petroleum

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Hydrocarbons. So this is a, I'm try to kind of, give a simplified explanation. It gets way more complicated than this when we talk about weathering. Which is a process that can change how these footprints look like over time. In addition to this other organic compounds, non-petroleum compounds can actually come out on a TPH run. So it's a

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head scratcher but it's another example of this, a non-specific method to try to identify and screen for the presence of hydrocarbons.

Next slide

So I wanted to just kind of touch on briefly about what are we seeing. So we've seen historically over the long-term monitoring period, we have seen low-level detections of TPH. So total petroleum hydrocarbons again, is that petroleum, is that biogenic, is it pyogenic? That's a question. So all we have is the TPH measurement from the lab. The majority the vast majority of those detections have been between the method detection limit (MDL) and the method reporting limit (MRL). Okay and I'm going to explain why that matters. But upwards of 70, 71, 70% we're still collecting samples of

2:14:05 (AKA 266 ug/L)

the results of the detections, have been between the method detection limit the method reporting limit.

So a little bit of background on this, the method, let me put it this way so one of the things I think if you are a fan of CSI and watch on TV. You know they go into the clean room, they inject the sample, and within you know five minutes they get a result. And it takes longer in real life, right?

In order to do the science at the levels that we're talking about part per billion, part per drillion, it takes a little bit of time in order to do that.

But there's a concept that a lab can detect zero, okay, we can't detect zero. That's a hard concept there. It's the lab cannot tell you if it's exactly zero. So what it can tell you is what the detection limit was, how far could they

2:15:00

go down, before they can't tell anymore. So it's kind of like having, and you may have heard me say this example before, some of you is taking your cell phone and taking a picture and you zoomed in right and you've got something way out in the distance that you're trying to see. At some

point you can't zoom in any further it gets blurry right you can't see beneath. That's the that analogy applies to a lab. They get to a certain

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level and then they can't differentiate between the noise of the instrument and

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whether or not it's actually there. So they set that as a method detection limit (MDL) that's kind of the floor so at R for the TPH data our

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method detection limit is typically 50 micrograms per liter (mg/L) that's 50 parts per billion (ppb).

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Okay it's a very very low, that's a very sensitive number especially for a

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TPH method. Our method reporting limit is typically between 75 and 80. So a method reporting limit is the level that at the lab actually has high degree of confidence in not only what they've identified but also in what the concentration is.

Okay so typically when we look at data we typically Focus mostly on the method reporting limit because that's a **legally defensible number** that's there. The lab will say yeah and we have confidence in the concentration. So we have 70% of our numbers that are detections that are between 50 and 70, so they're in this area where it's starting to get blurry.

As to what it is, okay now I'm not saying that it couldn't potentially be petrogenic TPH, what I'm saying is that whenever we see a detection, especially down at that level, we have to do more investigation.

As to what that might be. Is it petrogenic, meaning is it petroleum related? Is it biogenic, is it U potentially pyogenic or could it be something associated with what's going on in the lab.

So at these levels at these low levels, all of these things that we talked about, in terms of complicating factors, become more of an issue. Because we're pushing this limit, this analytical method to its limit. So I'll talk more about this, in terms of kind of what that means, in terms of overall significance. All right so what I'm going to show is a few slides after this slide if you go to the

next slide

please. Thank you.

What I'm going to show after this slide is just some spatial Maps. So some geographical maps that you might have seen. I think EPA, with some of these figures, I took from EPA's presentation the other day. That'll show locations of where we've seen some of the detections. But I wanted to give some context to what you're going to see on these figures.

So one of the first things is over 12 billion gallons and that's a billion with a B of water from Waiawa Shaft have moved through the system over the LTM period. Okay so that LTM started in about March of 2022 and we're

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now going on to about two years. That corresponds to about 20 million gallons per day on average through the entire system. So we have a lot

of water flowing through this system continuously and this is after the emergency response; when all zones had been flushed, and sampled, and cleared. And the health advisory had been lifted for the entirety of the system. So that's, in addition, to that all TPH detections, that we've seen or have been below the incident specific parameter of 266.

That's an important point but that's not the focus of my discussion. I'm actually focused on the lower level results. What does that mean, the majority of detections I said are between 50 and 80. This is pushing the method to its limits. It was never really intended to go that low and I'll talk about that a little later.

So on the figures that you'll see, so we see similar Trends in terms of the TPH detections amongst all 19 zones. So those of you may be familiar and I think many of you are. The Joint Based Pearl Harbor Hickam System was divided up into 19 individual zones. Really from a management perspective, to try to make it easier to understand the data, they're geographically located. It would give us a way of being able to Monitor and measure what was going on out there. So we're seeing a similar distribution of these detections in all zones. The detections are typically bracketed, meaning there'll be a detect and then we'll have a non-detect. And then maybe a detect somewhere else and then non-detects all around it. So there's no Geographic cluster if you will of detections or anything like that. And that's really important.

!!!!! Two other points are that there are similar detections and Trends observed in zones that did not receive drinking water from the Red Hill shaft during the November 21, 2021 Red Hill release. So there was hydraulic modeling that was done. That has been reviewed and

submitted to EPA, had been approved and it shows that for example, and you'll see on a figure, where you've got Pearl City Peninsula, which is

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straight down from the Waiawa Shaft. It didn't receive water from Red Hill during the release, just hydraulically, couldn't happen and I'll give you a little bit more information on that. At the time of the Red Hill release Waiawa shaft, the Navy Waiawa shaft and the Red Hill shaft were operating. Waiawa provided about 74% of the 20 million gallons per day that was coming down into the into the system.

The Navy Halawa (???) was around 1% in change.

And the Red Hill shaft was at about 24%. So based on Flow, you can't have water that's going to flow uphill in the system to the Pearl City Peninsula. So it's really important to note that.

So we've got a we call it, A1 or Pearl City, A2 is Ford Island, B1 is McGrew Halawa and G1 Camp Smith. I'll show you some of those on the figures, second thing is that we saw similar Trends and detections of TPH through all the LTM periods and including period 6 and period 7 in zones that were protected by granular activated carbon (GAC).

So some of you may or may not know that after the Red Hill release, the Army installed inline granular activated carbon vessels, that basically, all the water from Joint Base Pearl Harbor Hickam has to pass through prior to distribution to the residences within that zone within those zones. And so those zones are what we call H1, H2, H3; those are the Aliamanu Military Reservation. And then I1 which is Red Hill.

Okay so all of that water is treated. And so the significance of that is, as you may know, is that the GACs will remove all Organics from the water that includes TPH. It'll also remove chlorine it'll remove lots of different

things and yet we're still seeing the same pattern of detections in those zones. So let me show you some pictures to show you that.!!!

So LTM period five, so I didn't go through every period, I just kind of have five and six. I think you've seen some slides with those. So what this slide shows is the yellow dots are concentrations less than 150 micrograms.

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per liter. There are also non-detects that are in those. And then there are a red dot that shows you a concentration greater than 150 micrograms per liter. So the main thing is that you're seeing a similar distribution across the zones.

Okay here and that'll become more apparent on the next slide.

next slide

Okay so this is LTM period 6. So this was, just so that you know, that was the period was a six-month period of sampling between June 2023 and through November 2023.

So the main take-home messages from this just in terms of observations, is as you see, first off is that we do have a larger number of red dots at concentrations greater than 150 micrograms per liter, parts per billion, so those red dots, as you can see on this figure, are in all of the zones on the site,

Now I have the Zone outlines on there, but unfortunately there the color is kind of muted. You can't really see them. So what I'll do is point out a couple. So up here, if you go up, look up, the top at a one which is called out.

You'll see the yellow dots and then we've got some a couple of red dots in that zone. Now that's a Zone, that's right off of Waiawa shaft, right, that's coming down from up north of that. And yet we've got you know a Red Dot in that area. If you go over to the east side to H1, H2, H3 and look there you'll see that we've got corresponding red dots in those zones.

Now those zones are the Zones that are behind the inline GACs. So all the water from Joint Base has to go through those GACs before it's distributed to these homes these residences. Okay same thing if we look at I1 is up there and then G1 which is up to the top of the figure; also has those that's not protected by GACs but it's water that was provided from Waiawa Shaft. So the important part of this is if you look at this and look at some of the other areas

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down towards, the kind of the central part of the Joint Base Pearl Harbor Hickam Network, you can see that we've got a similar distribution, pattern of distribution, Now these areas are areas that probably got 50-75% of their water from Red Hill during the release period. And then obviously after the shaft was secured, they've gotten all the water since then and during LTM from Waiawa, we're seeing similar distributions there.

So you know had it let's say for example say, me say well what if it's from Waiawa, you know is Waiawa impacted? If we actually had results of TPH in the Waiawa shaft we would expected to see A1, one of the most significantly impacted areas, because it's the closest Zone to Waiawa. And then you would see

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a decrease, as it moves away. So the way that contaminants are going to move and migrate, if you have a release Point, you're going to see Geographic clusters and relationships. They get blurrier as they go away but, you wouldn't see as kind of this sporadic random pattern of some higher concentrations bracketed by lower concentrations, right in the same street, right in the same neighborhood over and over again.

The other thing I wanted to talk about is that there's some comments and thoughts about what could be buildup in water heaters or some sort of accumulation.

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That isn't born out by the data either in terms of this, I mean we'd be looking at similar patterns within certain areas Geographic areas, based on construction type, based on age of the water heater, but also based on the nature of the contaminant. The contaminant is going to flow. Okay it's not heavier than

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Water, it's lighter than water. And we're also talking about and this gets kind of technical. But we are talking about concentrations where TPH is going to be dissolved in water ,primarily we're not talking about having floating product on top of the water. Okay and so with that we would see a different pattern. We're not seeing that okay.

Next slide

All right so what did we do, what did we do with that? So on January 29th I flew out, met with a team of inter-agency experts. We had over 20 people were here from Navy, we had Army, we had EPA, we had DOH, had people from the industry. All of us, some of us, were in the same room we had a bunch of folks that were on teams. Some of the folks

here in the audience today were participating in that. We had a week's long you know set of discussions, every single day. And we've had numerous discussions since then. As we continue to kind of follow on track and evaluate this. So it by no stretch in the imagination and was it just me, I guess I got the lucky straw and I'm here today to kind of brief this out. There was a lot of people that were involved in that room from a variety of different technical backgrounds. Many of those folks had not

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been involved in Red Hill at all. So they brought an entire fresh perspective to our discussions and our task, our charge, was very simple. To start with a clean slate and determine the root cause of the increase in frequency of low level detections of TPH. That was it there. There was no other direction given to us, as a team, figure out what's going on, use the best science, challenge all of the thoughts and ideas that you might have, but open it up. Let's figure out what

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this is. And so we did that. We rolled up our sleeves, we dug in, and we did a lot of work in a short amount of time. One of the things I want to emphasize before I kind of get into this a little bit more detail is that we are developing a tech memo to document this in progress.

So again trying to be open and transparent about what are. The what's the data that we have all of which came from the Safe Waters website. So all of this is out there. But then what did we do with it? What did we look at? What's the results of our analysis? That will all be shared.

INTERRUPTED BY MODERATOR LOL

So we looked at a variety of different causes and you can see them listed on the screen. You know one of the couple of the ones that I wanted to talk about, just mention, is that TPH and the Waiawa shaft Source water is added, potential regulated, disinfest byproducts, residual JP-5 in the system and so on and so on.

So we looked at 12 or 13 different root causes at least in terms of what's documented here, but we actually discussed more than that. So what we ended up with was it appeared to be more of a systematic effect, in terms of the concentrations, that we're seeing and the distribution. And so that led us to a "laboratory method challenge." And that's what I'm going to talk about today

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So the hypothesis that we we're evaluating is that the low-level detections at TPH during LTM are most likely associated with really two things, one is laboratory challenges to quantify TPH to the method detection limit. So what do I mean by that?

As you push that detection limit lower it becomes more challenging for the laboratory in terms of trying to minimize cross-contamination. So within the lab they share glass, they wash it, they clean it, They're using different solvents; all of those are the potential for introducing low levels of contamination.

In addition to that, one of the things we also came upon is there's method challenge. And the method challenge is the interaction of residual chlorine in the drinking water samples with reagents, that are required by the method, to analyze the samples. And so I will talk about that in detail.

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And so that's really my focus today is to give you the Baseline on this. in terms of that information. there are also other supporting lines of evidence.

We just didn't just look at the lab, we looked at a lot of other things but I'll talk about that today. One of the points I want to emphasize is that the validity of the method is not in question, so 8015 is a good method for what it's intended for . The method was not intended to test drinking water samples, especially at these low levels. Okay it is typically used on waste samples, Wastewater, soil with much higher TPH concentrations. And so the impact of that is we're pushing the limit to its actual limits. Pushing the methods to its limits. And you with that, we've got to do a little bit more homework in terms of just looking at a number. [266]

One of the things that we had as an issue just for background is that we had a similar issue pop up with TPH gasoline. For those of you that were involved in the emergency response, in the first phase of LTM. Where we had some low-level detections appear with TPH gasoline, that we had never seen before. And it turned, it was caused by a reaction between chlorine and one of the internal standards in the method. And we evaluated

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That, documented that in conjunction with EPA, and DOH. And then we took corrective action with the laboratory, to have them change one of the reagents. So this is not necessarily unusual with this applying this non-drinking water method to drinking water

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So more chromatograms. I'm going to show a couple of chromatograms. After this, this is a chromatogram that shows on the left gasoline range hydrocarbons. And so if you look at kind of the left hand side of the slide, there's a title up above it. And it comes out first because it's more on the lighter end. All right there are fewer carbons involved in gasoline, it's more volatile, typically will elute or come out first, And then diesel will come out after that because they're heavier than the gasoline range. So those are just giving you kind of a visual. One of the things, that a key message from this, is that we have seen no petroleum patterns in the chromatograms observed in long-term monitoring. So we haven't seen any patterns that match or resemble petroleum whether that's JP-5 or other

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petroleum products and we're not just looking at JP-5 collected under the LTM program.

next slide

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Okay so this is a side by-side comparison of showing the impact of chlorine on the exact same sample and so you're seeing two chromatograms.

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One on the left and one on the right. The chromatogram on the left and this is from an actual field sample from Zone H3. The chromatogram on the left shows the standard sample that was collected in the field. So that means we collected the sample and it was submitted to the lab. And they analyzed it and so you can see on that and I think Lieutenant if you can kind of go to the chromatogram that's on the left hand side. If you can see that. So what I wanted to show in the chromatogram is that we have a solvent front which is in the blue box and that's what's used

to extract the sample. So you get a solvent front that comes out, it's methylene chloride. Okay it's not part of the sample, it was added by the left Lab., in order to extract that. Then we see Four Peaks and I've identified those Four Peaks. They are pretty small but we've seen that characteristically on almost every sample from Red Hill during the LTM program. If you move to the right you'll see a green arrow it's called a surrogate. This is a another compound that's added to the sample by the lab. So they Spike the sample with it and it comes out and it's kind of like a marker, it's like a road map, it says 'hey this isn't part of the sample, but when it comes out it should come out at a certain time. Right remember I said it's independent so it should come out at a certain time. And we're going to have a big peak because we put a lot of it in there, in order to make sure that it's clear. And then after that, we get some additional Peaks that are formed.

All right so as we looked at this we said hey what's going on here? Well on the right hand side is the same exact sample but what we did is we quenched the sample. So quenching, is adding a compound, usually it's sodium thiosulfate (sp), but it could be others, to neutralize the chlorine that's in the samples. Chlorine is electrophilic, it's got a negative charge it will react with things in

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the sample and things that are added to the sample. So when we quench the sample and this is typically done when you when we look at drinking water methods. Board of Water Supply, it runs them. Any drinking water method, they will have quenching in that okay for Organics. 8015, being a non-drinking water method, we did not quench the samples because it's not called standardly by the method. Okay we can talk about that later.

The take-home message is, if you look at this you'll see, I've got two circles on the right, the quenching eliminates those and so what is that? Well we what we determined is that the chlorine is interacting with the surrogate. So on the right hand side, the surrogate, is O fenel (?) and the halogens are in the chlorine are reacting with the O fenel . Ad it's creating those, what we call, ghost Peaks. So on the left hand side we had them, on the right hand side we don't. So chlorine in the sample reacting with the surrogate.

next slide

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All right so this is the **same sample** but what I wanted to do with this slide **{This is important: If you look at the sample number on the slide before and the number on this one: THEY ARE FROM DIFFERENT ZONES}**

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is say okay well there's going to be a question about well, how do you know? How do you know that it's the quenching? Right that's the issue. It's the interaction. I'm saying that for us, in terms of take messages, you got the surrogate and you've added this quenching agent to it and it's removed it. But what if you don't quench it and you just take the surrogate out do those Peaks disappear?

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That's what this slide shows. The slide on the left is exactly the same. It's the original sample, unquenched. You saw it on the previous slide. I've just put it on here, just to show you what we did, was is we ran that sample. We didn't quench it but we also didn't add the surrogate.

Okay the important part of this is that you see that we still have the same Four Peaks, the little the tiny Peaks now those disappeared when we quenched previously. Okay but we didn't quench this time so they still appear but the circle there would be right after where that surrogate was disappears.

So again the reaction, how does this reaction work? Well if we take away the chlorine, we don't see the Peaks, or if we take away the surrogate and the chlorine is still in the sample, we don't see the Peaks.

Right, you got to have them both. So this is what confirms that we're having a reaction between the surrogate. Why is that relevant? Is it happens in this low-level range and those Peaks would be identified as TPH even though they're not. Again being a non-specific method, the TPH results are going to show as TPH, when in fact. what it was a reaction. In that case, with those ordinarily, it wouldn't matter because they're at such

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low levels. Right, within a sample, a typical sample that we would run.

One of the other things I want you to understand is, and is really important, is this does not quench or remove JP-5 or petroleum, if it were actually in the sample. Okay so if there's actually JP-5 or Petroleum in the sample, this isn't going to affect it whatsoever. And we can demonstrate that and have demonstrated that by doing what we call Matrix spike samples. Where we take a sample in the field, we spike it with a known concentration of JP-5 or other Fuel, and then it shipped to the lab. The lab analyzes it, does all those steps and then we can compare the result. How much did we put in, did it get quenched out, no. We can compare what the response is and show empirically that that's

not going to have any impact on actual TPH or fuels that are in the samples.

That's a really important Point.

All right this is **BELIEVE IT OR NOT MY LAST SLIDE** . Trying to push it forward. So TPH detections and lines of evidence. So just a little bit more chemistry.

So I wanted to summarize again were any petroleum signatures observed in the samples collected during LTM and the answer is no.

We've evaluated the petroleum signatures while we have low-level concentrations of TPH being reported by the method again the method's **not specific to just petroleum we're seeing some lab artifacts as we call them in those samples method 8015 is a valid method and the results that we've had to date are still valid kay they are low-level detections based on the method but they're really overestimates in a sense you could call**

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them false positives

Okay so we've seen them, they appear to be based on all the information that we got that they're associated with an interaction with the

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Surrogate. They're not actually petroleum related but they're **essentially false positive there's an overestimate** and what I would say is you can't just take a TPH result from method 8015 and

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just run with it.

A lot of times what we want to do is say hey I got this number it's 100 and I want to do a comparison and say what is that with 8015 with TPH.

You actually have to dig a little bit deeper especially at these levels and try to figure out what is actually making up that result. Since it's not specific to just petroleum and that's one of the things that we're doing as we move forward.

So going forward the Lessons Learned.

What we're proposing in going forward into EDWM, is adding a quenching step to Method 8015. So we collect the samples, we'll quench them

2:43:02

just like we do every other drinking water method sample that we collect. And we'll run them through those. We're also proposing to include a step which is called **micro extraction. Micro extraction, what that does is it minimizes the contact in the lab. So glassware, gloves, solvents, all that stuff is a minimized, in order to help minimize the potential for any sort of cross-contamination in the lab.**

All of which can be documented. Doesn't mean the lab's not doing a good job by any stretch of the imagination, but as you push these levels down you can see that those things come up. I mean one of the things is for folks is even the gloves that are used in the lab contain fatty acids, which will pop up. In an actual analysis for TPH, we are adding

multiple additional layers of quality assurance, quality control. So we're going to increase the number of blanks.

I talked about Matrix (bikes) and Matrix (bike) duplicants. We're also going to include blind performance samples. So those are samples that will spike in the field with known concentrations of JP-5 fuels and submit to the lab and the lab will not know what they are . Okay they will have no idea what it is. That's just another sample come in and we should be able to evaluate those results if we spiked it with 500. So should be getting somewhere near 500 on the outside when the lab analyzes it. And so that's another qaqc (?) approach. And then lastly for TPH detections, we're adding a very detailed set of steps to determine the origin of the detections. And what sop for that? But is it petroleum, is it pyrogenic, is it biogenic, is it potentially lab contaminant reacted, or reactant all of

2:44:57

those things. Are just an additional layer of analysis in evaluating these results and with that over to you sir so

next slide **{he said the last one was his last slide "believe it or not"}**

2:45:09

I will go very quickly through **these last two slides.** The extended drinking water monitoring plan, that we've laid out, This is again what will follow LTM with it ends at the end of this month. So this plan will be a 12-month plan. In LTM we had 19 zones. We have 20 in this, Manana housing was not included in the LTM. It was not on the Navy distribution system at the time of Red Hill crisis (BS) but we've identified that there are still concerns because it is on the Navy drinking water system now. So we have added that back into the extended drinking water monitoring as Chris and as well as Allison had talked about. The focus on indicator

compounds, you know that the ISP while it is an important screening tool, it is not a level. It's something that we can absolutely stand on.

It's this is the line so instead the focus is going to be on those JP-5 related analytes for LTM.

WE GOT 65% OF ALL RESIDENTS THE GOAL OF EDW IS TO TO GET THE OTHER 35% OF THOSE RESIDENTS THAT HAD NOT BEEN

2:46:19

TESTED IN THE PAST LTM PERIODS THIS WILL BE BROKEN UP OVER 12 PERIODS 12 ONE MONTH PERIODS

And in each of those periods, we will be testing all CDC's Child Development Centers, as well as, schools as part of that. And then at the end of that, it's still to be determined, it is going to be condition based. And there will be follow on discussions for at the end of this 12-month period. What happens then? So that's still to be determined.

next slide

2:46:49

The last thing I want to do is just reiterate again some of the items that we've talked about today.

The water quality action team that Focus moving from. If anyone has a concern we will go out to your house right away. We will take samples but we will look at more than just determining is it JP-5, is a TPH related?

Look at the rest of your systems, as well. Compliance monitoring, as we talked about, will continue just as it does for BWSa nd all other water purveyors.

Extended drinking water monitoring program, that I just discussed on the last slide. We will obviously also continue with our normal drinking water operations and maintenance that's required for all water purveyors and all

2:47:26

water systems. And then of course the medical monitoring and the Red Hill Clinic, to make sure that any concerned family members and those that are affected even outside of the military family are able to get the treatment that they need.

So thank you very much for your patience as we went through what is a lot of detail. I know that we got into the science. We geeked out but we want to make sure that we have the opportunity to show all of those details and not just touch the surface, the wavelengths, the wave Toops but actually let you see the science that goes into the approach.

As well as give you the opportunity to challenge us if there's something we're missing if there's something that's wrong, we look forward to that feedback as we

2:48:09

continue to move forward with the commitment to ensure that the water is and remain safe to drink.

2:48:22

Fuel Tank Advisory Committee (FTAC) Meeting

Drinking Water Investigation

Overview of Presentation

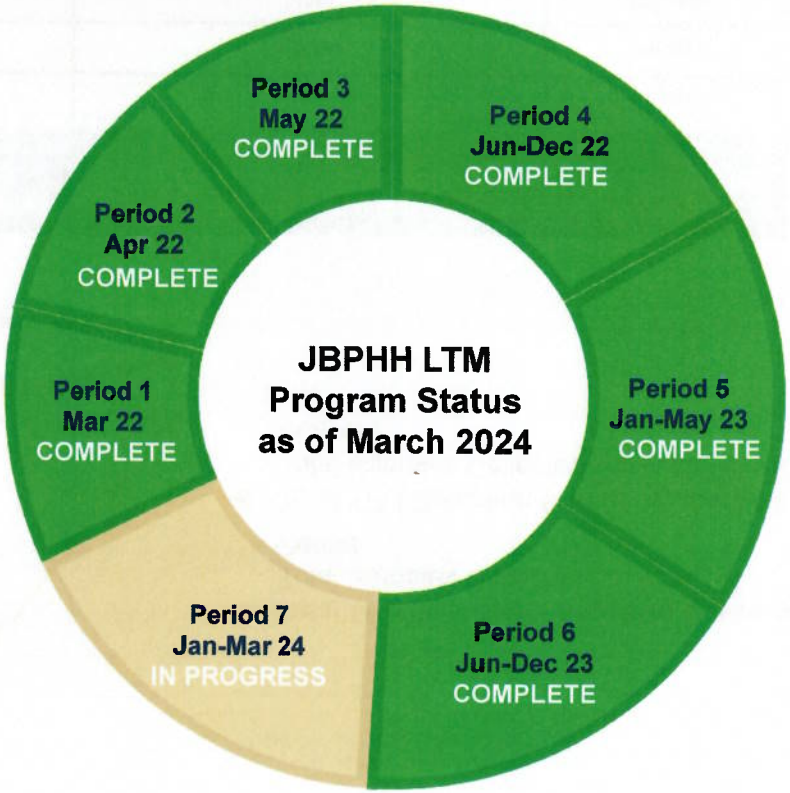
SAFE. DELIBERATE. ENGAGED. COMMITTED.

- Status of Long-Term Monitoring (LTM) Program
- Discuss Increase in Low-Level Detections of Total Petroleum Hydrocarbons (TPH) and Consumer Complaints
- Actions Taken by Navy
- JBPHH Water Quality Plan

Drinking Water Long-Term Monitoring

SAFE. DELIBERATE. ENGAGED. COMMITTED.

- LTM Began in March 2022 and will end in March 2024
  - Samples collected monthly for 0 – 3 months of LTM
  - Samples collected every 6 months for 4 – 24 months of LTM
  - As of February 2024, over 8,000 drinking water samples collected as part of LTM Results available on JBPHH Safe Water website
- Drinking water samples collected from Residences, Schools, CDCs, Non-Residences (i.e., medical facilities, workplaces, gyms), Hydrants, and the Waiawa Shaft
- Validated Navy results from the co-sampling event conducted with DOH in mid-Feb – all (14) sample locations (9 schools, 3 shafts, 2 CDCs) report Non-Detect

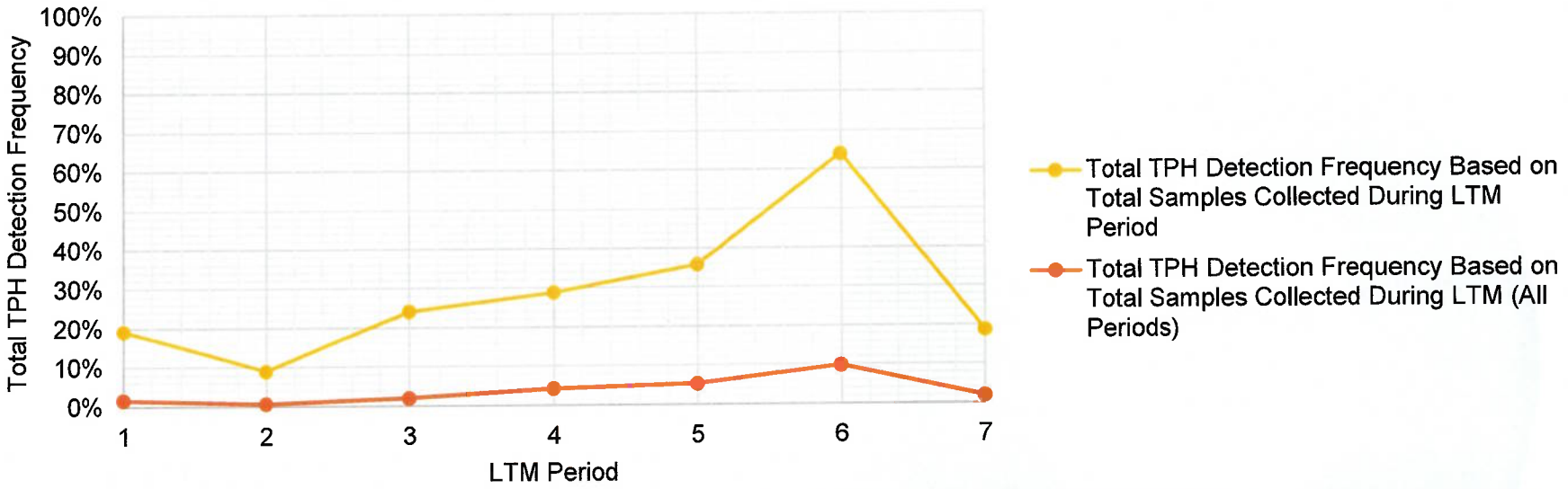


Visit the Safe Waters website for more information

Overview of Low-Level TPH Detections

SAFE. DELIBERATE. ENGAGED. COMMITTED.

Total TPH Detection Frequency by LTM Period (March 2022 - February 16, 2024)



LTM Period	Number of Samples	Number of Total TPH Detects	Total TPH Detection Frequency (Based on Number of Samples Collected During Current LTM Period)	Total TPH Detection Frequency (Based on Total Number of Samples Collected During All LTM Periods)	Average Detected Concentration
Period 1 (Month 1)	897	174	19%	1.8%	65 ug/L
Period 2 (Month 2)	892	85	9.2%	0.84%	63 ug/L
Period 3 (Month 3)	886	216	24%	2.2%	67 ug/L
Period 4 (Month 4)	1,492	434	29%	4.5%	65 ug/L
Period 5 (Month 10)	1,490	536	36%	5.5%	67 ug/L
Period 6 (Month 16)	1,522	977	64%	10%	80 ug/L
Period 7 (Month 22)*	1,094	208	19% (in-progress)	2.1% (in progress)	73 ug/L

Consumer Complaints/Concerns

SAFE. DELIBERATE. ENGAGED. COMMITTED.

- Increasing amount of low-level TPH detections during recent LTM Period
- Higher volume of EOC calls and residential complaints starting September 2023
- Established "SWARM" Team of DW Experts (01/29/2024)
  - Navy, EPA, DOH, DHA, and technical experts
  - ***Determine root cause of low-level detections of TPHs in JBPHH water system***
- The Navy is committed to engaging with the community through events like Town Halls, Fuel Tank Advisory Committee / Navy Information Sharing Forum meetings, and other events
  - Developing fact sheets and informational packets to keep residents informed

Month	No. EOC Calls	Samples Collected
Sept 2023	35	1
Oct 2023	41	16
Nov 2023	9	7
Dec 2023	10	6
Jan 2024	28	24
Feb 2024	19	17
Total	142	71

Notes: EOC calls also include inquiries and sample requests. Not all EOC calls

NAVY REGCOGNIZES SIGNIFIGANCE OF POTENTIAL HEALTH AND SAFETY CONCERNS AND TAKES THESE ISSUES VERY SERIOUSLY

Actions Taken by Navy

SAFE. DELIBERATE. ENGAGED. COMMITTED.

Compliance Monitoring	• JBPHH water system is monitored in accordance with Federal and State requirements
Rapid Response → Water Quality Action Team	• New and updated training and capability enhancements to address community water quality concerns • Provide bottled water to residents while awaiting results
Improved Communication	• Increase community outreach and fact sheet development
Premise Plumbing Assessment	• Investigating premise plumbing at 10 residences, reviewed drinking water sample results, and investigated hot water heaters
Performed TPH Root Cause Analysis	• 12 primary causes were evaluated. • Results will be summarized in Tech Memo (being developed)
Developed the EDWM Program	• Follow-on to Long Term Monitoring • Focused on Red Hill Fuel Related Constituents

Actions Taken By Navy

What Are Hydrocarbons?

SAFE. DELIBERATE. ENGAGED. COMMITTED.

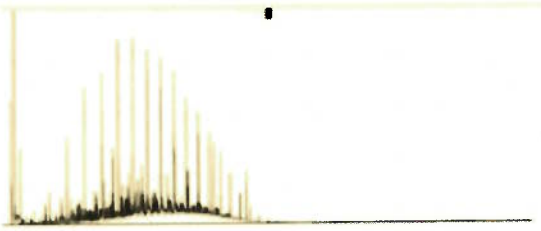
- Hydrocarbons are compromised of Carbon and Hydrogen atoms
- Are all hydrocarbons TPH?
  - There are many sources of hydrocarbons:
    - Petroleum – Crude oil, JP-5, other fuels, oils
    - Biogenic – Originate from a mixture of organic compounds biosynthesized by living organisms (algae, bacteria, etc)
    - Pyrogenic – Produced by combustion
- The TPH Method (8015) is called Total Petroleum Hydrocarbons but this is a misnomer
  - Method 8015 is not specific to fuel, it provides results for all hydrocarbons that are present can include hydrocarbons that are Petroleum, Biogenic, Pyrogenic
- The presence of Biogenic/Pyrogenic Hydrocarbons has greater impact when attempting to Quantify TPH at very low levels, such as Red Hill

Are All Hydrocarbons TPH?

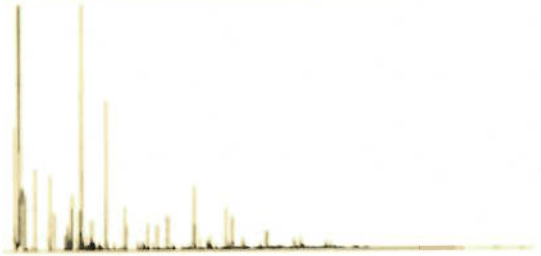
SAFE. DELIBERATE. ENGAGED. COMMITTED.

All will be Detected as TPH Under Method 8015

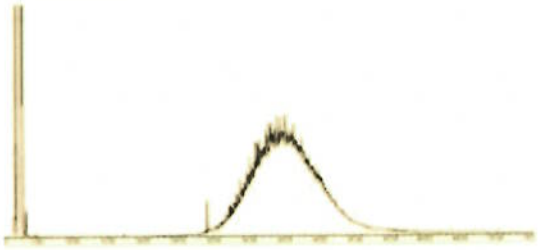
*But Not All Are TPH



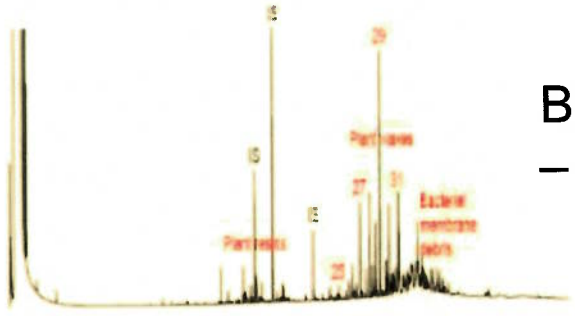
Diesel – **TPH? Yes.**



MGP Tar – **TPH? Yes.**



Lube Oil – **TPH? Yes.**

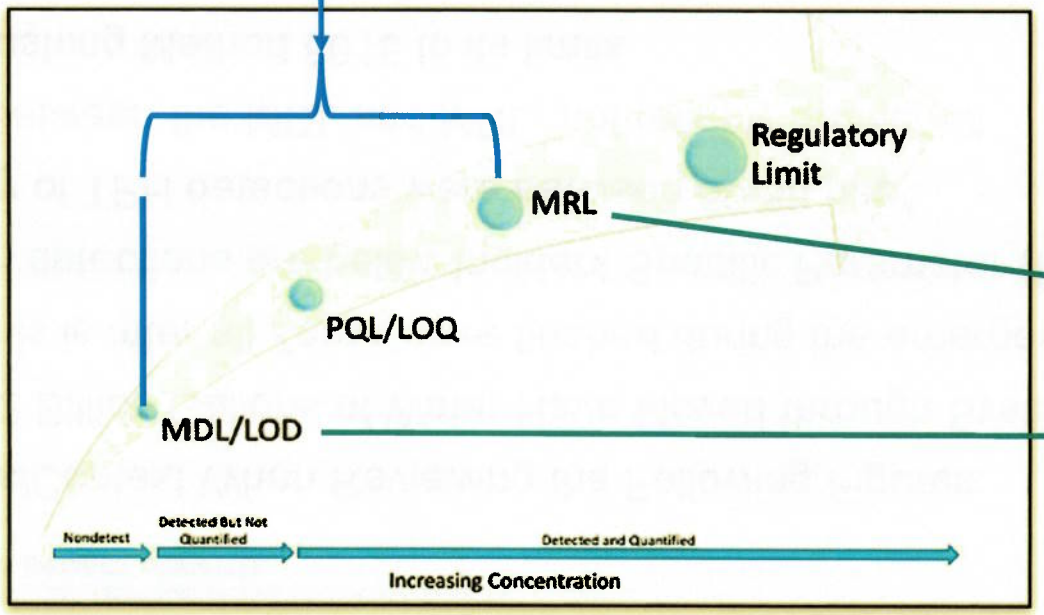


Biogenic Matter (Plant/Bacterial) – **TPH? No*.**

Low-Level TPH Detections: MDL/MRL

SAFE. DELIBERATE. ENGAGED. COMMITTED.

- Majority of TPH detections under LTM between 50-80 ppb
  - Between MDL and MRL*
  - *MDL > Results < MRL are estimates, not reliably quantified



Minimum Reporting Level (MRL) for TPH is 80 ppb

Method Detection Limit (MDL) for TPH is 50 ppb

- Higher level of detection (>150 ppb) provides improved reliability that TPH can be accurately quantified

Low-Level TPH Detections: Spatial Evaluation

SAFE. DELIBERATE. ENGAGED. COMMITTED.

Important Notes/Context When Reviewing the Following Figures:

- Over 12 Billion Gallons of Water Have Moved through System Since LTM Began
  - This is after all Zones were flushed during the emergency response
- All TPH detections are below Incident Specific Parameter (ISP) of 266 ppb
- Majority of TPH detections were between 50-80 ppb*
  - *Between the MDL and MRL, not reliably quantified
  - Pushing Method 8015 to its limits
- Similar trends among all 19 JBPHH sampling zones
  - TPH detections are not clustered in one area
  - TPH detections are bracketed by non-detects
- Similar TPH detections/trends were observed in Zones that did not receive drinking water from Red Hill during the November 2021 Red Hill Release:
  - A1 (Pearl City Peninsula), A2 (Ford Island), B1 (McGrew/Halawa), and G1 (Camp Smith)
- Similar TPH detections/trends were observed in Zones protected by Granular Activated Carbon (GAC) filters, which will remove all organics (including TPH):
  - H1, H2, H3 (Aliamanu Military Reservation) and I1 (Red Hill)

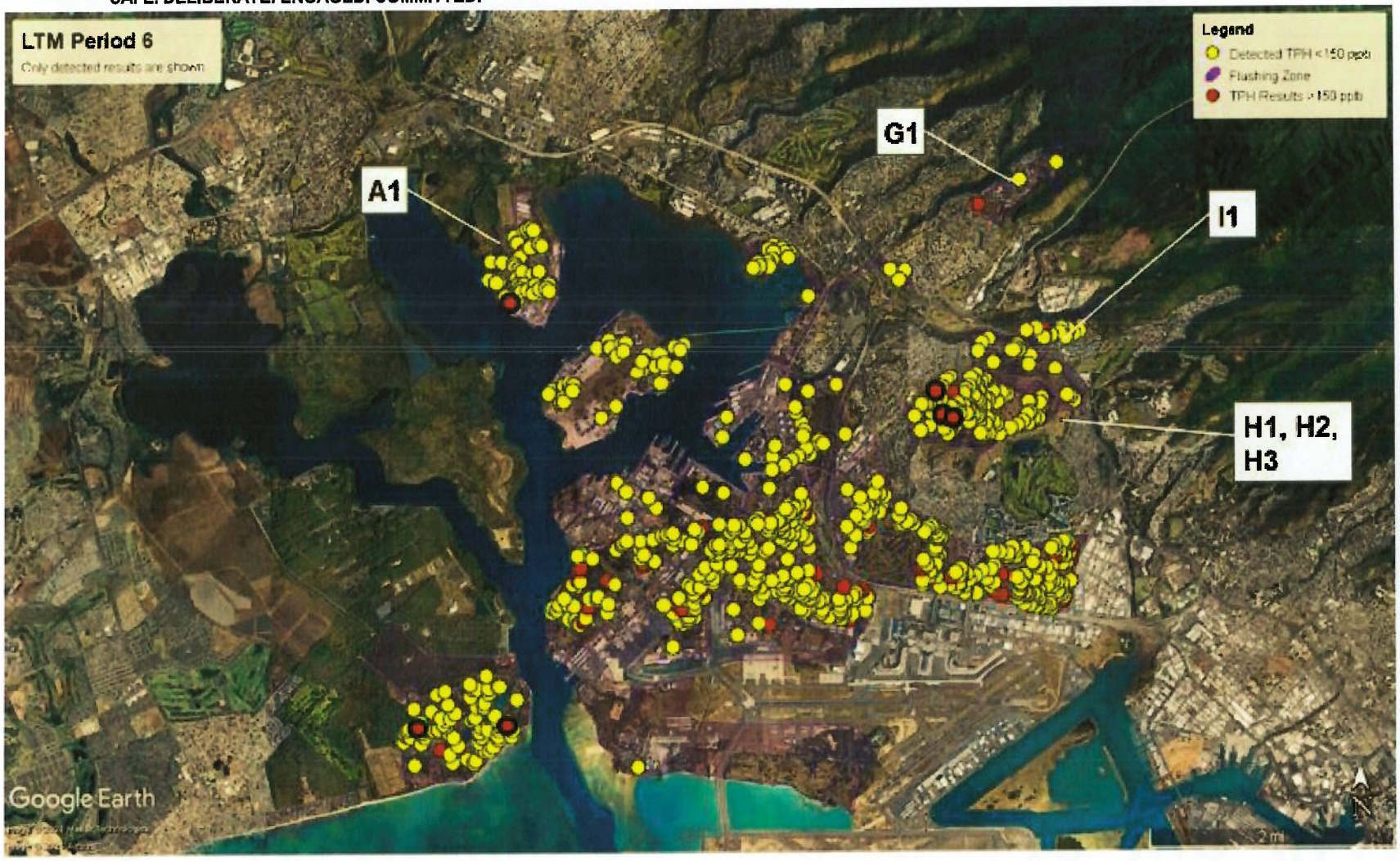
LTM Period 5 – Dec 2022 to Jun 2023

SAFE. DELIBERATE. ENGAGED. COMMITTED.

- TPH < 150 ug/L (ppb)
- TPH > 150 ug/L (ppb)

LTM Period 6 – Jun 2023 to Nov 2023

SAFE. DELIBERATE. ENGAGED. COMMITTED.



- TPH < 150 ug/L (ppb)
- TPH > 150 ug/L (ppb)

LTM – TPH Detections: Root Cause Analysis

SAFE. DELIBERATE. ENGAGED. COMMITTED.

- Jan 29, convened Interagency Team of DW Experts from across the country (Navy, EPA, DOH, DHA, and private Industry
- Below is the Interagency Team's assessment of how likely the potential root cause is related to/responsible for the increase in frequency of low-level TPH detections that have been observed during LTM:
  - **Laboratory Method Challenges – *High Likelihood.***
  - TPH in the Waiawa Source Water – *Extremely Low Likelihood.*
  - Regulated Disinfection Byproducts – *Low Likelihood.*
  - Residual JP-5 in Distribution System – *Extremely Low Likelihood.*
  - Residual Fuel Additives in Distribution System – *Extremely Low Likelihood.*
  - Biofilm Activity – *Medium/Low Likelihood.*
  - Premise Plumbing – *Low Likelihood.*
  - Pipe Scale Sloughing – *Low Likelihood.*
  - Pesticides – *Extremely Low Likelihood.*
  - Change in System Operations – *Extremely Low Likelihood.*
  - Change in Source Water (Waiawa Shaft) Water Quality – *Extremely Low Likelihood.*
  - Contaminant / Debris Introduced During Water Main Breaks – *Extremely Low Likelihood.*
  - Other – *Unknown Likelihood.*

LTM – TPH Detections: Hypothesis

SAFE. DELIBERATE. ENGAGED. COMMITTED.

Hypothesis: Low-level detections of TPH observed during LTM are most likely associated with:

- Laboratory challenges to quantify TPH to the Method Detection Limit
  - Method blank contamination/laboratory cross-contamination
- Method challenges
  - Interaction of residual chlorine in the drinking water samples with reagents required by the method to analyze the samples

Supporting Lines of Evidence[1]:

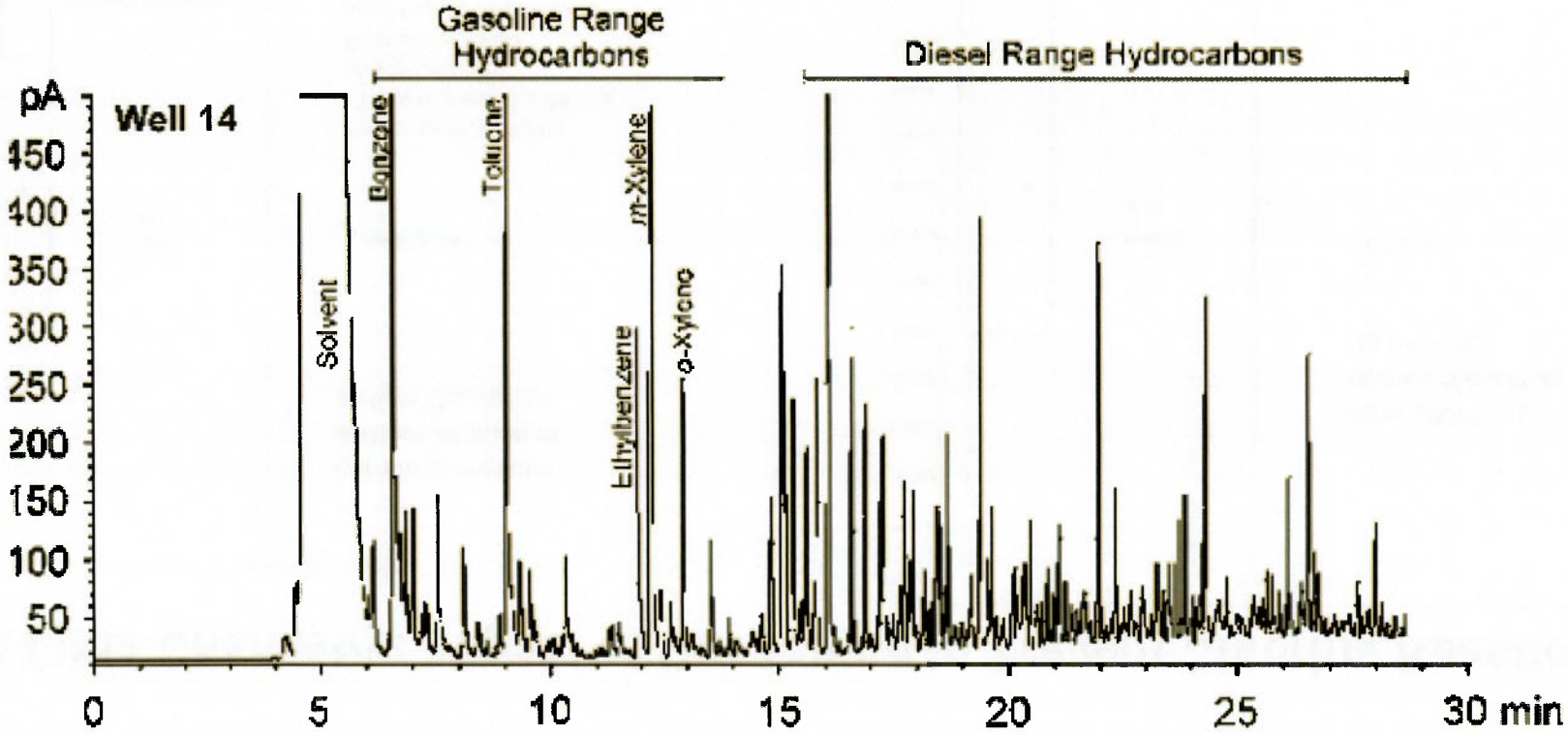
- Spatial and Temporal Trends of TPH Results
- Hydraulic Modeling of the JBPHH Drinking Water System
- **Detailed Review of the Analytical Methods Used to Identify and Quantify TPH**
- Statistical Analysis of Chlorine Residual

[1]Will be documented in Tech Memo (currently being developed).

LTM – TPH Detections: Lines of Evidence

SAFE. DELIBERATE. ENGAGED. COMMITTED.

A Little Chemistry: Chromatograms Showing Gasoline and Diesel



NOTE: There have been no petroleum patterns in the chromatograms that match JP-5 or other petroleum products in drinking water samples collected under the LTM Program

LTM – TPH Detections: Lines of Evidence

SAFE. DELIBERATE. ENGAGED. COMMITTED.

A Little Chemistry: Impact of Quenching to Prevent Chlorine Reactions

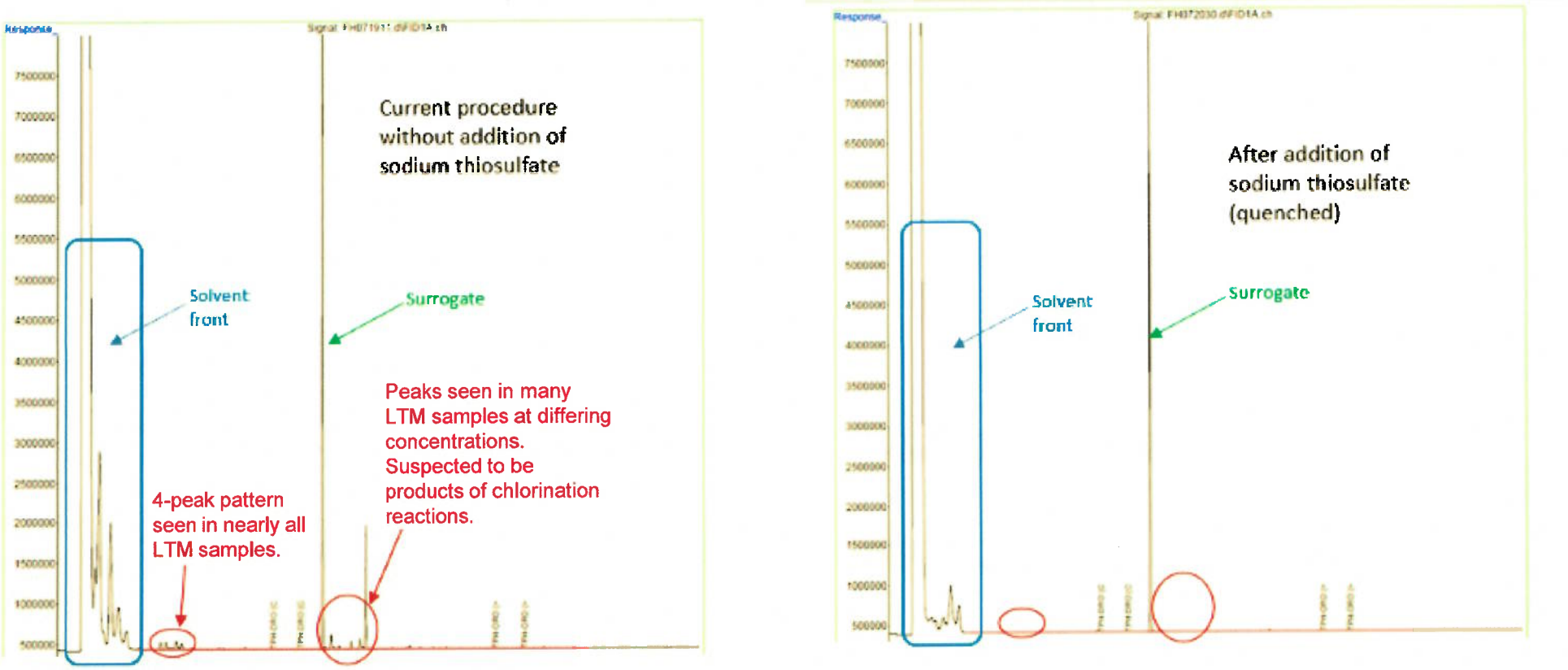


Figure C-1. Effect of Sodium Thiosulfate Addition (Quenching) Sample H3-TW-0013887-23335-A

LTM – TPH Detections: Lines of Evidence

SAFE. DELIBERATE. ENGAGED. COMMITTED.

A Little Chemistry: Impact of Quenching to Prevent Chlorine Reactions

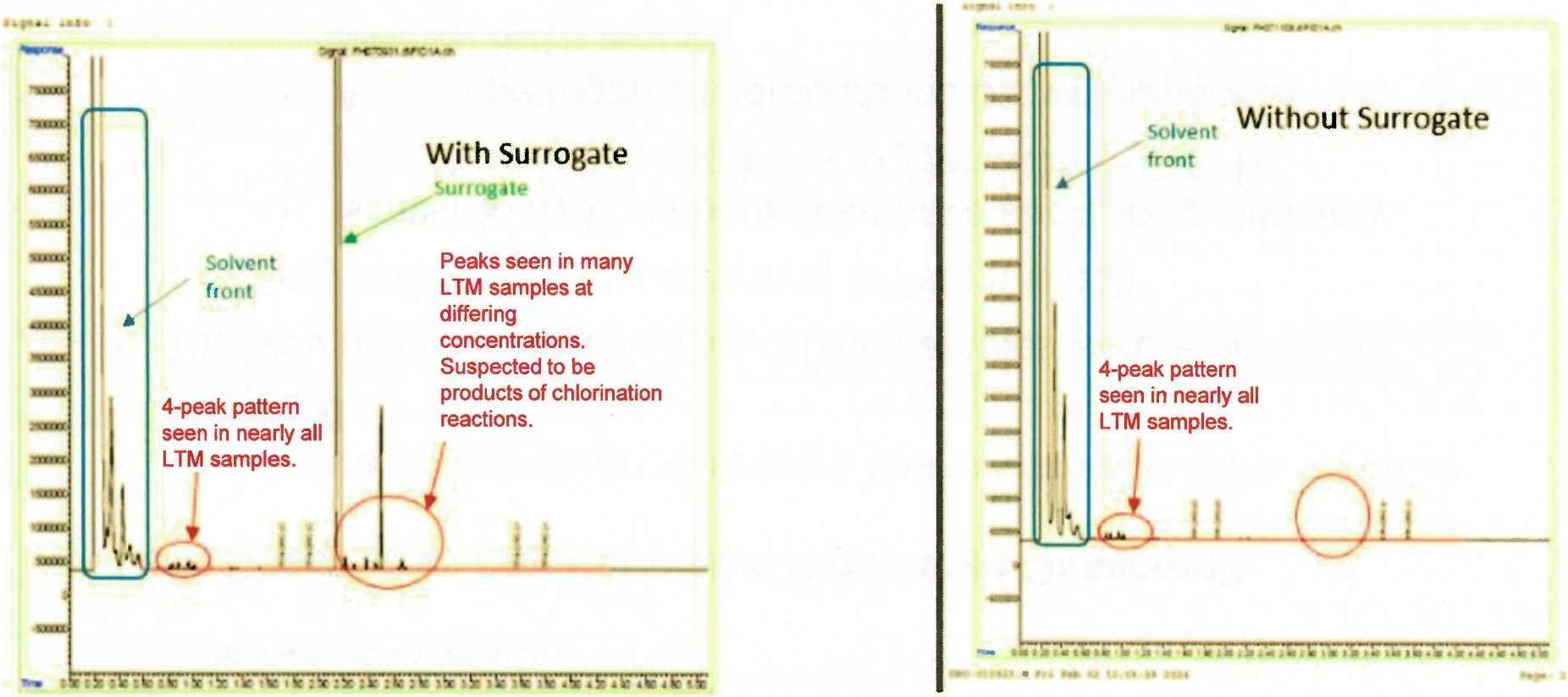


Figure C-2. Surrogate Contribution of Precursors to Halogenation Reaction Sample F2-TW-0009845-23335-N

LTM – TPH Detections: Lines of Evidence

SAFE. DELIBERATE. ENGAGED. COMMITTED.

A Little Chemistry: Any Petroleum Signatures Observed?

- There were no petroleum signatures observed in any of the samples examined
- The only unknown peaks in any of the samples were found to be:
  - Fatty acids (naturally occurring in Fats [Lipids])
    - Similar to hydrocarbons (can have short, long, and very long chains) but also have oxygen atoms (C-O-H)
    - Are not petrogenic hydrocarbons but will appear as TPH in Method 8015 results
  - Phthalates (used in plastics – very, very common in laboratories and the environment)
    - Are not petrogenic hydrocarbons but will appear as TPH in Method 8015 results

Extended Drinking Water Monitoring (EDWM)

SAFE. DELIBERATE. ENGAGED. COMMITTED.

- The Navy agreed to voluntary effort to extend monitoring past Long Term Monitoring – EDWM program
  - Original 19 sampling zones + Manana housing (20 zones total)
  - Focus on JP-5 related analytes
  - New analytical method for TPHs – reduce impact from residual chlorine and reduce impact of cross contamination in the lab
  - Sampling will take place monthly for 1 year
  - Results will be posted to Safe Waters and documented in Quarterly Reports
- Goals:
  - Sample Remaining residences on JBPHH water system (~35% have not been sampled)
  - Continue to monitor the JBPHH system to ensure there are no impacts from the 2021 Red Hill release

JOINT BASE PEARL HARBOR-HICKAM DRINKING WATER PROGRAM

ENSURING SAFE AND COMPLIANT DRINKING WATER

Water Quality Action Team

- 24/7 Response to Consumer Concerns through Emergency Operations Center
- Full Water Quality evaluation for consumer concerns, includes Water Quality Professional
- Includes investigations of hydrocarbons, bacteria, residual chlorine, water heater, and plumbing concerns

Compliance Monitoring

- Recurring monitoring in accordance with the Safe Drinking Water Act for all Drinking Water Systems
- Full Drinking Water analytes sampled for plus required operational testing (bacteria/chlorine/etc.)
- Reported to all consumers by the JBPHH Consumer Confidence Report which is completed each summer

Extended Drinking Water Monitoring Program

- Follow-on to Long Term Monitoring Program, will be conducted for an additional 12 months
- Focus of the monitoring will be on petroleum hydrocarbon and fuel-related constituents

Drinking Water System Operations and Maintenance

- Source Water and Wellhead Protection Plan
- Unidirectional Flushing
- Backflow and Cross Connection Program

Medical Monitoring

- Established Red Hill Clinic and authorizing eligible community members to use the clinic
- Established Defense Occupational and Environmental Health Readiness Red Hill Incident Report
- Ongoing CDC/ATSDR Public Health Assessment and establishing Red Hill Registry
- Epidemiological Studies and Medical Record Reviews


NAVY CLOSURE TASK FORCE
RED HILL

Meredith Wilson
BWS Board Meeting 4/22/24
Written Testimony on Item for Information #1: Red Hill Impacts

Aloha Board,

Although I'm not able to present in-person testimony today, I would like to submit the following questions:

1. Has the BWS or HIDOH received a response from the March 1st request for further PFAS testing of the Navy?

2. Can you explain the rationale of how Groundwater test results would not further reflect Drinking Water System results? For example, the troublesome RHMW02 measured an exceedance of TPH-d as recent as 3/15/24 at 1,380ppb—how can the public be assured that this will not migrate to their drinking water?

3. What are the implications of keeping on or removing an aerator during the sampling of Drinking Water within a home?

4. What is the expected "background level" or "noise" of TPH in groundwater or drinking water sampling?

5. Do you think that the Red Hill Shaft *should* or even *could* ever be put back into service? Can BWS withstand the indefinite closure of the Halawa Shaft due to Red Hill? Navy officials seem adamant that re-opening the Red Hill well is their eventual goal.

DOH has posted a Draft of updates to their Environmental Health Evaluation (EHE) guidance as early as April 4th on their website (albeit without fanfare and hard for average public to find).

Has BWS seen and/or reviewed these documents? (attaching link here for reference) It contains exhaustive information, but so far, it seems as if the future land use of the Red Hill site has a great dictation for the level of cleanup to be required. This is why the Reuse and Repurposing report that is yet to be finalized is so crucial.

These documents are available for public comment directly to Dr. Roger Brewer by May 1st. Please encourage your users to submit comment and it would be helpful to hear your reply to these updates.

As always, I appreciate your accessibility to the public and mahalo for your time.

Draft DOH EHE Update, Spring 2024:
https://health.hawaii.gov/heer/guidance/ehe-and-eals/

ITEM FOR INFORMATION NO. 2

"April 22, 2024

RECRUITMENT STATUS

Chair and Members
Board of Water Supply
City and County of Honolulu
Honolulu, Hawai'i 96843

Chair and Members:

Subject: Recruitment Status

Michele L. Thomas, Executive Assistant, Human Resources Office, will be presenting an update on the Recruitment Status for the period of January 2024 to March 2024.

Respectfully Submitted,

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

Attachment"

The foregoing was for information only.

DISCUSSION:

Michele Thomas, Executive Assistant I, Human Resources Office, gave the report.

Chair Anthony added that he signed a certificate of appreciation for an employee with 45 years of service. He commended employees who have served and shared their knowledge throughout the years.

Manager Lau agreed with Chair Anthony's comment. He stated that senior employees' knowledge and expertise are valuable and can be passed down to the younger employees. He shared that the BWS provides opportunities for career progression, and even those who start at the entry-level can move up in the organization. Manager Lau commented that the entire workforce faces challenges and struggles to keep up with the demand to fill vacancies. The BWS is a vital part of the community; therefore, having a workforce to continue the BWS's mission and vision is important.

Ms. Michele Thomas echoed Manager Lau's comments.

Board Member Bryan Andaya thanked Ms. Thomas for her recruiting efforts. He suggested that the BWS look into developing succession plans for program administrators and their assistants.

Ms. Thomas shared that the BWS Human Resources Office (HRO) diligently worked on trying to obtain consultant services for the succession planning for the BWS but has faced challenges. While the

BWS HRO is short-staffed, they continue to try to fill vacant positions and work in-house on succession plans. However, due to the civil service provisions, it has been difficult to bring in professional services.

Manager Lau added that the current challenge is keeping positions filled and retaining experienced employees, especially engineers who are beginning to move up the organization. He shared that the City is looking into ways to improve and compete with the different compensation and benefits packages offered elsewhere, but it remains a challenge. Manager Lau shared some tactics used to keep employees and younger people, including interns and student aids, excited and interested, such as exposing them to the different possibilities and opportunities within the divisions and organization. As an example, he shared about Ms. Lin, a Civil Engineer from the Water Resources Division, who is temporarily assigned to the Manager and Chief Engineer's Office (OMCE) to be exposed to other issues the BWS handles, such as Red Hill.

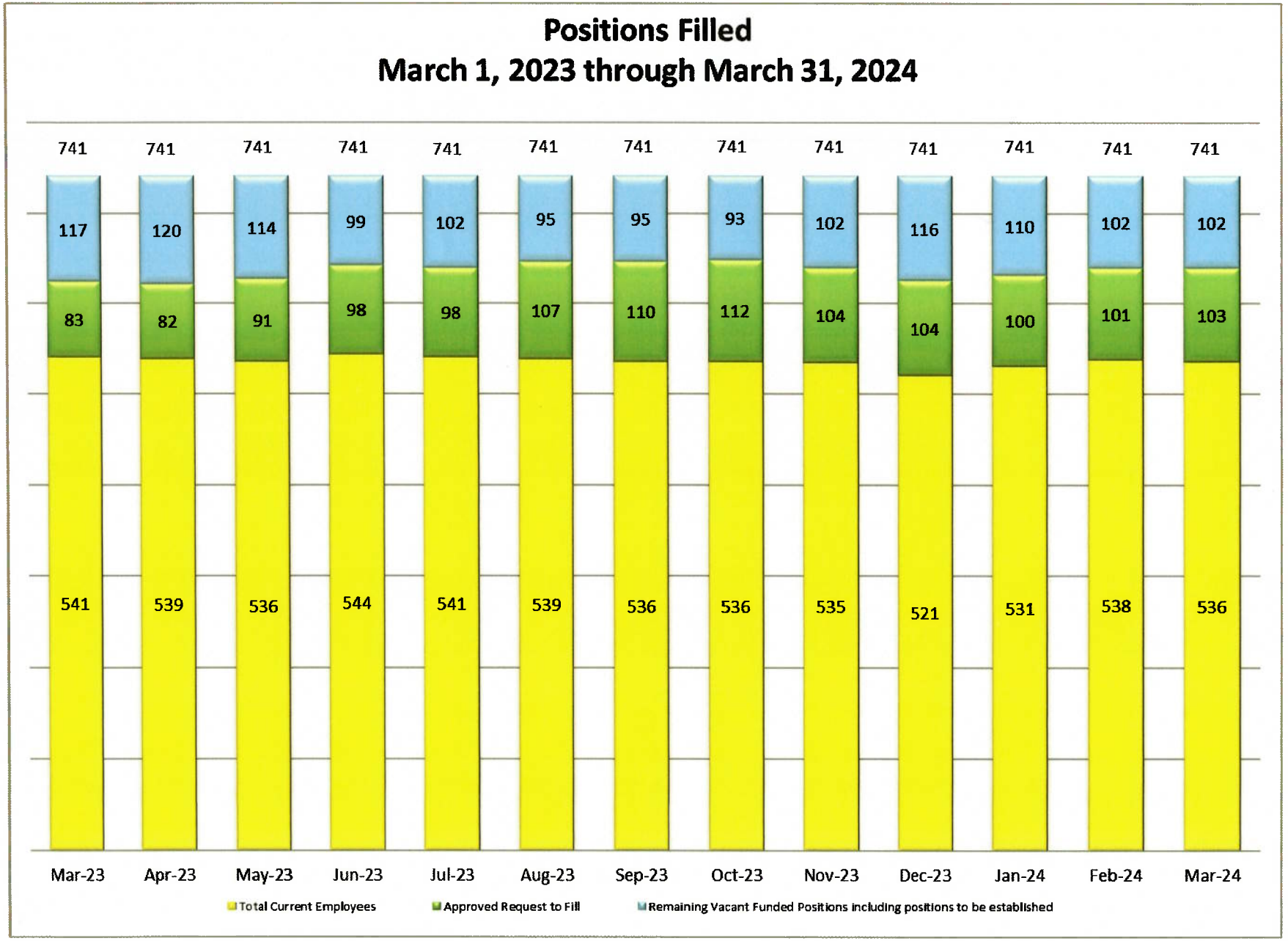
Board Member Andaya commented that he understands the challenges of filling positions throughout the agency and appreciates all the work put into filling vacant positions. He encourages the BWS to continue working hard and thinking outside the box.

Manager Lau agreed with Board Member Andaya. He shared that the BWS Procurement office is also short-handed. Therefore, Ms. Raelynn Nakabayashi, Executive Support Assistant I, started to hire contract trainees to help fill vacant positions in her office. The HRO also faces the same challenges because it is a specialized field. Manager Lau stated that higher-level positions are offered to existing staff to bring in people at lower levels.

Ms. Thomas explained that the BWS has been tailoring how each division fills vacant positions and what has been working to fill those positions. Some positions are filled by promoting from within and by recruiting at the lower levels; other positions are filled by offering cross-training opportunities, offering trade opportunities areas, and partnering with community groups, depending on the specific needs of each division.

Manager Lau shared that he began his career in public service as a student aide. He announced since summer is a few months away, if anyone in the public knows any students looking for a summer job to, refer them to the BWS.

Ms. Thomas shared that the BWS HRO can be reached at 808-748-5160, and more information is available on www.boardofwatersupply.com.



For the period Jan24-Mar24 Actions: 28 New Hires, 6 Promotions, 1 Transfer, 13 Separations.

BOARD OF WATER SUPPLY

City and County of Honolulu

RECRUITMENT AND SEPARATION STATUS

For Period January 1, 2024 to March 31, 2024

Status of Positions Under Recruitment

	as of		
	1/31/2024	2/29/2024	3/31/2024
Pending DHR Open List (external recruitment)	23	22	24
Pending Internal recruitments	9	6	3
Pending Final Interview Questions	15	11	12
Pending Interviews with Division	28	47	32
Anticipated Starts (pre-employment clearances)	18	12	27
Cancelled Requests	7	3	5
Total Positions Under Recruitment	100	101	103

Filled Positions

Month	1/31/2024	2/29/2024	3/31/2024
Open list	14	9	5
Internal Promotions	4	2	0
Internal Demotions/Transfers	1	0	0
Reallocations	11	13	8

Separations

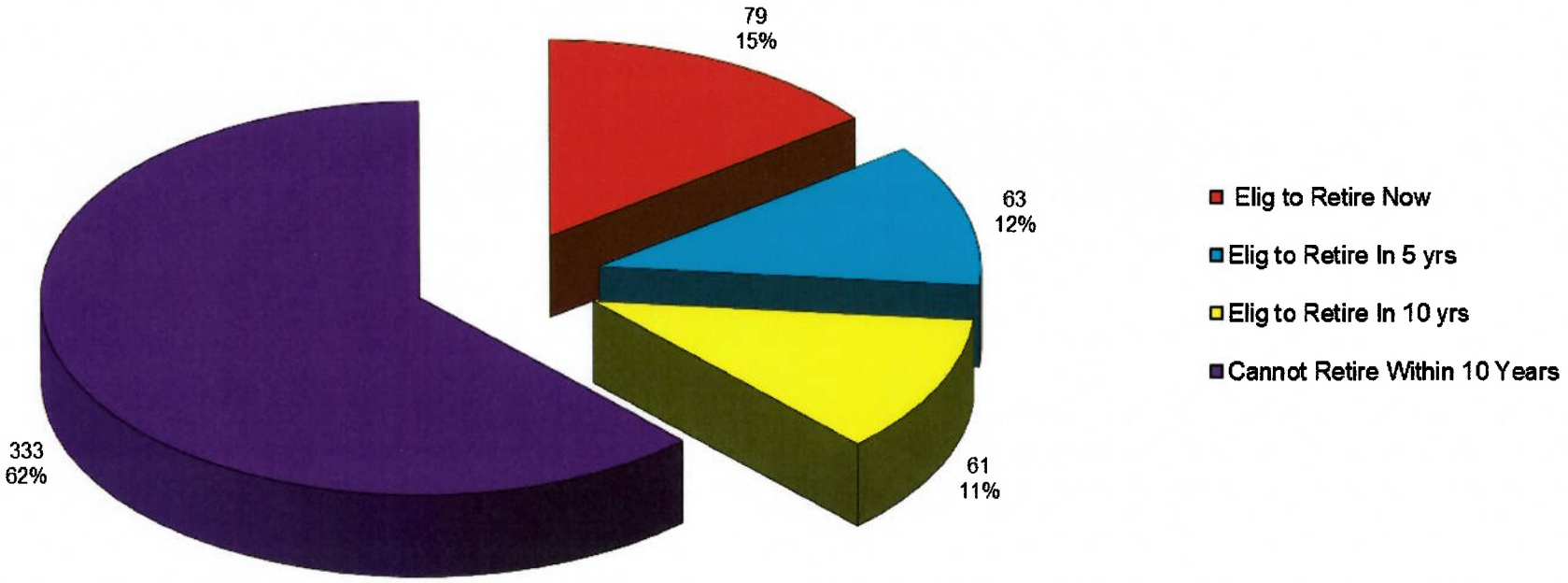
Month	Jan-24	Feb-24	Mar-24
Retire	0	2	2
Resign/Termination/Other	4	0	5

Legend:

DHR = Department of Human Resources City and County of Honolulu

Reallocation = Employee has demonstrated compentency in higher level position and position was adjusted

BWS Retirement Projections
As of March 31, 2024



ITEM FOR INFORMATION NO. 3

"April 22, 2024

STATUS UPDATE OF GROUNDWATER LEVELS AT ALL INDEX STATIONS

Chair and Members
Board of Water Supply
City and County of Honolulu
Honolulu, Hawai'i 96843

Chair and Members:

Subject: Status Update of Groundwater Levels at All Index Stations

Six aquifer index stations were in low groundwater condition for the production month of March 2024. Kaimukī, Moanalua, Pearl City, Kaluanui and Waialua are in Caution Status. Punalu'u is in Alert status. The monthly production average for March 2024 was 130.71 million gallons per day.

The Board of Water Supply rainfall index for the month of March 2024 was 53 percent of normal, with a 5-month moving average of 89 percent. As of April 2, 2024, the Hawai'i Drought Monitor shows abnormally dry conditions across O'ahu, with moderate drought conditions along the leeward coast west of Pearl Harbor. The National Weather Service is forecasting below-normal precipitation through at least June 2024 and possibly as late as October 2024.

Most monitoring wells exhibited stable to slightly decreasing head levels for the month of March 2024, likely reflecting the seasonal lower production combined with relatively low rainfall in recent months. The average monthly production for March 2024 was slightly higher than March 2023 and the 5-year average. Increased conservation messaging is recommended into mid-2024.

Respectfully Submitted,

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

Attachment"

The foregoing was for information only.

DISCUSSION: Barry Usagawa, Program Administrator, Water Resources Division, gave the report.

Chair Anthony requested that a report to show how rainfall has changed over the years be included in his next report.

Mr. Barry Usagawa agreed that he and his team would provide a comparison of trends, which should mirror the lower groundwater reductions since pumpage has stayed fairly flat over the years, and the head levels should tie to the amount of rainfall.

Chair Anthony shared that at a meeting he attended with the University of Hawai'i (UH), they shared reports of what rainfall and tradewind could be like in the future. He suggested that the BWS look into the available federal funding and obtain data from UH to help plan for the future.

Manager Lau shared that the BWS worked with the Water Research Foundation a few years ago to produce a model of rainfall conditions and how climate change can impact rainfall.

Mr. Usagawa shared that Manager Lau, Thomas Giambelluca, Fresh Water Advisory Council and UH Water Resources Research Professor, and himself have done some studies around the recurrence of Kona storms. He also mentioned that Dr. Pao-Shin Chu's study indicated that tradewinds are changing from northeasterly to more easterly, causing less rainfall due to the winds shifting parallel to the Koolau's. Mr. Usagawa stated that there have not been any updates to the 2100 rainfall forecast since the 2000-2010 decrease in rainfall was documented.

PRODUCTION, HEAD AND RAINFALL REPORT
MONTH OF MARCH 2024

POTABLE

STATION	MGD
HONOLULU (1)	
KULIOUOU	0.12
WAILUPE	0.13
AINA KOA	0.00
AINA KOA II	0.19
MANOA II	0.95
PALOLO	1.07
KAIMUKI HIGH	2.26
KAIMUKI LOW	0.71
WILDER	8.29
BERETANIA HIGH	0.94
BERETANIA LOW	1.93
KALIHI HIGH	3.64
KALIHI LOW	2.55
KAPALAMA	0.26
KALIHI SHAFT	7.82
MOANALUA	2.57
HALAWA SHAFT	0.00
KAAMILO	0.81
KALAUAO	8.94
PUNANANI	9.37
KAAHUMANU	0.26
HECO WAIAU	2.73
MANANA	0.26
WAIALAE IKI	0.54
WELLS SUBTOTAL:	56.36
MANOA TUNNEL	0.17
PALOLO TUNNEL	0.00
GRAVITY SUBTTL:	0.17
HONOLULU SUBTTL:	56.53

STATION	MGD
WINDWARD (2)	
WAIMANALO II	0.76
WAIMANALO III	0.00
KUOU I	0.63
KUOU II	0.34
KUOU III	0.69
LULUKU	0.85
HAIKU	0.31
IOLEKAA	0.00
KAHALUU	0.57
KAHANA	0.64
PUNALUU I	0.00
PUNALUU II	1.12
PUNALUU III	1.00
KALUANUI	1.54
MAAKUA	0.28
HAUULA	0.26
WELLS SUBTOTAL:	8.99
WAIM. TUNNELS I & II	0.00
WAIM. TUNNELS III&IV	0.19
WAIHEE INCL. WELLS	0.30
WAIHEE TUNNEL	4.28
LULUKU TUNNEL	0.18
HAIKU TUNNEL	0.37
KAHALUU TUNNEL	1.41
GRAVITY SUBTOTAL:	6.73
WIND. SUBTOTAL:	15.71

STATION	MGD
NORTH SHORE (3)	
KAHUKU	0.37
OPANA	0.98
WAIALEE I	0.41
WAIALEE II	0.69
HALEIWA	0.00
WAIALUA	1.30
N.SHORE SUBTOTAL:	3.75

MILILANI (4)	
MILILANI I	1.81
MILILANI II	0.00
MILILANI III	0.59
MILILANI IV	1.40
MILILANI SUBTOTAL:	3.79

WAHIAWA (5)	
WAHIAWA	1.62
WAHIAWA II	1.10
WAHIAWA SUBTOTAL:	2.73

PEARL CITY-HALAWA (6)	
HALAWA 277	0.00
HALAWA 550	0.00
AIEA	0.00
AIEA GULCH 497	0.00
AIEA GULCH 550	0.20
KAONOHI I	1.57
WAIMALU I	0.00
NEWTOWN	1.73
WAIAU	1.75
PEARL CITY I	0.78
PEARL CITY II	1.02
PEARL CITY III	0.22
PEARL CITY SHAFT	0.91
PEARL CITY-HALAWA SUBTOTAL:	8.17

STATION	MGD
WAIPAHU-EWA (7)	
WAIPIO HTS.	1.88
WAIPIO HTS. I	0.00
WAIPIO HTS. II	0.31
WAIPIO HTS. III	1.29
WAIPAHU	6.71
WAIPAHU II	1.88
WAIPAHU III	1.63
WAIPAHU IV	2.65
KUNIA I	5.09
KUNIA II	1.80
KUNIA III	1.28
HOAEAE	5.67
HONOULIULI I	0.00
HONOULIULI II	5.57
MAKAKILO	0.00
WAIPAHU-EWA SUBTOTAL:	35.77

WAIANAE (8)	
MAKAHA I	0.81
MAKAHA II	0.00
MAKAHA III	0.25
MAKAHA V	0.19
MAKAHA VI	0.00
MAKAHA SHAFT	0.00
KAMAILE	0.08
WAIANAE I	0.26
WAIANAE II	0.34
WAIANAE III	0.79
WELLS SUBTOTAL:	2.72
WAIA. C&C TUNNEL	1.40
WAIA. PLANT. TUNNELS	0.13
GRAVITY SUBTOTAL:	1.53
WAIANAE SUBTOTAL:	4.25

NONPOTABLE

NONPOTABLE	MGD
KALAUAO SPRINGS	0.51
BARBERS POINT WELL	1.15
GLOVER TUNNEL NP	0.31
NONPOTABLE TOTAL:	1.98

RECYCLED WATER (FEBRUARY 2024)

RECYCLED WATER	MGD
HONOULIULI WRF R-1	4.32
HONOULIULI WRF RO	1.41
RECYCLED TOTAL:	5.73

PRODUCTION, HEAD AND RAINFALL REPORT
MONTH OF MARCH 2024

PRODUCTION SUMMARIES

TOTAL WATER	MGD
PUMPAGE	122.28
GRAVITY	8.43
POTABLE TOTAL:	130.71
NONPOTABLE	1.98
RECYCLED WATER	5.73
TOTAL WATER:	138.42

CWRM PERMITTED USE AND BWS ASSESSED YIELDS FOR BWS POTABLE SOURCES

	WATER USE DISTRICTS	A PERMITTED USE/ BWS YLDS	B MAR 2024	C DIFF. A-B
1	HONOLULU	83.32	56.36	26.96
2	WINDWARD	25.02	15.71	9.31
3	NORTH SHORE	4.70	3.75	0.95
4	MILILANI	7.53	3.79	3.74
5	WAHIAWA	4.27	2.73	1.54
6	PEARL CITY-HALAWA	12.25	8.17	4.08
7	WAIPAHU-EWA	50.63	35.77	14.86
8	WAIANAE	4.34	4.25	0.09
	TOTAL:	192.06	130.54	61.52

CWRM PERMITTED USE FOR BWS NONPOTABLE SOURCES

	WATER USE DISTRICTS	A PERMITTED USE	B MAR 2024	C DIFF. A-B
7	WAIPAHU-EWA (BARBERS POINT WELL)	1.00	1.15	-0.15
	TOTAL:	1.00	1.15	-0.15

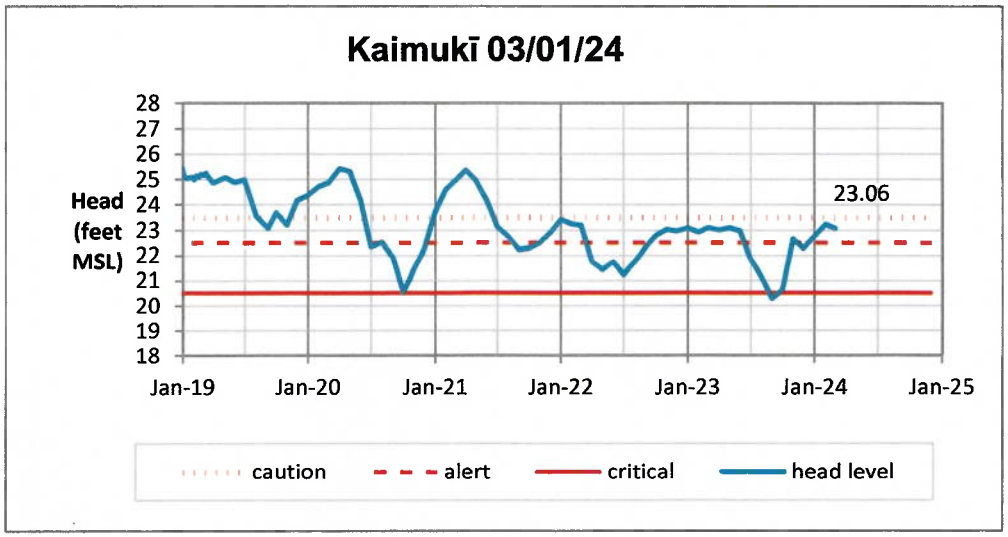
EFFECTIVE WATER DEMAND PER DISTRICT

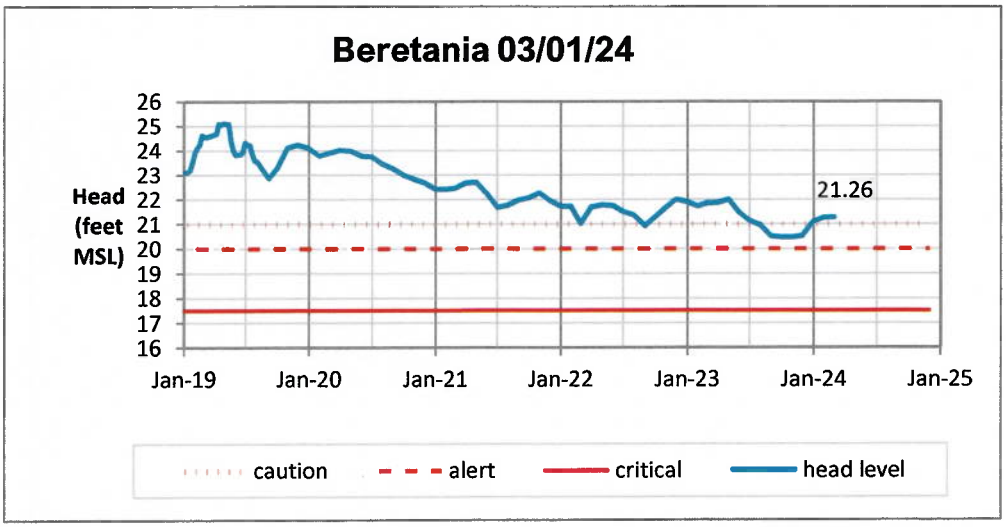
IMPORT/EXPORT BETWEEN WATER USE DISTRICTS

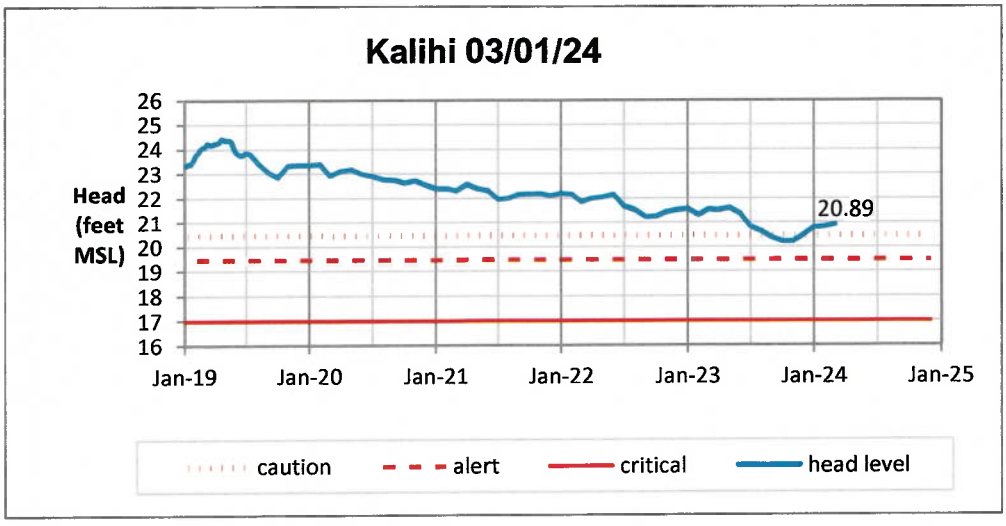
FROM	TO		MGD
2	1	WINDWARD EXPORT	0.14
7	8	BARBERS PT LB	5.03

	WATER USE DISTRICTS	SUBTOTAL	IMPORT	EXPORT	EFFECTIVE WATER DEMAND
1	HONOLULU	56.53	0.14	-	56.67
2	WINDWARD	15.71	-	0.14	15.57
3	NORTH SHORE	3.75	-	-	3.75
4	MILILANI	3.79	-	-	3.79
5	WAHIAWA	2.73	-	-	2.73
6	PEARL CITY-HALAWA	8.17	-	-	8.17
7	WAIPAHU-EWA	35.77	-	5.03	30.74
8	WAIANAE	4.25	5.03	-	9.29
	TOTAL:	130.71	5.17	5.17	130.71

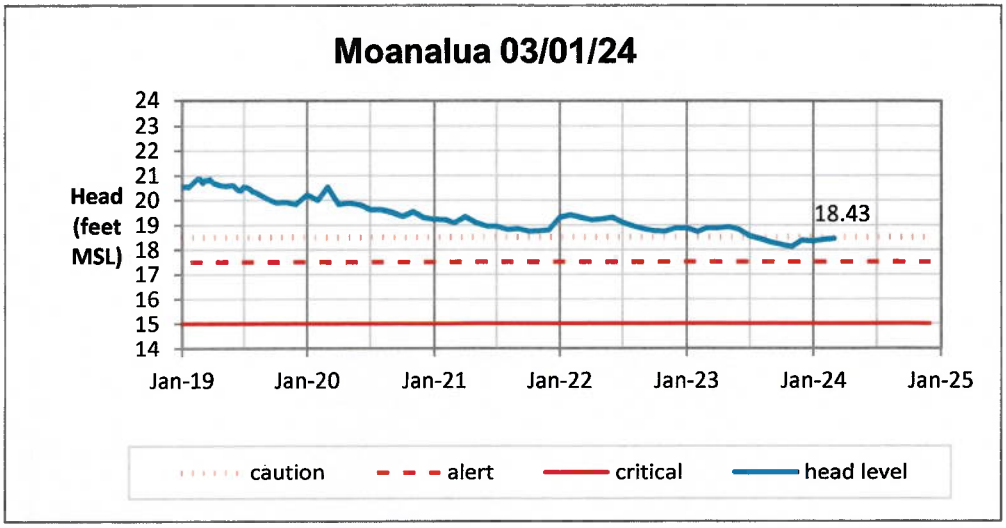
Head Report

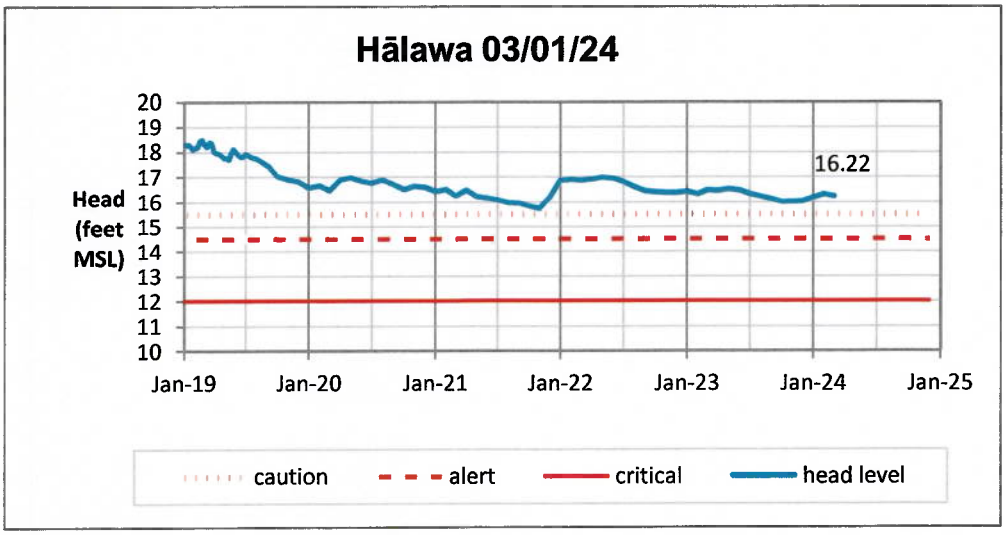

Kaimukī 03/01/24
Head (feet MSL)
28
27
26
25
24
23
22
21
20
19
18
23.06
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
Jan-25
caution
alert
critical
head level

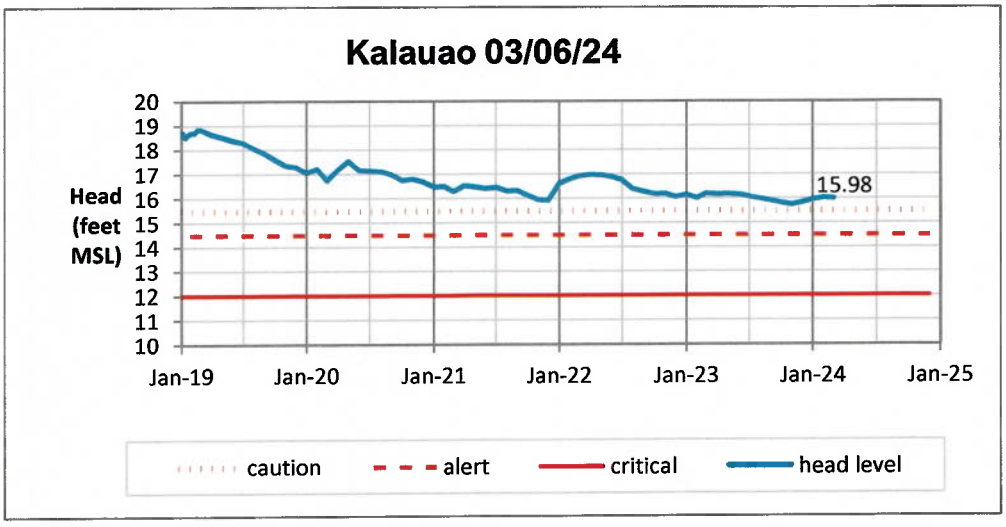

Beretania 03/01/24
Head (feet MSL)
26
25
24
23
22
21
20
19
18
17
16
21.26
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
Jan-25
caution
alert
critical
head level


Kalihi 03/01/24
Head (feet MSL)
26
25
24
23
22
21
20
19
18
17
16
20.89
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
Jan-25
caution
alert
critical
head level

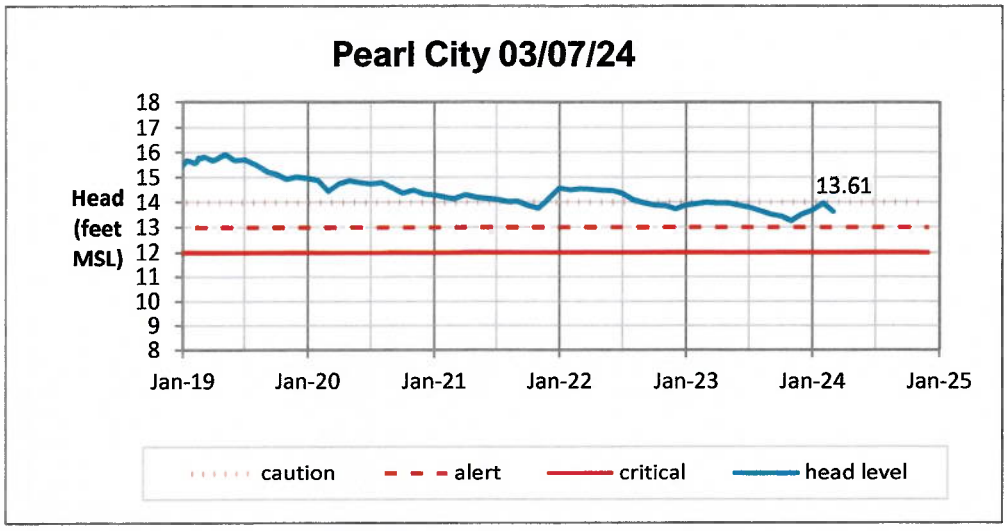
Head Report

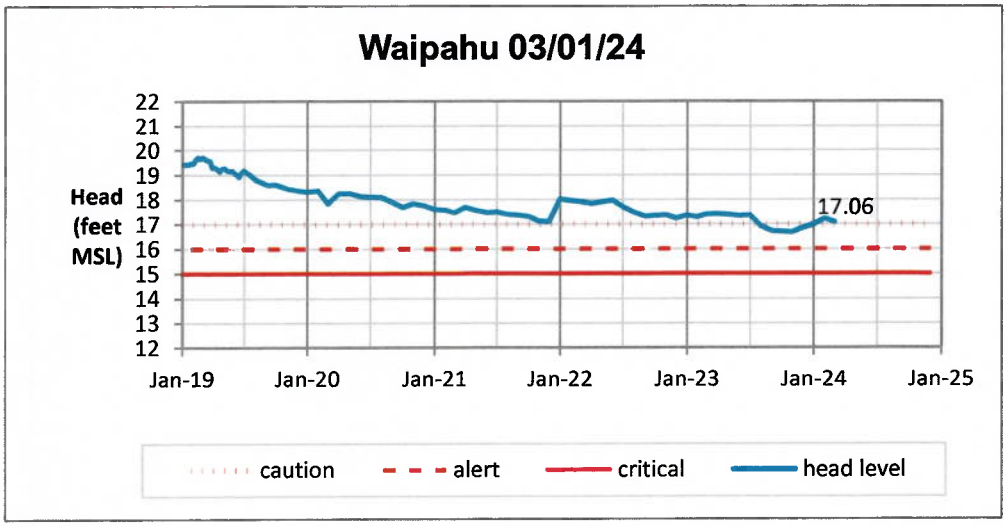

Moanalua 03/01/24
Head (feet MSL)
24
23
22
21
20
19
18
17
16
15
14
18.43
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
Jan-25
caution
alert
critical
head level

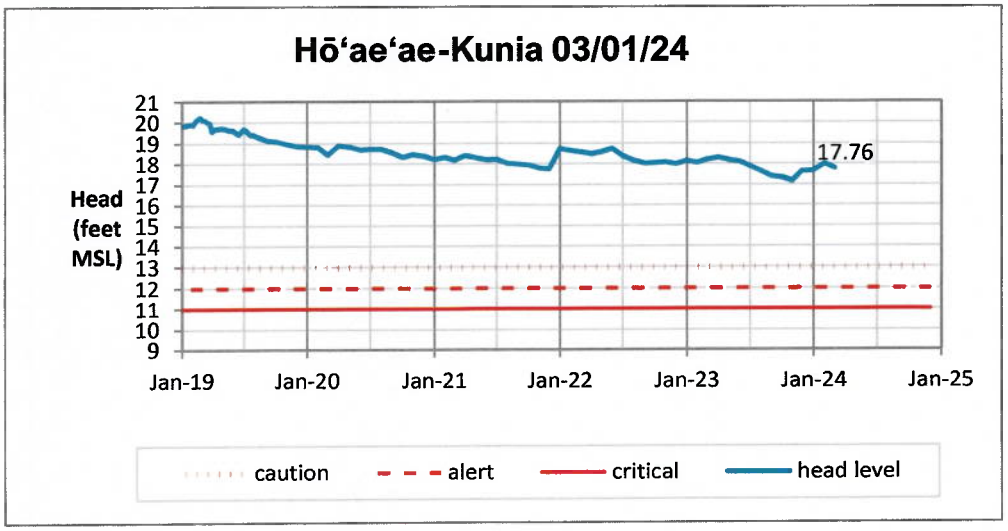

Hālawa 03/01/24
Head (feet MSL)
20
19
18
17
16
15
14
13
12
11
10
16.22
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
Jan-25
caution
alert
critical
head level


Kalauao 03/06/24
Head (feet MSL)
20
19
18
17
16
15
14
13
12
11
10
15.98
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
Jan-25
caution
alert
critical
head level

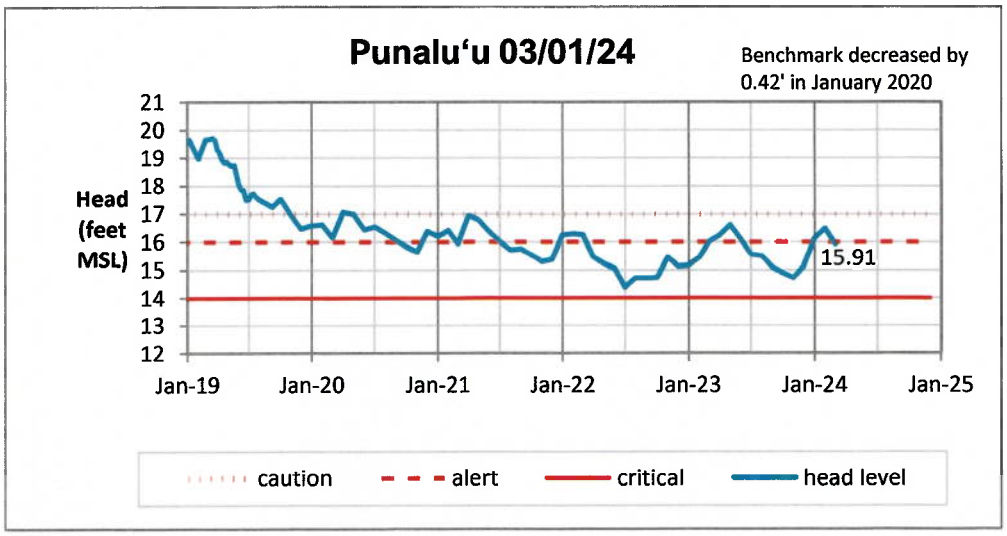
Head Report

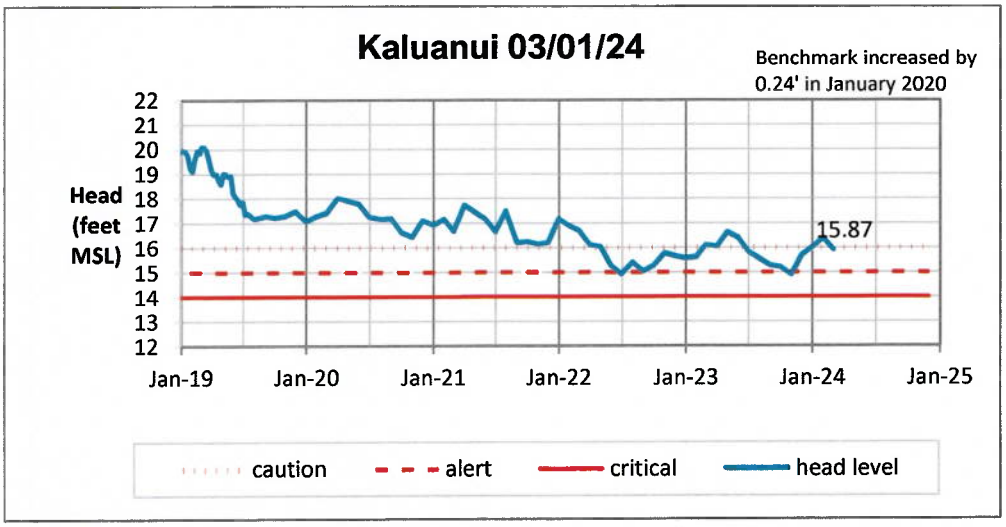

Pearl City 03/07/24
Head (feet MSL)
18
17
16
15
14
13
12
11
10
9
8
13.61
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
Jan-25
caution
alert
critical
head level

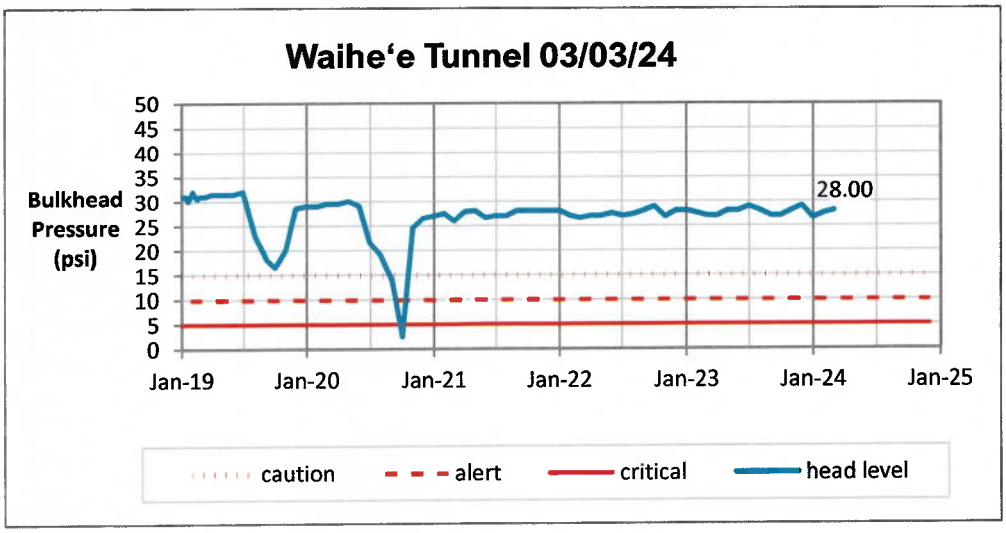

Waipahu 03/01/24
Head (feet MSL)
22
21
20
19
18
17
16
15
14
13
12
17.06
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
Jan-25
caution
alert
critical
head level


Hō'ae'ae-Kunia 03/01/24
Head (feet MSL)
21
20
19
18
17
16
15
14
13
12
11
10
9
17.76
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
Jan-25
caution
alert
critical
head level

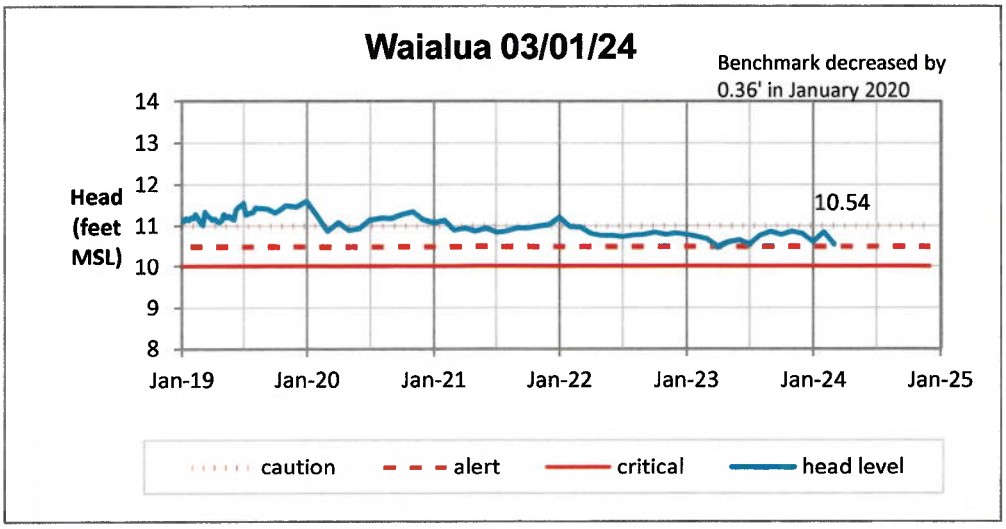
Head Report

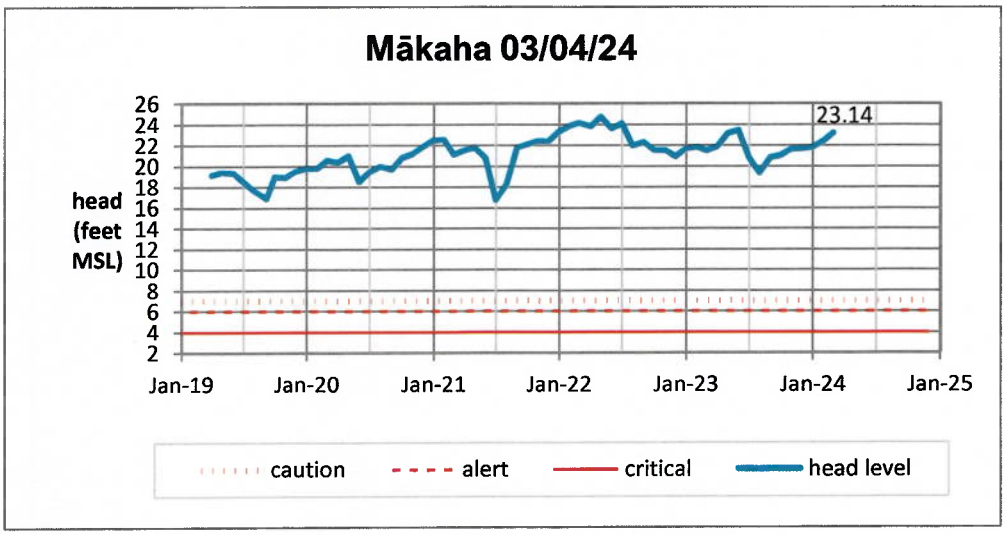

Punalu'u 03/01/24
Benchmark decreased by 0.42' in January 2020
Head (feet MSL)
21
20
19
18
17
16
15
14
13
12
15.91
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
Jan-25
caution
alert
critical
head level

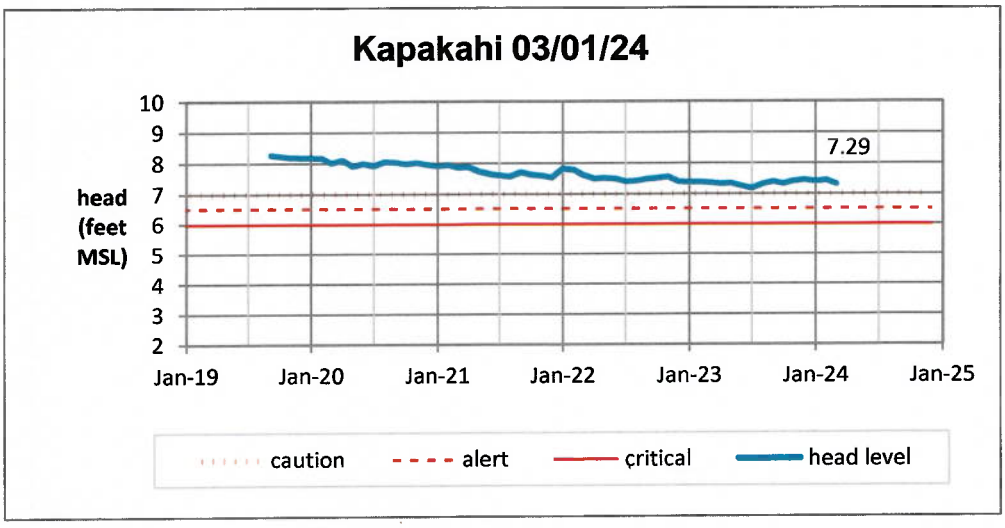

Kaluanui 03/01/24
Benchmark increased by 0.24' in January 2020
Head (feet MSL)
22
21
20
19
18
17
16
15
14
13
12
15.87
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
Jan-25
caution
alert
critical
head level

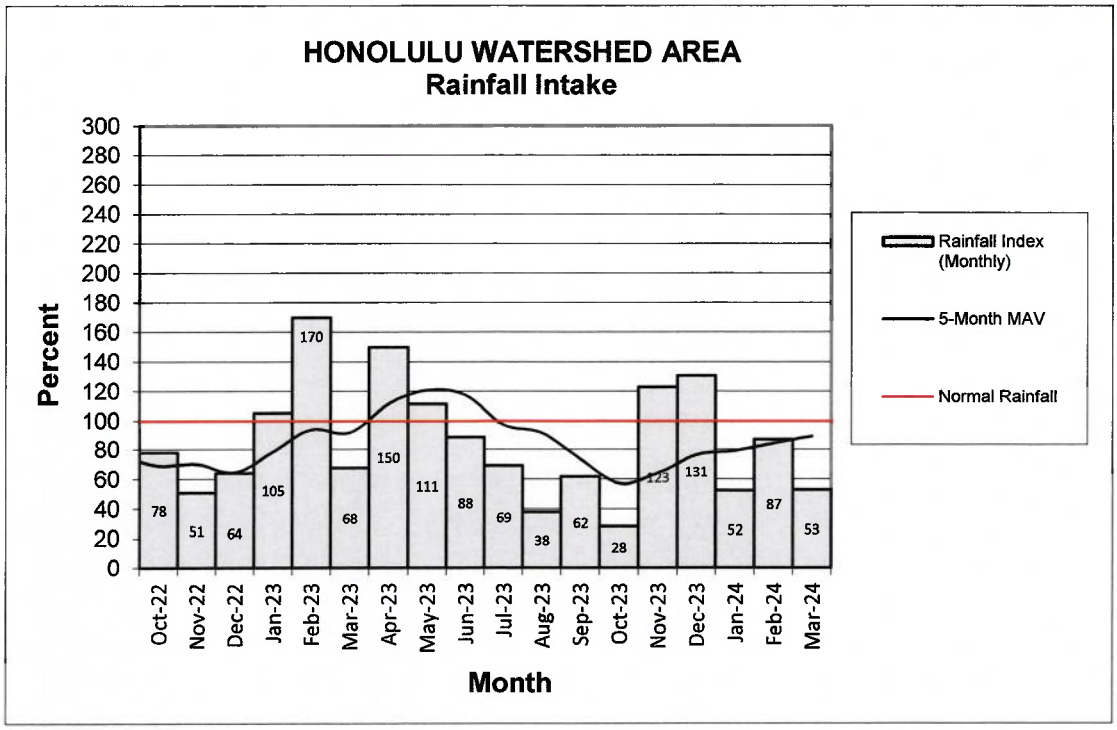

Waihe'e Tunnel 03/03/24
Bulkhead Pressure (psi)
50
45
40
35
30
25
20
15
10
5
0
28.00
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
Jan-25
caution
alert
critical
head level

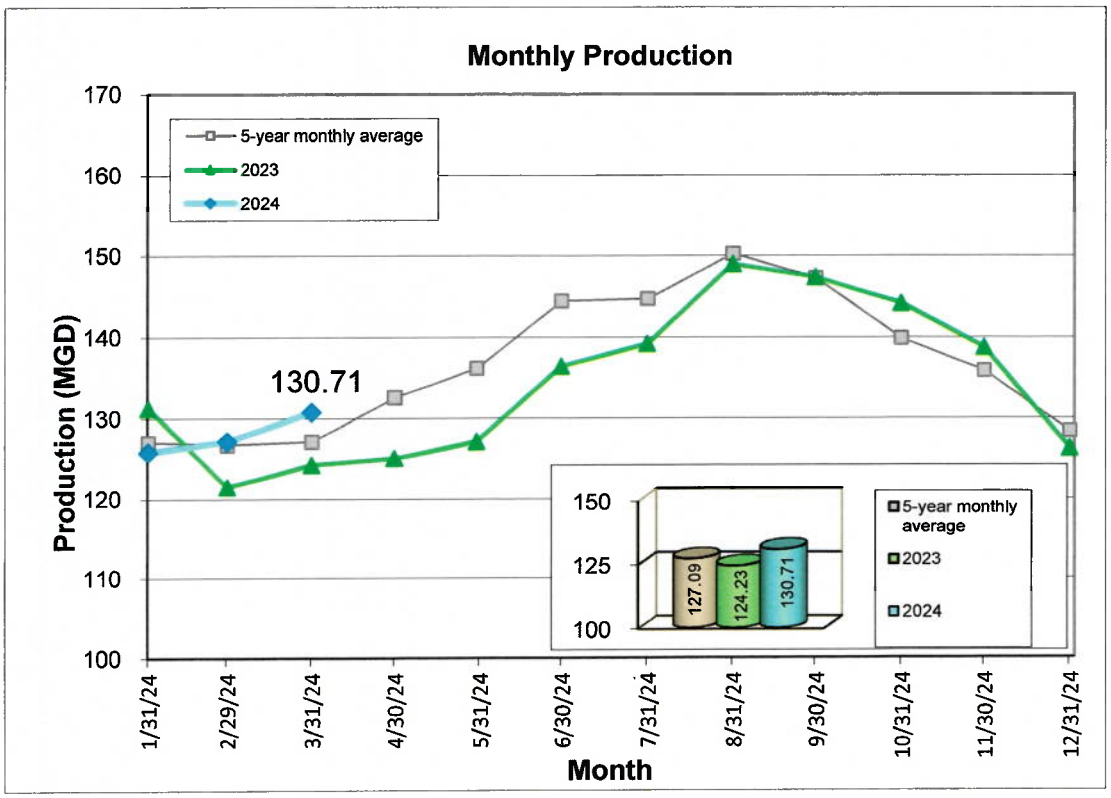
Head Report


Waialua 03/01/24
Benchmark decreased by 0.36' in January 2020
Head (feet MSL)
14
13
12
11
10
9
8
10.54
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
Jan-25
caution
alert
critical
head level


Mākaha 03/04/24
head (feet MSL)
26
24
22
20
18
16
14
12
10
8
6
4
2
23.14
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
Jan-25
caution
alert
critical
head level


Kapakahi 03/01/24
head (feet MSL)
10
9
8
7
6
5
4
3
2
7.29
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
Jan-24
Jan-25
caution
alert
critical
head level


HONOLULU WATERSHED AREA
Rainfall Intake
Percent
Month
Rainfall Index (Monthly)
5-Month MAV
Normal Rainfall
78
51
64
105
170
68
150
111
88
69
38
62
28
123
131
52
87
53
Oct-22
Nov-22
Dec-22
Jan-23
Feb-23
Mar-23
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24


Monthly Production
Production (MGD)
Month
5-year monthly average
2023
2024
130.71
127.09
124.23
130.71
1/31/24
2/29/24
3/31/24
4/30/24
5/31/24
6/30/24
7/31/24
8/31/24
9/30/24
10/31/24
11/30/24
12/31/24

ITEM FOR INFORMATION NO. 4

"April 22, 2024

WATER MAIN REPAIR REPORT FOR MARCH 2024

Chair and Members
Board of Water Supply
City and County of Honolulu
Honolulu, Hawai'i 96843

Chair and Members:

Subject: Water Main Repair Report for March 2024

Jason Nikaido, Program Administrator, Field Operations Division, will report on water main repair work for the month of March 2024.

Respectfully submitted,

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

Attachment"

The foregoing was for information only.

DISCUSSION: Jason Nikaido, Program Administrator, Field Operations Division, gave the report.

Board Member Jonathan Kaneshiro inquired about the high number of main water breaks and whether the satellite technology is better or if it is a humble abode.

Mr. Jason Nikaido responded that in March, other factors caused a high number of breaks. He shared that two clusters of water main breaks were associated with a BWS capital project. He explained that sometimes the BWS is required to change how the system operates due to closures, the use of heavy equipment, or the area being prone to more breaks, which is the reason for pipeline replacements.

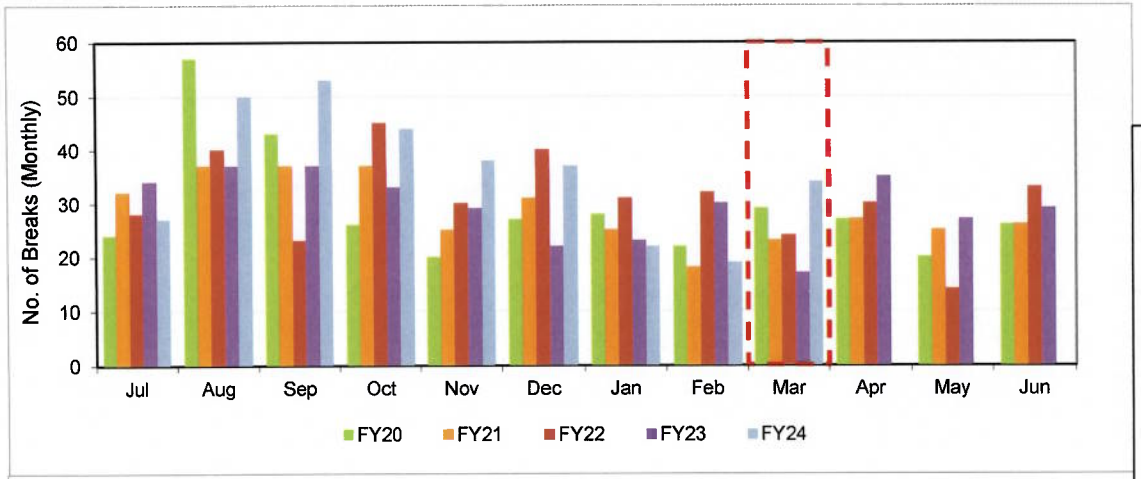
WATER MAIN REPAIR REPORT
for March 2024

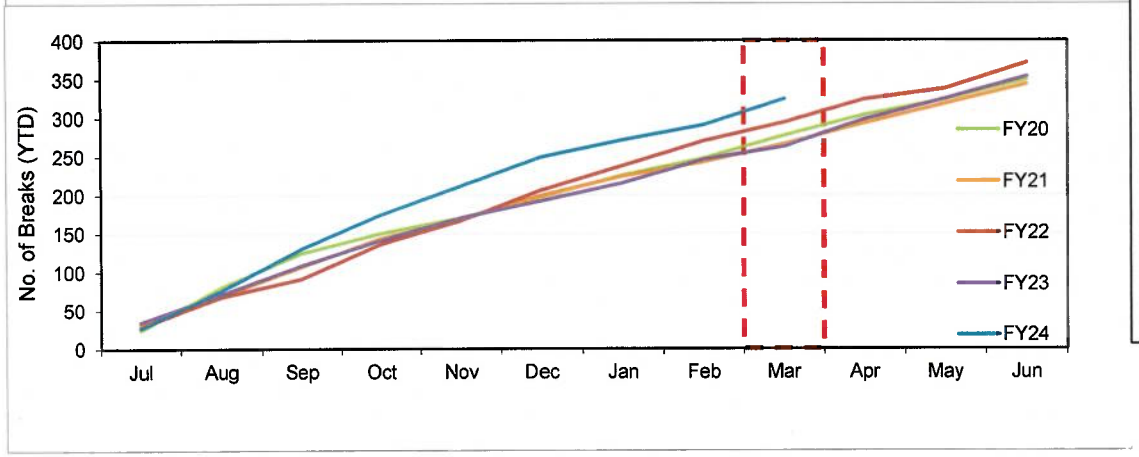
Monthly Main Breaks

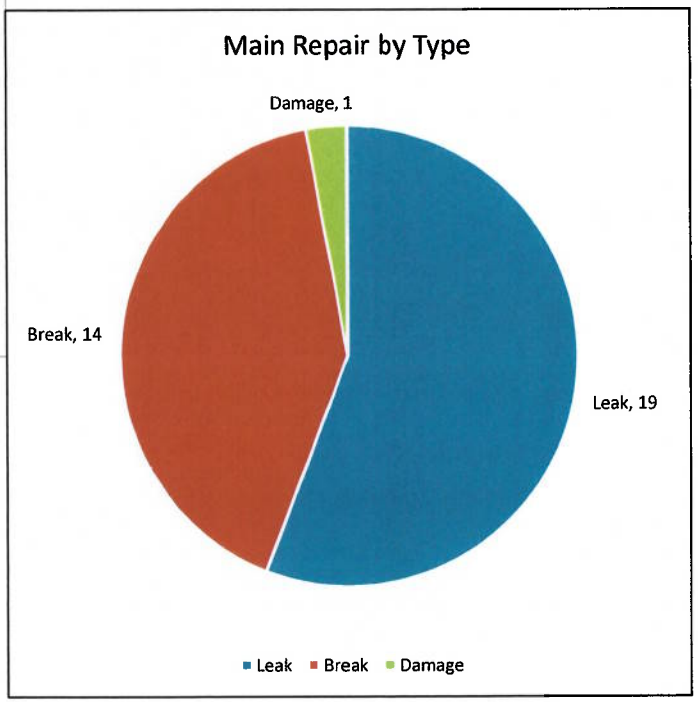
FY	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
2024	27	50	53	44	38	37	22	19	**34**				**324**
2023	34	37	37	33	29	22	23	30	17	35	27	29	**353**
2022	28	40	23	45	30	40	31	32	24	30	14	33	**370**
2021	32	37	37	37	25	31	25	18	23	27	25	26	**343**
2020	24	57	43	26	20	27	28	22	29	27	20	26	**349**

Main Repair by Type

Type	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
Leak	--	--	--	--	--	24	12	12	**19**				67
Break	--	--	--	--	--	13	10	7	**14**				44
Damage	--	--	--	--	--	0	0	0	**1**				1
Total	---	---	---	---	---	**37**	**22**	**19**	**34**	**0**	**0**	**0**	**112**







Date	Address	Size (In)	Pipe Type
3/2/2024	321 Ilimalia Lp, Kailua	8	CI
3/4/2024	44-723 Malulani St, Kaneohe	6	CI
3/4/2024	91-844 Kekakia Pl, Ewa Beach	8	CI
3/5/2024	411 Hualani St, Kailua	8	CI
3/5/2024	2131 Makiki Heights Dr, Honolulu	8	CI
3/5/2024	1184 Palekaiko St, Pearl City	8	CI
3/6/2024	44-731 Malulani St, Kaneohe	6	CI
3/7/2024	1321 Akalani Lp, Kailua	12	CI
3/13/2024	1723 Hoolehua St, Pearl City	8	CI
3/13/2024	45-511 Kolani Pl, Kaneohe	4	CI
3/13/2024	1489 Kanapuu Dr, Kailua	12	PVC
3/14/2024	1431 Hooli Cir, Pearl City	8	CI
3/15/2024	1994 9th Ave, Honolulu	8	CI
3/15/2024	98-1454 Hoohiki St, Pearl City	12	CI
3/16/2024	94-342 Haaa St, Waipahu	8	CI
3/16/2024	94-526 Honowai St, Waipahu	12	CI
3/16/2024	91-1440 Farrington Hwy, Ewa Beach	30	CC
3/16/2024	716 Lukepane Ave, Honolulu	8	CI
3/17/2024	716 Lukepane Ave, Honolulu	8	CI
3/18/2024	673 22nd Ave, Honolulu	12	CI
3/19/2024	715 Hoomoe St, Pearl City	8	CI
3/20/2024	54-198 Hauula Homestead Rd, Hauula	8	DI
3/20/2024	599 Haiku Rd, Kaneohe	16	CI
3/21/2024	99-039 Kaamilo St, Aiea	8	PVC
3/21/2024	758 Kaipuu St, Honolulu	8	CI
3/24/2024	91-928 Waihua Pl, Ewa Beach	8	DI
3/25/2024	2336 Anini Pl, Pearl City	8	CI
3/26/2024	3328 Oahu Ave, Honolulu	8	PVC
3/28/2024	1748 Hookupa St, Pearl City	8	PVC
3/28/2024	956 18th Ave, Honolulu	4	GALV
3/28/2024	91-277 Kalaeloa Blvd, Kapolei	12	CI
3/29/2024	71 Leokane St, Waipahu	12	CI
3/29/2024	92-834 Kinohi Pl, Kapolei	8	CI
3/30/2024	1723 Hoolehua St, Pearl City	8	CI

LEAK DETECTION
for March 2024

POIs Investigated

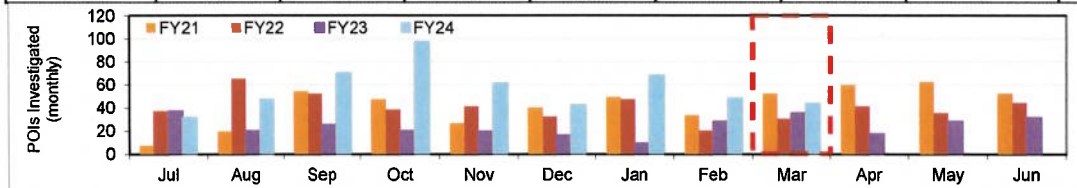
FY	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
2024	31	47	70	97	61	42	68	48	**43**				**507**
2023	37	20	25	20	19	16	9	28	35	17	28	31	285
2022	37	65	52	38	41	32	47	20	30	41	35	44	482
2021	7	19	54	47	26	40	49	33	52	59	62	52	500

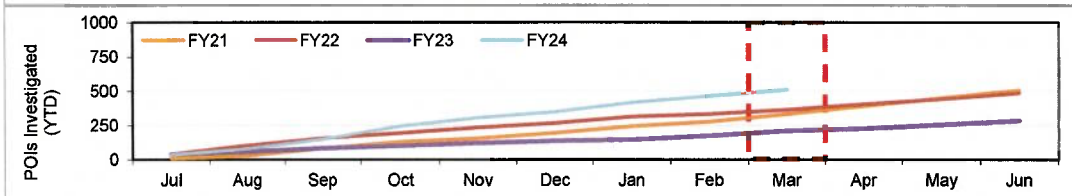
Leaks Found

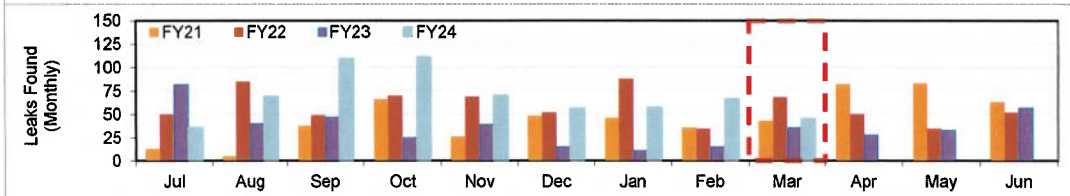
FY	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
2024	36	69	109	111	70	56	57	66	**45**				**619**
2023	82	40	47	25	39	15	11	15	36	28	33	57	428
2022	50	85	49	70	69	52	88	35	68	50	35	52	703
2021	13	5	38	66	26	48	46	36	43	82	83	63	549

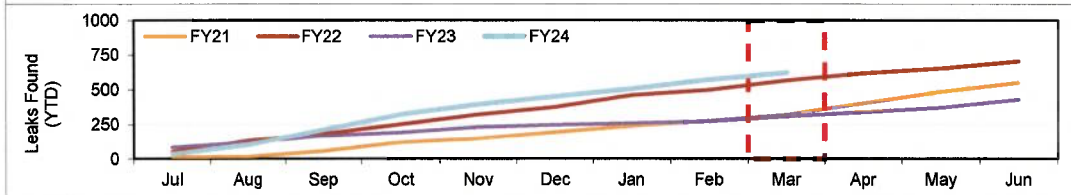
Satellite Leak by Type

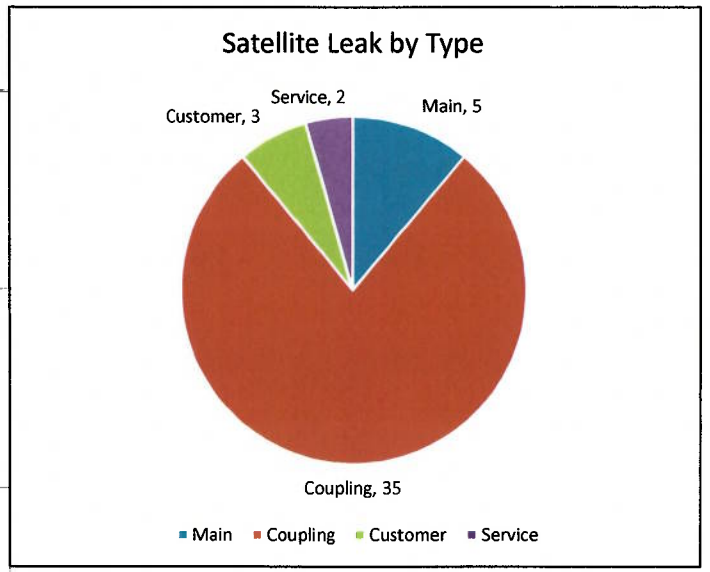
Type	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
Main	6	14	13	6	5	4	3	5	**5**				61
Coupling	17	35	74	71	48	46	47	41	**35**				414
Customer	9	13	14	23	12	1	5	16	**3**				96
Service	4	7	8	11	5	5	2	4	**2**				48
Total	**36**	**69**	**109**	**111**	**70**	**56**	**57**	**66**	**45**	**0**	**0**	**0**	**619**











MOTION TO RECESS INTO EXECUTIVE SESSION

There being no further business, Chair Anthony, at 4:01 PM, called for a motion to adjourn the Open Session. Jonathan Kaneshiro so moved; seconded by Gene Albano and unanimously carried.

Upon unanimous approved motion, the Board recessed into Executive Session Pursuant to [HRS § 92-5 (a)(4)] at 4:02 PM to Consider Issues Pertaining to Matters Posted for Discussion at an Executive Session.

OPEN SESSION

The Board reconvened in Open Session at 4:05 PM.

MOTION TO ADJOURN

There being no further business Chair Anthony, at 4:06 PM, called for a motion to adjourn the Regular Session. Jonathan Kaneshiro so moved, seconded by Kapua Sproat, and unanimously carried.

The minutes of the Regular Meeting held on April 22, 2024, are respectfully submitted,

JOY CRUZ-ACHIU

APPROVED:

NĀʻĀLEHU ANTHONY
Chair of the Board
MAY 28 2024
Date

THE MINUTES OF THE REGULAR MEETING HELD ON APRIL 22, 2024, WERE APPROVED AT THE MAY 28, 2024, BOARD MEETING			
	AYE	NO	COMMENT
NĀʻĀLEHU ANTHONY	X		
KAPUA SPROAT	X		
BRYAN P. ANDAYA	X		
JONATHAN KANESHIRO	X		
EDWIN H. SNIFFEN			ABSENT
GENE C. ALBANO	X		