

# Update on the Source Water Concerns in the Moanalua and Waimalu Aquifer Systems Area

Ernest Y.W. Lau, P.E.  
Manager and Chief Engineer  
Honolulu Board of Water Supply

STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
COMMISSION ON WATER RESOURCE MANAGEMENT  
MEETING OF THE  
COMMISSION ON WATER RESOURCE MANAGEMENT  
June 18, 2014

# Today's Discussion

- Quantity and quality linked together
  - State Constitution
  - State Water Code HRS 174C
- Source water concerns in the Waimalu and Moanalua Aquifers
- BWS wells near Red Hill Fuel Facility
  - Past Studies and Findings
  - Next steps

# State Constitution

- Article XI - Water Resources
  - Section 7. The State has an obligation to protect, control and regulate the use of Hawaii's water resources for the benefit of its people. The legislature shall provide for a water resources agency which, as provided by law, shall set overall water conservation, quality and use policies; define beneficial and reasonable uses; protect ground and surface water resources, watersheds and natural stream environments; establish criteria for water use priorities while assuring appurtenant rights and existing correlative and riparian uses and establish procedures for regulating all uses of Hawaii's water resources. [Add Const Con 1978 and election Nov 7, 1978]

# State Water Code

- §174C-2 Declaration of Policy
  - (d) The state water code shall be liberally interpreted to protect and improve the quality of waters of the State and to provide that no substance be discharged into such waters without first receiving the necessary treatment or other corrective action. The people of Hawaii have a substantial interest in the prevention, abatement, and control of both new and existing water pollution and in the maintenance of high standards of water quality.

# Quantity and Quality

- State Constitution and Water Code declares that water quantity and quality are linked.
- Impact to one increases the importance of the other.
- Cannot have one without the other.
- Threats to quality concern BWS as does threats to quantity.
- BWS source water concerns in the Waimalu and Moanalua aquifers.

# Red Hill Fuel Storage Facility

- In January 2014, Navy reported a 27,000 gallon leak of jet fuel from its Red Hill Bulk Fuel Storage Facility.
- BWS owns and operates 5 wells near the facility.
- Navy Red Hill Shaft adjacent to the facility.





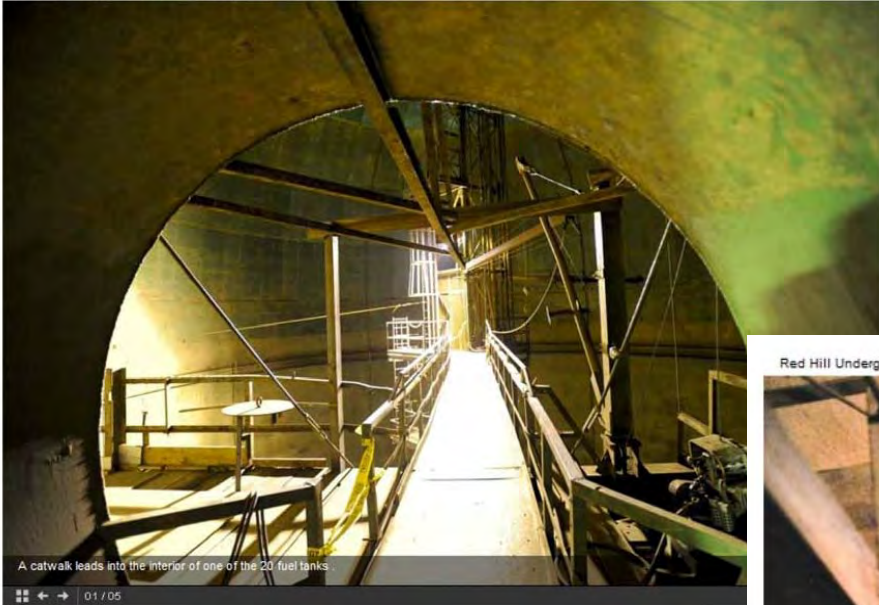






# Inside Red Hill Tank

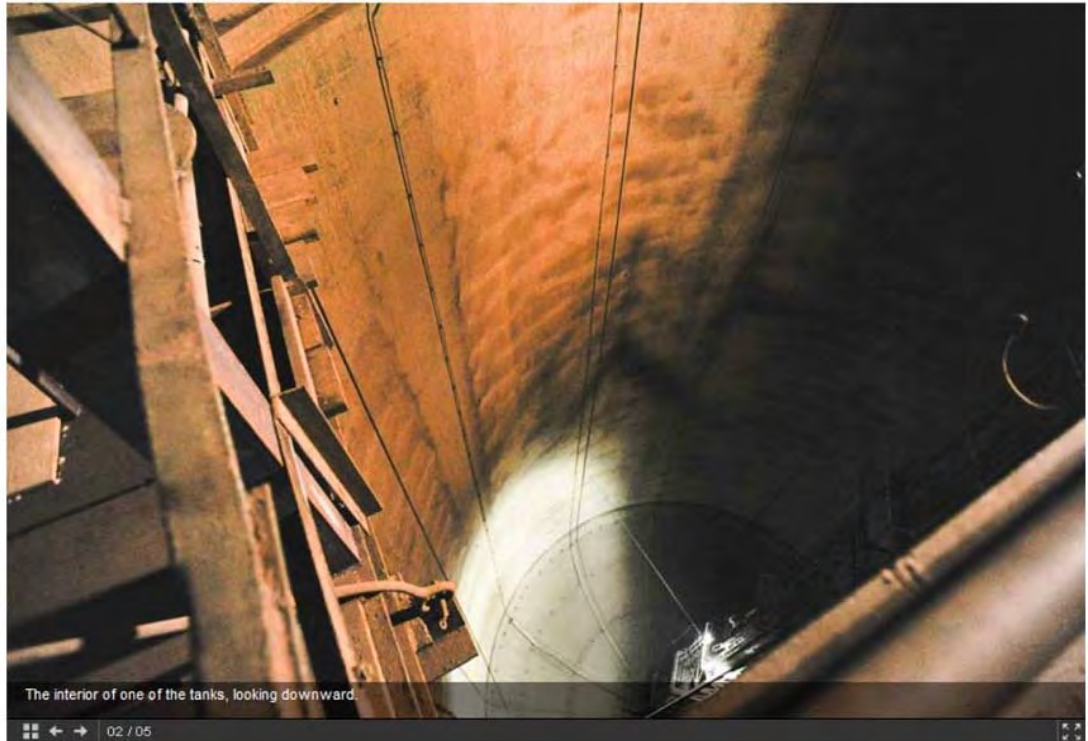
Red Hill Underground Fuel Storage Facility/ Navy Photos



A catwalk leads into the interior of one of the 20 fuel tanks.

01 / 05

Red Hill Underground Fuel Storage Facility/ Navy Photos



The interior of one of the tanks, looking downward.

02 / 05

Ref: Red Hill: EPA May Force New Leak Detection System For Toxic Spills, Civil Beat, S. Cocke, 2/14/14

# UST Rules Applying to Red Hill

## UST Typical Owner & Operator Requirements

1. Design, construction, and installation
2. Notification, permits, and variances
3. General operating requirements (ie spill & overfill protection, repairs, recordkeeping)
4. Release detection
- 6. Release reporting, investigation, & confirmation\***
- 7. Release Response Action\***
- 8. Closure\***
9. Financial Responsibility
- 10. Enforcement\***

**\*Federal Statutory Exemption require Field Constructed USTS to comply with only 6, 7, 8 & 10.**

# Navy Study and Fuel Record Findings

- Navy commissioned studies
  - Petroleum hydrocarbons present in groundwater and soil beneath facility.
  - Warn of increasing facility age and potential for more releases both large and small.
- Fuel releases
  - Occurred in the past.
  - 1947 – 1999 records.
  - Detail varies.
  - According to DOH, Navy reports up to 1.2 million gallons released to date.



# Underneath Red Hill Tanks

- Basalt core samples taken from under each tank show petroleum stains.
- 1998-2002 Investigations.

Ref: Navy Phase II Site Characterization Report, Section 4, page 11, March 1999. (Related to Release ID 990051)



Figure 4-7 Petroleum Stained Core - B16C, 49' to 60'

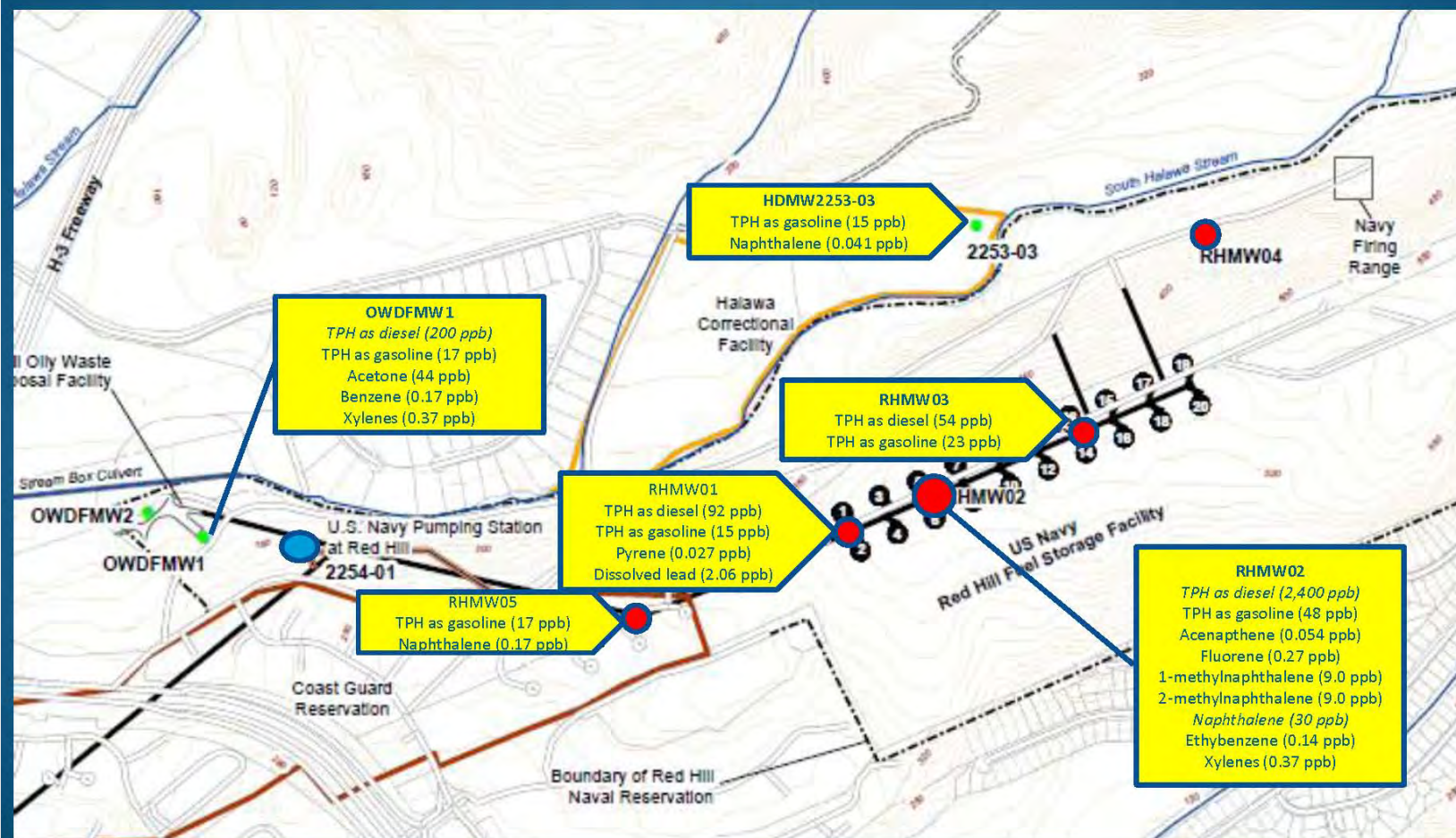


Figure 4-8 Petroleum Stained Core - B16C, 60' to 69'

# TPH in GW Underneath Red Hill

## US Navy Red Hill Complex

Construction of 5 Groundwater Monitoring Wells 2005 – 2009  
(Sampling results from October 22-23, 2013)





# Drinking Water Monitoring Results

## RHMW 2254-01 (Navy Red Hill Shaft)

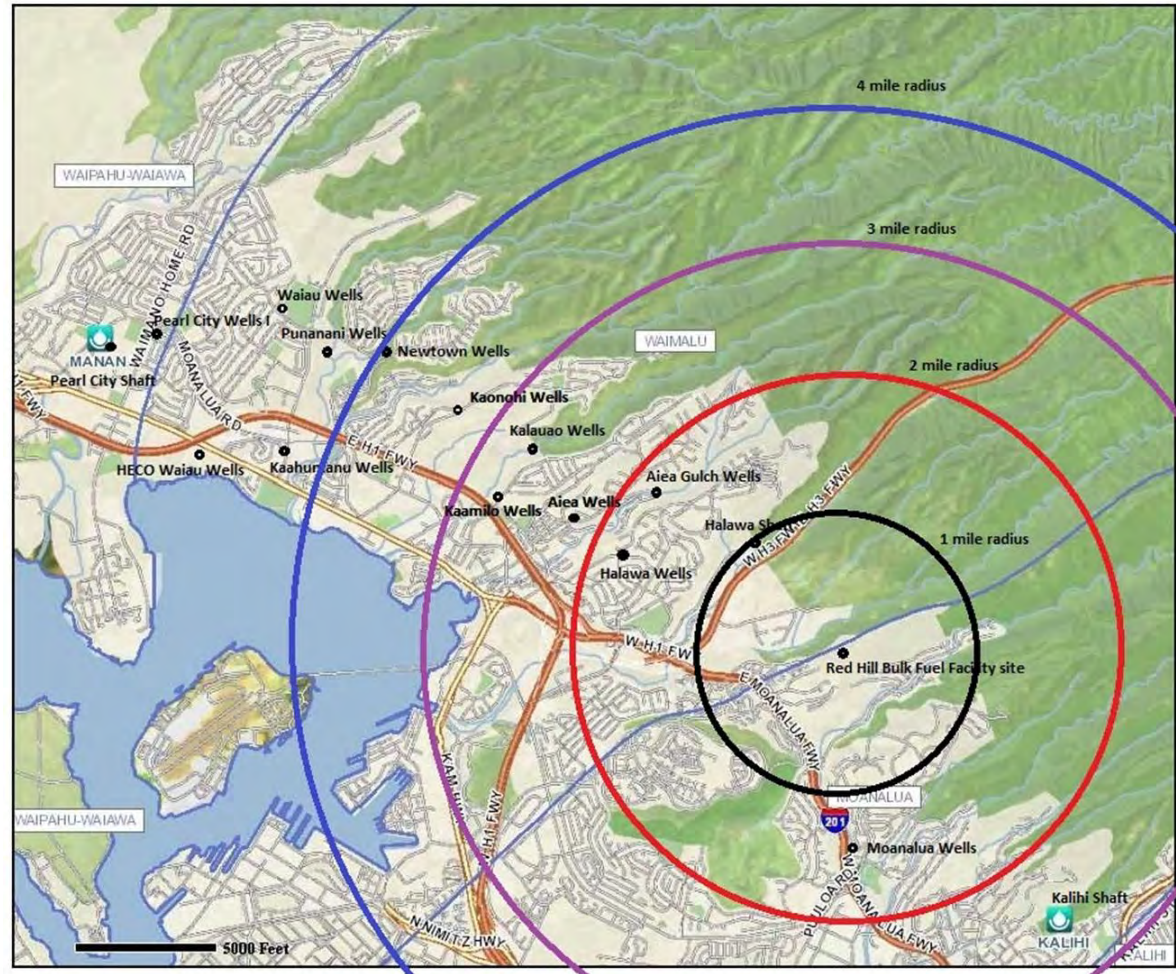
contaminant	Detected range	Detected dates	Health advisory level
1-methylnaphthalene	0.0276 – 0.0435 ppb	2008	4.7 ppb (DOH EAL)
2-methylnaphthalene	0.0071 – 0.018 ppb	2005 – 2009	10 ppb (DOH EAL)
lead, dissolved	0.02 – 3.3 ppb	2005 – 2011	15 ppb (drinking water action level)
lead, total	0.06 – 0.828 ppb	2005, 2012, 2013	n/a
naphthalene	0.011 – 0.099 ppb	2005 – 2014	17 ppb (DOH EAL)
toluene	0.71 – 1 ppb	2005, 2012	1000 ppb (drinking water MCL)
TPH-d	22 – 58 ppb	2005, 2013	100 ppb (DOH EAL)
TPH-g	13 – 19.1 ppb	2009, 2012	100 ppb (DOH EAL)

Ref: DOH presentation, Joint Senate-House Briefing on Navy Red Hill Fuel Tanks, 3/7/14



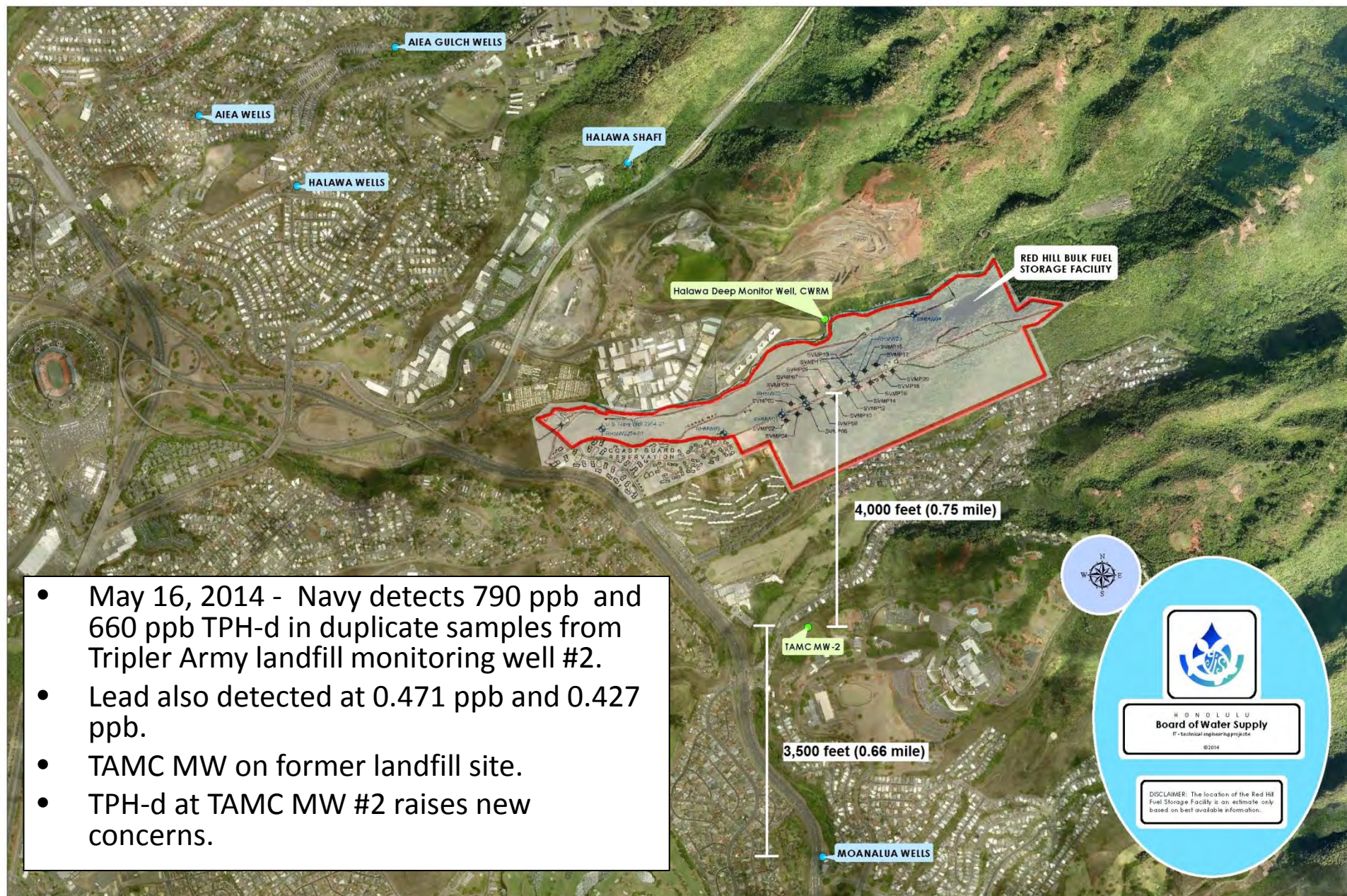
# 2010 Navy Study

- Northwest GW flow direction toward Halawa Shaft identified.
- Hydrocarbon plume may be present.
- Currently no monitor wells between Halawa Shaft and the Facility.
- Install two monitor wells recommended. To date, no additional monitor wells installed.





- May 16, 2014 - Navy detects 790 ppb and 660 ppb TPH-d in duplicate samples from Tripler Army landfill monitoring well #2.
- Lead also detected at 0.471 ppb and 0.427 ppb.
- TAMC MW on former landfill site.
- TPH-d at TAMC MW #2 raises new concerns.





## As of June 2014

- June 12 - Navy reported finding three small holes in Tank 5.
  - The holes not visible to the unaided eye, were found in areas that had undergone previous welding repairs.
  - The holes found using a vacuum box testing technique that determines if air can flow through the tank wall, giving an indication that liquid would also be able to escape the tank.



## As of June 2014 – cont.

- To date, BWS detects no fuel contaminants in the five BWS wells near Facility. This is not a statement of the future.
- Need additional monitor wells and data from them to better understand aquifer quality and impacts from Red Hill.
- BWS
  - Working with USGS to assess GW flow direction and contaminant transport.

# Summary

- Tests continue to show petroleum hydrocarbon chemicals present in GW and soil at Red Hill.
- Mitigate petroleum hydrocarbons presently under Red Hill to protect Oahu's GW and environment.
- TAMC MW #2 TPH-d detection raises new concerns.
- More information needed to precisely know current condition of aquifer to ensure holistic protection of aquifer Quantity and Quality.

# Questions / Discussion