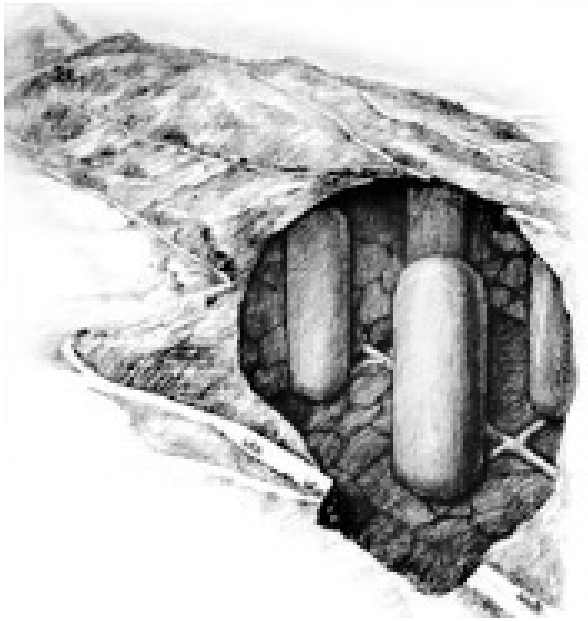
Reducing the Threat of Fuel Release from the Red Hill Fuel Storage Facility



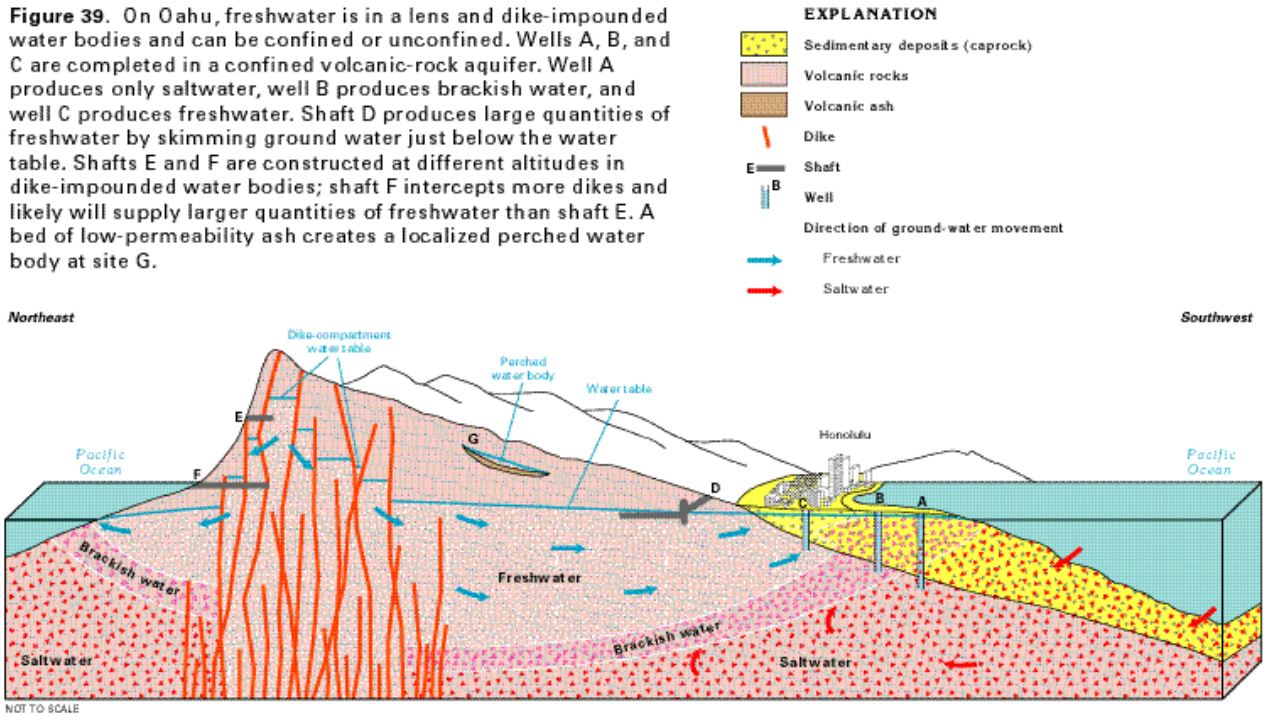
A Unique Engineering Challenge

Why is the Red Hill Situation Unique

- Large Scale Field Constructed Underground Tanks Are Rare
- Most Large Fuel Storage Facilities Utilize Above Ground Tanks
- The Construction Approach to the Facility was Unique
  - Facility is deeper than typical underground tanks
- The Geologic Setting is Particularly Complex

Complex Geologic Setting

Figure 39. On Oahu, freshwater is in a lens and dike-impounded water bodies and can be confined or unconfined. Wells A, B, and C are completed in a confined volcanic-rock aquifer. Well A produces only saltwater, well B produces brackish water, and well C produces freshwater. Shaft D produces large quantities of freshwater by skimming ground water just below the water table. Shafts E and F are constructed at different altitudes in dike-impounded water bodies; shaft F intercepts more dikes and likely will supply larger quantities of freshwater than shaft E. A bed of low-permeability ash creates a localized perched water body at site G.



Modified from Macdonald, G.A., Abbott, A.T., and Peterson, F.L., 1983, Volcanoes in the sea: The geology of Hawaii (2nd ed.): Honolulu, Hawaii, University of Hawaii Press, 517 p.

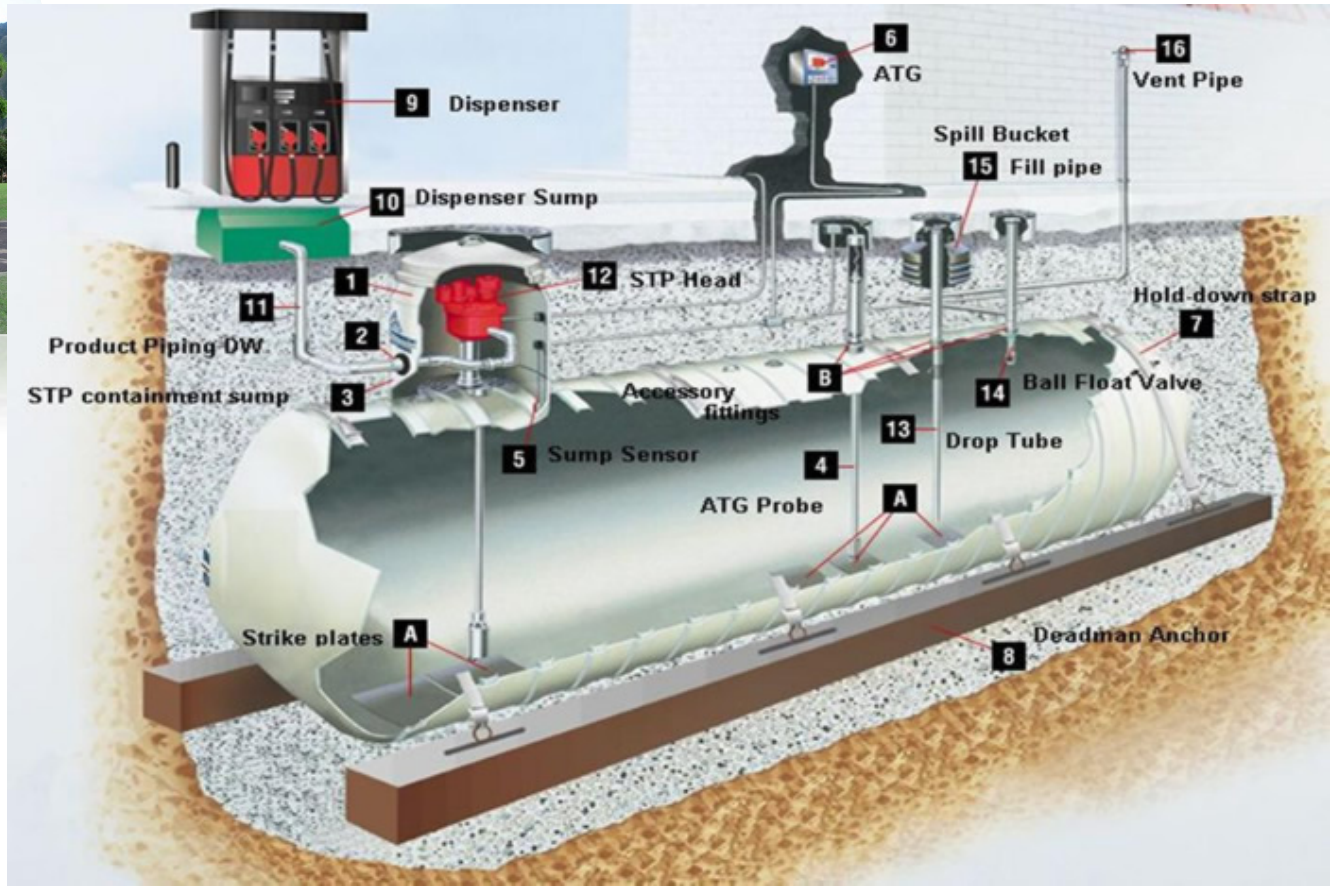
Navy Has Currently Exceeded State and Federal Requirements for Operation of Red Hill USTs

- Leak Detection
- Tank Tightness Testing
- Tank Maintenance
- Pipeline Testing

DOH and EPA Are Currently Working with the Navy To Develop a Structured Approach for Making Further Improvements to the Red Hill UST Facility

- Improvements in Fuel Isolation Infrastructure
- Improvements in Evaluating and Controlling Corrosion and Metal Fatigue
- Improvements in Leak Detection
- Evaluation and Implementation of Secondary Containment if Practicable
- Development and Implementation of Improved Catastrophic Release Contingency Plans

Gas Station Technology Has Evolved Considerably Since the 1940s



Modern Fuel Underground Tanks

Improvements in Commercial Fuel Storage

- Improvements in Storage Tank Materials
- Active Corrosion Protection
- Secondary Containment
- Continuous Leak Detection Monitoring
- Routine Inspections and Equipment Testing
- Environmental Monitoring

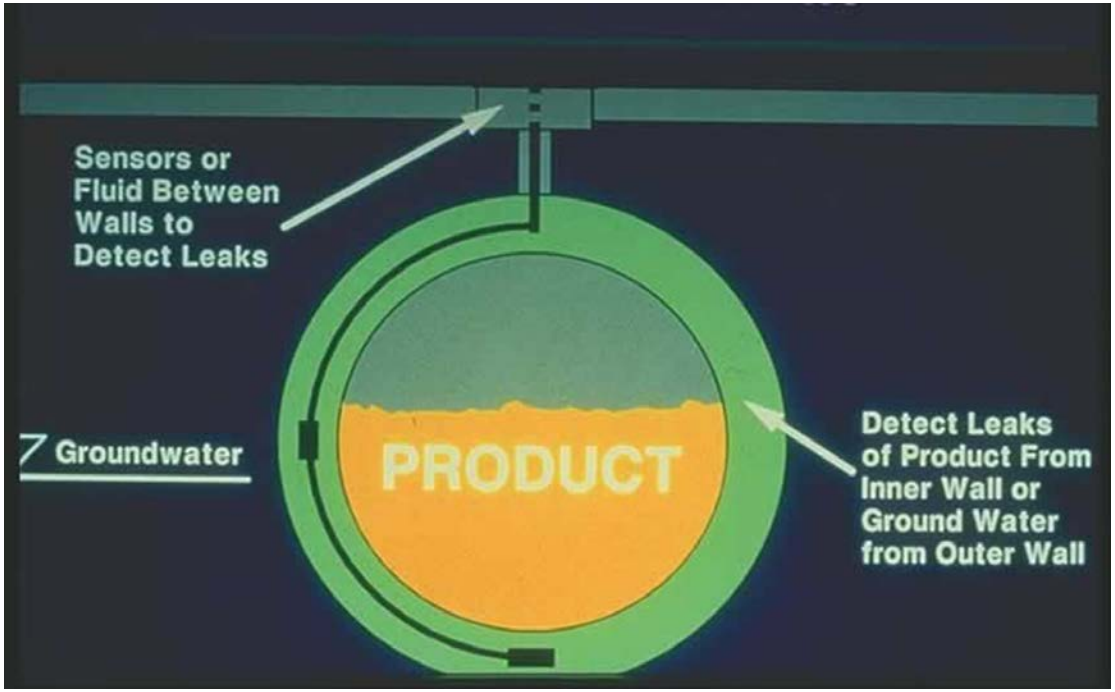
What Can Be Done To Further Reduce Threat From Red Hill

- Further Improvements to Corrosion Protection
- Further Analysis of Metal Fatigue
- Further Improvement to Leak Detection System
- Installation of Secondary Containment if Deemed Practicable

What is Corrosion

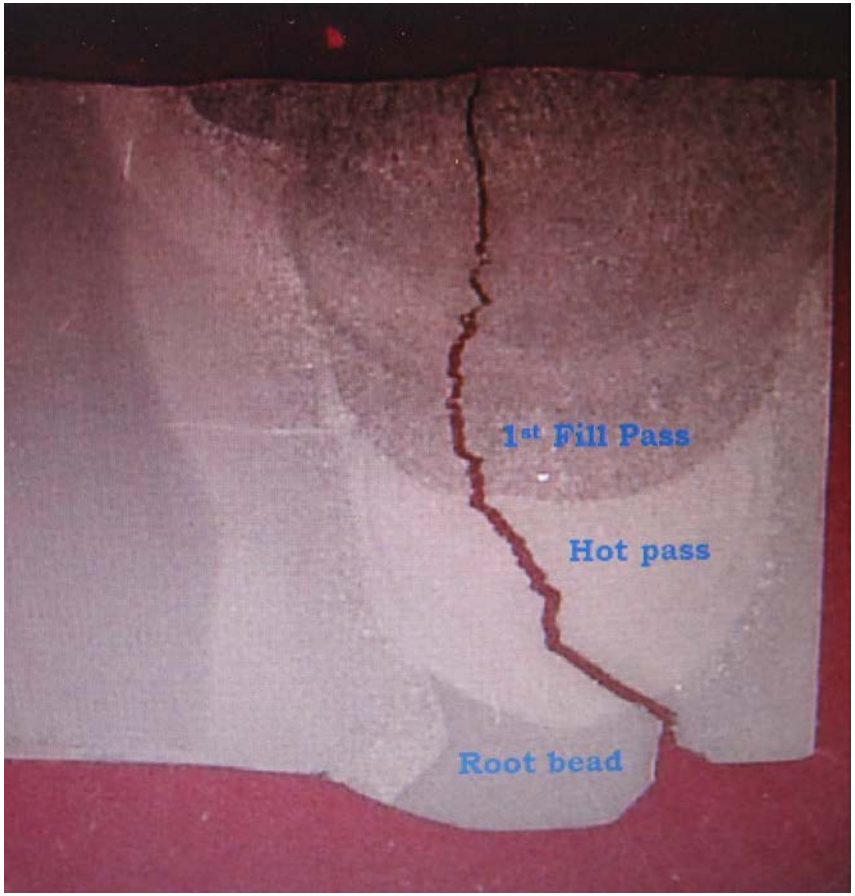
- The breaking down or destruction of a material, especially a metal, through chemical reactions. The most common form of corrosion is rusting, which occurs when iron combines with oxygen and water.

What is Tank Secondary Containment



What is Metal Fatigue

- **Fatigue** is the weakening of a material caused by repeatedly applied loads. It is the progressive and localized structural damage that occurs when a material is subjected to cyclic loading.



Potential Adverse Impacts of Release of Fuel