

# How to Comply with State AST Rules and Avoid Petroleum Discharges to the Environment



**Mott-Smith Consulting Group, LLC**





# Marshall T. Mott-Smith, President Mott-Smith Consulting Group, LLC



National Technical Expert and Regulatory Liaison, AET Compliance

1933 Commonwealth Lane, Tallahassee, FL 32303

[marshall@mott-smithconsulting.com](mailto:marshall@mott-smithconsulting.com)


[mmott-smith@aetllc.com](mailto:mmott-smith@aetllc.com)

850-391-9835 850-766-1562 cell

850-591-1434 cell



**NISTM**  
National Institute for Storage Tank Management

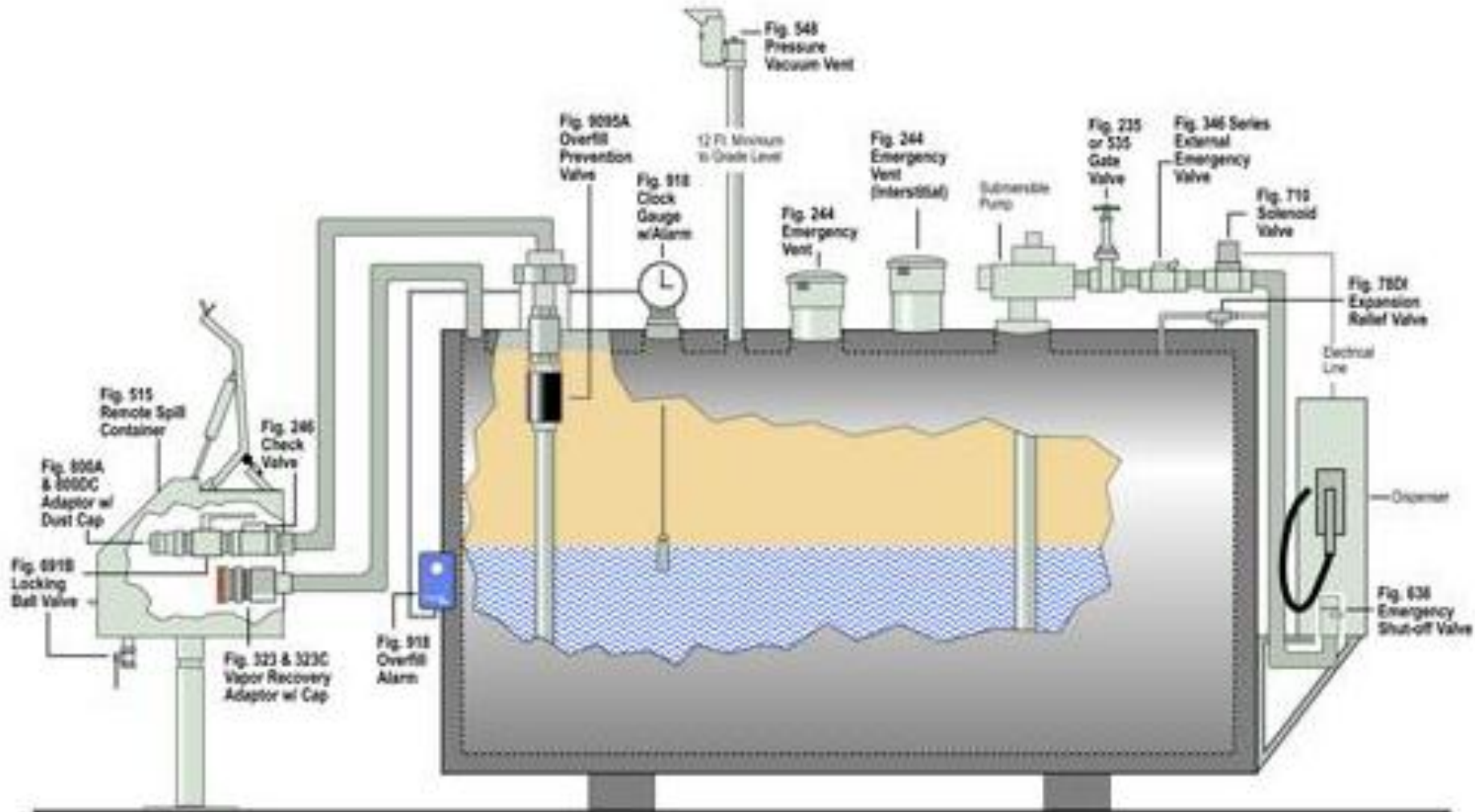


**Missouri Statutes  
Chapter 414**

**Missouri Rules – All  
locations utilized for  
wholesale or retail sales**

**Division 90—Weights and Measures  
Chapter 30—Petroleum Inspection**

# States Regulate and Inspect Storage Tank Systems



# Canadian Tank Inspectors



# Reference Standards



# Industry Reference Standards – The Technical Foundation of State Regulations

- **ACI** - American Concrete Institute.
- **API** - American Petroleum Institute.
- **ASME** - American Society of Mechanical Engineers
- **ASTM** - American Society for Testing and Materials.
- **NACE** - National Association of Corrosion Engineers.
- **NFPA** - National Fire Protection Association.
- **PEI** - Petroleum Equipment Institute.
- **SSPC** - Society for Protective Coatings.
- **STI** - Steel Tank Institute.
- **UL** - Underwriters Laboratories.



# Field-Erected ASTs





# Field-Erected AST Installation



# Do the job right!



Do the job right with  
Qualified Personnel!





**Tank Shell**



**Welding**



**Bottom plates**



**Quality work is essential!**

# Piping Connections, Sumps, Manways, & Shell Penetrations



# Reference Standards- API-650



## API STD 650 STORAGE TANK

API APPENDIX	<b>E</b>	CONTRACT NO.	<b>116118</b>
API REVISION	<b>ADD. 4</b>	TANK NO.	<b>#1</b>
API EDITION	<b>9TH</b>	YEAR BUILT	<b>1999</b>
NOMINAL DIAMETER	<b>104'-9"</b>	DESIGN LIQUID HEIGHT	<b>45'-8 1/4"</b>
DESIGN SPECIFIC GRAVITY	<b>0.76</b>	POST WELD HEAT TREATMENT	<b>NO</b>
MAXIMUM OPERATING TEMP.	<b>180°F</b>	DESIGN PRESSURE	<b>0 PSI</b>
NOMINAL CAPACITY	<b>70,000 BBLs</b>	NOMINAL HEIGHT	<b>48'-5 1/4"</b>

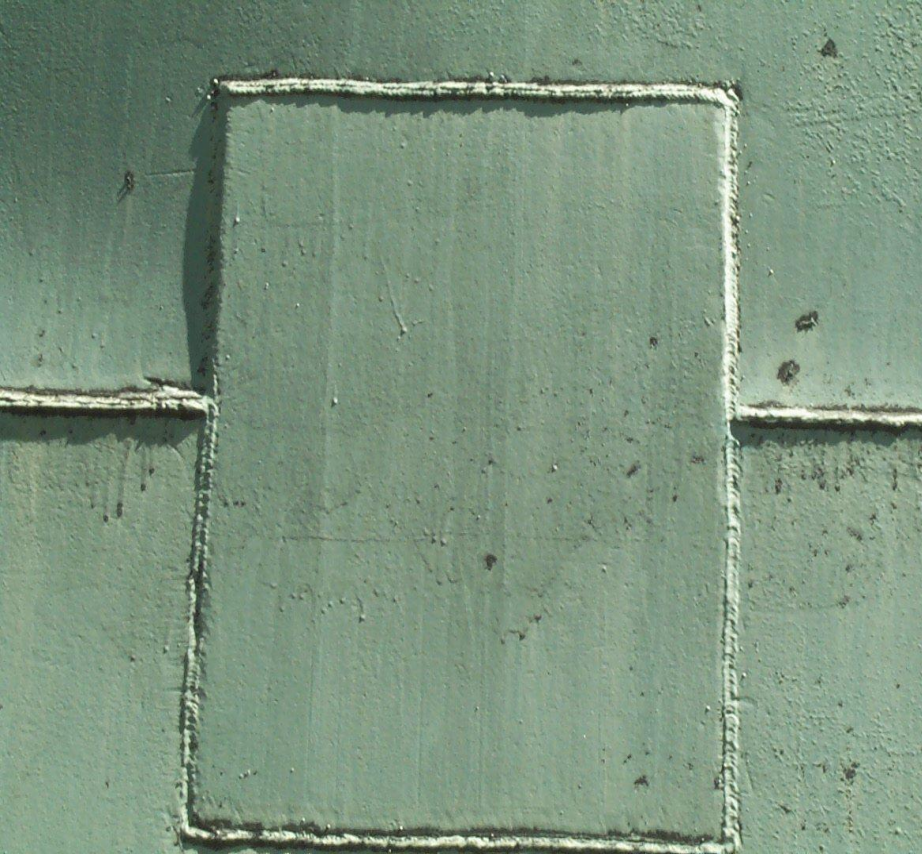
RING	MATERIAL
#1 & 2	A36 MOD
#3 THRU 6	A36

SHELL MATERIAL

FABRICATED BY **CBI CONSTRUCTORS**

ERECTED BY **CBI CONSTRUCTORS**

# API 650 Work That Doesn't meet the Standards

































# Final Steps



# New Tanks



# API 650 Optional/Traditional Double-Bottom Designs

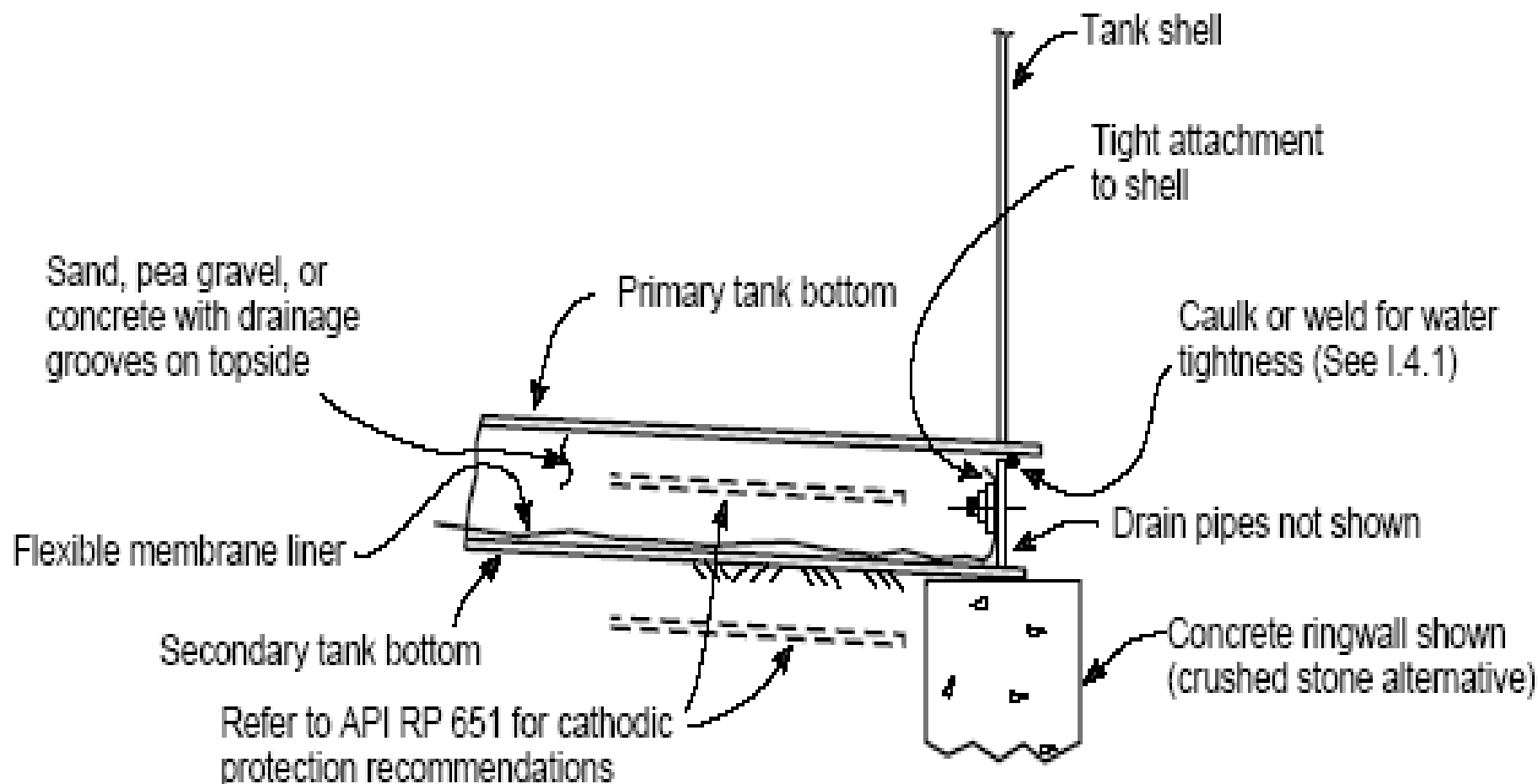


Figure I-4—Double Steel Bottom with Leak Detection at the Tank Perimeter (Typical Arrangement)



German  
Double-  
Bottom  
Design



# El Segundo Bottoms



**Cone-Down**

# El-Segundo Designs

- Cone-up
- Cone-down
- Shovel-bottom





27

# Double-Wall Tanks

**Port of  
Palm Beach**



**Germany**



**Port Canaveral**



# Impervious Synthetic Liners Beneath the Tank



# Upgrading Existing Single-Bottom ASTs with Secondary Containment

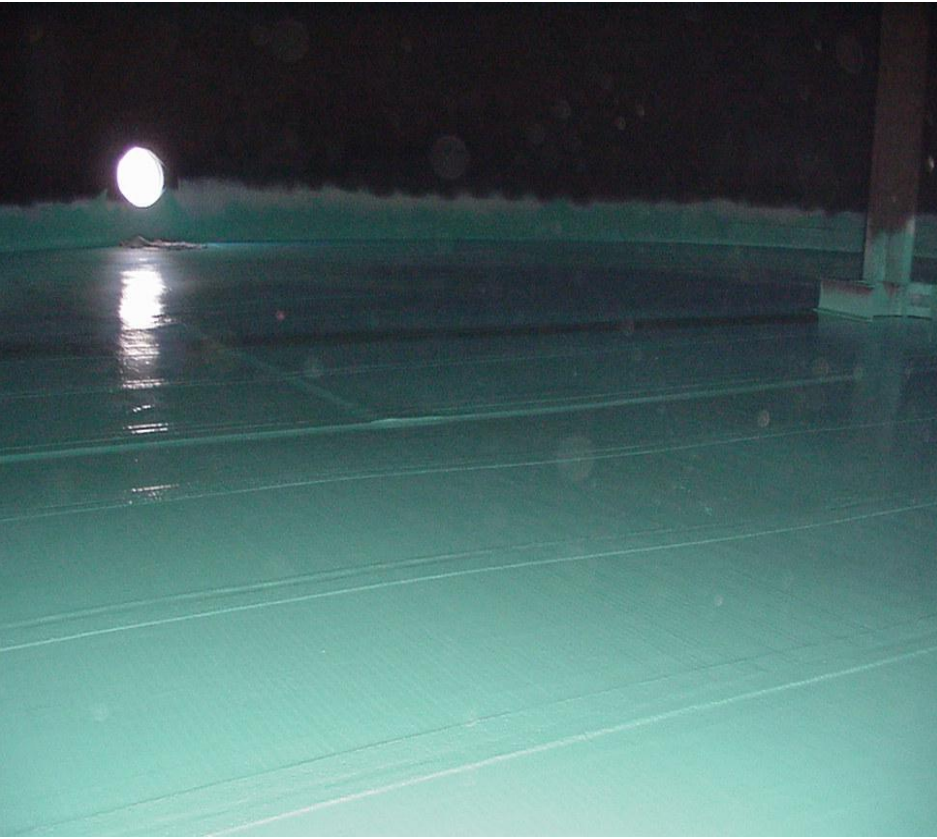








# Internal Secondary Containment Using Parabeam



# Tankbau (Germany) Internal Secondary Containment System



**Steel Tanks**



**Concrete Tanks**

# Steel Internal Secondary Containment



# Tank-Jacking to Install Secondary Containment





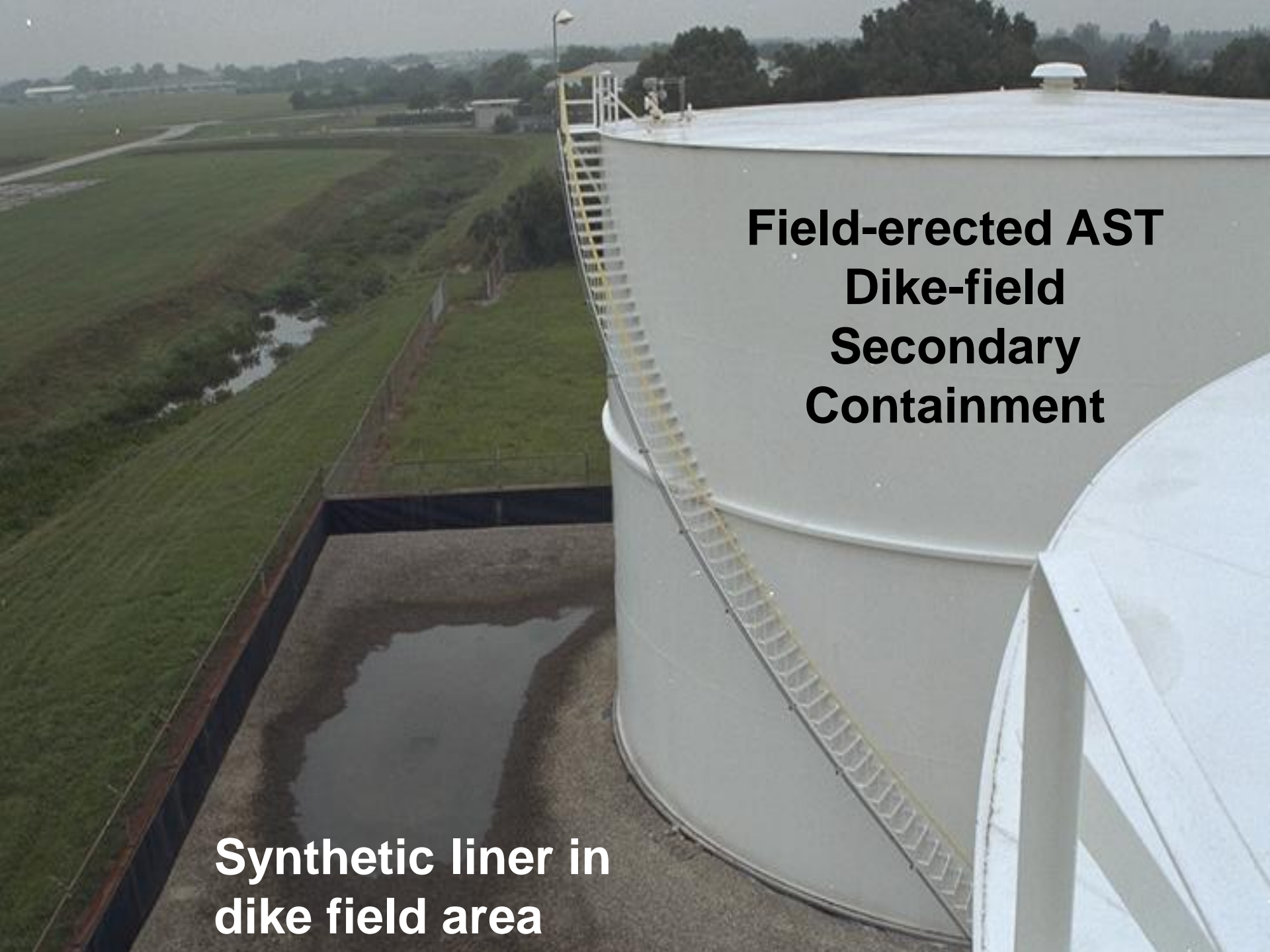
Field-erected AST Lifting  
for secondary  
containment  
installation beneath the  
tank



2005 4 27

# Moving Tanks to Different Locations





**Field-erected AST  
Dike-field  
Secondary  
Containment**

**Synthetic liner in  
dike field area**

**Concrete**

**AST Dike-field Secondary  
Containment -  
Field-Erected Tanks**



**Double-walled**



**Synthetic Liner**



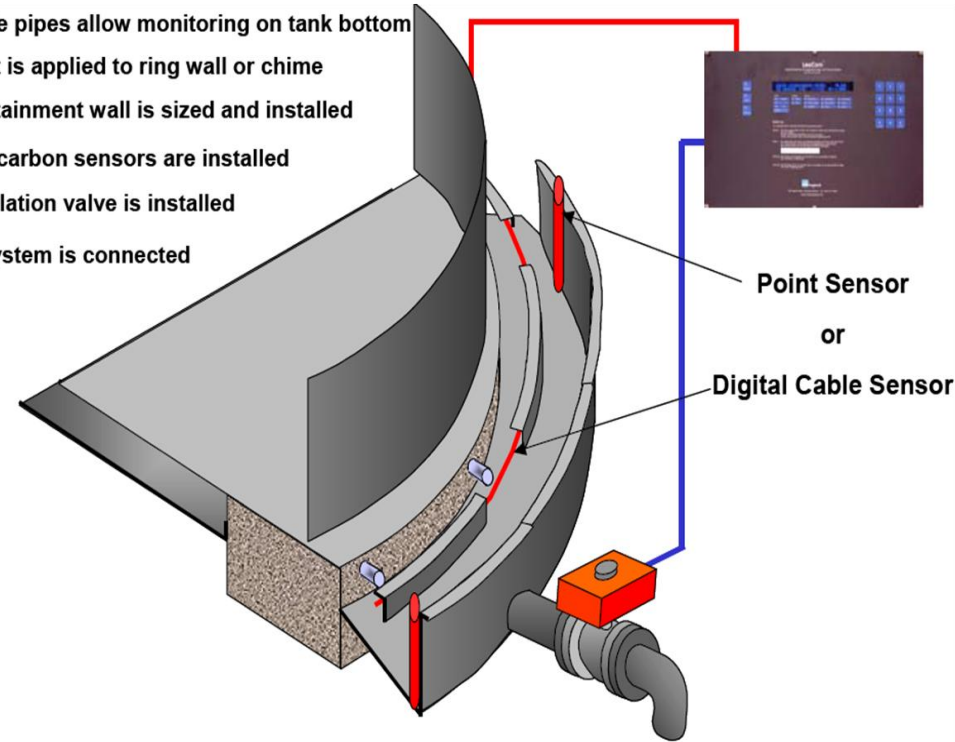
**Alternative Dike-  
field  
containment**



# Eco-Tank TABs-02 System



- ✓ Telltale pipes allow monitoring on tank bottom
- ✓ A skirt is applied to ring wall or chime
- ✓ A containment wall is sized and installed
- ✓ Hydrocarbon sensors are installed
- ✓ An isolation valve is installed
- ✓ The system is connected



Alternative  
Dike Field  
Secondary  
Containment

# Pre-Hydrated Bentonite Clay Liners – “Rawmat” by Rawell



# Poly-Urea Liners



# Shop-fabricated tank installation





# Issues in selecting the type of shop-fabricated tank best-suited for your needs:

- Storage volume needed
- Site security
- Available space
- Piping needs
- Dispensing needs
- Portability
- Regulation
- Cost
- Operation and maintenance issues
- Risk assessment – fire safety, hurricanes, etc





**Shop-fabricated  
ASTs should have  
secondary  
containment at the  
time of installation**





## AST Secondary Containment - Shop-fabricated Tanks

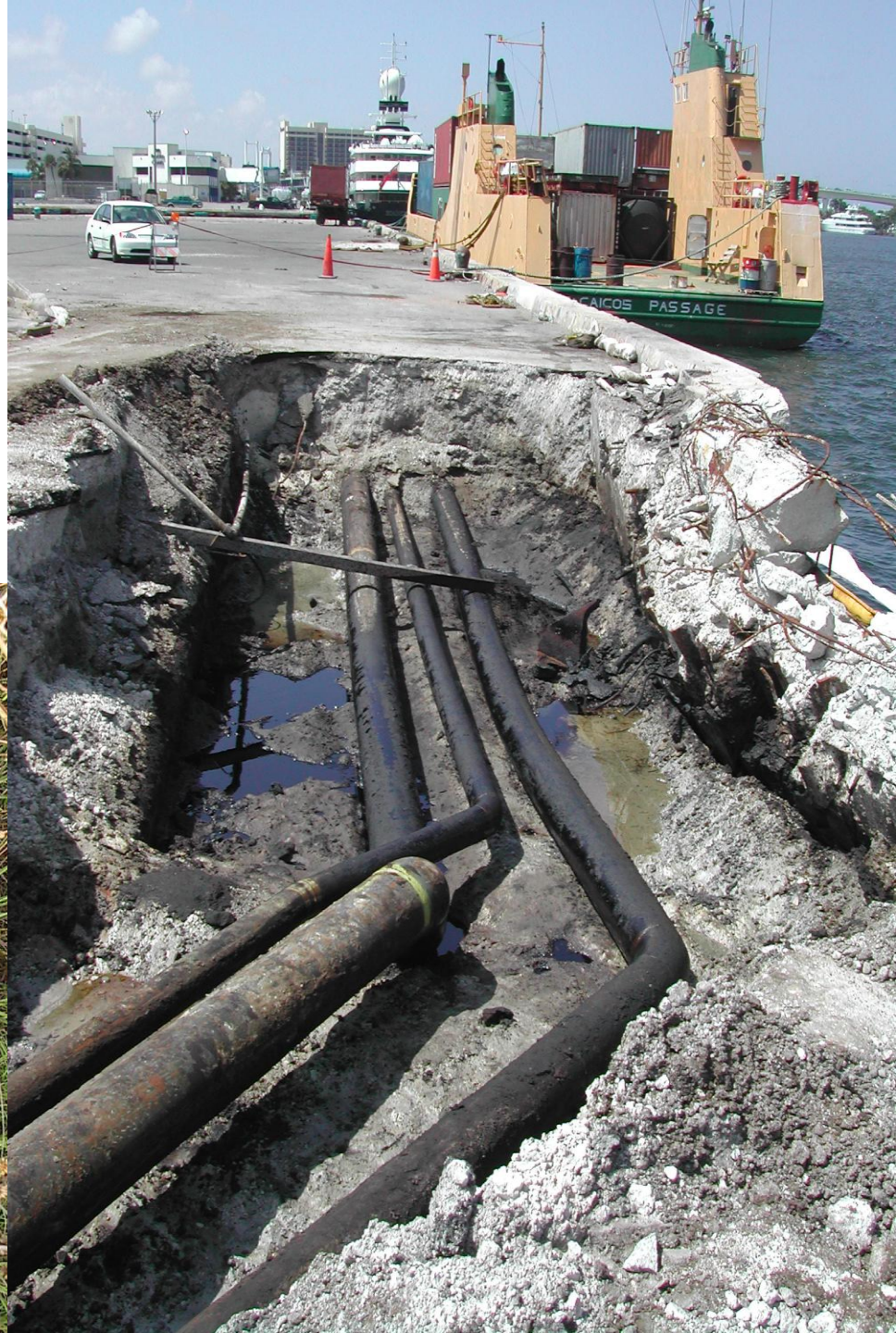




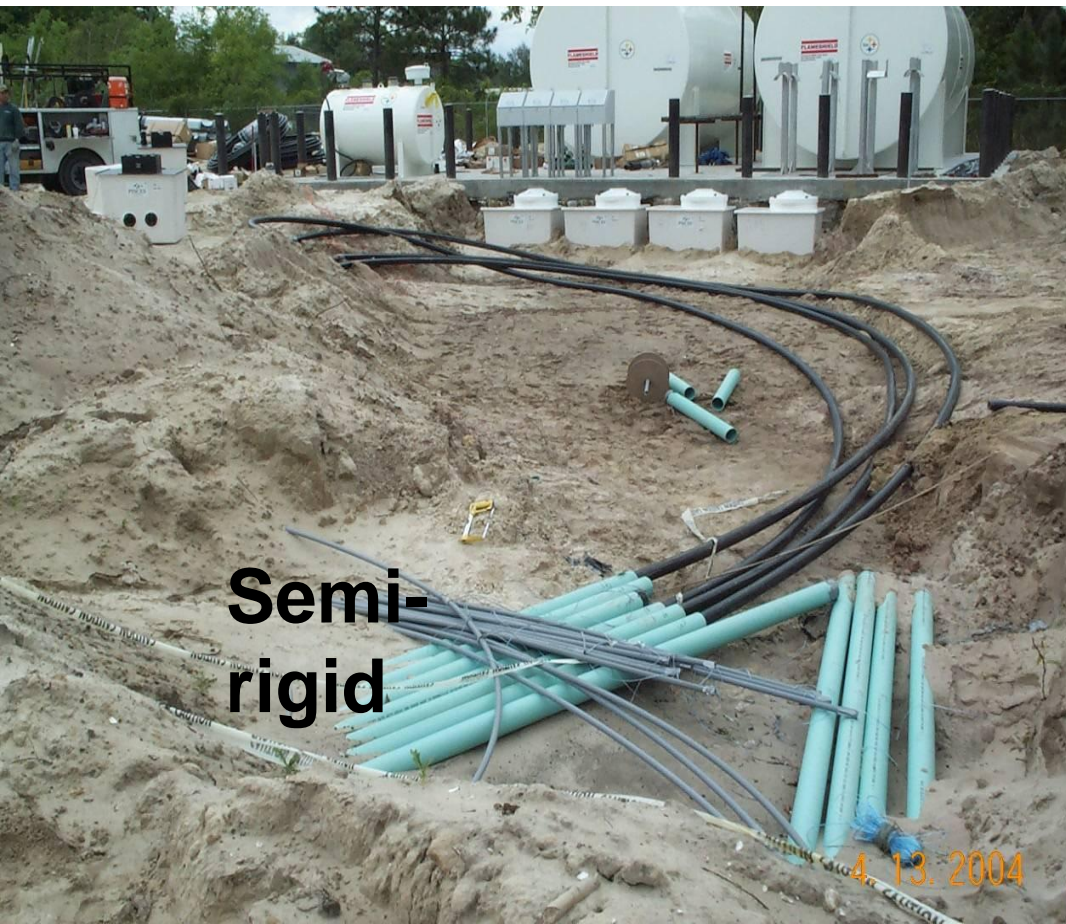
# Piping



# Piping - The major source of Field-erected AST leaks...



# Small Diameter Piping with Secondary Containment





Be sure to install the proper valves for shop-fab ASTs with STPs serving dispensers

# Single-wall Large Diameter Piping Above Ground





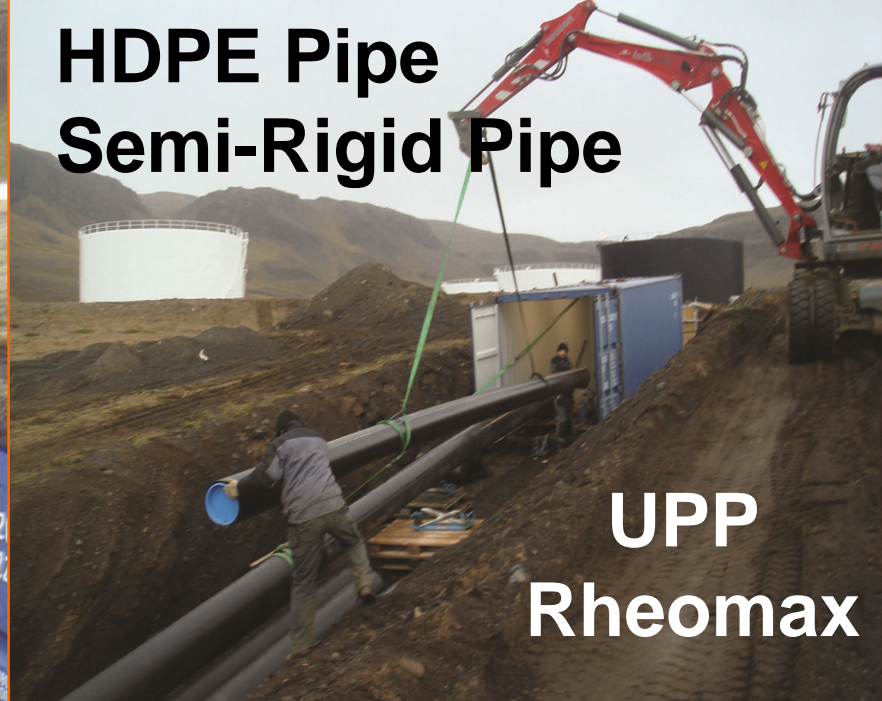
**Steel Bulk Product  
Piping with  
Secondary  
Containment for  
Piping in Contact  
with the Soil**



**Steel Bulk Product Piping with Secondary Containment - Installation concerns**



**HDPE Pipe  
Semi-Rigid Pipe**



**UPP  
Rheomax**





IPP HDPE  
Semi-Rigid  
Petrol Pipe





Airport Hydrant Piping



AST Spill Protection

# AST Overfill Protection



GAUGE HT  
MAX. FILL  
MIN. FILL  
LINE DISP.

12:43pm



12:34pm

# Release Detection Standards

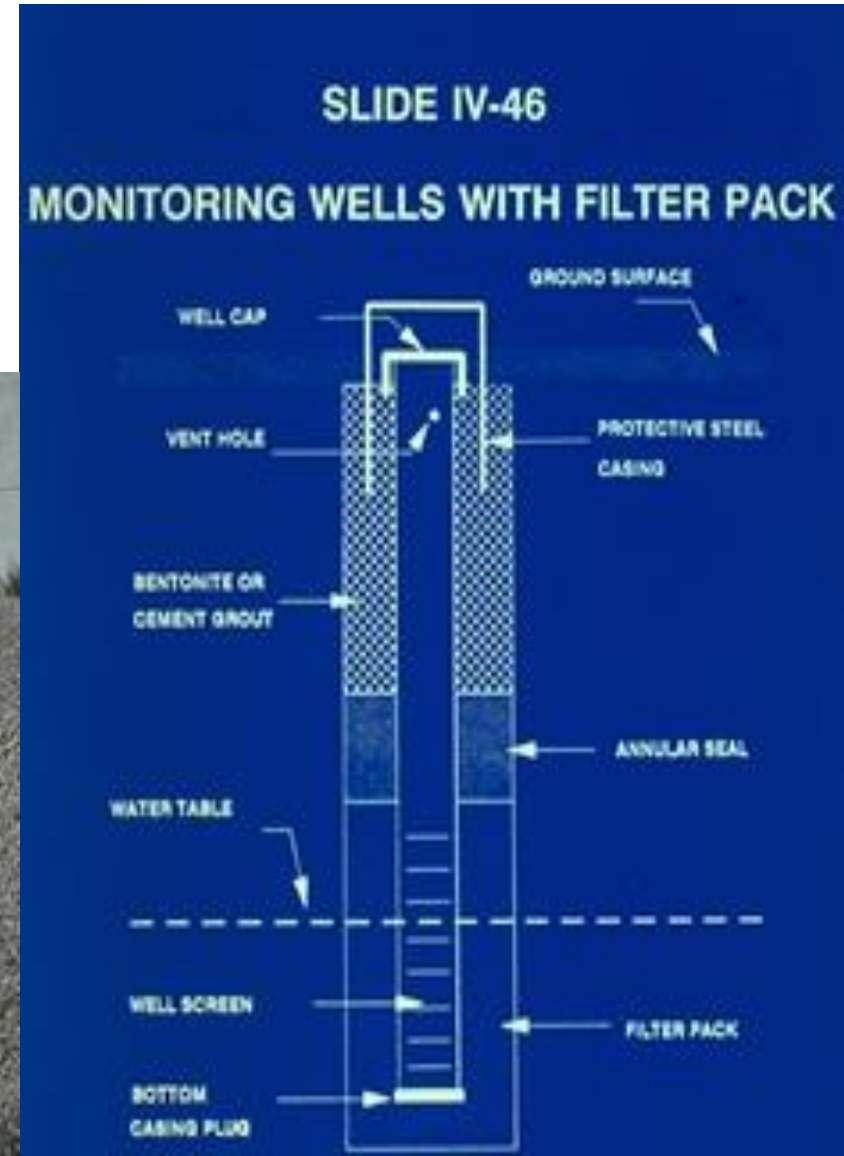


# Internal Release Detection for Single-wall Systems

**NONE**

# External Release Detection for Single-wall Systems

- Well construction
- Site Suitability
- Groundwater monitoring wells
- Vapor monitoring wells



# Release Detection for Double-wall Systems

Internal  
Interstitial  
Monitoring

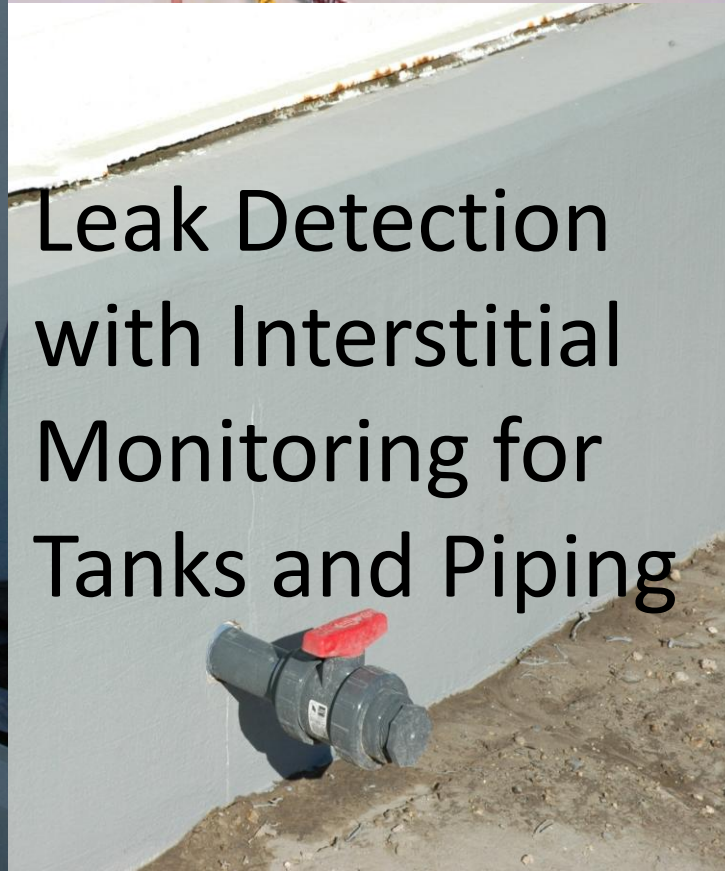


- Visual
- Vacuum
- Pressure
- Hydrostatic
- Sensors & Probes





# Leak Detection with Interstitial Monitoring for Tanks and Piping

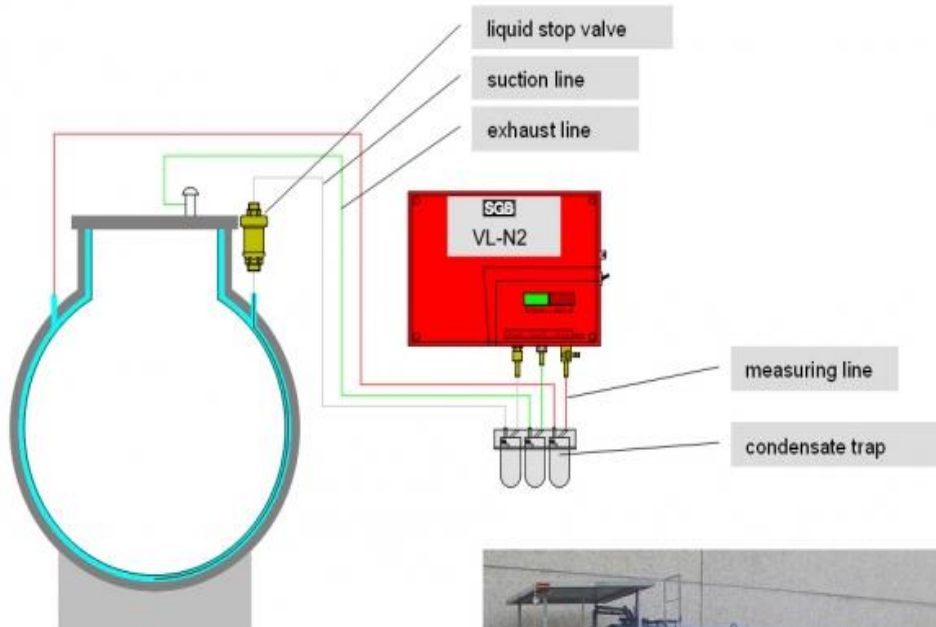


# Recommendation for Release Detection...

## “First Class” Version

## The “Economy” Version

Vacuum or Pressure Continuous  
Monitoring



Visual Inspections!



# General Operation & Maintenance

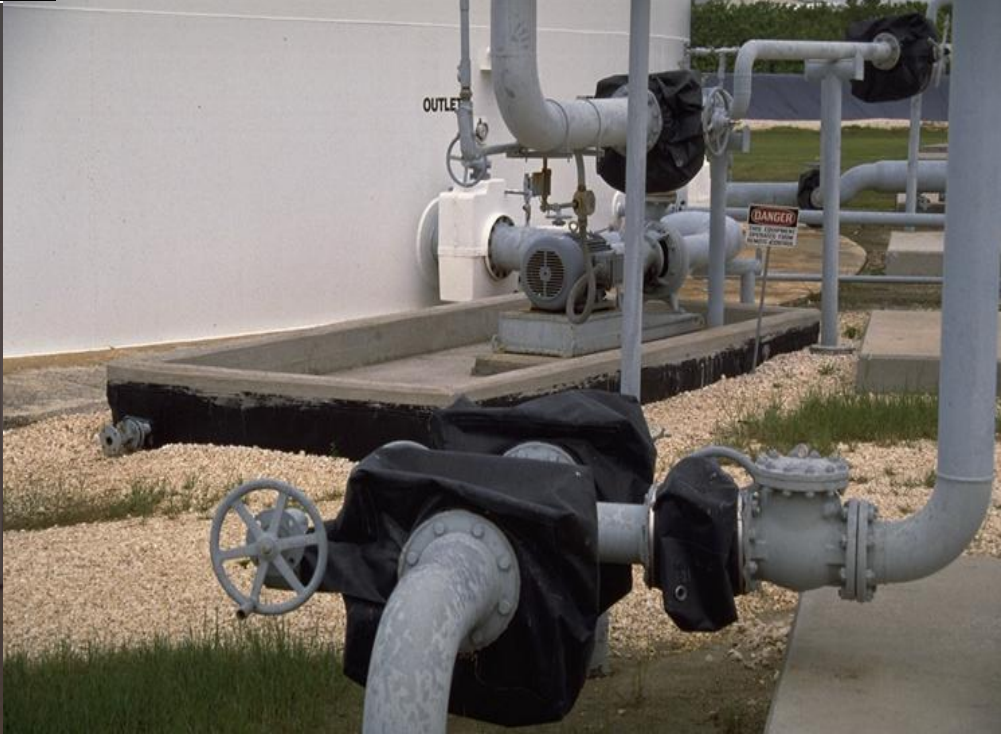
Piping connection drip-protection



Internal lining



Fuel filters

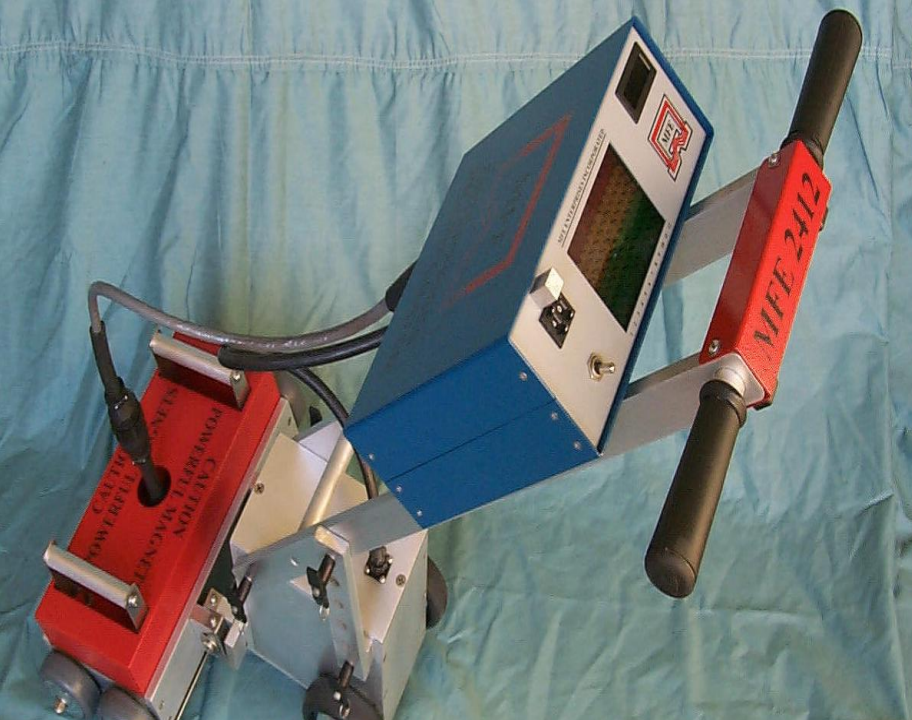


# Stormwater Management

Stormwater retention and removal , and dike field liners



# API 653 Inspections



# API 570 tests for Bulk Product Piping



# Unusual Situations



# RecordKeeping

- Keep a spiral notebook of visual inspections
- Keep a tabbed notebook of all other records required by the State
- Photo-document if possible
- Keep Registration Information up-to-date
- Commercially available recordkeeping systems





# Registration

Manufacturers must register with the State.



Missouri Department of Agriculture  
Division of Weights and Measures  
PO Box 630  
Jefferson City, MO 65102  
Phone: 573-751-4278

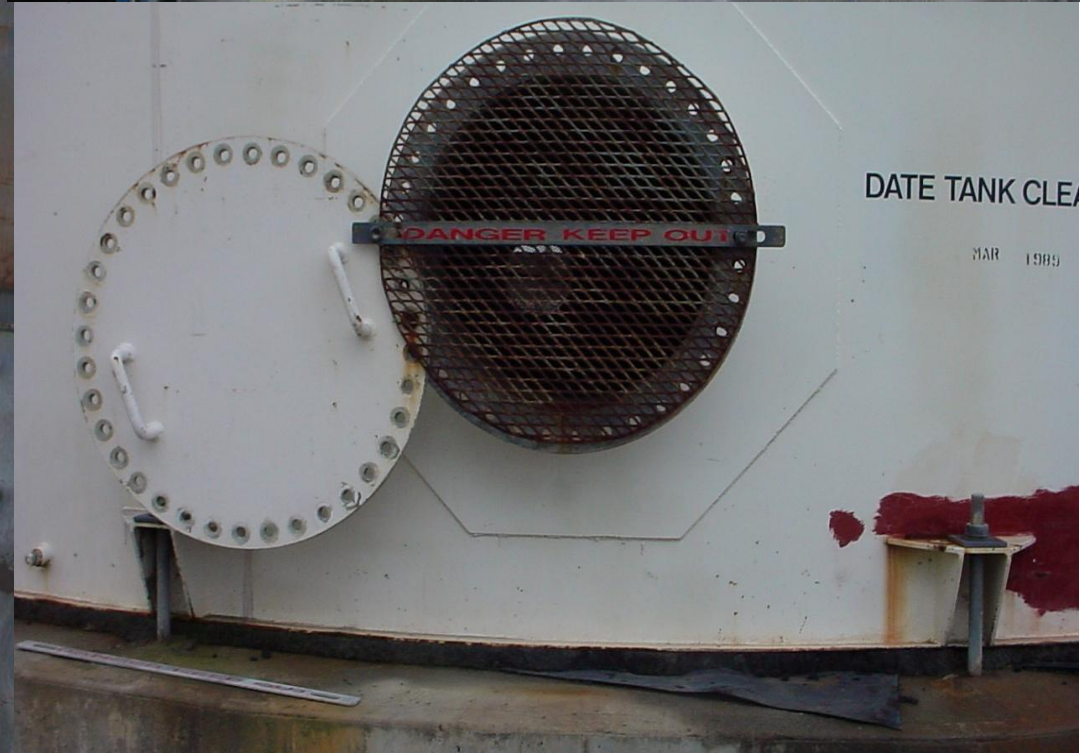
## APPLICATION FOR ANNUAL REGISTRATION

In accordance with Section 414.035, RSMo: Any person who manufactures an aboveground or underground fuel storage tank for use in this state, or piping for such tank, or who installs or repairs a fuel storage tank system in this state, must register with the Department and provide evidence of financial responsibility for the costs of corrective action directly related to releases caused by improper manufacture, installation, or repair of such. This requirement does not apply to the installation or repair of fuel storage tank systems by the tank owner or operator.

Please complete this application and submit it with an insurance policy certificate of

# Out-of-Service and Closure Requirements





# AST Closure

Two Choices – Removal,  
or abandon-in-place







## Closure Assessments

Recommendation: Hire a qualified, experienced professional environmental consulting firm

# Incident and Discharges



# Incident and Discharge Reporting

Discharges



Incidents





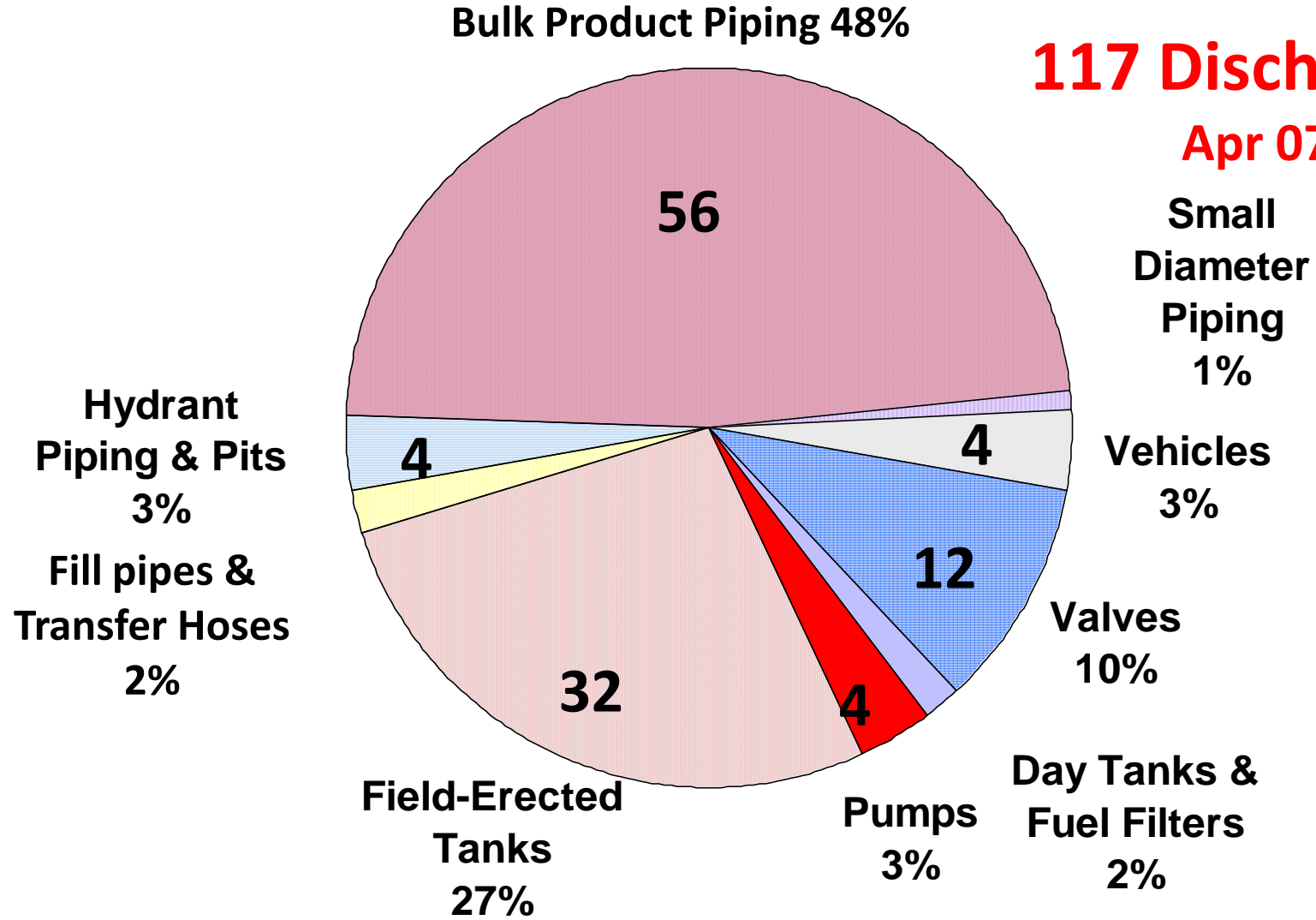
**Release or Discharge Response** – Complete discharge form within 24 hours or the close of the next business day – control and abate the discharge



# Sources of Discharges - Field-Erected AST Systems

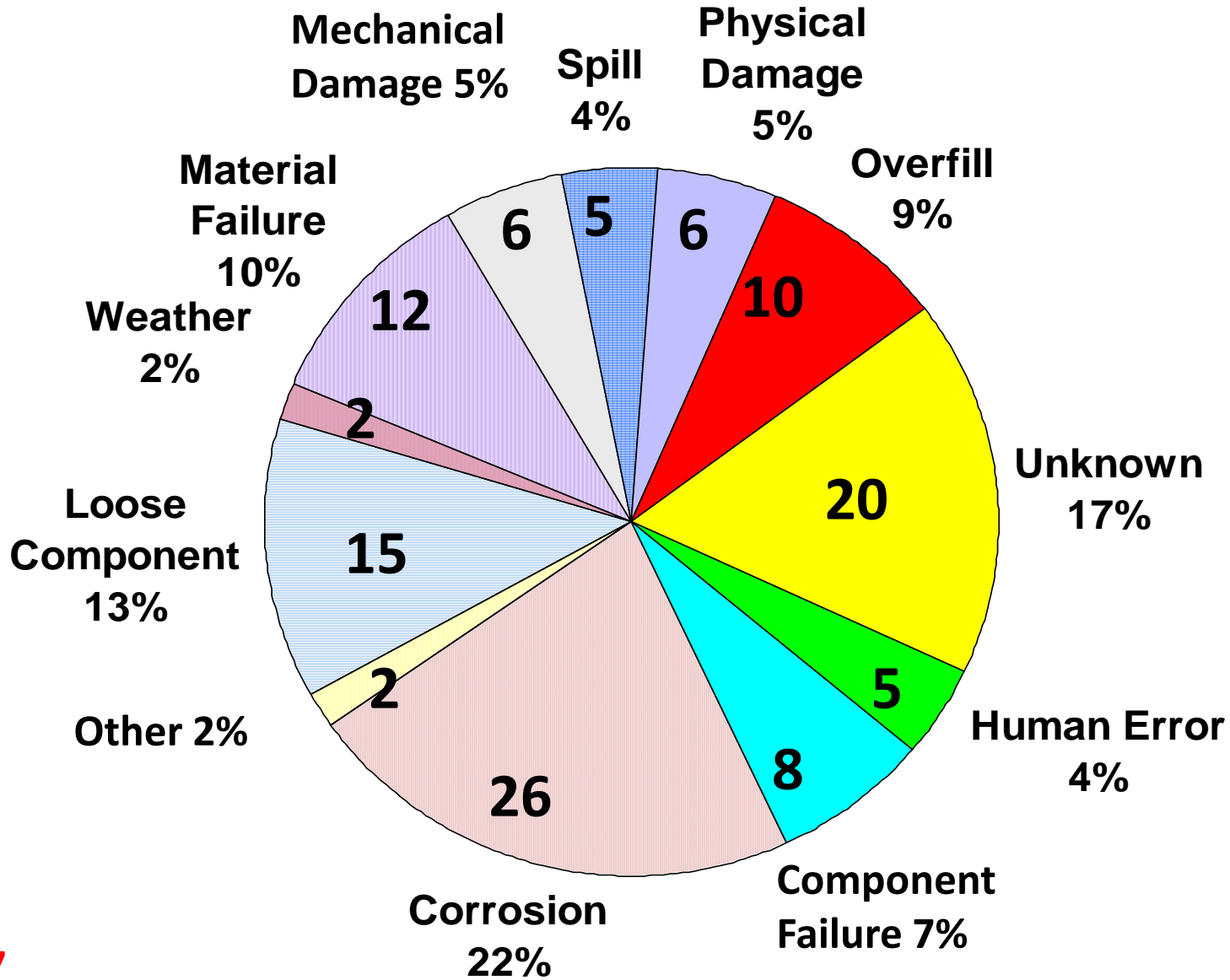
**117 Discharges**

**Apr 07**



Tanks are only 17% if overfills and other external factors are excluded

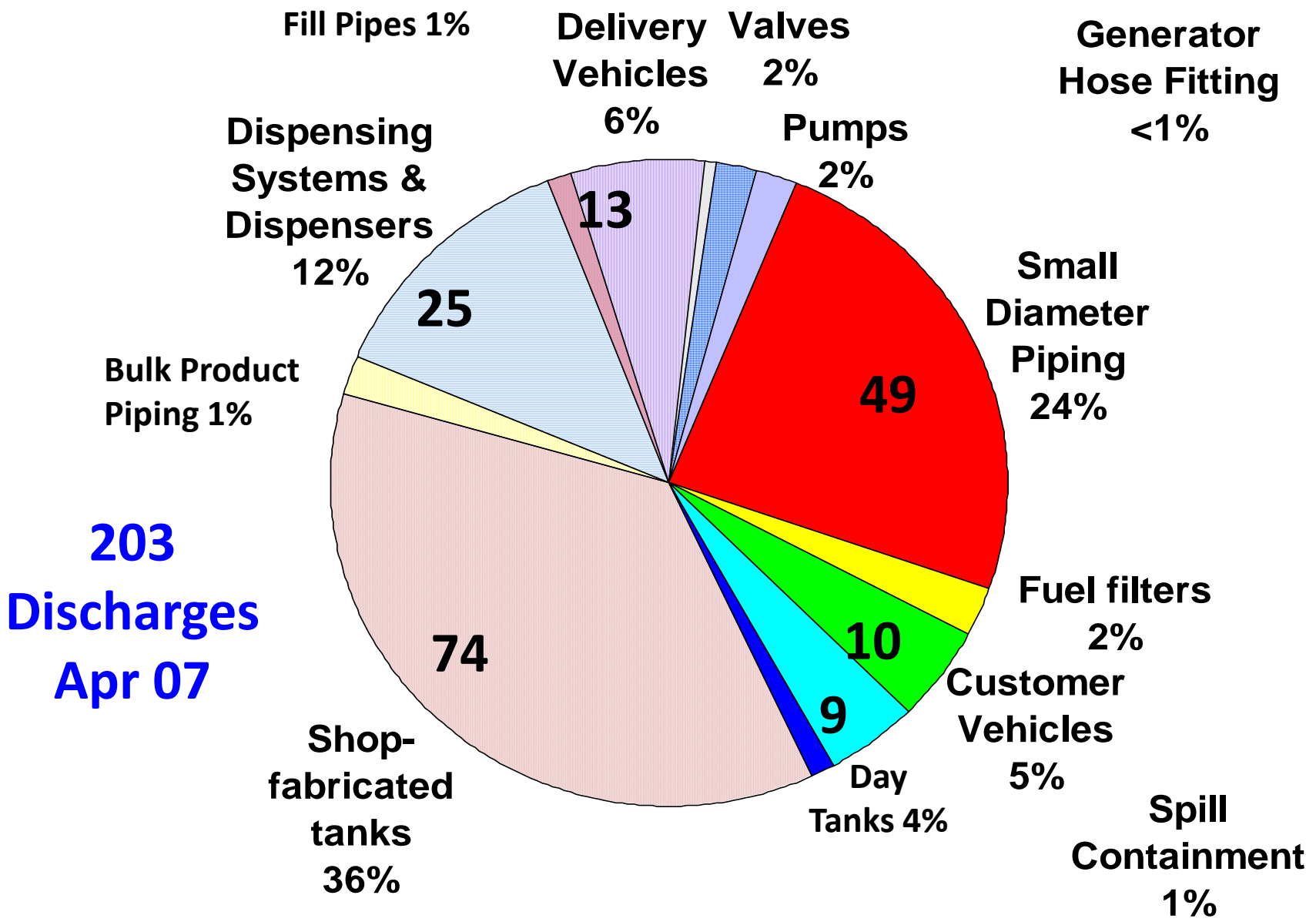
# Causes of Discharges from All Sources



Apr 07

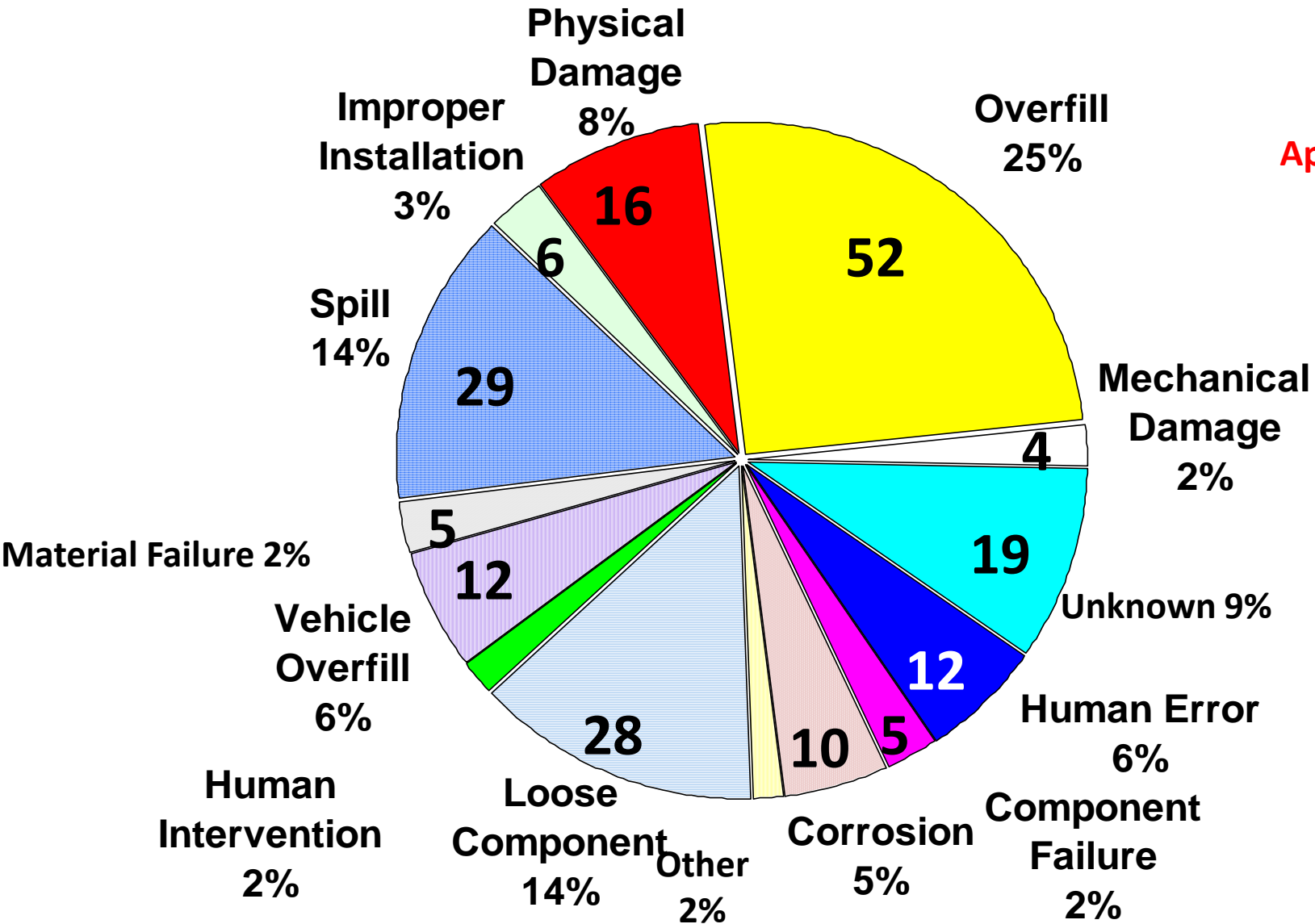
## Field-Erected AST Systems

# Sources of Discharges - Shop-fabricated ASTs



# Causes of Discharges from All Sources

Apr 07



Shop-fabricated AST Systems

# Shop-Fab Fires & Explosions



**January 25, 2008, Gilchrist, Colorado**



# Buncefield, England, 2005







# Caribbean Petroleum, Puerto Rico, United States, October 23-25, 2009



# Miami International Airport, Florida, March 27, 2011



The End

