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

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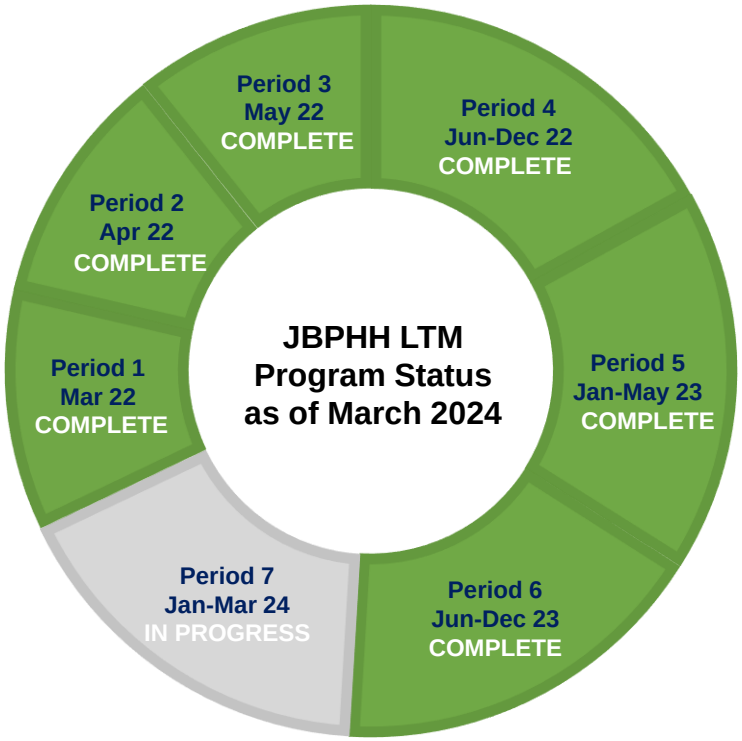
- LTM Began in March 2022 and will end in March 2024
  - Samples collected monthly for 0 – 3 months of LTM
  - Samples collected every 6 months for 4 – 24 months of LTM
  - As of February 2024, over 8,000 drinking water samples collected as part of LTM Results available on JBPHH Safe Water website
- 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

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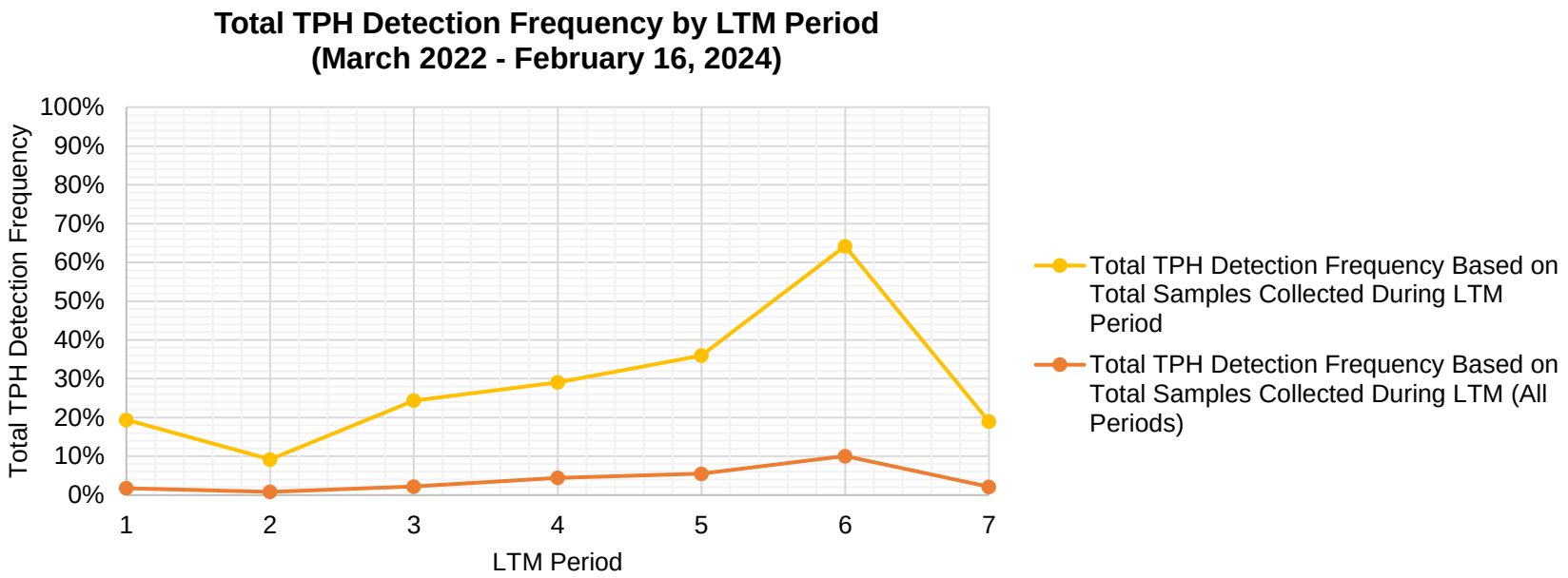

LTM Period	Number of Samples	Number of Total TPH Detects	Total TPH Detection Frequency (Based on Number of Samples Collected During Current LTM Period)	Total TPH Detection Frequency (Based on Total Number of Samples Collected During All LTM Periods)	Average Detected Concentration
Period 1 (Month 1)	897	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

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- 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 are water complaints.

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

Actions Taken by Navy

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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?

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- 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?

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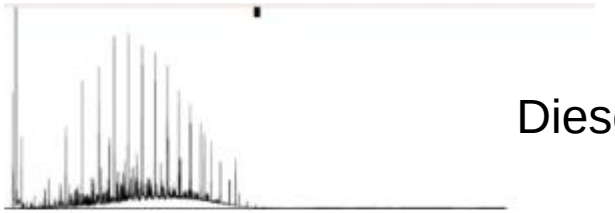
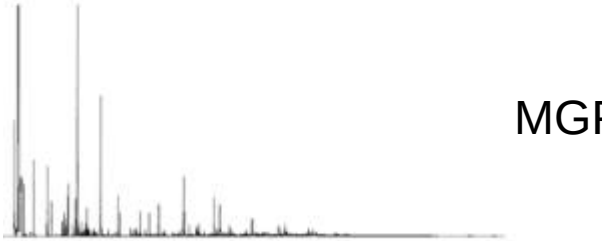
All will be Detected as TPH Under Method 8015

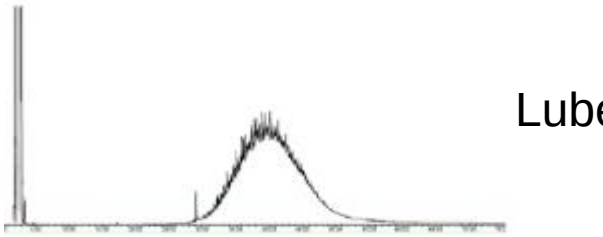
***But Not All Are TPH**



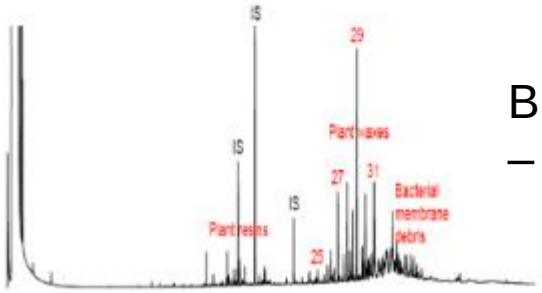
Diesel – **TPH? Yes.**



MGP Tar – **TPH? Yes.**



Lube Oil – **TPH? Yes.**



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

Low-Level TPH Detections: MDL/MRL

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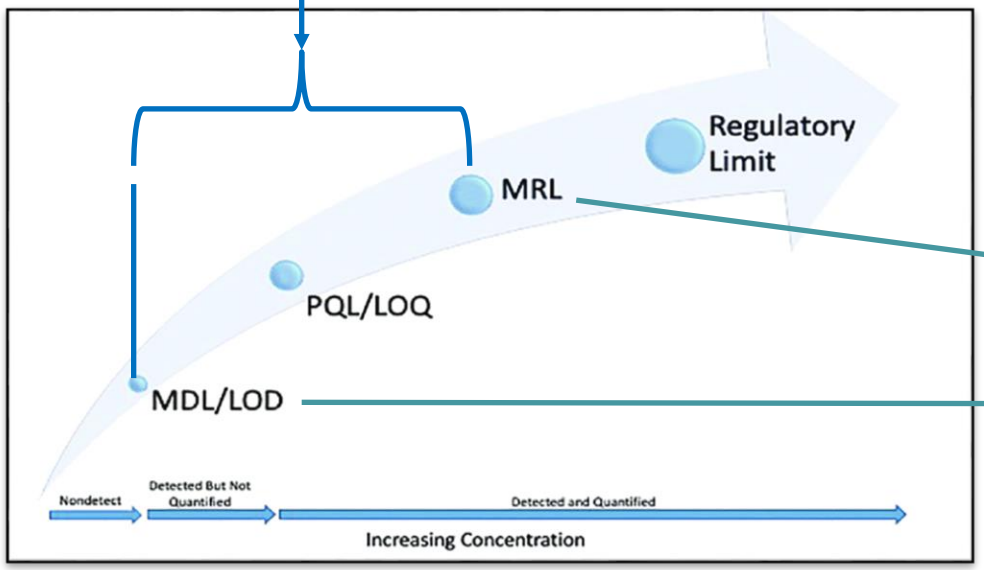
- Majority of TPH detections under LTM between 50-80 ppb
  - Between MDL and MRL*
  - *MDL > Results < MRL are estimates, not reliably quantified



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

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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

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

LTM Period 6 – Jun 2023 to Nov 2023

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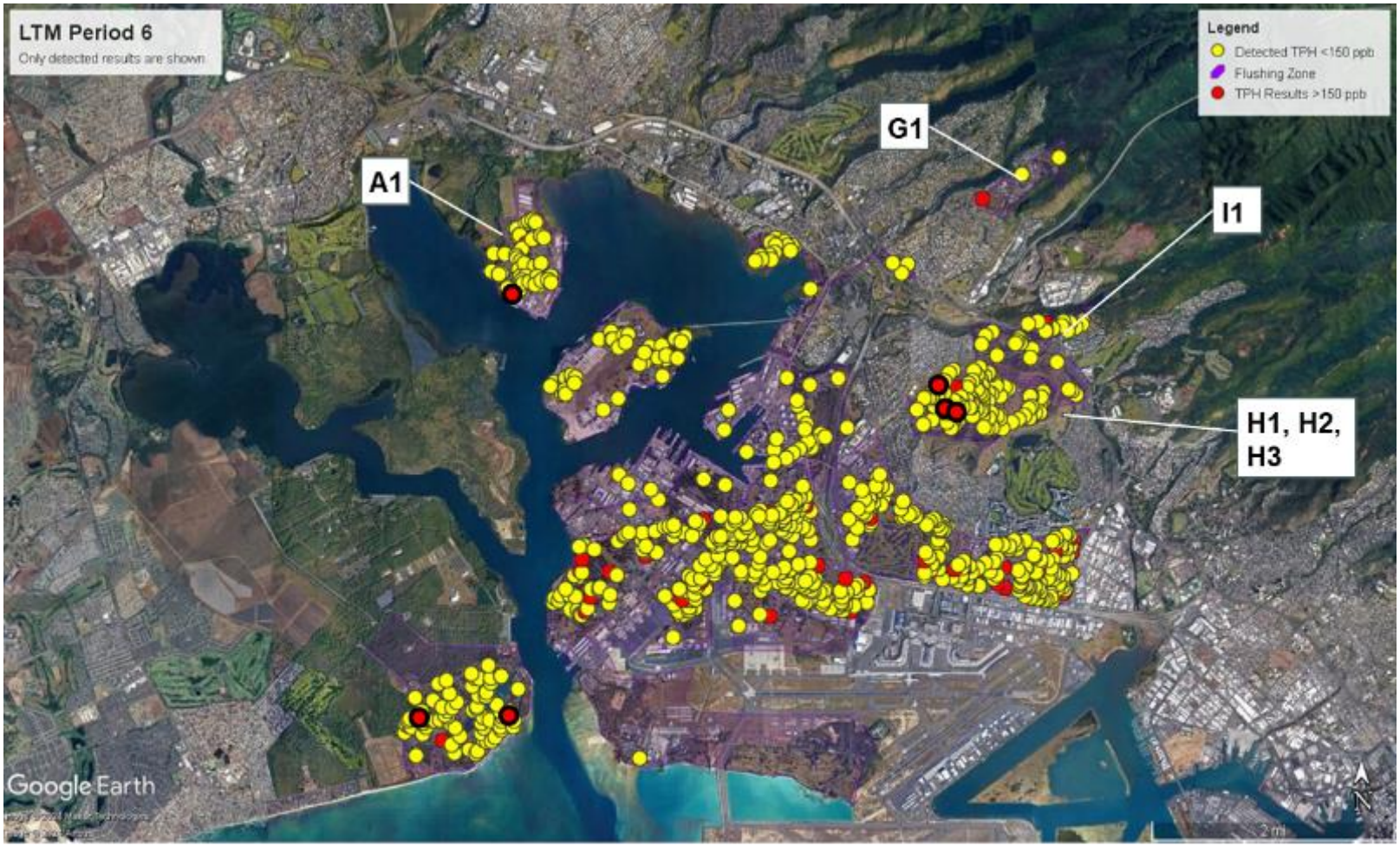

TPH < 150 ug/L (ppb)
TPH > 150 ug/L (ppb)

LTM – TPH Detections: Root Cause Analysis

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- 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

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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

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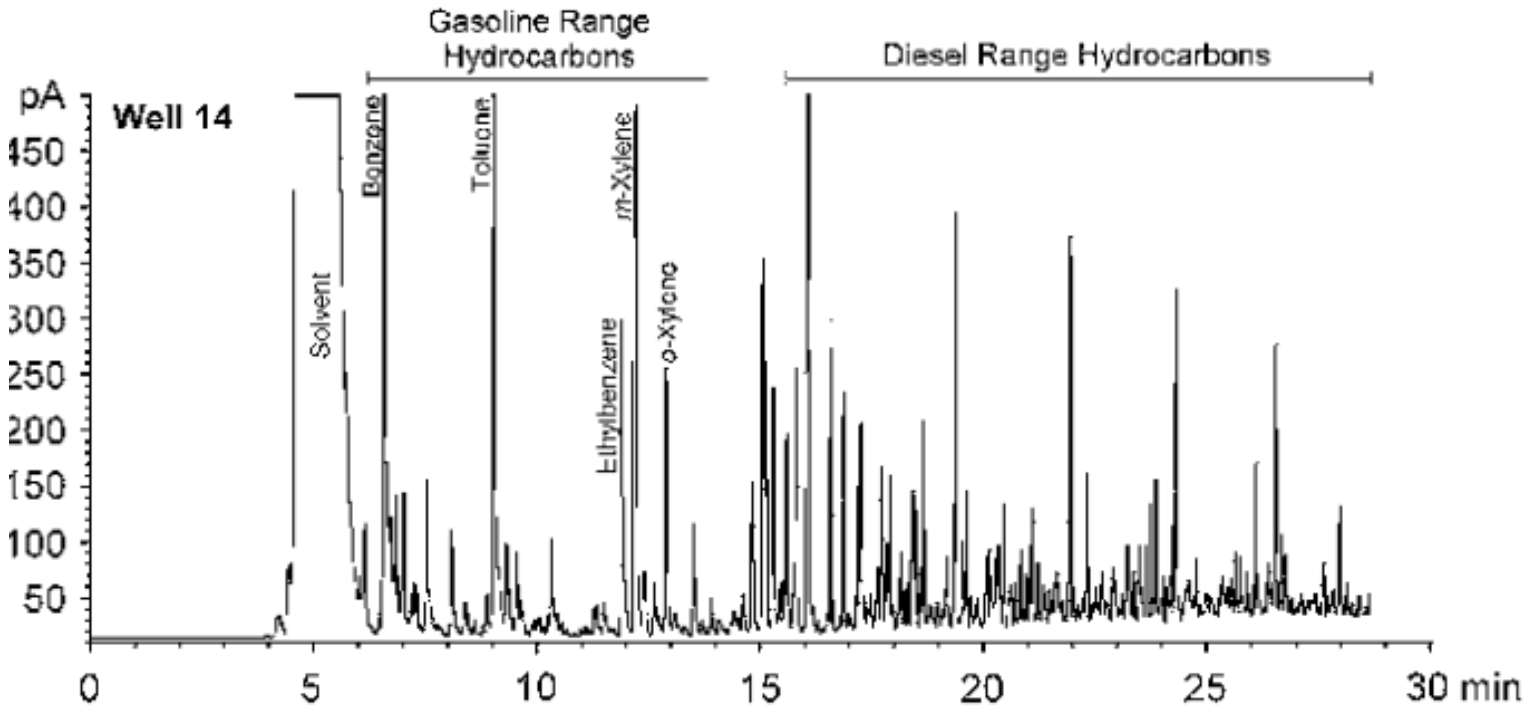
A Little Chemistry: Chromatograms Showing Gasoline and Diesel



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

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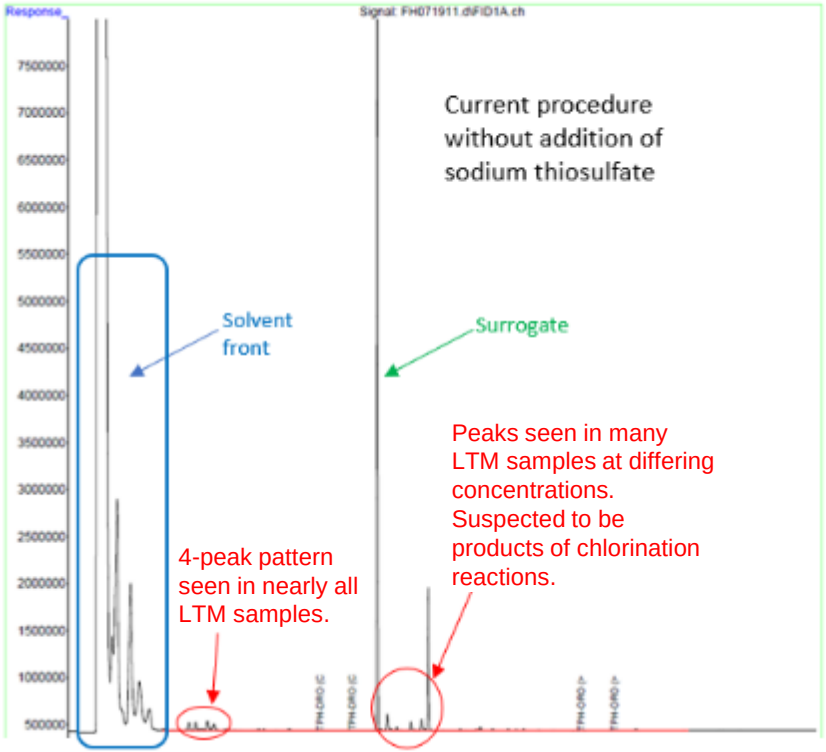
A Little Chemistry: Impact of Quenching to Prevent Chlorine Reactions



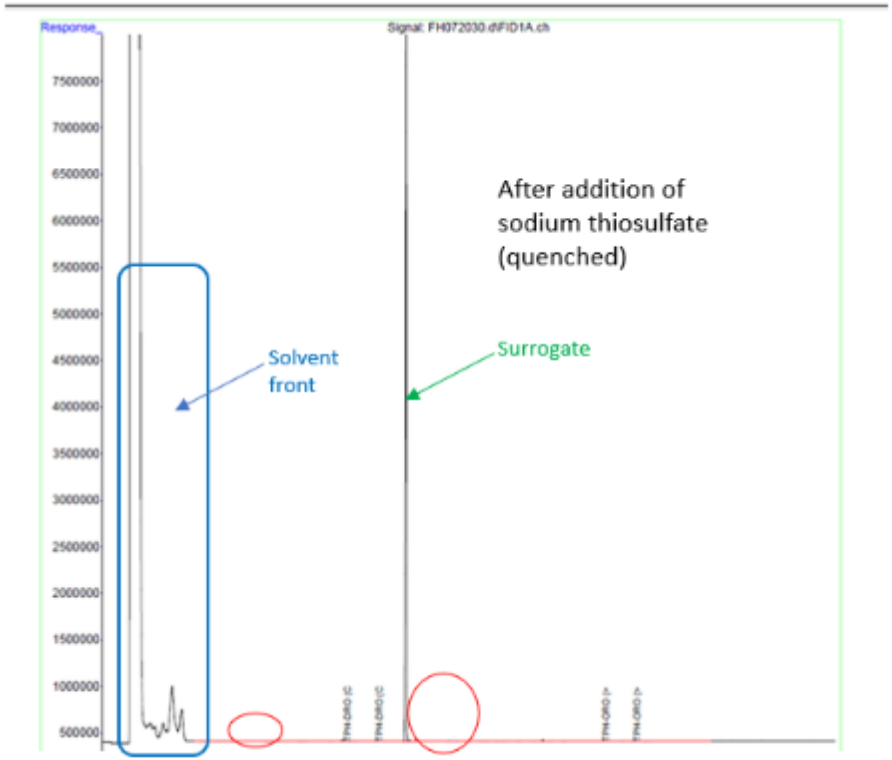


Figure C-1. Effect of Sodium Thiosulfate Addition (Quenching) Sample H3-TW-0013887-23335-A

LTM – TPH Detections: Lines of Evidence

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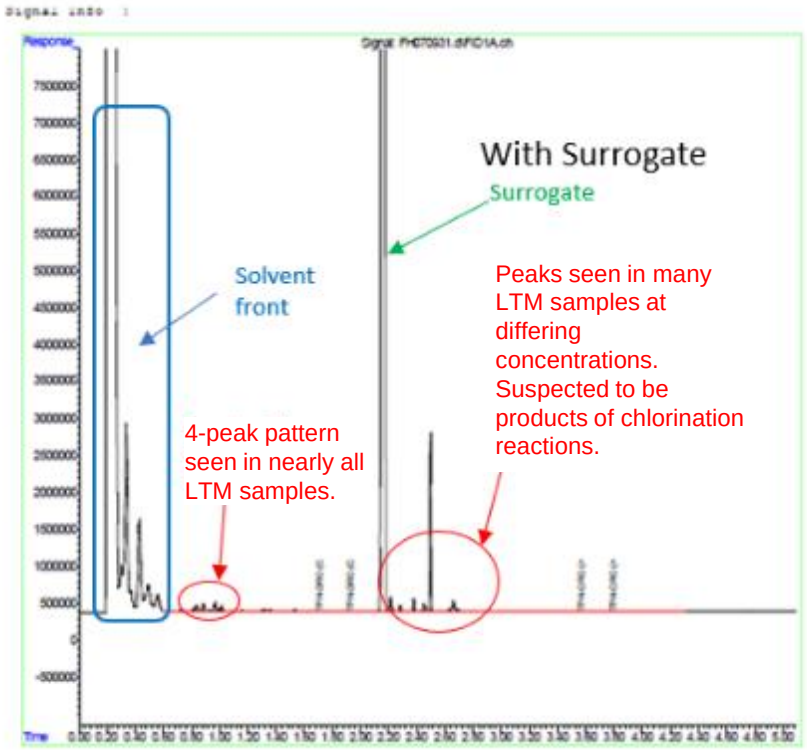
A Little Chemistry: Impact of Quenching to Prevent Chlorine Reactions



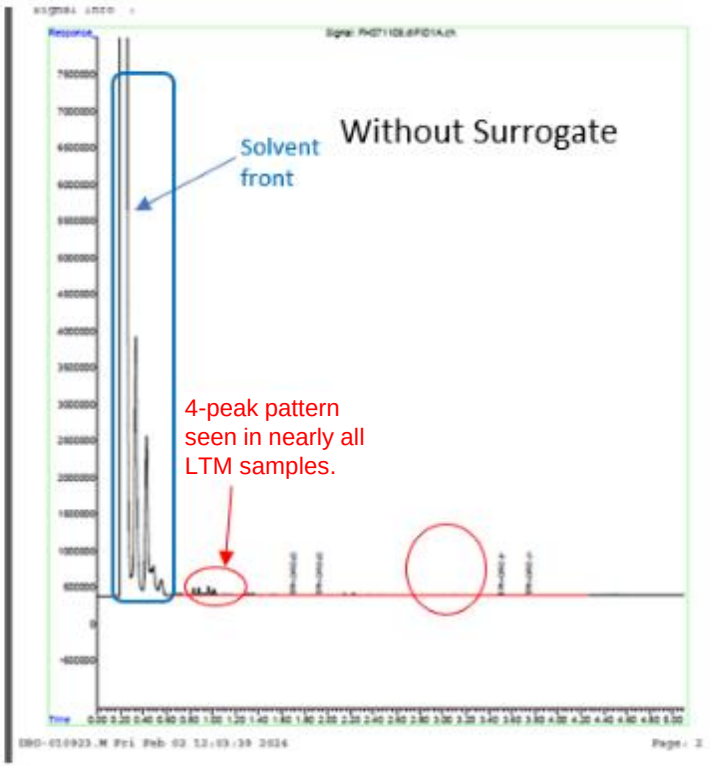


Figure C-2. Surrogate Contribution of Precursors to Halogenation Reaction Sample F2-TW-0009845-23335-N

LTM – TPH Detections: Lines of Evidence

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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)

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- 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

JBPHH


NAVY CLOSURE TASK FORCE
RED HILL