



Update on Short Term and Long Term Groundwater Monitoring as Part of Emergency Response for Pearl Harbor

**Presented to:
Hawai'i Commission on Water Resource Management**

**Presented by:
Naval Facilities Engineering Systems Command Hawai'i**

15 March 2022



Agenda

- **Groundwater Monitoring Objectives**
- **Short Term Groundwater Monitoring**
 - Types
 - Requirements
 - Results
- **Additional Investigations and Monitoring**
- **Ongoing and Future Groundwater Monitoring**
- **Closing Remarks**

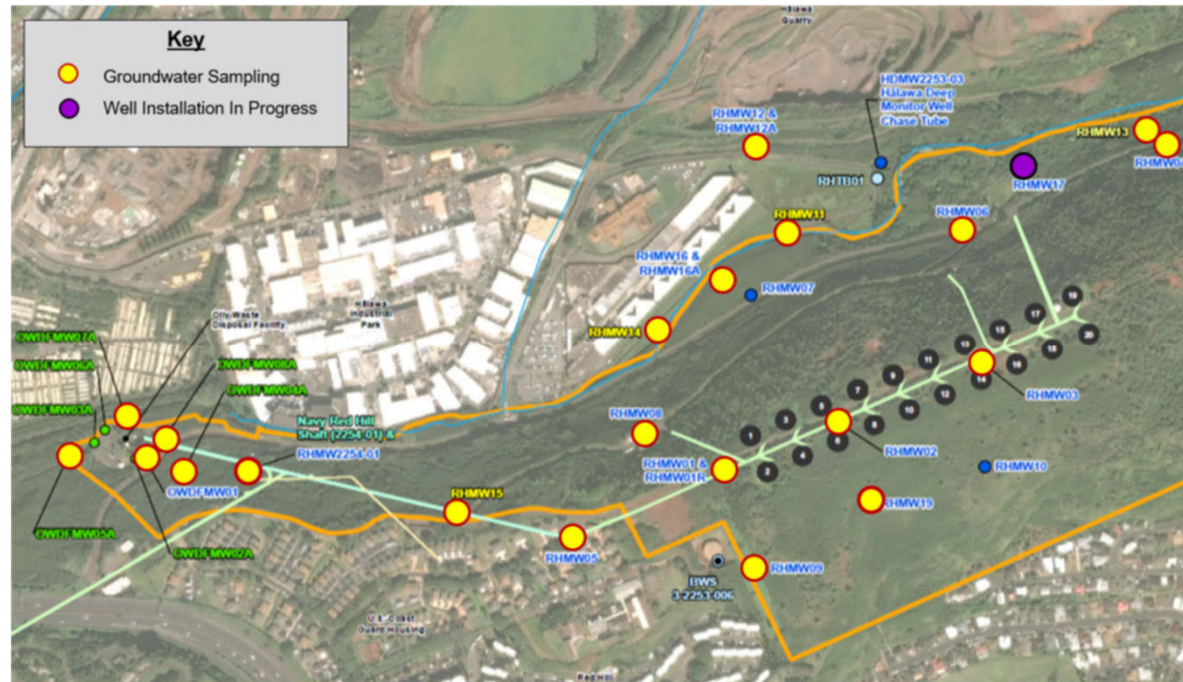


Groundwater Monitoring Objectives



• Short Term Objectives

- Assess groundwater impacts from the May 6 and Nov 20, 2021 events
- Assess mobility of earlier fuel releases in the subsurface
- Evaluate capture zone effectiveness from Red Hill Shaft pumping



• Intermediate/Long Term Objectives

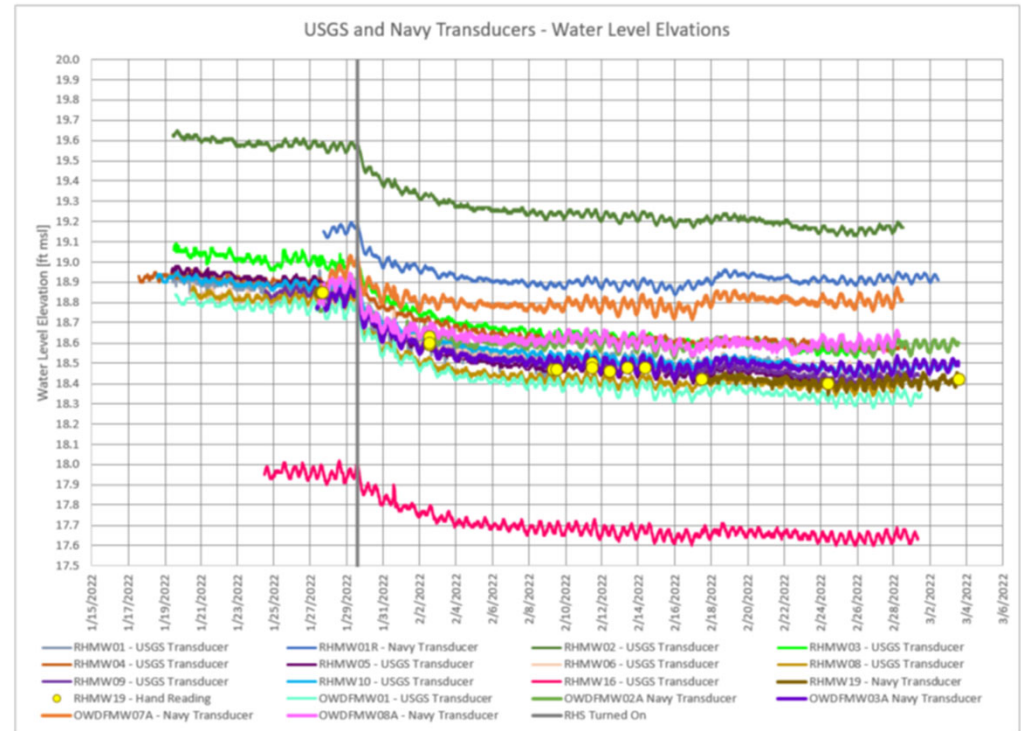
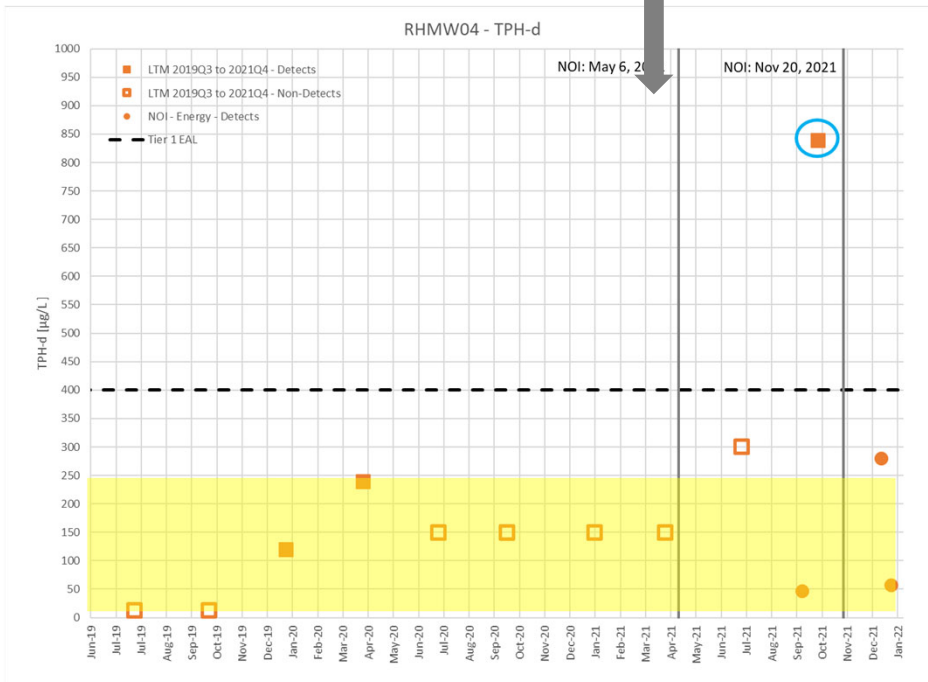
- Provide early warning for potential contaminant migration to other water supply wells
- Monitor the effectiveness of long term remediation strategies



Short Term Groundwater Monitoring

• Types of Data Collection

- Water Levels
- Headspace PID Measurements
- Free Product Gauging
- Groundwater Sampling
 - Low Flow Pump
 - Bailer



• Additional Analyses

- Fuel Fingerprinting
- Chromatogram Evaluation
- Trend Analysis
- Other Investigations



Short Term Groundwater Monitoring



• Groundwater Monitoring Requirements

	Pre-May 6	Post-May 6	Post Nov 20
Program	Long Term Monitoring	May 6 Notice of Interest (NOI)	May 6 & Nov 20 NOI
Locations	20 RH Wells, 1 OWDF Well, 1 State Well	3 Wells	16 RH Wells, 5 OWDF Wells, Sump
Frequency	Quarterly	Weekly	Weekly
Analyses	TPH-g/d/o BTEX Naphthalenes Natural Attenuation Parameters Fuel Additives Lead Scavengers	TPH-g/d/o BTEX Naphthalenes	TPH-g/d/o BTEX Naphthalenes VOC SVOC TOC Methane Lead Scavengers
Reporting	Report posted on DOH Website ¹	Cumulative results posted on DOH Website ²	Cumulative results posted on DOH Website ²
Status	Ongoing – Long Term, Subject to Change	Replaced	Ongoing – to May 2022

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

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



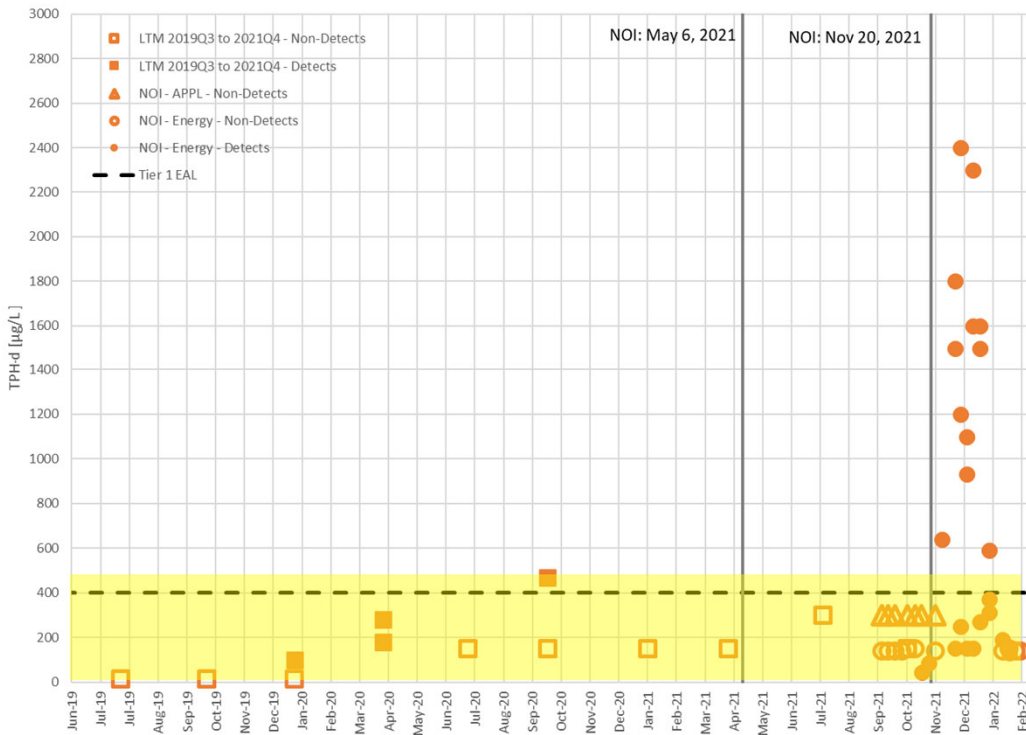
Groundwater Monitoring Results



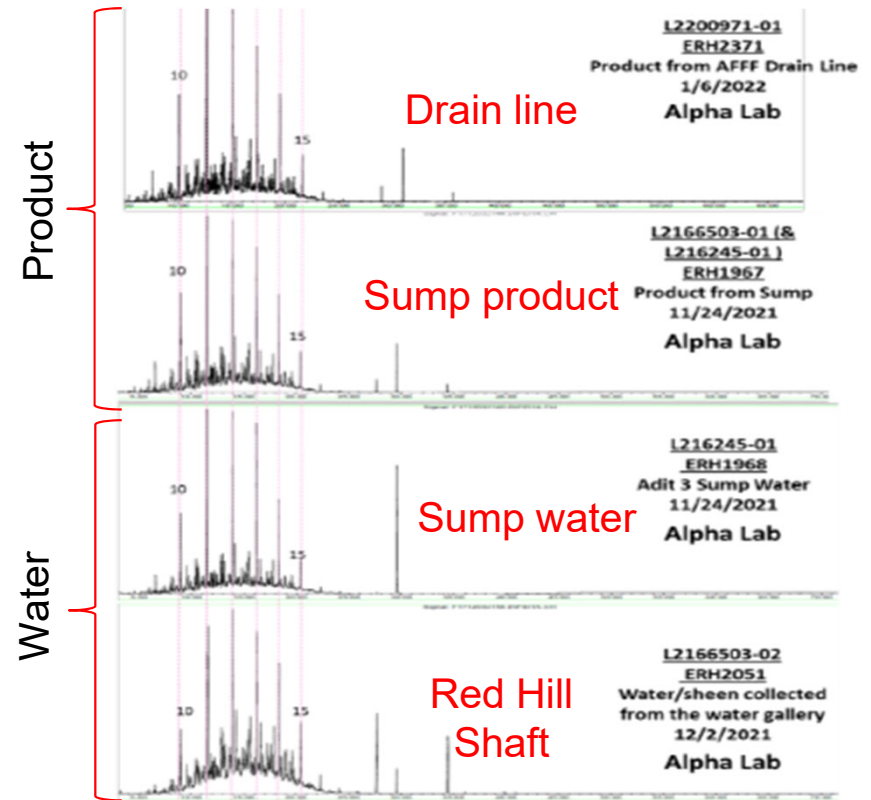
• Red Hill Shaft:

– Concentration data and chromatograms confirm that Red Hill Shaft has been impacted by JP-5.

TPH-d in Red Hill Shaft



Chromatogram Comparison



Fuel Fingerprinting: JP-5 in the Red Hill Shaft and sump water samples is related to the product released from the drain line



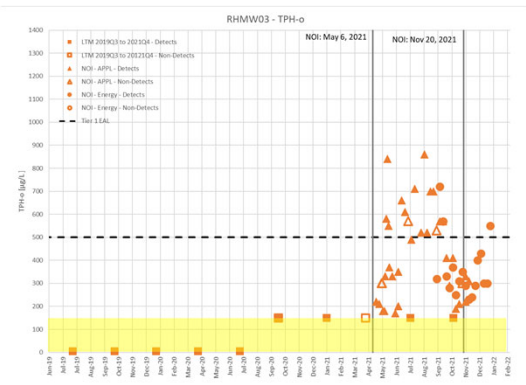
Groundwater Monitoring Results



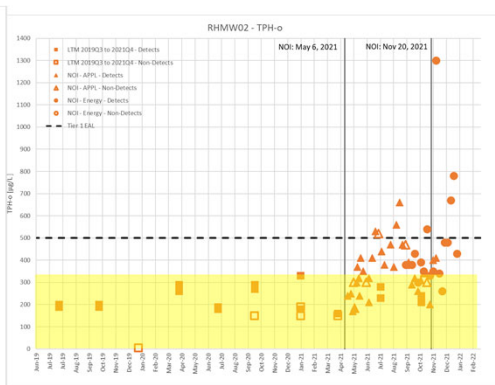
• Interior Wells:

- TPH results may reflect some increased concentrations following the May 6 release.
- Sequential TPH-o detections and exceedances observed following the May 6 release:

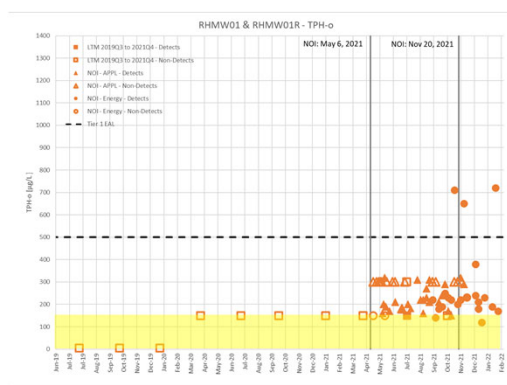
RHMW03



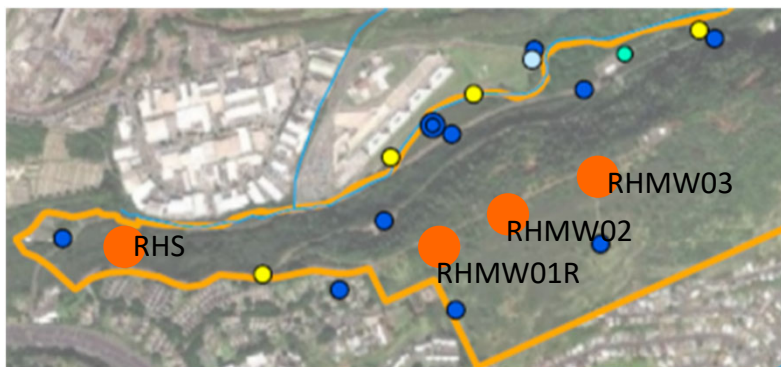
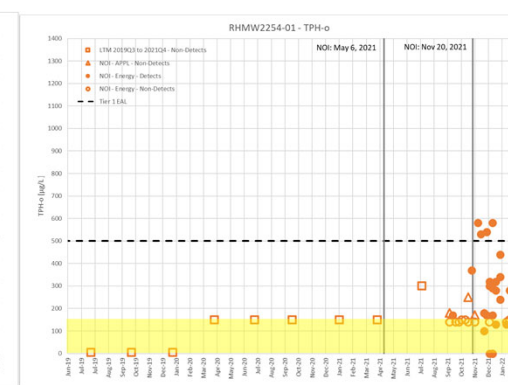
RHMW02



RHMW01R



Red Hill Shaft



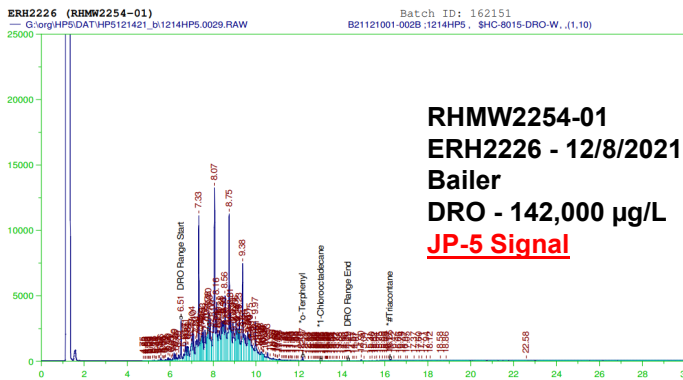


Groundwater Monitoring Results

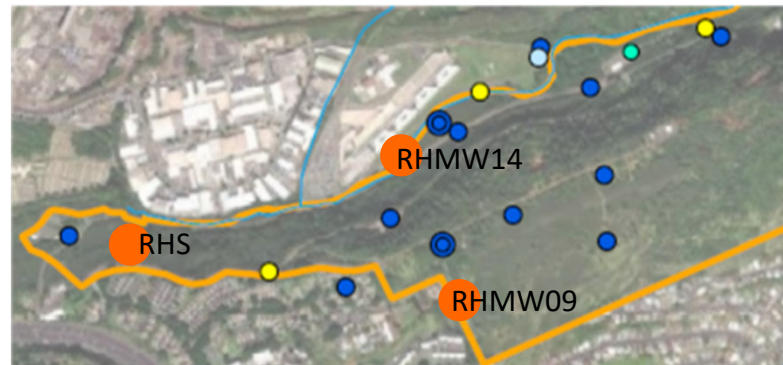
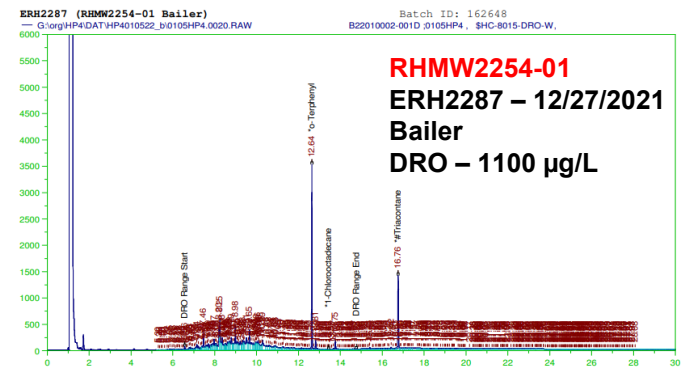
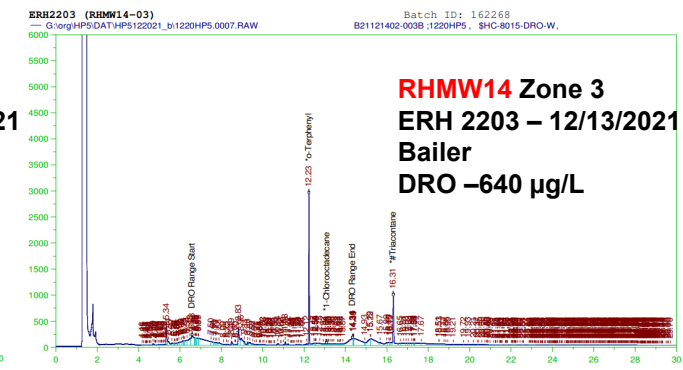
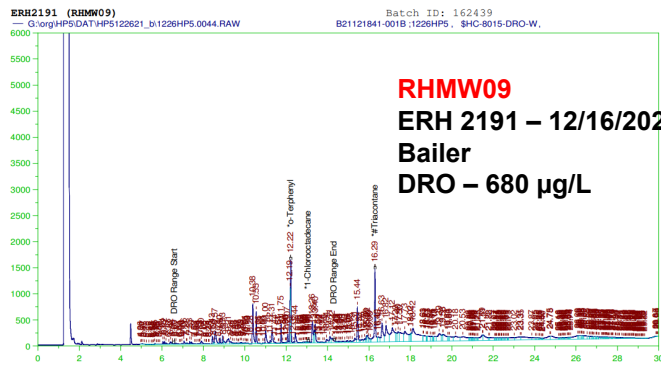


- **Outlier Wells where TPH-d is above EAL (400 µg/L):**
 - Most of these TPH-d detections have been “one-off” events that have not been repeated (an exception is RHMW08).
 - Chromatograms of these detections do not clearly match chromatogram of JP-5 or chromatogram from Red Hill Shaft (RHMW2254-01) or soluble compounds in JP-5.

JP-5 in Red Hill Shaft Samples



Outlying Well Samples



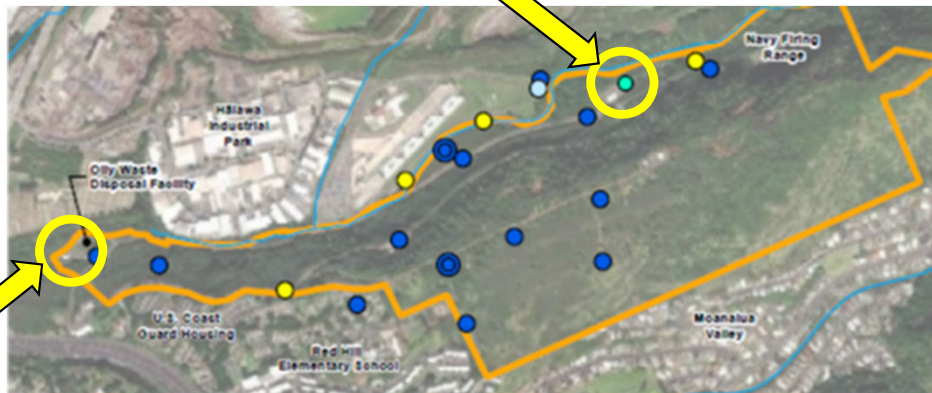


Additional Investigations and Monitoring

- **Sampling and Analysis of Perched Water Zones**

- **Drilling of Red Hill Monitoring Well 17 (RHMW17) – ongoing**

- Close and frequent coordination with CWRM and DOH
- Analysis of perched water in piezometer well and in borehole when it was open to depths of 120 ft and 170 ft bgs



- **Site Characterization of Holding Tank/Leach Tank – ongoing**

- Work plan approved by DOH and EPA
- Three temporary wells to be drilled 5 ft into perched aquifer and sampled (30-36 ft bgs)
- Determine whether perched aquifer below the holding tank/leach tank has petroleum impacts

- **Analysis of conductivity of water from Red Hill Shaft - pending**



Ongoing and Future Groundwater Monitoring

Ongoing

- Continue NOI groundwater monitoring
- Optimize groundwater sampling with water level measurements
- Planning and permitting of new monitoring wells

Intermediate

- New monitoring wells to be added to the groundwater monitoring program
- Continue optimization of monitoring plan

Long Term

- Implement remediation strategies
- Transition to long term monitoring to evaluate remediation effectiveness and progress over time.

Due to anticipated closure of Red Hill, possible future refocusing of monitoring activities to support remediation efforts vice monitoring in support of an operational fuel facility.



Closing Remarks

- **The Navy truly appreciates the responsiveness and collaboration from CWRM in the Navy's emergency response efforts to expand its monitoring well network**
 - **As groundwater monitoring and efforts to install new monitoring wells continue, the Navy requests:**
 - **Continued support for expedient issuance of well permits**
 - **Participation in proposed coordinated outreach to landowners**
 - **Provide recommendations on groundwater monitoring and water level measurements**
 - **Recommend monitoring data required to determine acceptability to continue the Red Hill capture zone, if necessary**
- The Navy is committed to working expeditiously and collaboratively to obtain cultural resources approvals to enable well permit issuance
 - Prioritization of wells permits will be accomplished through collaboration within the ARFG Monitoring Well Stakeholder Group (*DOH, EPA, CWRM, USGS, BWS, Navy*)



Backup / Deleted



Monitoring Well Network Expansion

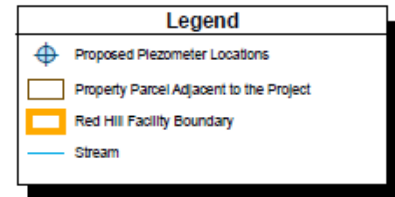


- Proposed Wells**
- EPA/DOH
 - Alternative
 - Navy
- Well Name (Construction Year)**
- Oil Waste Disposal Facility
 - Red Hill Well
 - Public Supply Shaft
 - USGS Well
 - BWS Well
 - PRI 1
 - PRI 2



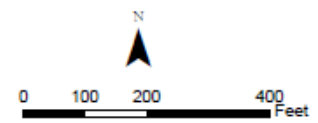


Monitoring Well Network Expansion



Notes

1. Map projection: NAD 1983 Hawaii State Plane Z3 ft
2. Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.
3. Coordinates: NAD 1983 Hawaii State Plane Z3 ft
4. Some locations are subject to field verification.
5. Revised January 2022.



Proposed Piezometer Locations
Red Hill Bulk Fuel Storage Facility
JBPHH, O'ahu, Hawai'i

CUI