Maintenance, Leak Detection in Large Underground Storage Tanks

Glenn E. Schmitt, P.E.
Environmental Director
Fleet and Industrial Supply Center
Puget Sound

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Report Documentation Page

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**BRIEF OVERVIEW**

- Introduction
- Scope of Military Large USTs
- Issues at Military Storage Tanks
- Types of USTs
Typical Construction

Regulatory Drivers

Manchester Experience
  Manchester Terminal
  Maintenance Methods and History
  Leak Detection History at MFD

Conclusions
Definitions

AFHE – Automated Fuel Handling Equipment
Atmospheric tanks – vented to Atmosphere – not pressurized
ATG – Automatic Tank Gaging
Barrel – 42 US gallons
DESC – Defense Energy Support Center
Floating Roof Tanks – Roof floats on product Stored
Large USTs – USTs larger than 50,000 gallons or 1200 barrels
Precision Leak Detection – quantitative leak detection at less than 1 gallon/hr.
Army – 4 Large USTS (non active)

Air Force – 136 Active Large USTS
   Biggest is 280,000 Barrels

Navy  325 Active Large USTs
   Biggest is 300,000 Barrels
Old Infrastructure
- Tanks Built in 1940’s/1950’s

Storage Requirements
- Maintenance of Minimum Volumes for Mission Requirements

Lack of Guidance
- No good standards for Maintenance
- No Industry Standard for large USTS
Military Storage
Tank Issues

- Technological Limitations
  - Installed Inventory Management limitations
  - Precision leak Detection Limitations
- Inconsistent Operator Training Standards
April 26, 2007 FISC Pearl Harbor Reports a loss of 366,000 gallons from tank 1403 (AST) (later revised to 359,000 gallons)
Results

- Results – a 1 inch by 3 inch hole in sump
- Operator Error detecting loss
Types of USTs

Concrete
- Cut and covered
- Underground Construction

Steel
- Cut and covered
- Riveted Tanks
- Welded tanks
Typical construction
Typical construction

Valve Pit

ATG

Stilling Well

Skin Valve

Tanks Sump

Foundation Drain
40 CFR 280/281

- Derives Basic Regulation of Underground Storage Tanks
- These tanks are Field Constructed – therefore “deferred” (40CFR 280.10)

State/Local Requirements

DOD Requirements
MFD GENERAL INFO

• Size: Facility encompasses 234 acres and has 1.5 miles of shoreline on Puget Sound and Rich Passage

• Personnel: 39 civilian and 2 military operate the facility
Terminal Tankage

Underground Storage Tanks
- 34 Bulk Fuel
- 5 metal 27/50 MBBL tanks
- 9 concrete coated 27MBBL tanks
- 20 concrete coated 47/50Mbbl Tanks

Aboveground Tanks
- 38 Bulk Storage Tanks (33 UST / 5 AST)
  - 5 80Mbbls Bulk tanks
  - 4 Lube oil tanks
  - 5 Waste Oil/Waste water tanks
  - 2 Additive Tanks

Pipelines
- F76 1.9 miles
- JP8 3.8 miles
- JP5 3.0 miles

1,834 Mbbls (77,009,730 Gallons)
Definitive Need to Clean and Inspect Bulk Tanks

No definitive guidance (API 653 etc.)

Coating installation challenges
Coating Issues

- Failure at the Tank wall joint (cove Failure)

- Failure of floor coating
Further Challenges

- Leaking Skin
  Valves/Pipe nipples

- Leaking older
  Tank Penetrations
Tank Inspection Repair

Pipelines

Leak Detection

Cathodic Protection
Manchester Methods

Detailed Inspection
- Visual
- Dye Penetrant
- High Voltage Holiday Detection
- Ultrasonic

Repairs
- Coating
- Penetrations
- Valves
Final Inspections

Leak Detection
Leak Detection

Arizona Instruments
- Vapor Detection Technology
- Failed due to complexity, and preexisting vapors in soil matrix

Tracer Technology
- Requires Injection of Trace Elements
- Tanks are Atmospheric, vented
- Soil Matrix is not homogenous

AFHE XLD 2000
- Technology relied on software for temperature/atmospheric pressure correction
- Complicated analysis of plots required
- Lack of SPAWAR support

VISTA Precision Leak Detection
- Applied to Tanks 29 and 16
- Required Isolating the Tanks – long turnaround
- Accurate to California Standard
Leak Detection Challenges

- Technical Capability of Leak Detection
- Tank construction challenges
- Ullage requirements
- Timing
Manchester Results

Contractor Partners (Shaw E& I, Michael Baker Corp, Vista)

Necessity of Ullage

Water Intrusion
Aggressive Maintenance Allows continued use of this asset
Managed Maintenance will minimize ultimate replacement costs
Environmentally and Economically viable method of fuels storage