



NAVAL SUPPLY SYSTEMS COMMAND

***FISC Puget Sound
Manchester Fuel Department***

**Maintenance,
Leak Detection in Large
Underground Storage
Tanks**

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

Ready. Resourceful. Responsive!

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE MAY 2009		2. REPORT TYPE		3. DATES COVERED 00-00-2009 to 00-00-2009	
4. TITLE AND SUBTITLE Maintenance, Leak Detection in Large Underground Storage Tanks				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Supply Systems Command,Fleet Logistics Center Puget Sound ,467 W Street ,Bremerton,WA,98314-5100				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES Presented at the NDIA Environment, Energy Security & Sustainability (E2S2) Symposium & Exhibition held 4-7 May 2009 in Denver, CO.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 27	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

BRIEF OVERVIEW

- ◆ **Introduction**
- ◆ **Scope of Military Large USTs**
- ◆ **Issues at Military Storage Tanks**
- ◆ **Types of USTs**

BRIEF OVERVIEW

- ◆ **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.**

Large Military USTs

- ◆ **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***

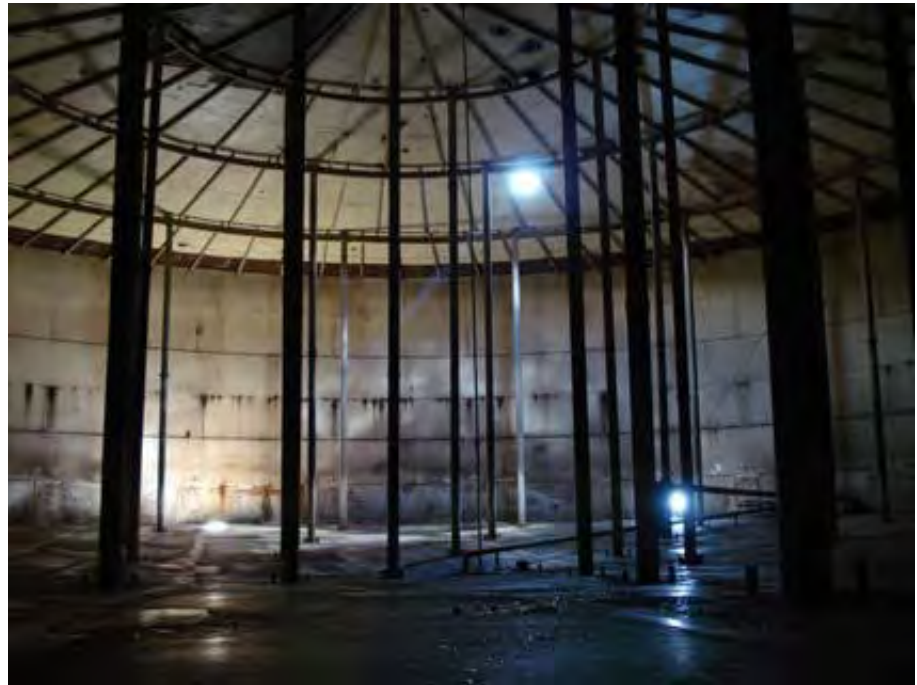
Military Storage Tank Issues

- ◆ **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***

- ◆ **Technological Limitations**
 - ◆ ***Installed Inventory Management limitations***
 - ◆ ***Precision leak Detection Limitations***
- ◆ **Inconsistent Operator Training Standards**

Results

◆ April 26, 2007 FISC Pearl Harbor Reports a loss of 366,000 gallons from tank 1403 (AST) (later revised to 359,000 gallons)



Results

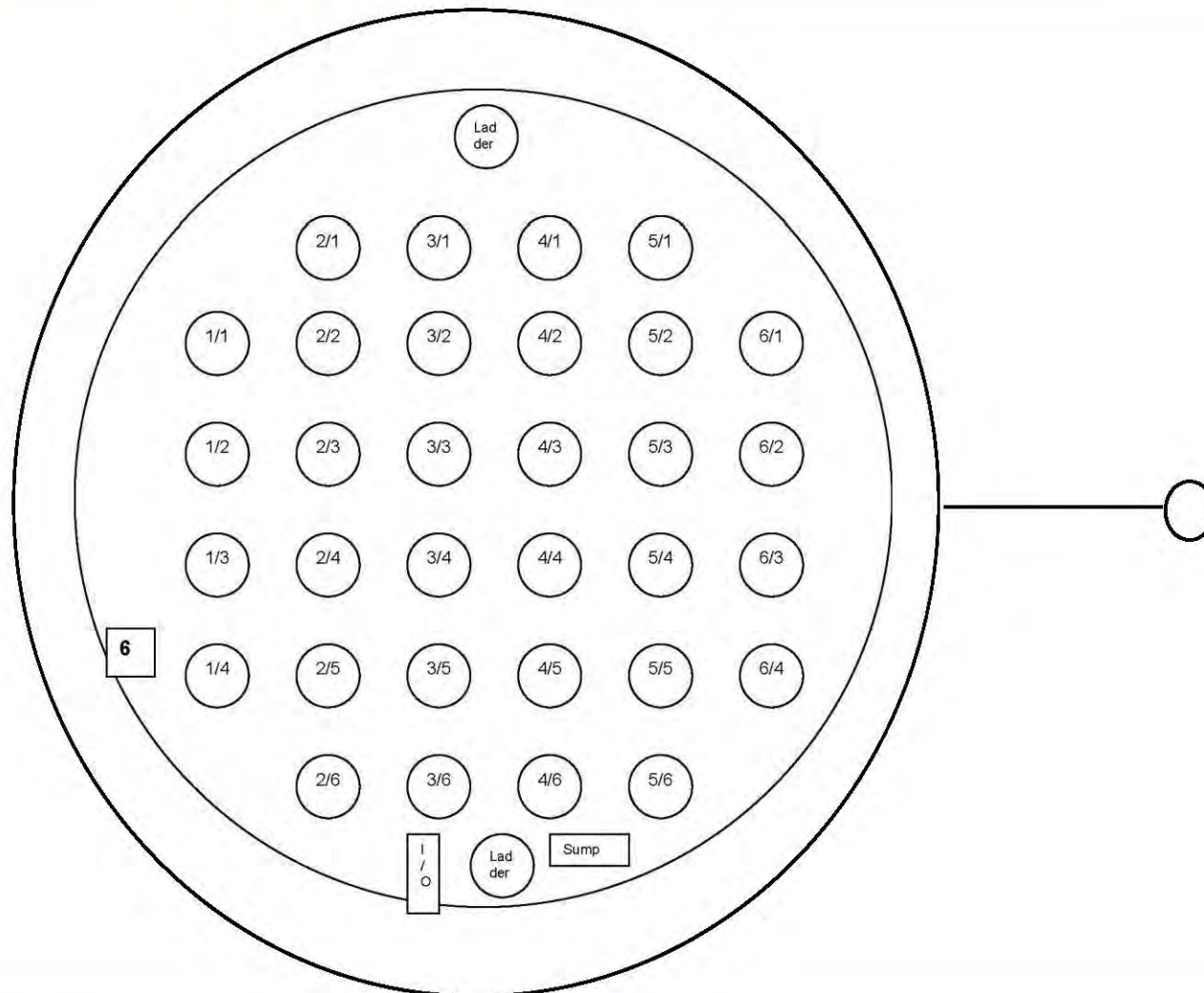
- ◆ Results – a 1 inch by 3 inch hole in sump
- ◆ Operator Error detecting loss



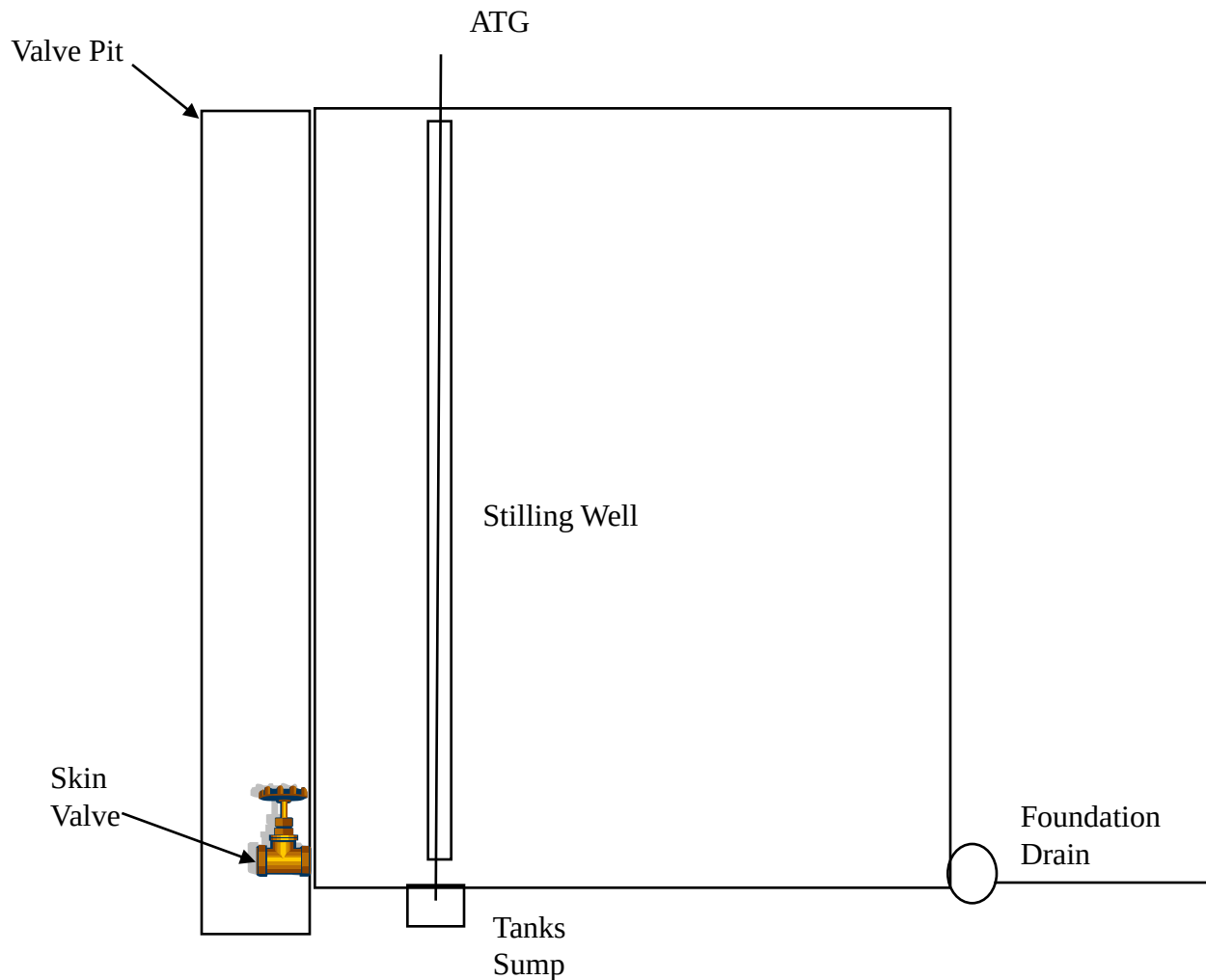
Types of USTs

- ◆ **Concrete**
 - ◆ *Cut and covered*
 - ◆ *Underground Construction*
- ◆ **Steel**
 - ◆ *Cut and covered*
 - ◆ *Riveted Tanks*
 - ◆ *Welded tanks*





Typical construction



Regulatory Drivers

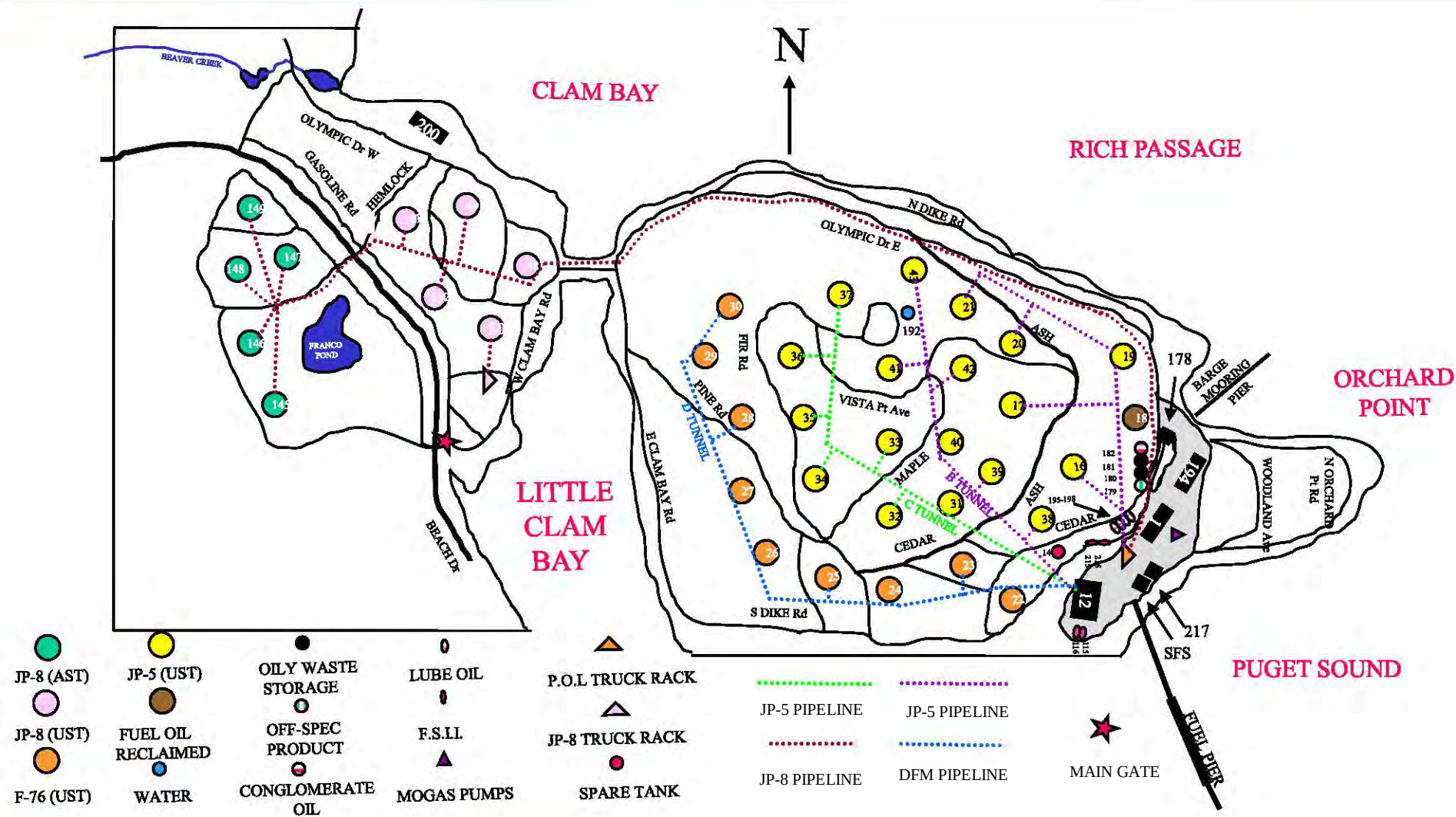
- ◆ **40 CFR 280/281**
 - ◆ *Derives Basic Regulation of Underground Storage Tanks*
 - ◆ *These tanks are Field Constructed – therefore “deferred” (40CFR 280.10)*
- ◆ **State/Local Requirements**
- ◆ **DOD Requirements**

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 LAYOUT



Terminal Tankage

◆ Underground Storage Tanks

- ◆ 34 Bulk Fuel
- ◆ 5 metal 27/50 MBBL tanks
- ◆ 9 concrete coated 27MBBL tanks
- ◆ 20 concrete coated 47/50Mbbbl Tanks

◆ Aboveground Tanks

- 5 80Mbbbls Bulk tanks
- 4 Lube oil tanks
- 5 Waste Oil/Waste water tanks
- 2 Additive Tanks

38 Bulk Storage Tanks (33 UST / 5 AST)

1,834 Mbbbls (77,009,730 Gallons)

◆ Pipelines

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

Maintenance Methods/ History

- ◆ **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***

Maintenance Validations

◆ **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**

Conclusions

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

QUESTIONS???

