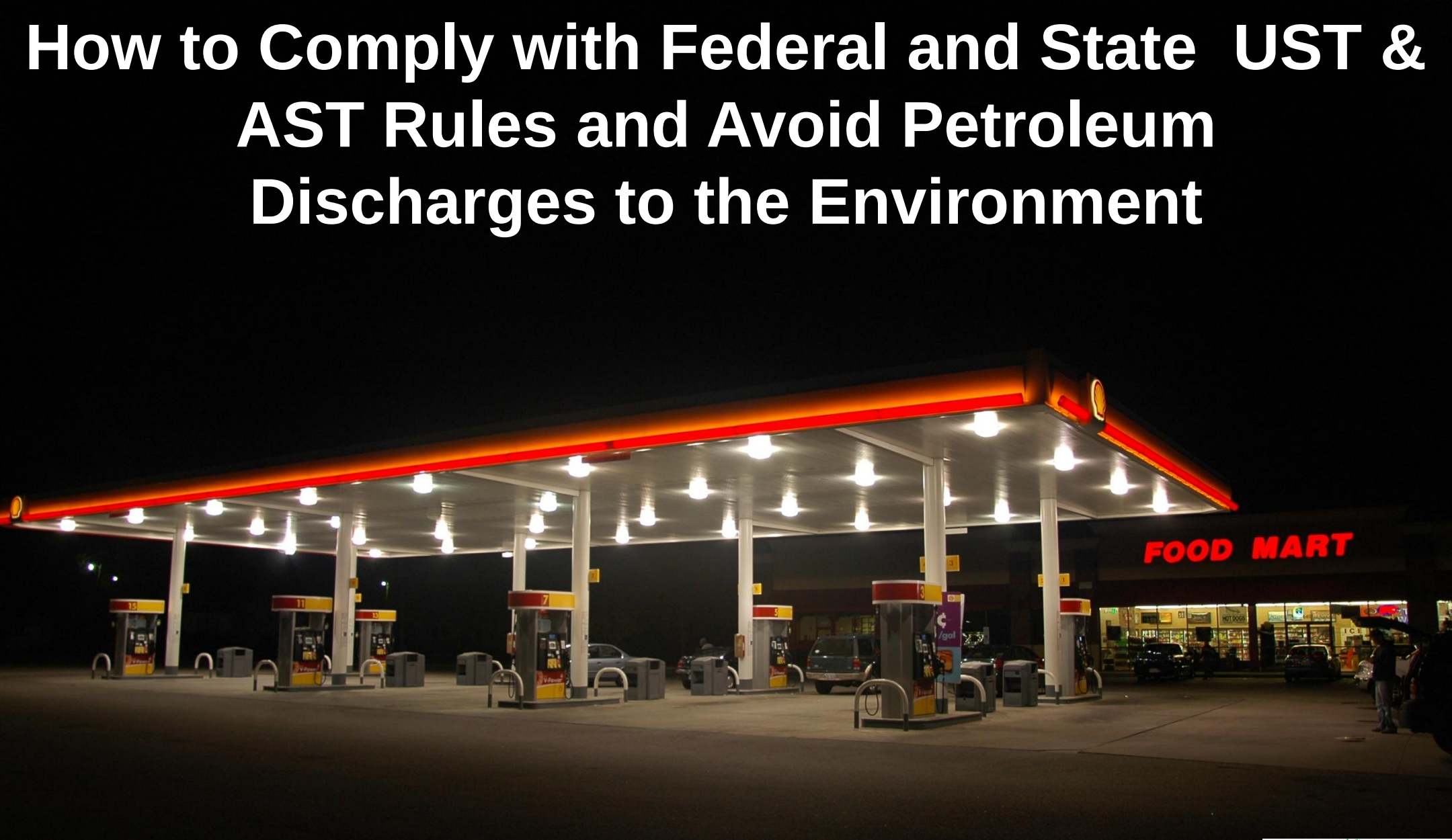
How to Comply with Federal and State UST & AST Rules and Avoid Petroleum Discharges to the Environment



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 mmott-smith@aetllc.com

850-391-9835 850-766-1562 cell 850-591-1434 cell

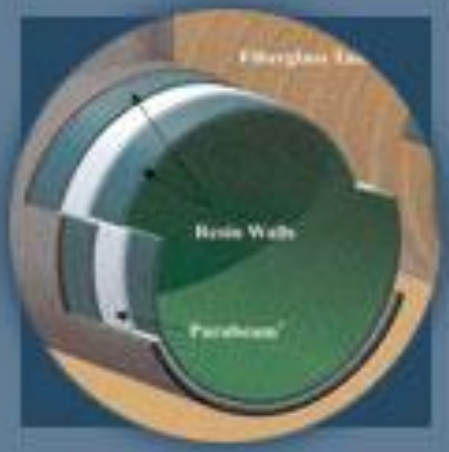
States Regulate Storage Tank Systems

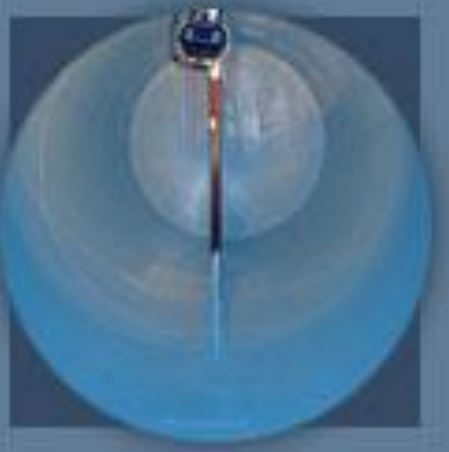
USE RELIABLE EQUIPMENT!

Underground Storage Tanks

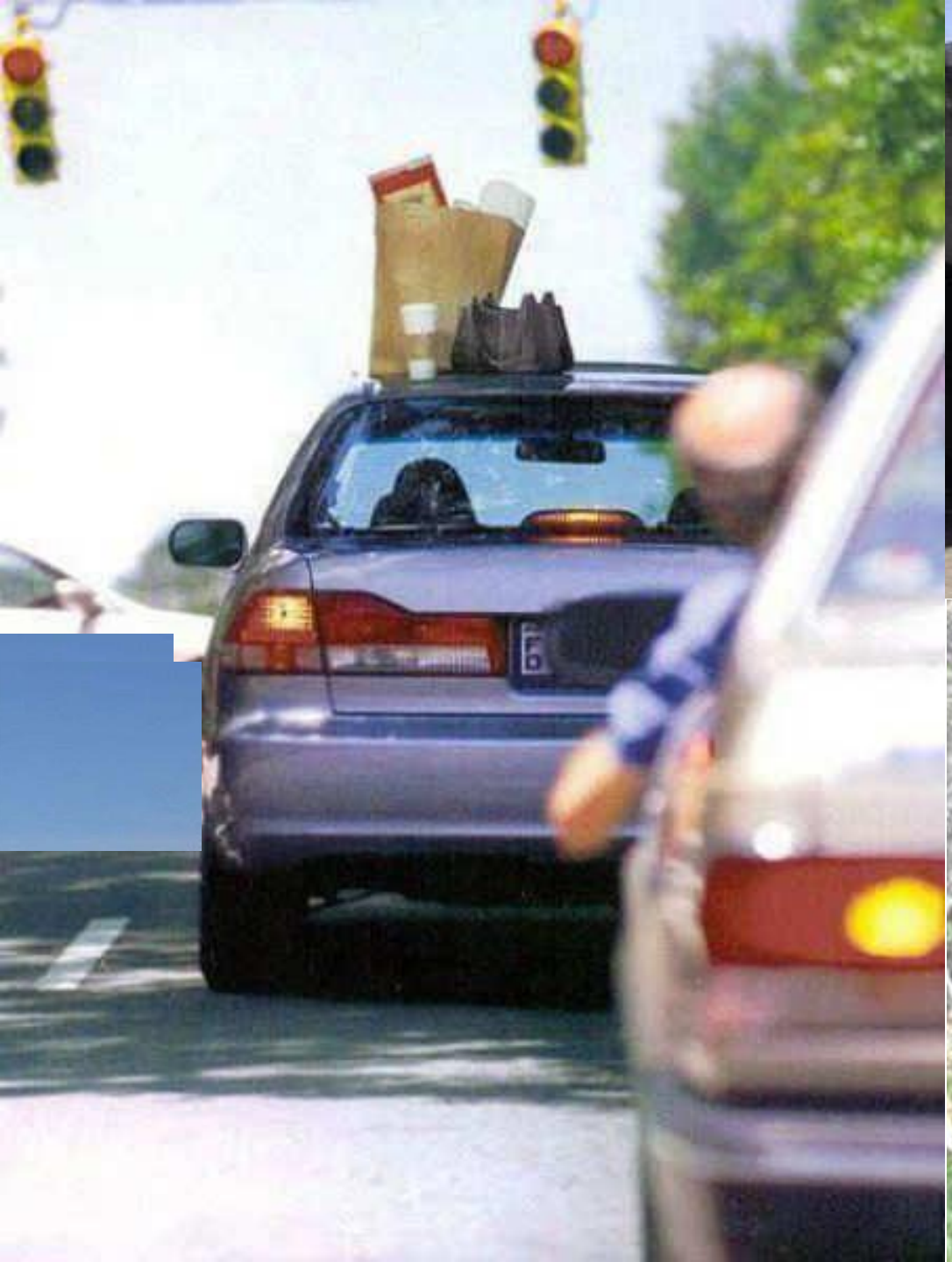
Internal Secondary Containment

Tank Tech Phoenix Hybrid
ZCL Phoenix System, Petrofuse





Installation



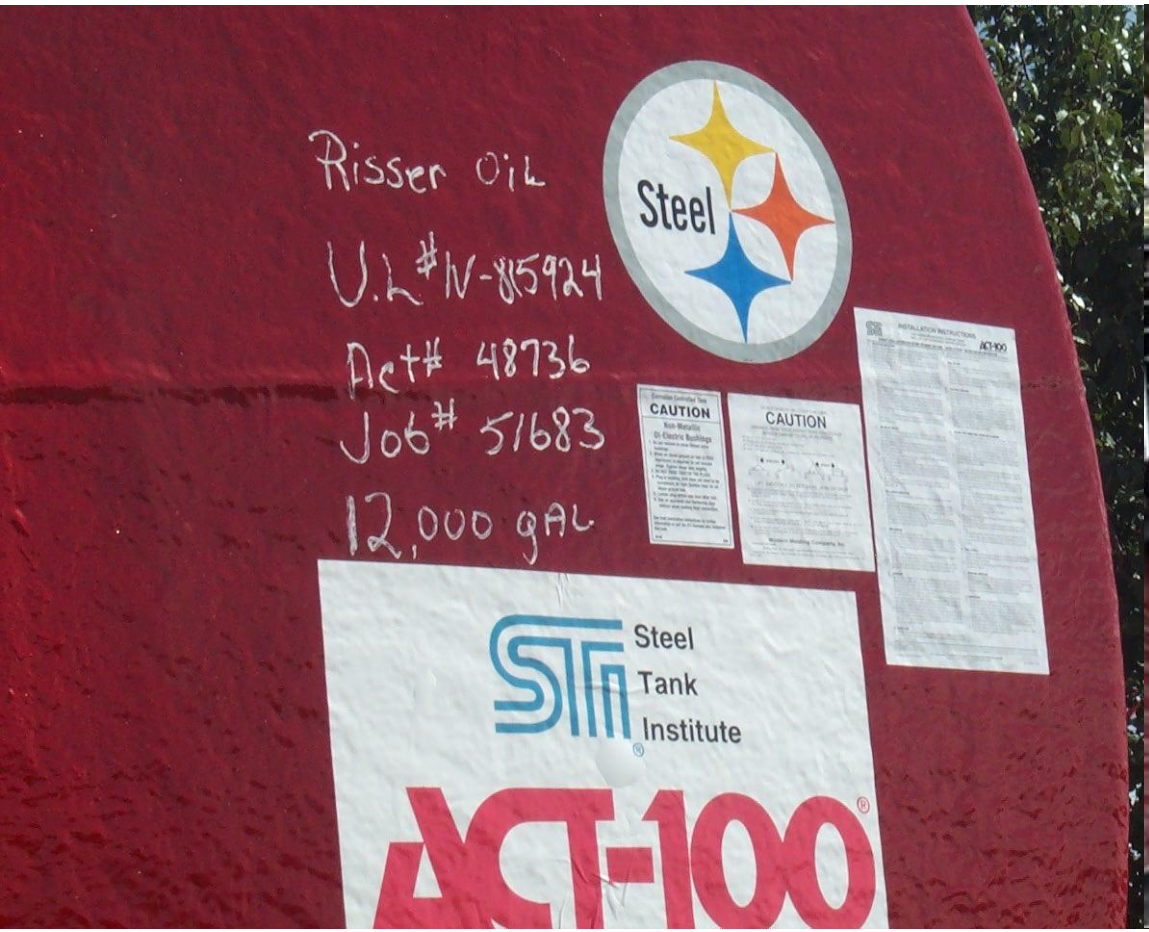

Do the job right!

How not to install a UST...

Proper UST Installation - Follow Reference Standards and Manufacturer's Instructions

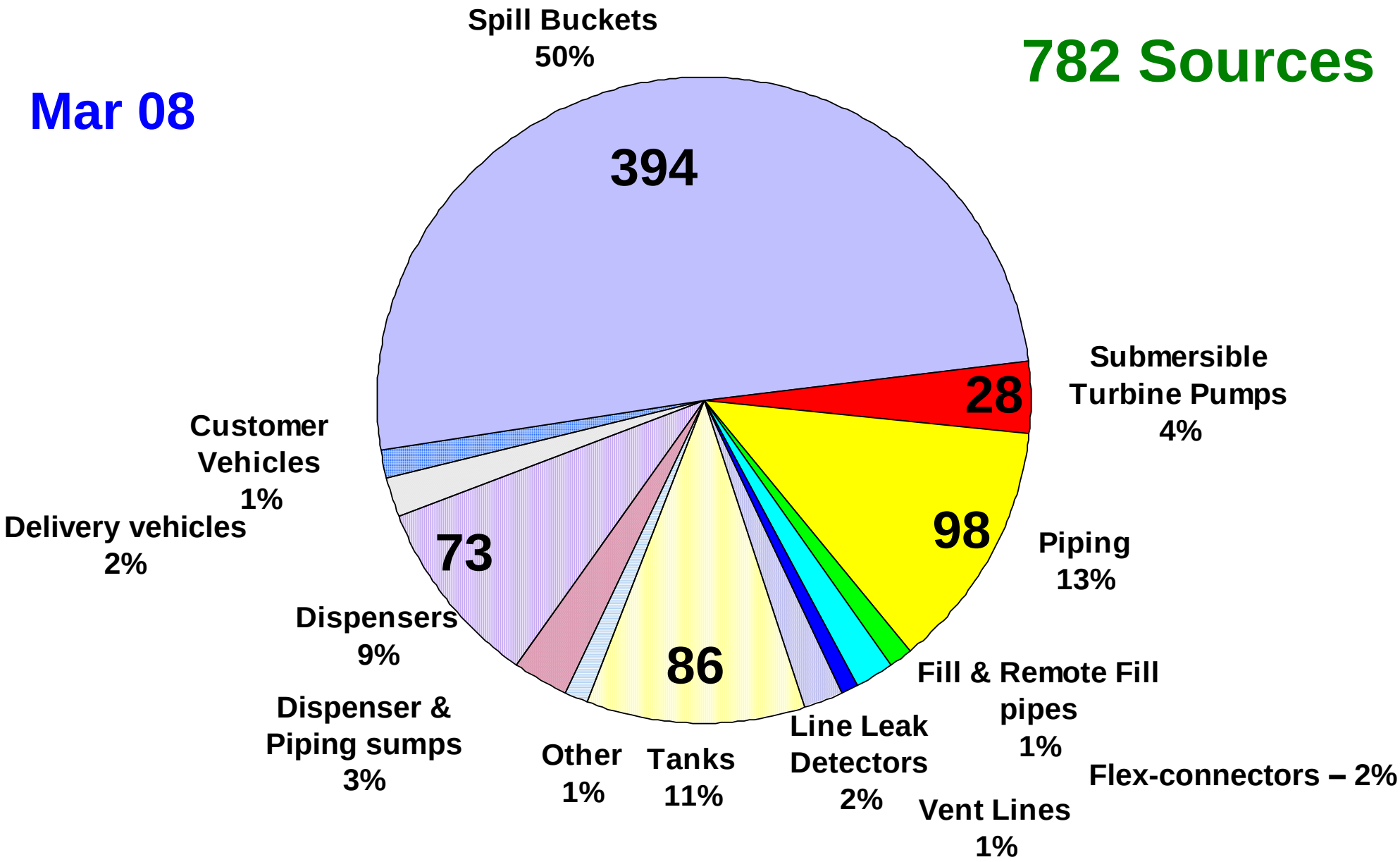
Remember - State and Local Permits

Underground Storage Tank Recommendation…



Florida Leak Autopsy Study Data shows good performance with fiberglass-coated steel and fiberglass tanks

UST Leak Sources - Florida Leak Autopsy Study




Piping
The second most frequent cause of leaks...

Small Diameter Piping with Secondary Containment

Installation and pre-operational testing must be in accordance with applicable industry reference standards, manufacturer's instructions, and local, state and federal rules


Hess 9533, Green Cove Sp., FL. 8/7/03

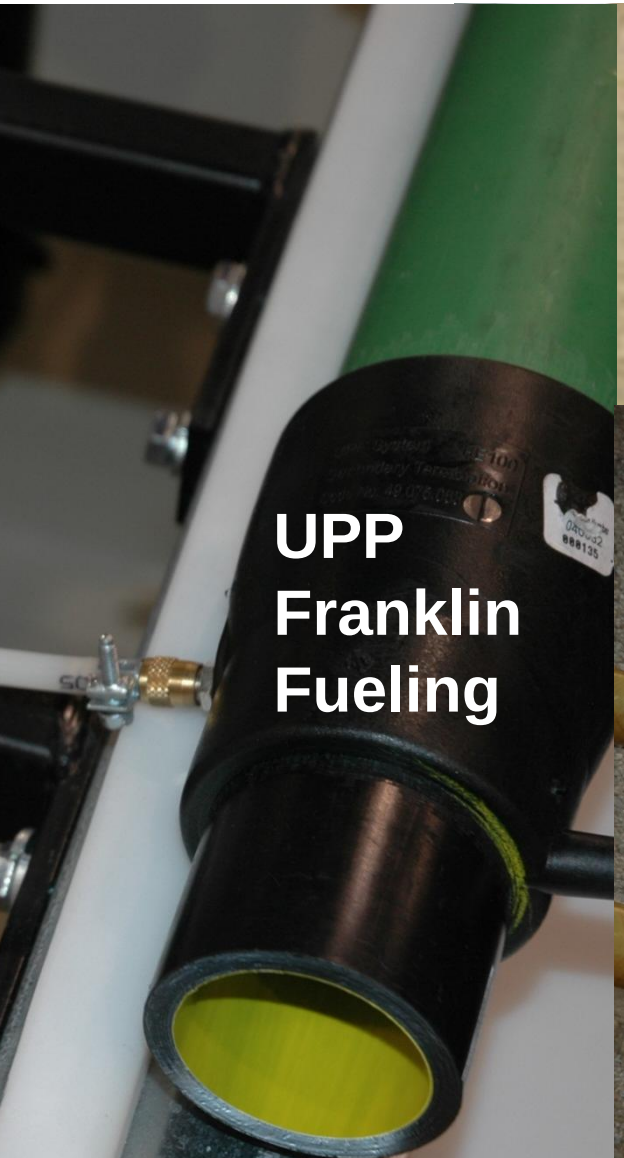

Problems!


17. 12. 2001

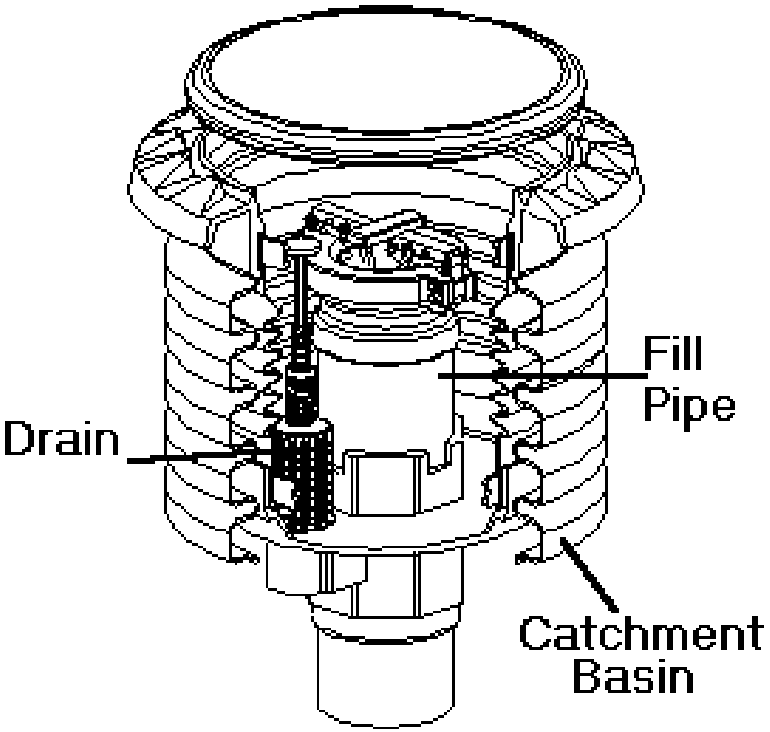
Fiberglass Piping

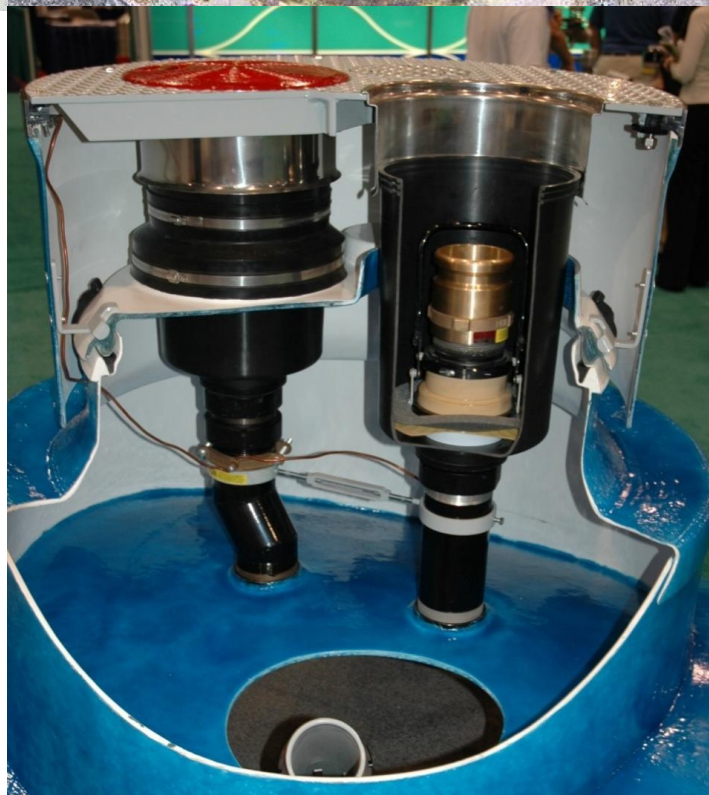
Problems as well…

Double-wall Piping with a Good Performance Record in the Florida Leak Autopsy Study*

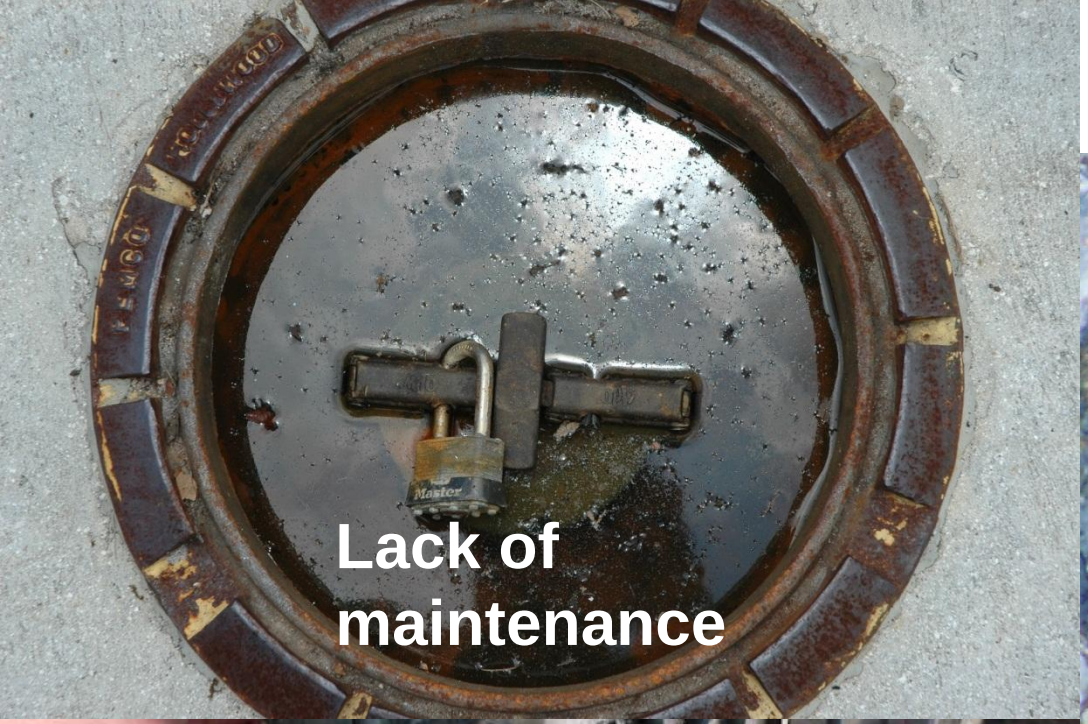


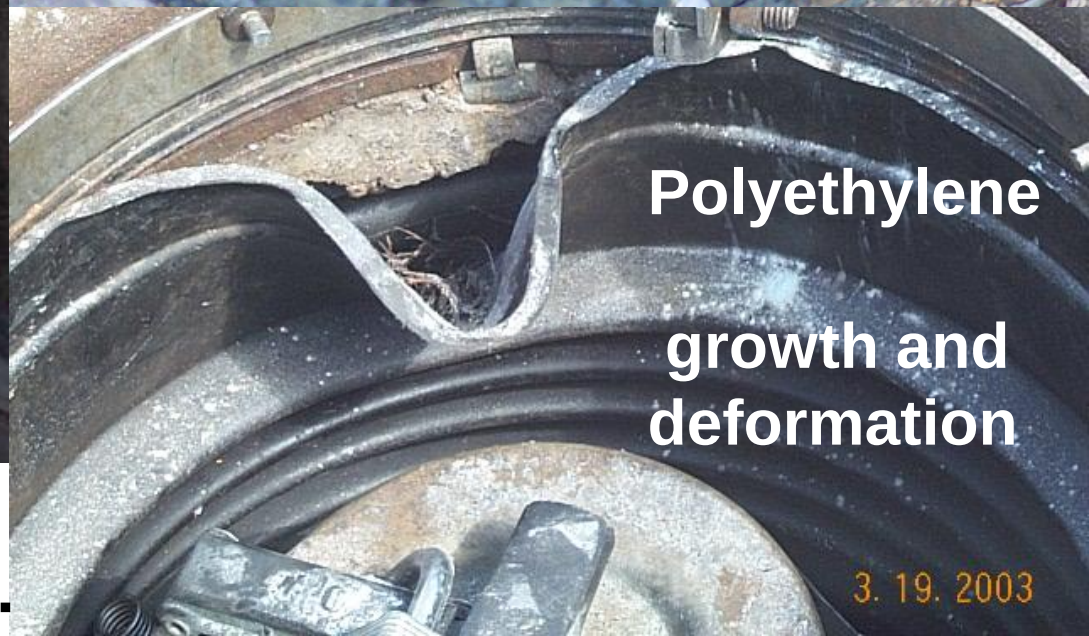
Spill Prevention





Problems!





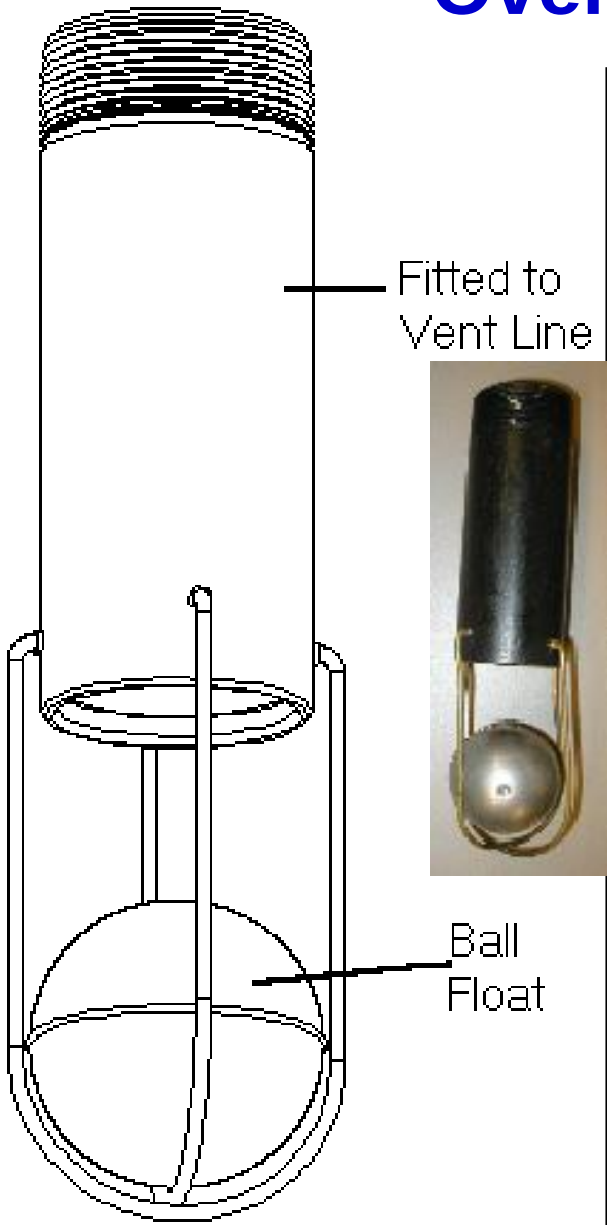
Spill buckets are the most frequent source of discharges…

Recommendation for Spill Prevention…

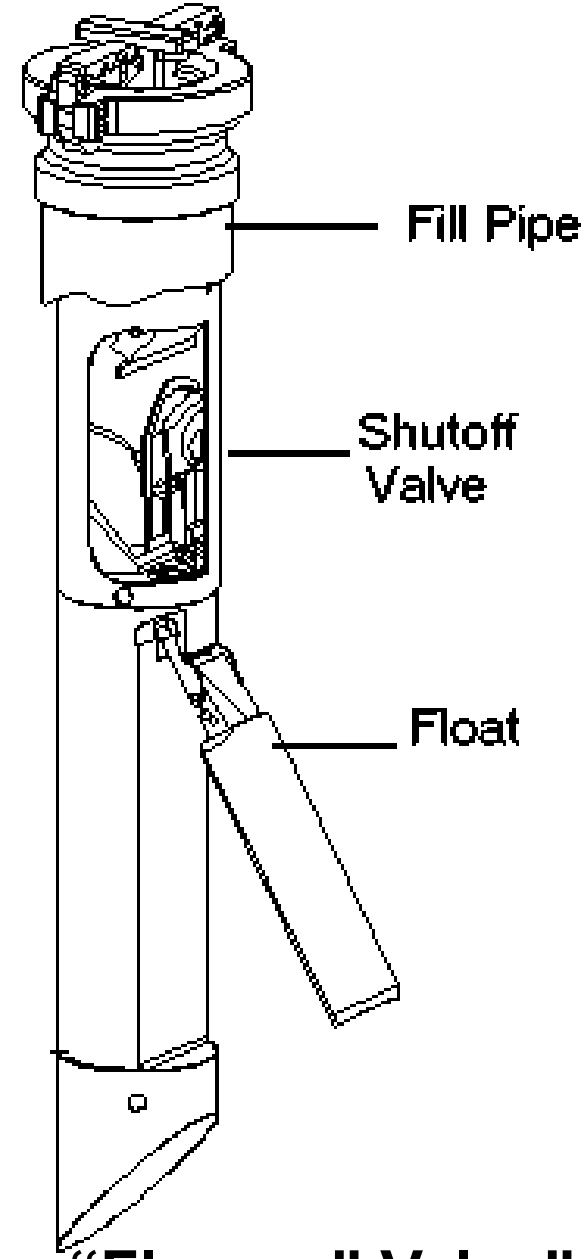
A system with a good track record – Get References!


Overfill
Prevention

Overfill Prevention Devices



Ball Float Valve



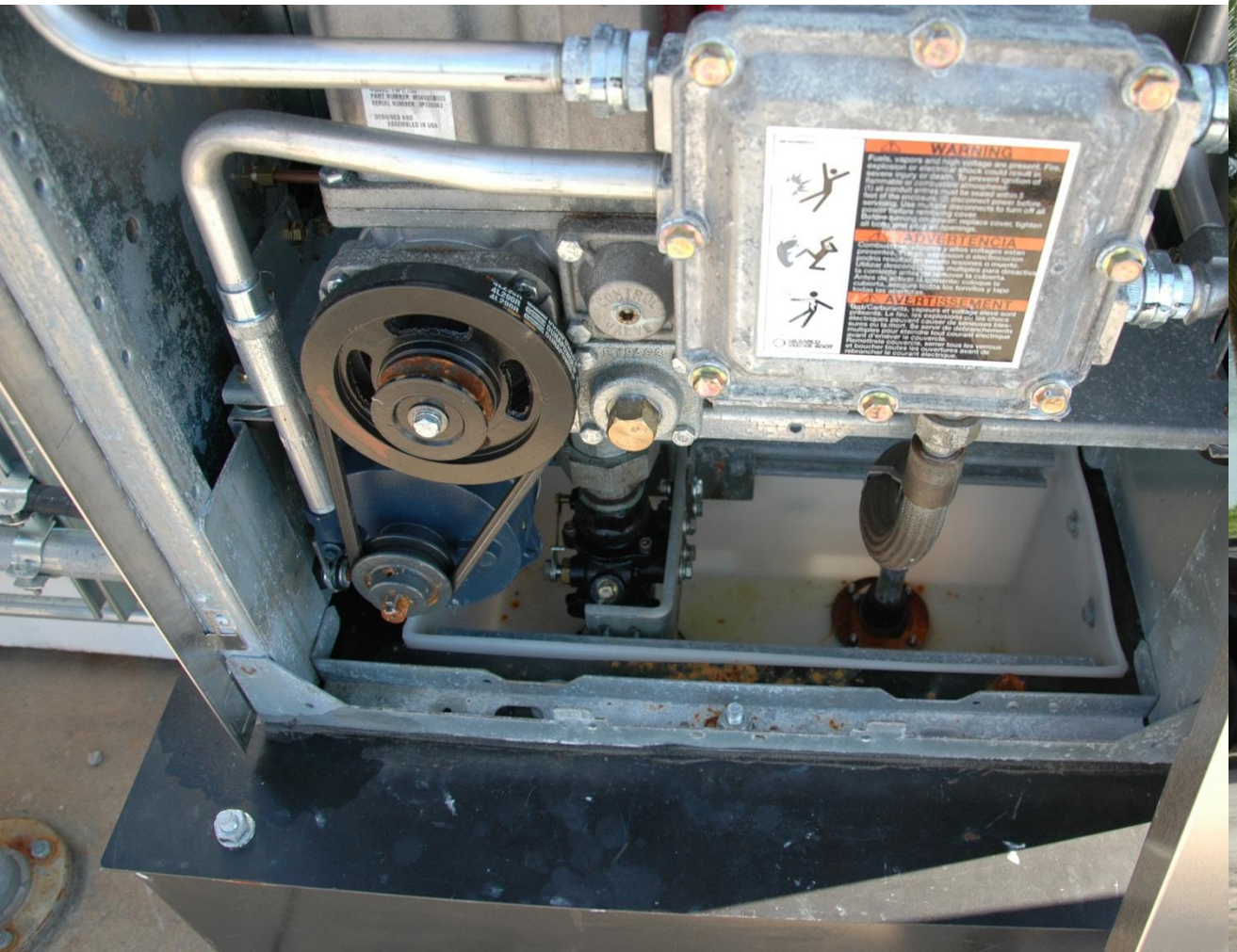
“Flapper” Valve”


NATIONAL
EMCO
WHEATON RETAIL
A1100
FLOW
U.S.PATENTS 5027870,5518024,5887614.
CITY OF NEW YORK
FIRE DEPARTMENT
APPROVAL # 4928
CZECH REPUBLIC
FTZÚ 98 EX 0733
II 1G


14 11:18AM

Dispensers

Under Dispenser Containment



Problems!

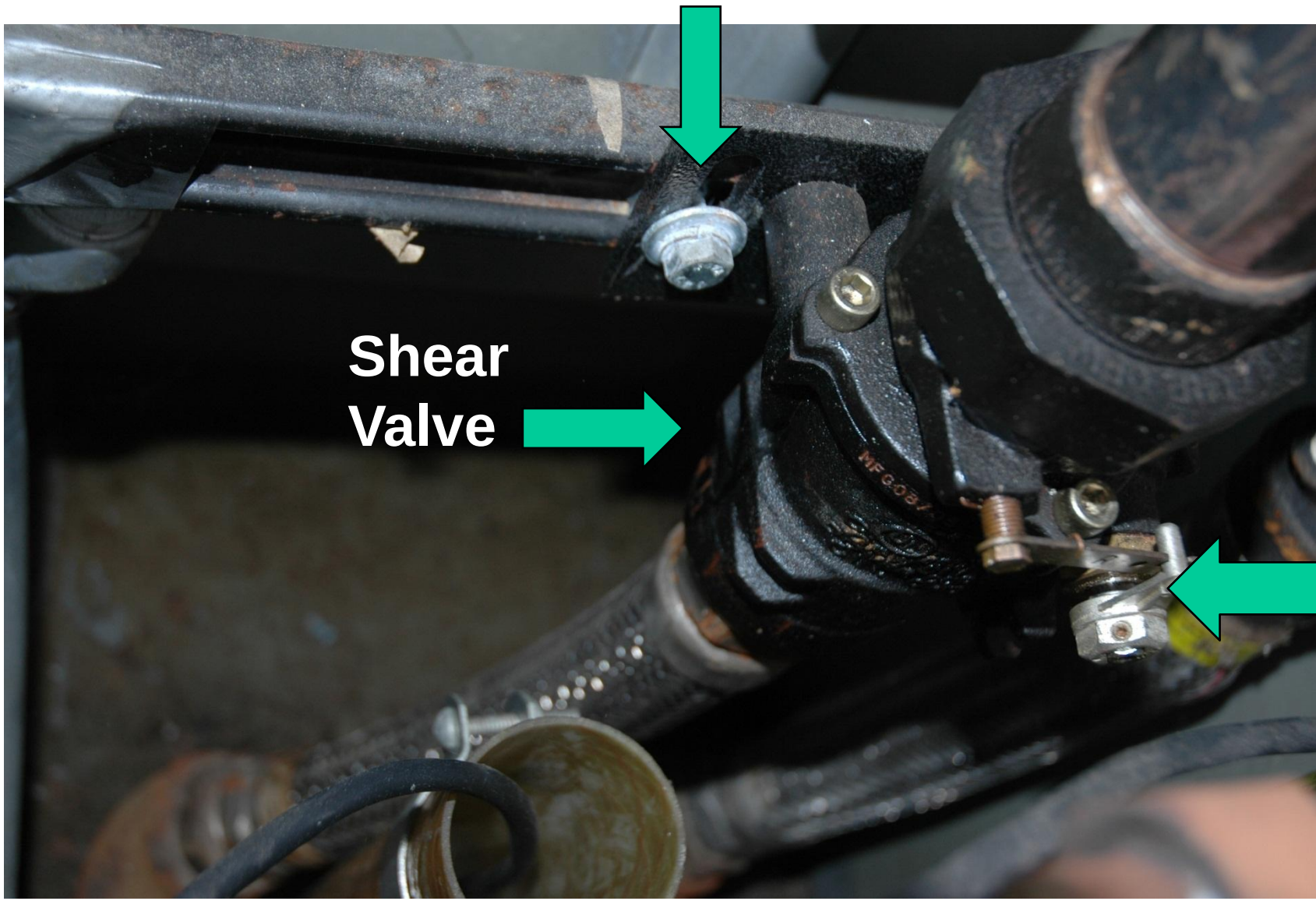

Frayed hoses


UDC sensors disabled


Shear Valves non-functional

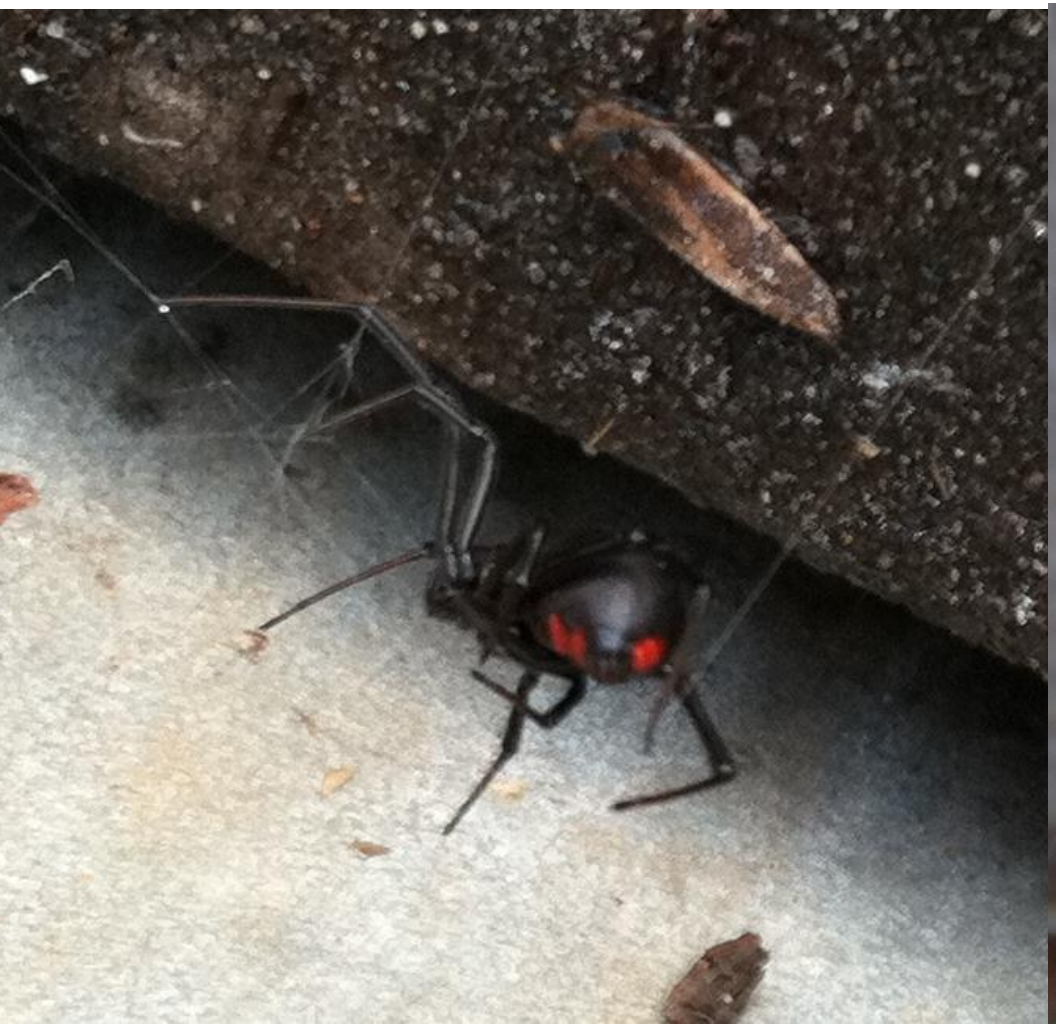
Shear (or Impact) Valves…

Make sure the shear valve is properly anchored



Make sure this pin is slotted within this notch

Safety Hazards…Black Widow Spiders!
Wearing Gloves is recommended before reaching within Dispenser Sumps

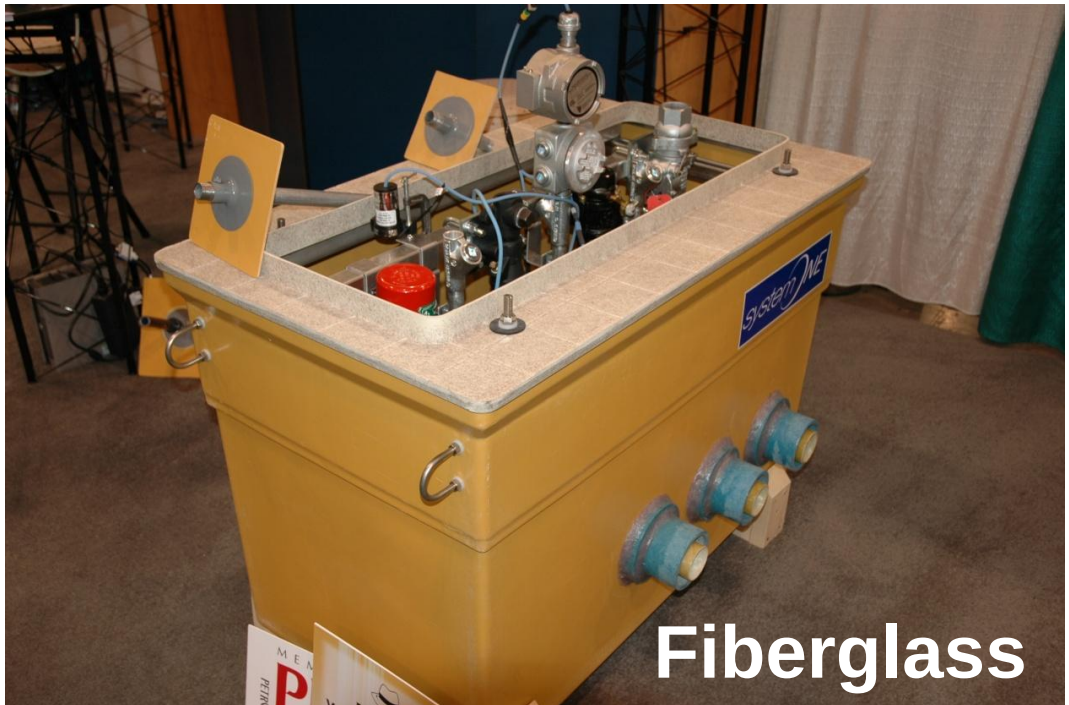


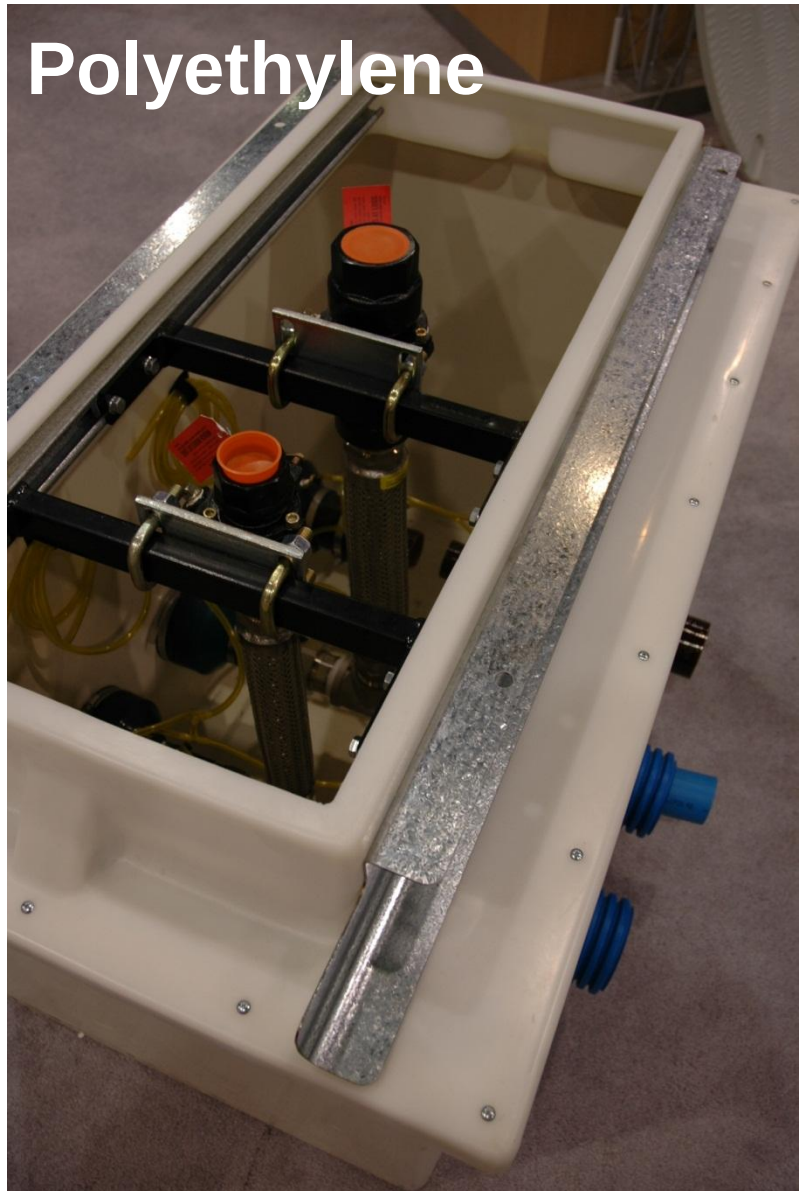
Under Dispenser Containment, UDC Sumps, or Dispenser Liners

Two main types…

<u>Fiberglass or Polyethylene</u>

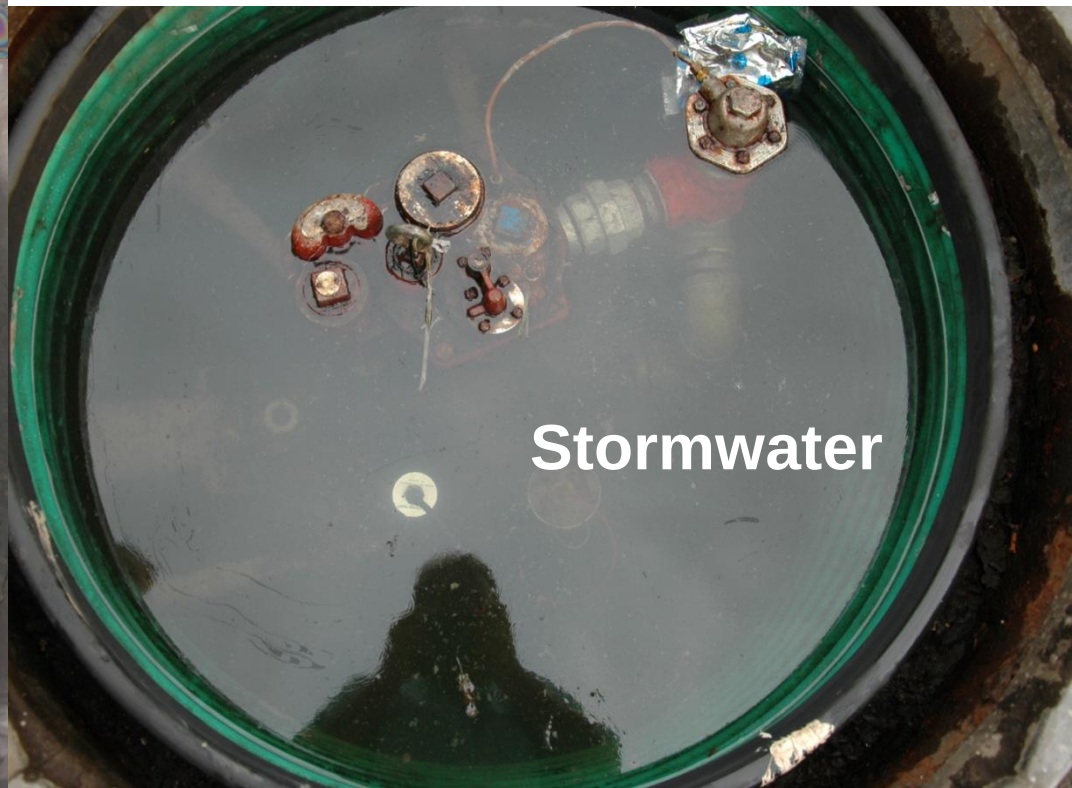
Both have been manufactured with significant improvements in the past several years – stronger, and with better penetration fittings





Piping Sumps

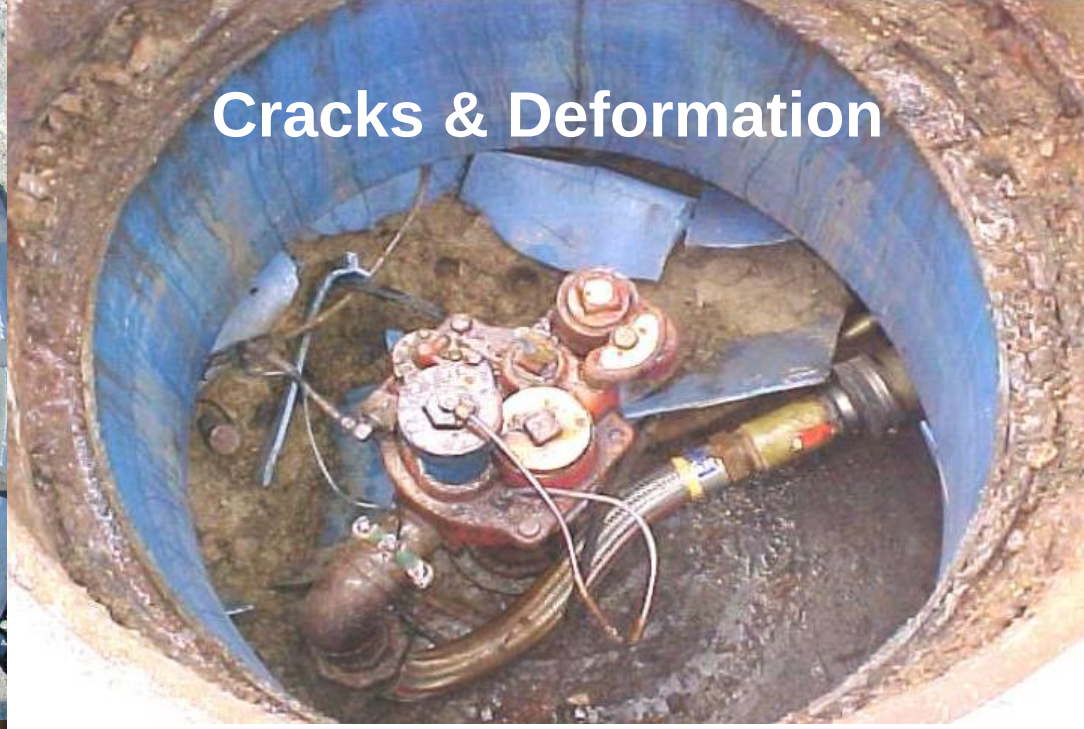
The most frequently cited violation by State UST Inspectors – water and fuel in sumps



Piping Sumps – The Way they Ought to Look…

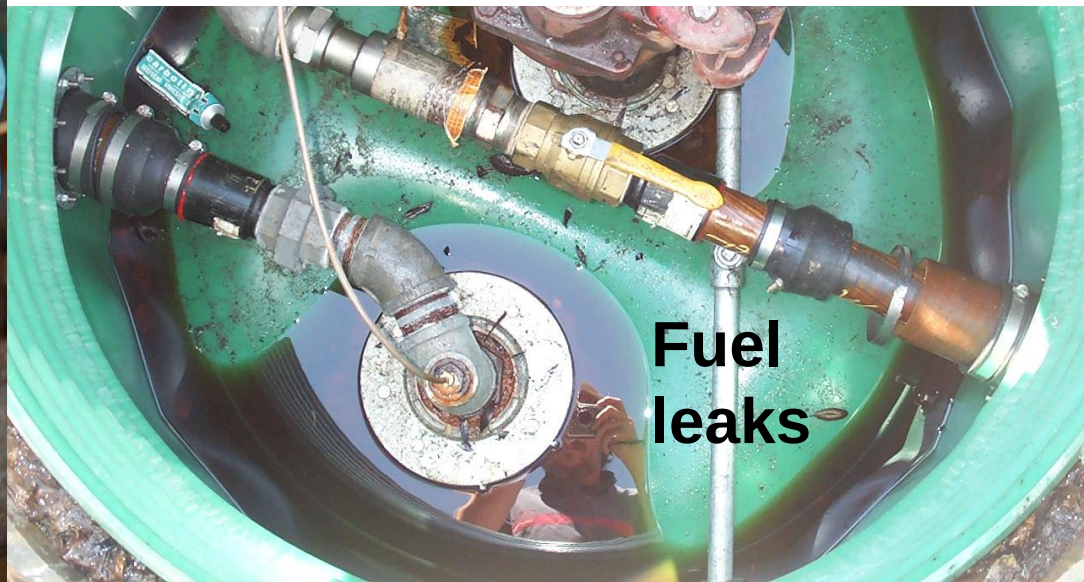
Dry, clean, good sump-wall penetrations, no soil build-up between sump wall collars, no rust, sensors properly positioned, gaskets in good condition.


Broken
sump
covers


Cracks & Deformation

Problems!

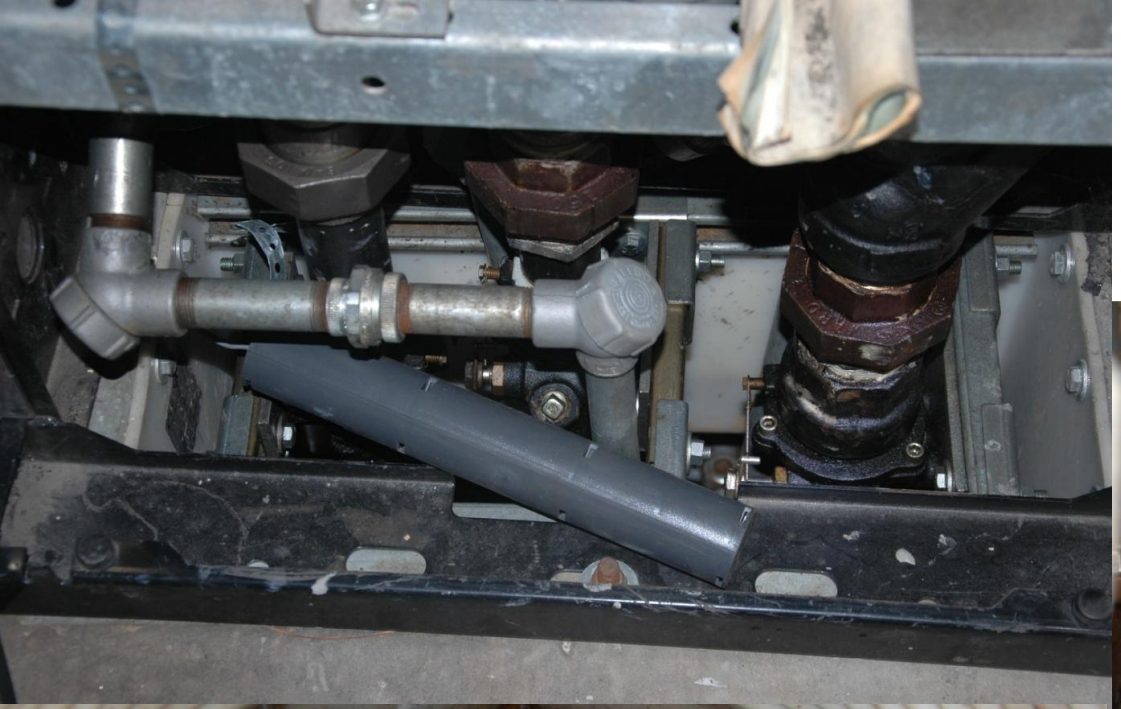

Excessive
Rust


Fuel
leaks

More Problems…Dirt level build-up between the manway collar and the piping sump collar prevents proper sealing of the sump access cover

Also note the cracked concrete tank pad that has settled and allows ponding and easier ingress of stormwater

Sump Sensor Circumvention



Sump-wall penetrations and Torn Boots

These problems affect the integrity of the STP sump and could lead to a release. Repairs are required

Piping Sumps

Additional Problems

Unsealed electrical conduits

Leaking Line Leak Detectors

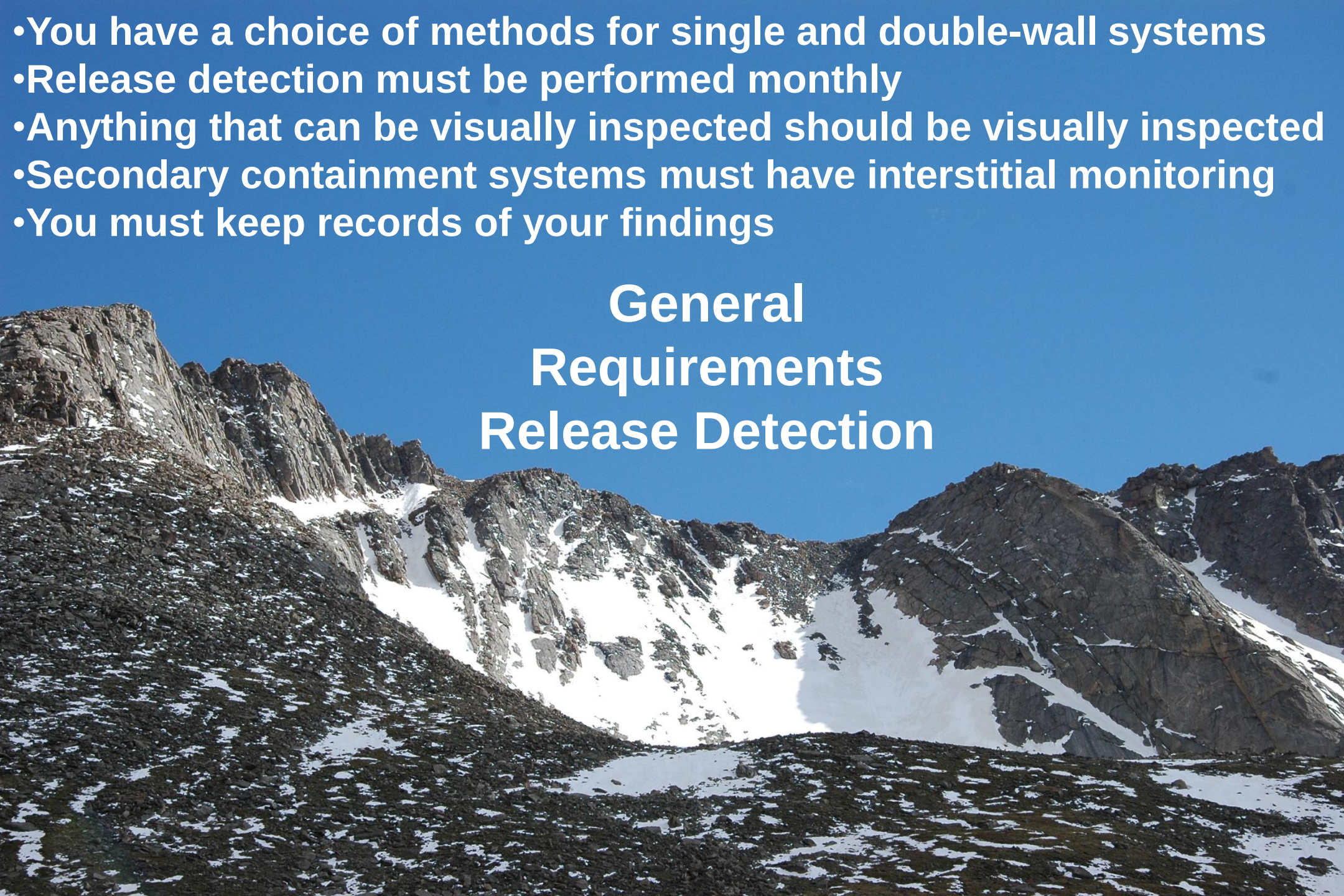
Damaged Flex-connectors

Submersible Turbine Pump Piping Sumps…

Same as for Dispensers: <u>Fiberglass or Polyethylene</u>

Both have been manufactured with significant improvements in the past several years – stronger, and with better penetration fittings

- You have a choice of methods for single and double-wall systems
- Release detection must be performed monthly
- Anything that can be visually inspected should be visually inspected
- Secondary containment systems must have interstitial monitoring
- You must keep records of your findings



General Requirements Release Detection

Performance Standards for Release Detection Methods

- General. Methods of release detection shall:

– Be capable of detecting a leak of 0.2 gallons per hour or 150 gallons within 30 days with a probability of detection of 0.95, and a probability of false alarm of 0.05, with the exception of tightness testing, visual inspections, groundwater or vapor monitoring; and manual tank gauging.

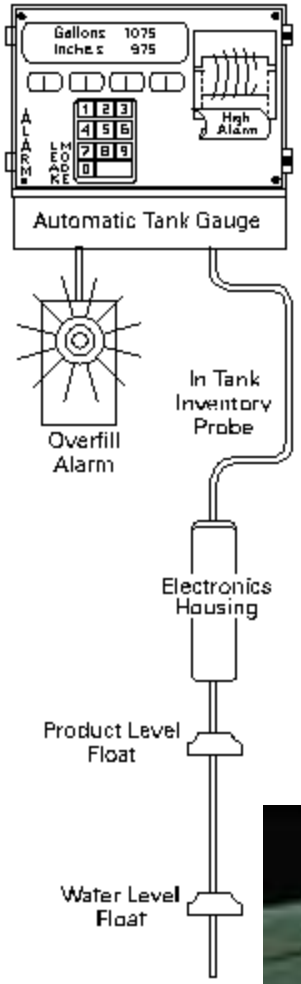
– Detect a leak from any part of the UST system, and have a third party certification/evaluation (from the NWGLDE)

– Must be installed in accordance with manufacturers specs.

External Release Detection for Single-wall Systems

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

Automatic Tank Gauges



Internal Release Detection for Single-wall Systems

SIR

What UST Inspectors Like to See…

What UST Inspectors Don’t Like to See…

Most ATGs have alarm history and test reports that can be printed by UST regulators. Don’t think that alarms can be ignored without consequences!

Five Ways to Do Interstitial Monitoring of Double-Wall Tanks…

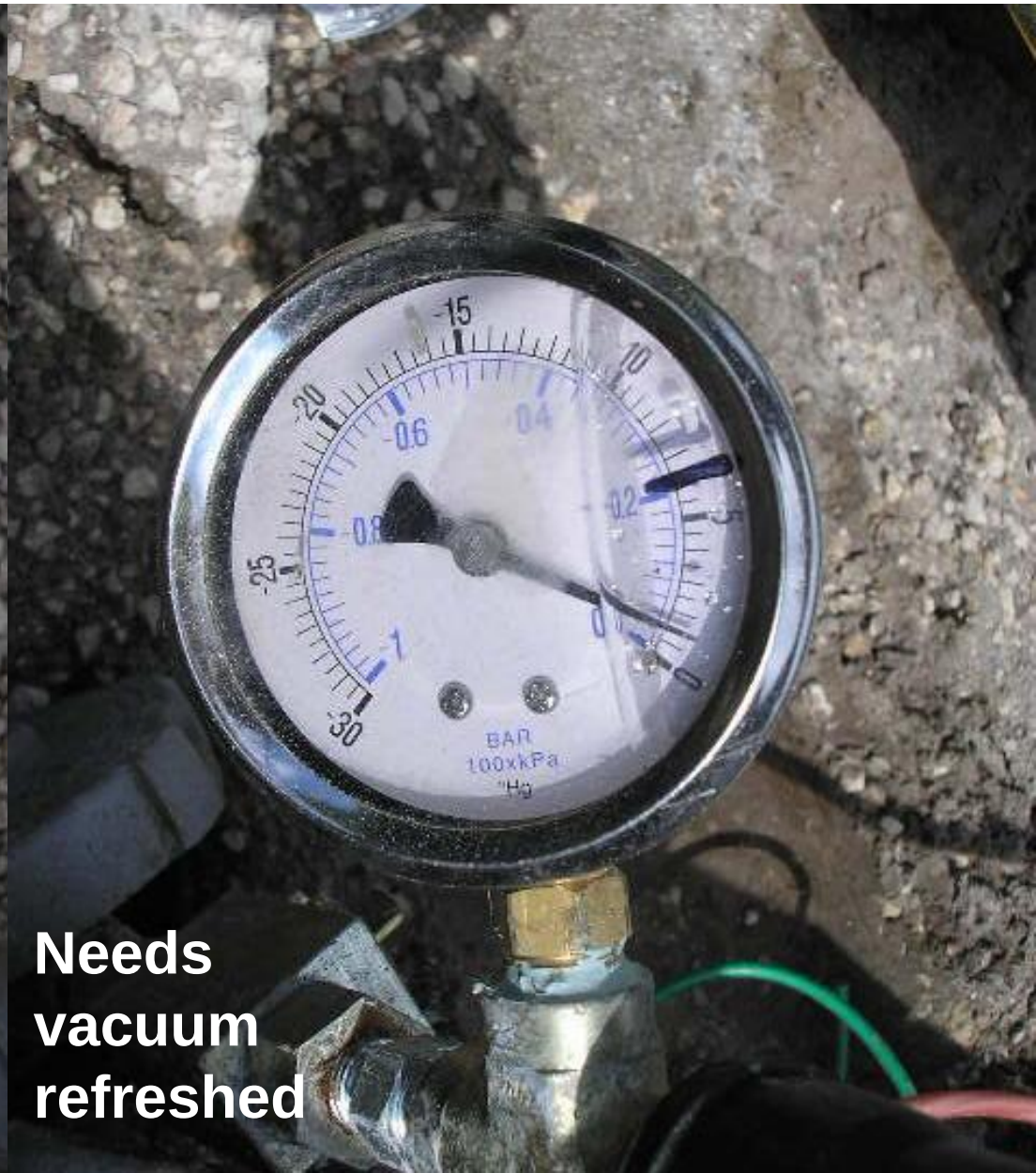
- Visual
- Vacuum
- Pressure
- Hydrostatic
- Sensors

Visual Monitoring of the UST Interstice

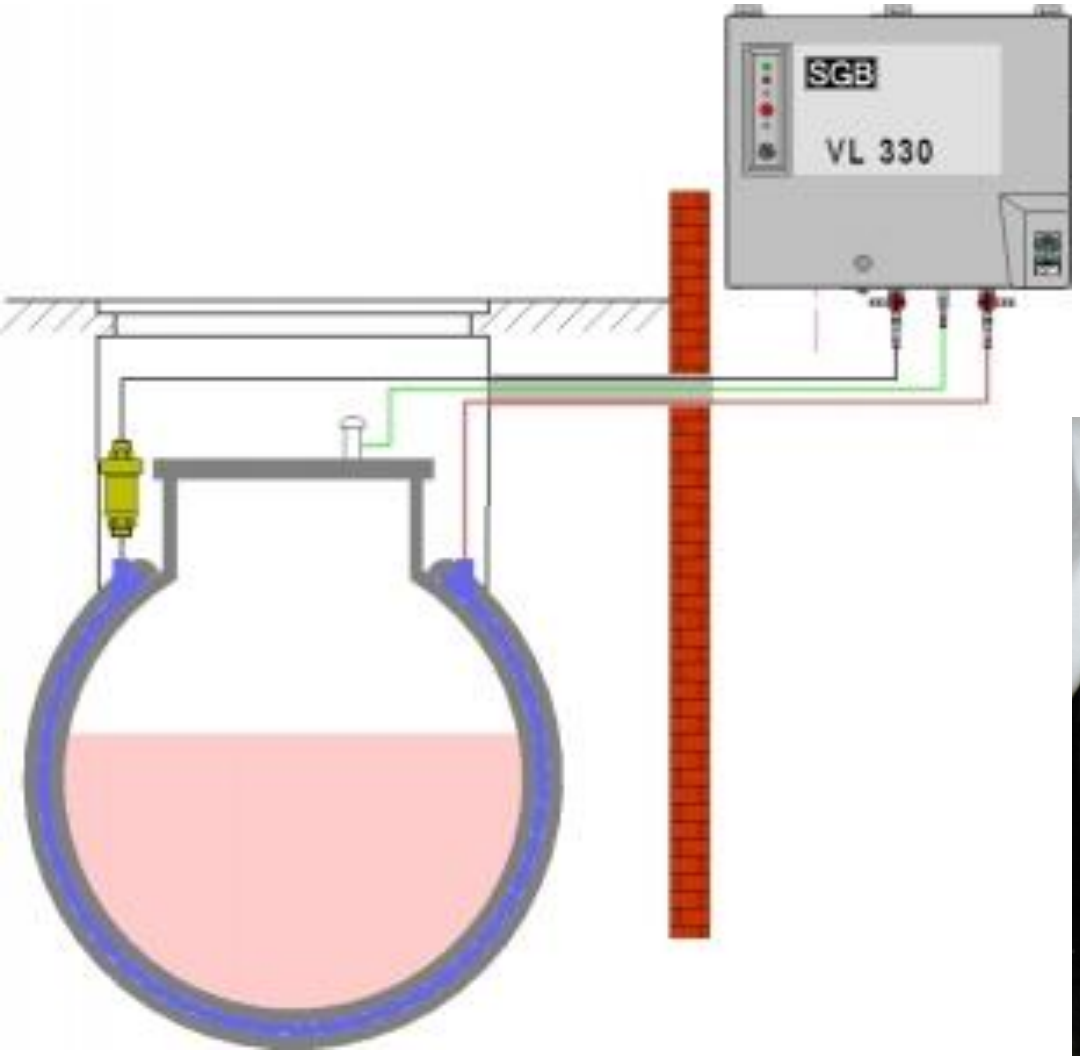
Using a Gauge Stick to look for liquids

Gauge Stick found 27” of fuel in this interstice

Vacuum Gauges – Watch for trends, refresh if necessary



Vacuum or Pressure Continuous Monitoring



Pressure monitoring not as common

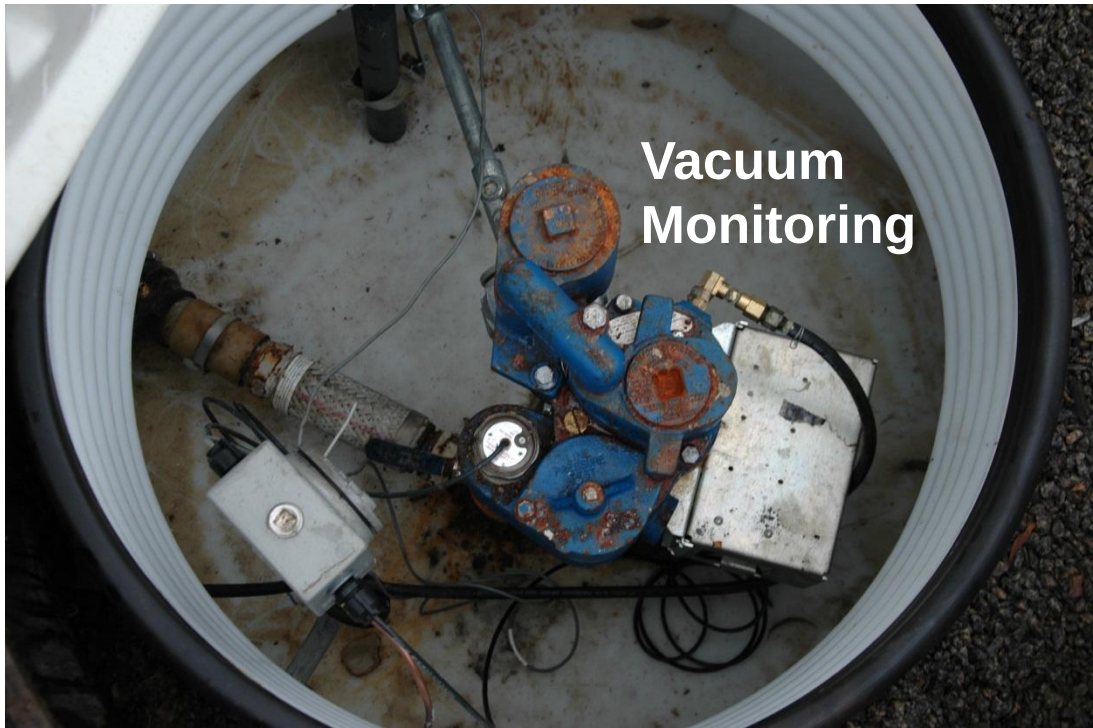
1336 RALEIGH RD
ROCKY MOUNT NC

MAR 3. 2012 5:34 PM

SMART SENSOR STATUS
- - - - - - - - - - - - -
MAR 3. 2012 5:34 PM

s 2:VACUUM PREM
SENSOR NORMAL

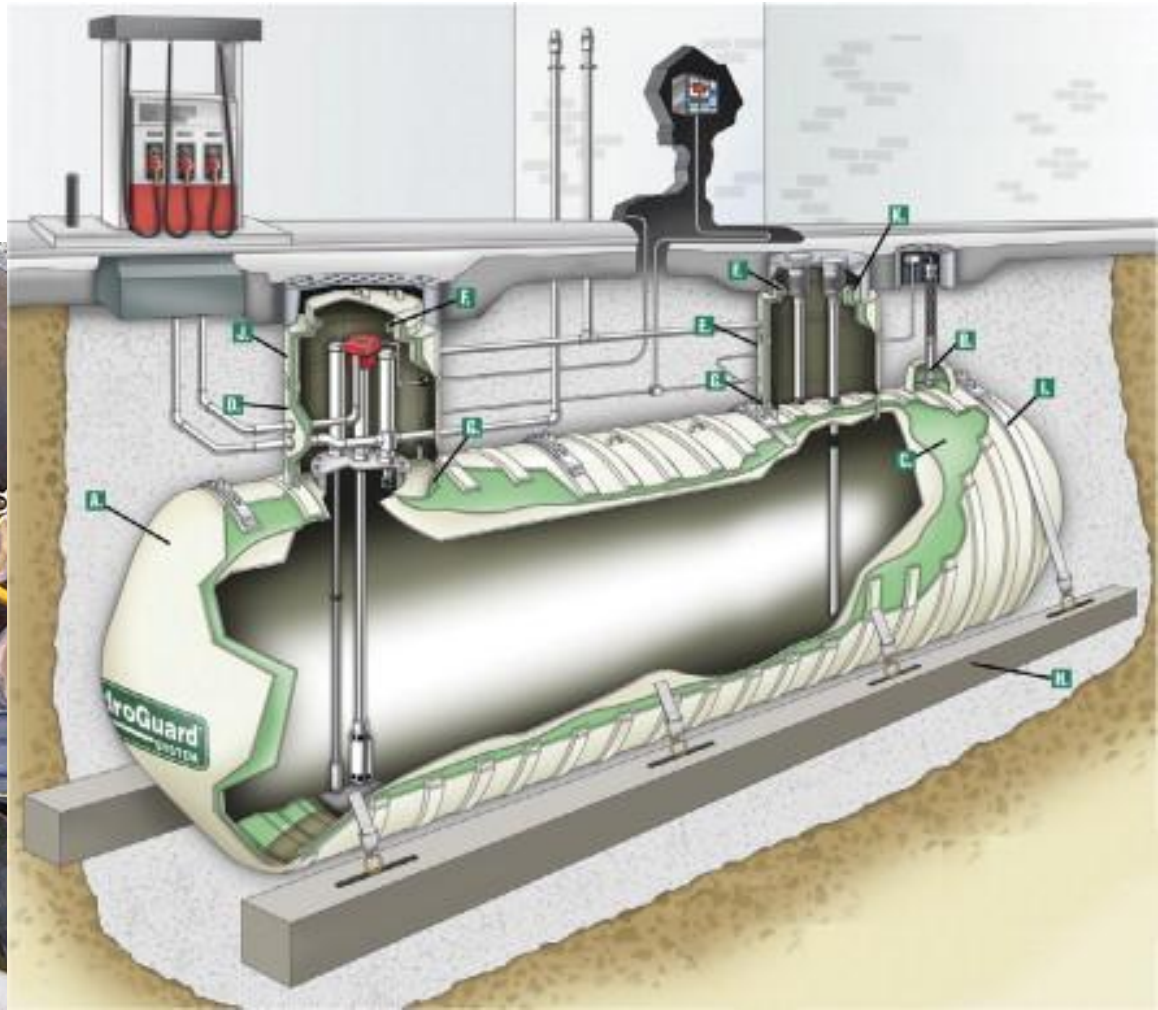
ATG Tape with vacuum sensor status



Hydrostatic – Liquid Level Sensing

The interstice is liquid-filled (usually a brine solution) and monitored to determine any change in static liquid levels

Less common than sensors or vacuum systems



Use of Sensors to Monitor the UST Interstice

One of the most common methods of interstitial UST release detection, and usually is programmed to an ATG for Alarms

06-04-12 14:40

LIQUID STATUS

06-04-12 14:40

I. 1:REG INTERSTICE
FUEL ALARM

L 2:PLUS INTERSTICE
SENSOR NORMAL

L 3:PREM INTERSTICE
SENSOR NORMAL

* * * * * END * * * * *

Double-Wall Piping Leak Detection

WINTER PARK,FL 32792
B0586111405001

OCT 8, 2011 1:10 PM

LIQUID STATUS

OCT 8, 2011 1:10 PM

L 1:RUL STP SUMP
SENSOR NORMAL

L 2:PUL STP SUMP
SENSOR NORMAL

L 3:RUL FILL SUMP
SENSOR NORMAL

L 4:PUL FILL SUMP
SENSOR NORMAL

L 5:RUL ANNULAR
SENSOR NORMAL

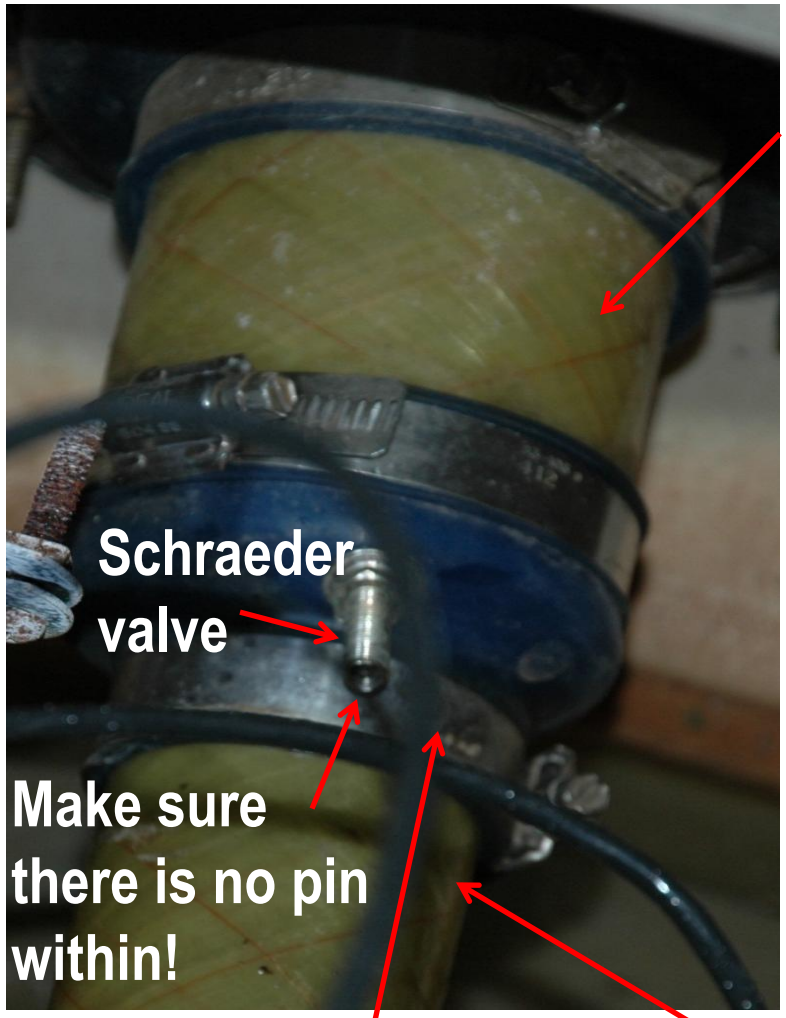
L 6:PUL ANNLAR
SENSOR NORMAL

L 7:DISP 1-2
SENSOR NORMAL

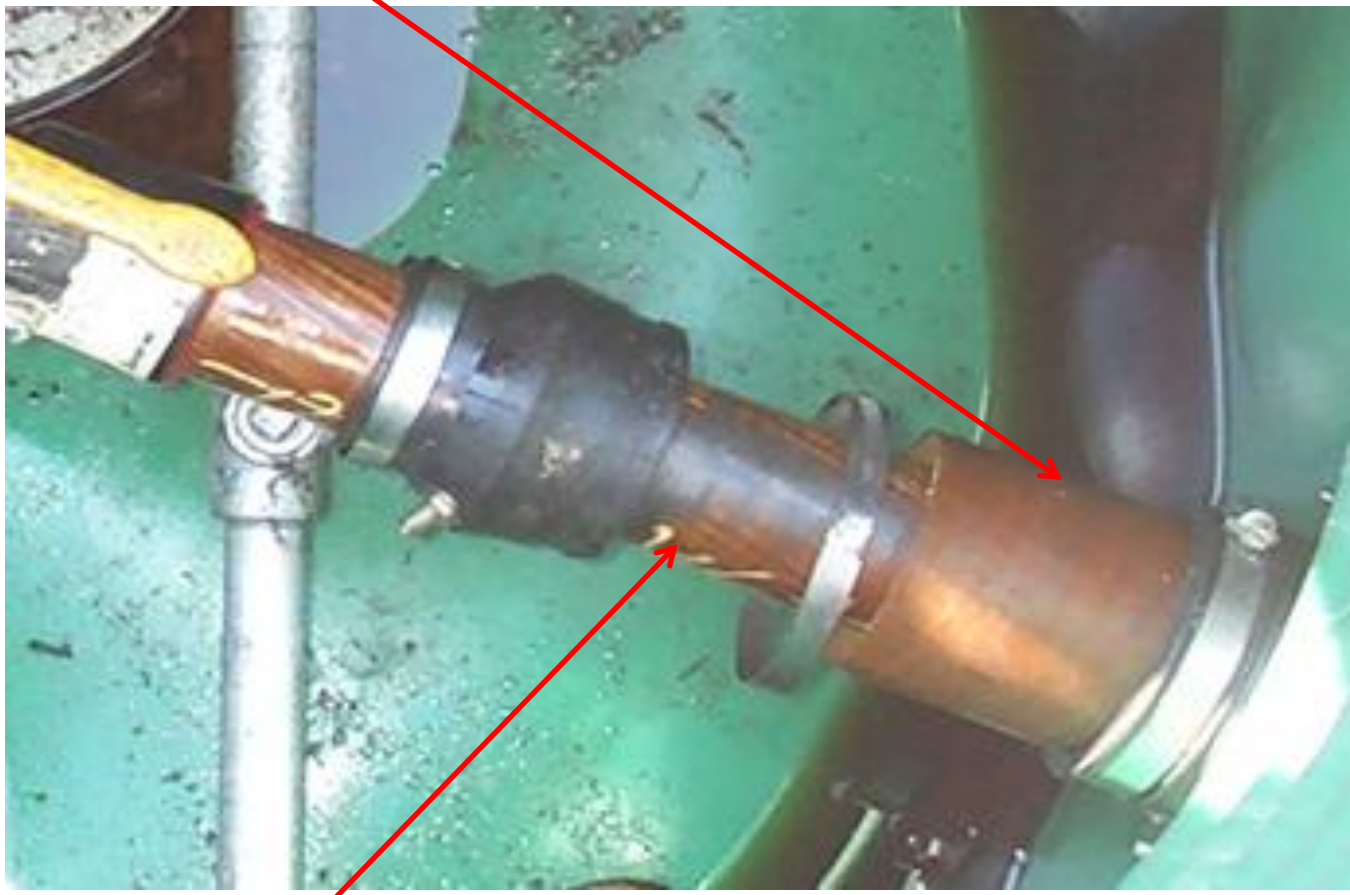
L 8:DISP 3-4
SENSOR NORMAL

* * * * * END * * * * *

Piping Leak Detection



Outer-wall



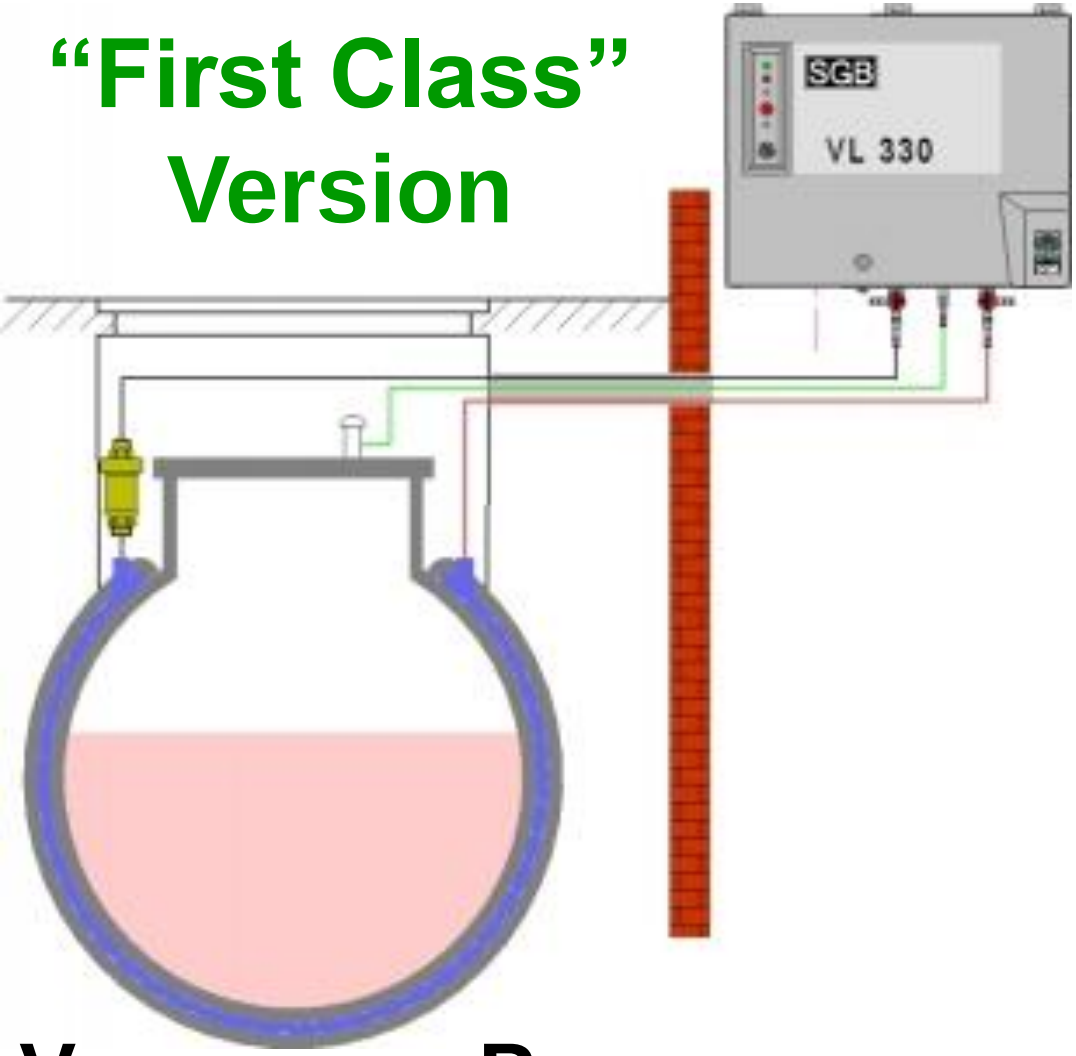
Inner-wall

Tight band clamp, no way for product to enter the sump unless the schraeder valve is open

Band clamp loose, free pathway for fuel to enter sump as shown

Recommendation for Release Detection…

“First Class” Version



Vacuum or Pressure Continuous Monitoring

The “Economy” Version

Visual Inspections!

Notification – Regulatory Authorities must be given a written notice:

- Before installation or upgrading
- Before internal inspections or closure
- Update Notification/Registration Form for change of ownership, closure, upgrading, facility info, including financial responsibility

Ohio requires permits. New Installation Tank Fees

$50/tank, $25/tank for Existing USTs

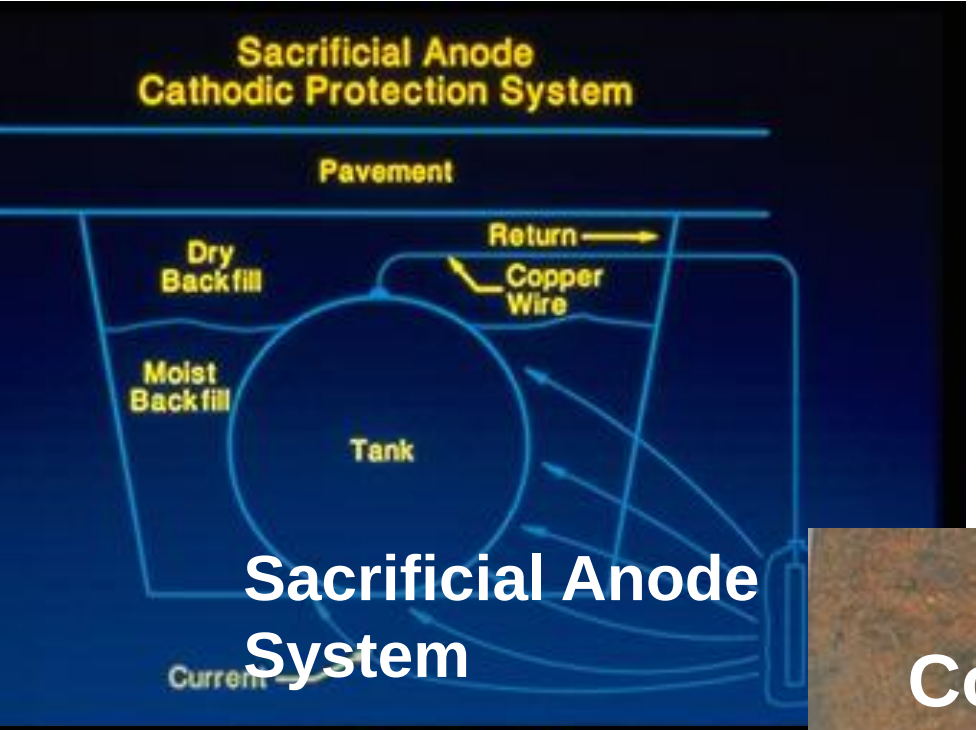
Financial Responsibility

- EPA Requirement.
- One million dollars coverage required for petroleum marketers (cleanup and third party liability).
- $500,000 coverage required for non-marketers.
- Use FR Allowable Mechanisms - Letter of Credit, Surety Bond, Insurance, etc.
- Only for petroleum storage systems. State & Federal facilities are exempt

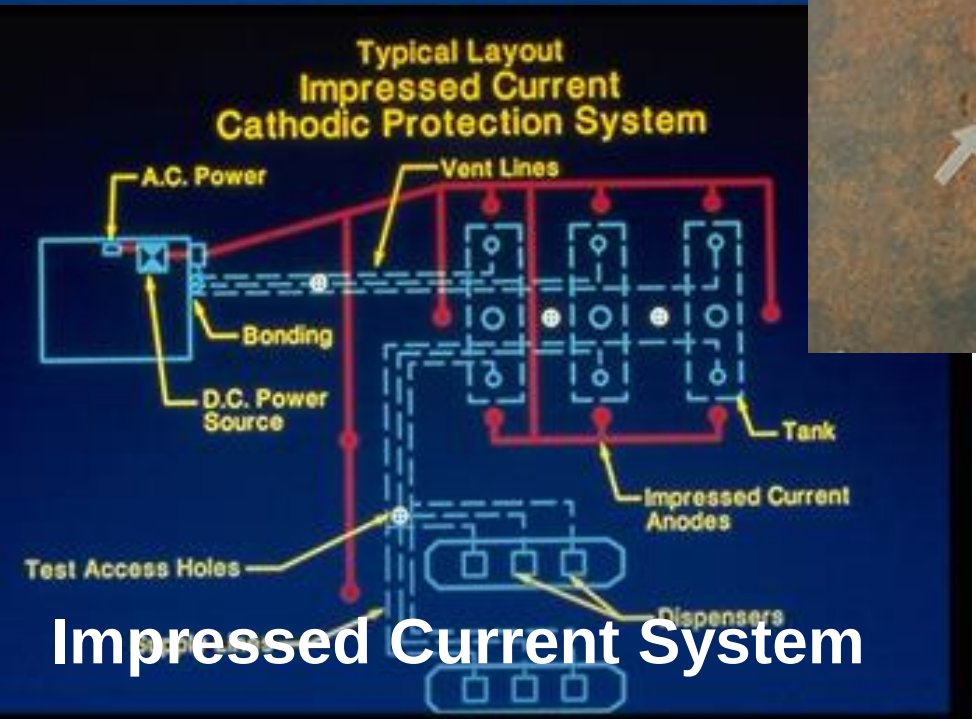
Repairs

- Hire qualified and state certified contractors with good references

Cathodic Protection for Steel Systems



Sacrificial Anode System



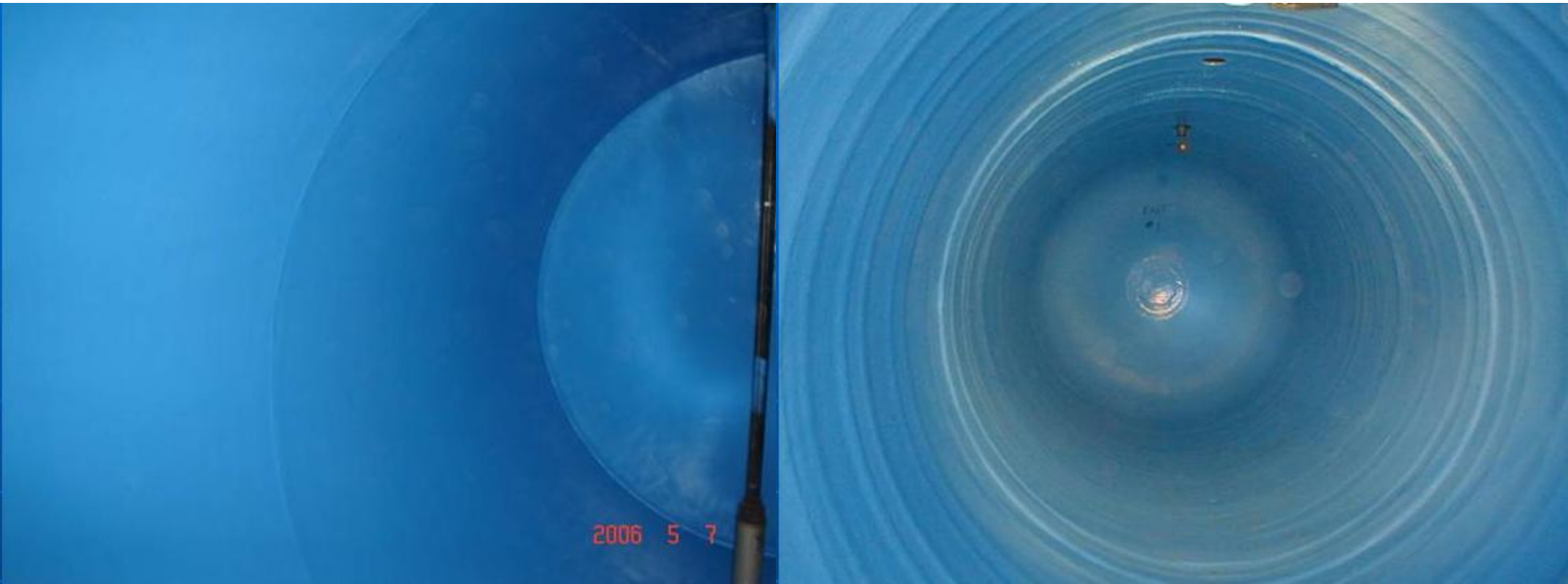
Impressed Current System

Corrosion pitting

Installing anodes

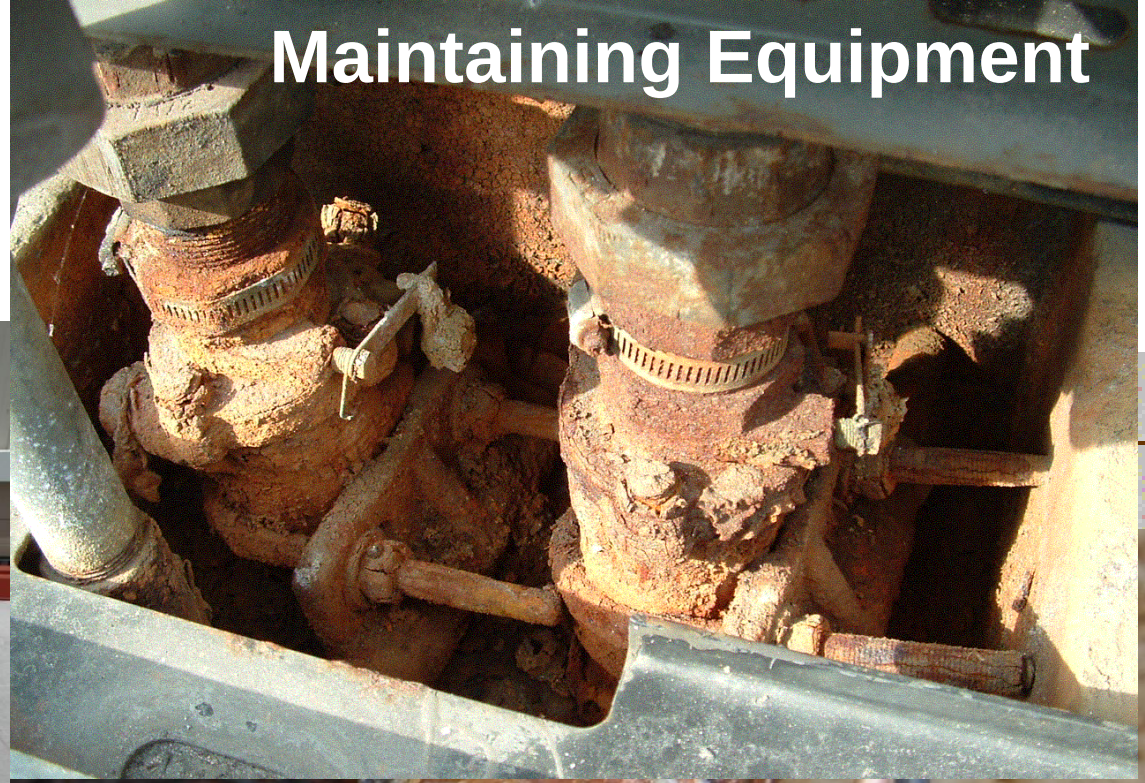
Sampling equipment

Internal Lining by reputable companies with new ethanol-compatible coatings



Operation and Maintenance

Mission Critical…



Maintaining Equipment

Performing tests

Painting
Fill-box
Covers

Removing Petroleum Contact Water

Operation and Maintenance

Changing filters

Removing dirt around sump collars

Checking hoses

Cleaning debris from sumps

VALERO 406
2829 OKEECHOBEE RD.
FT.PIERCE,FL 34947
772-882-4984

JAN 26, 2012 12:06 PM

LIQUID STATUS
- - - - - - - - - - - - - -
JAN 26, 2012 12:06 PM

L 1:REGULAR ANNULAR
SENSOR NORMAL

L 2:PLUS ANNULAR
SENSOR NORMAL

L 3:PREMIUM ANNULAR
SENSOR NORMAL

L 4:REGULAR STP SUMP
SENSOR NORMAL

L 5:PLUS STP SUMP
SENSOR NORMAL

L 6:PREMIUM STP SUMP
SENSOR NORMAL

* * * * * END * * * * *

Record Keeping

Most records kept for two years, others for the life of the system

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

Out of Service and Closure

Out-of-Service… time limits & assessment rules

Tanks must be empty!

Closure

Two Choices – Removal, or Closure-in-place

Closure in-place…

Foam

Closure in Place

Care must be taken…

Closure and Installation usually must be performed by State-qualified or State-certified contractors. Be sure to hire a contractor with the right certification.


Inerting

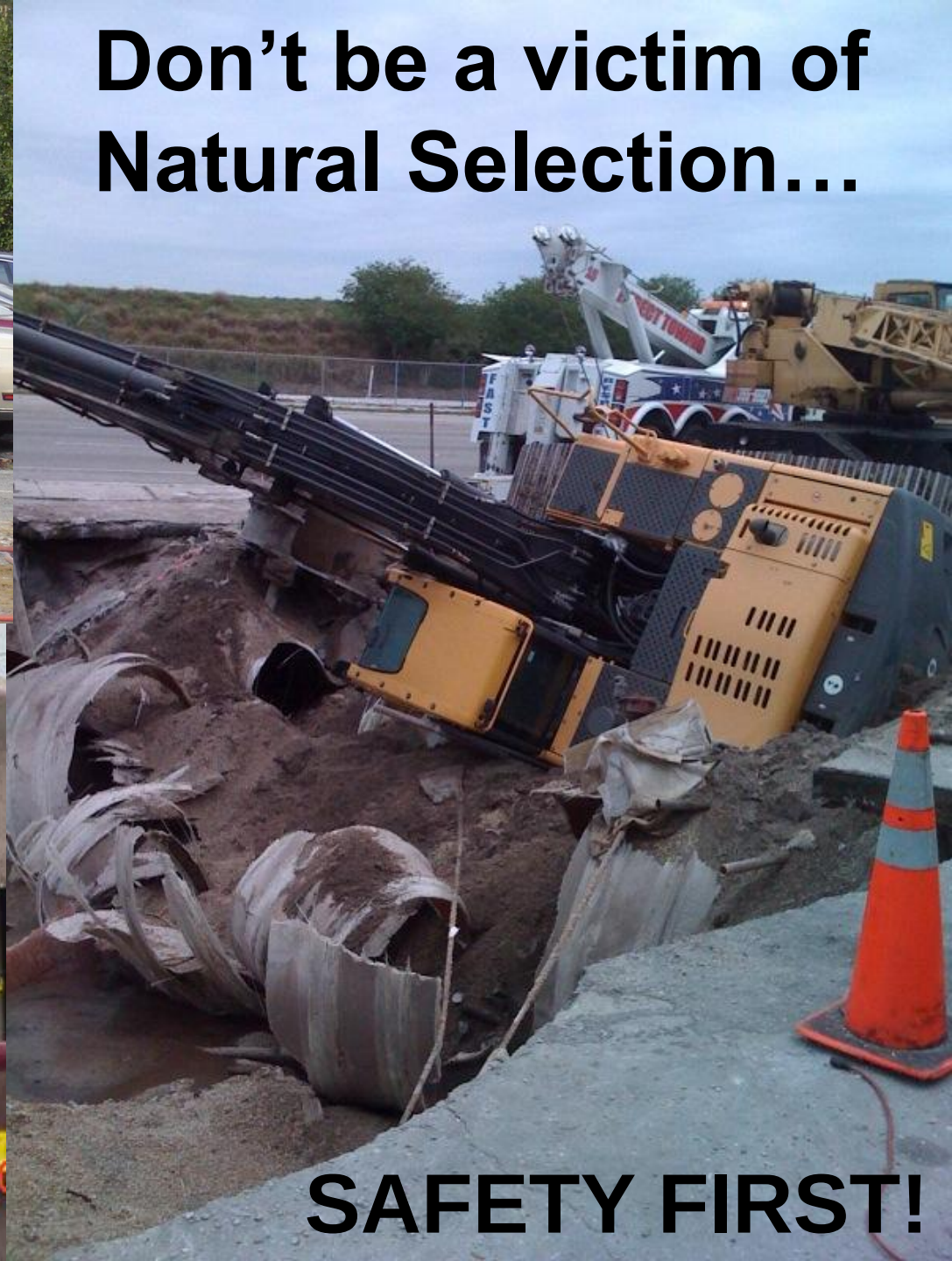

Sludge removal


Disposal
9502503 - Taylor's BP Food Mart #2
Moldenhauer
dbl wall steel
2005 1 12

UST Closure

Closure – Care must be taken during removal to prevent discharges. If you have a problem, photo-document the problem and keep a material sample of the system if possible.

Don’t be a victim of Natural Selection…



SAFETY FIRST!

Permanent Closure

Closure Assessments

Before permanent closure or a change-in-service is completed, owner/operators must measure for the presence of a release where contamination is most likely to be present at the UST site according to State procedures.

Incident and Discharge Reporting

Incidents

Discharges

Discharge/Release Response – Complete Release Report Form within 24 hours or the close of the next business day – control and abate the discharge

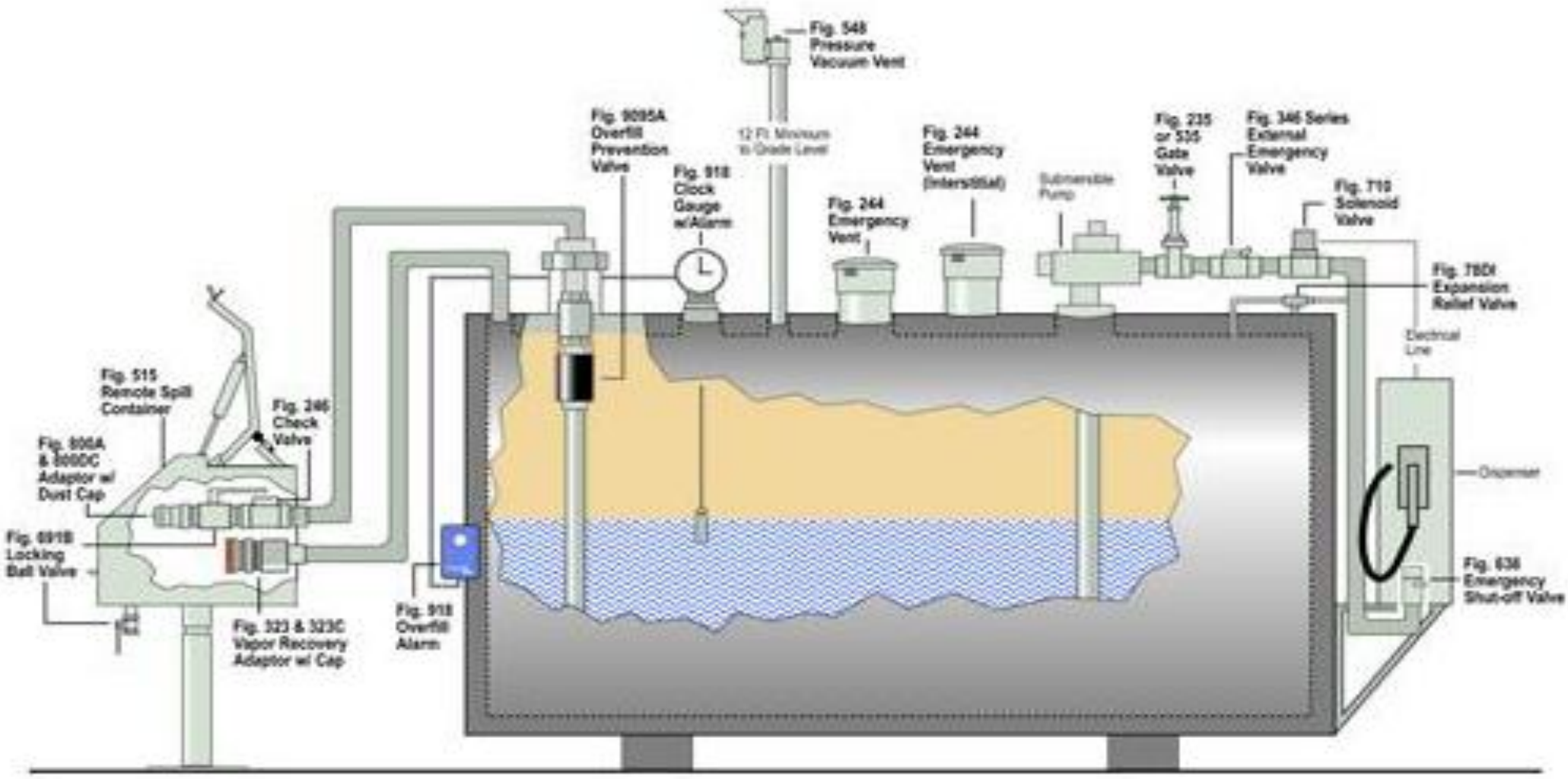
Other Inspections

Fire Safety Inspections by the Local Fire Marshal

Weights and Measures Inspections

ASTs

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 with Qualified Personnel!


Tank Shell
DO NOT WELD
NO SOLDAR
LIQ PUNT TEST
STOP WELD ARVI

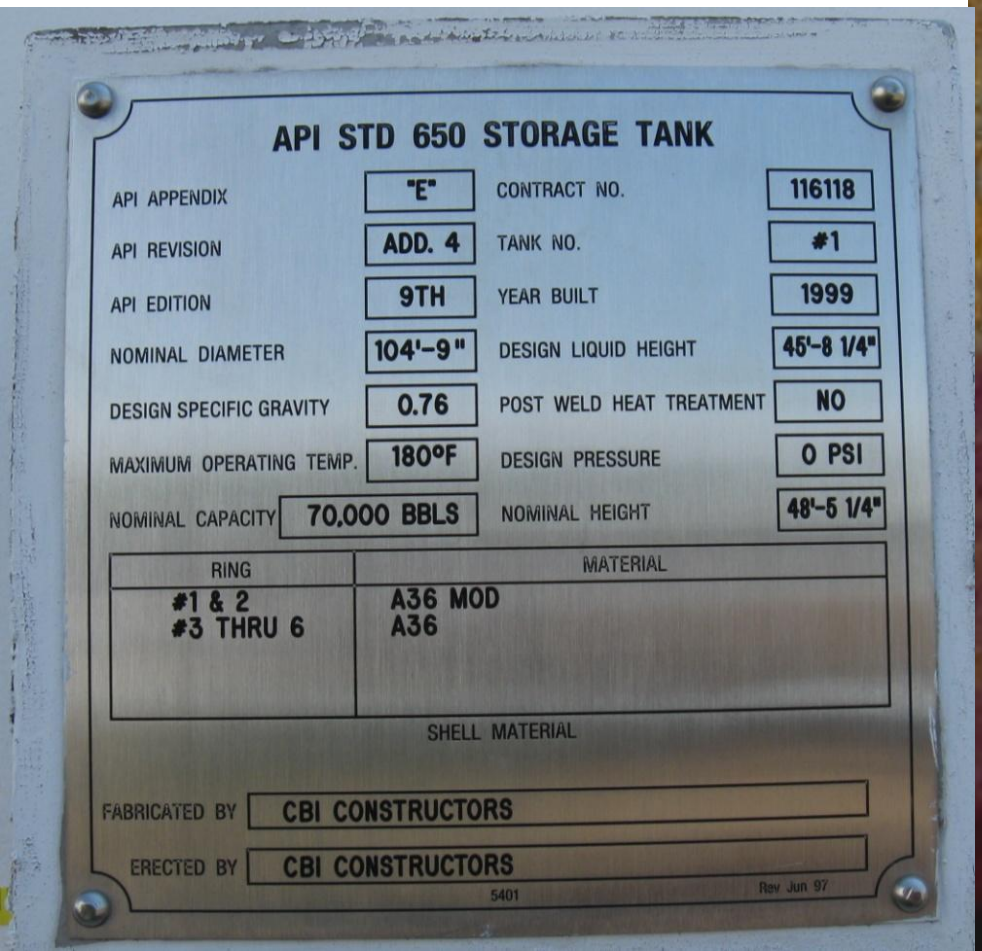

Welding


Bottom plates

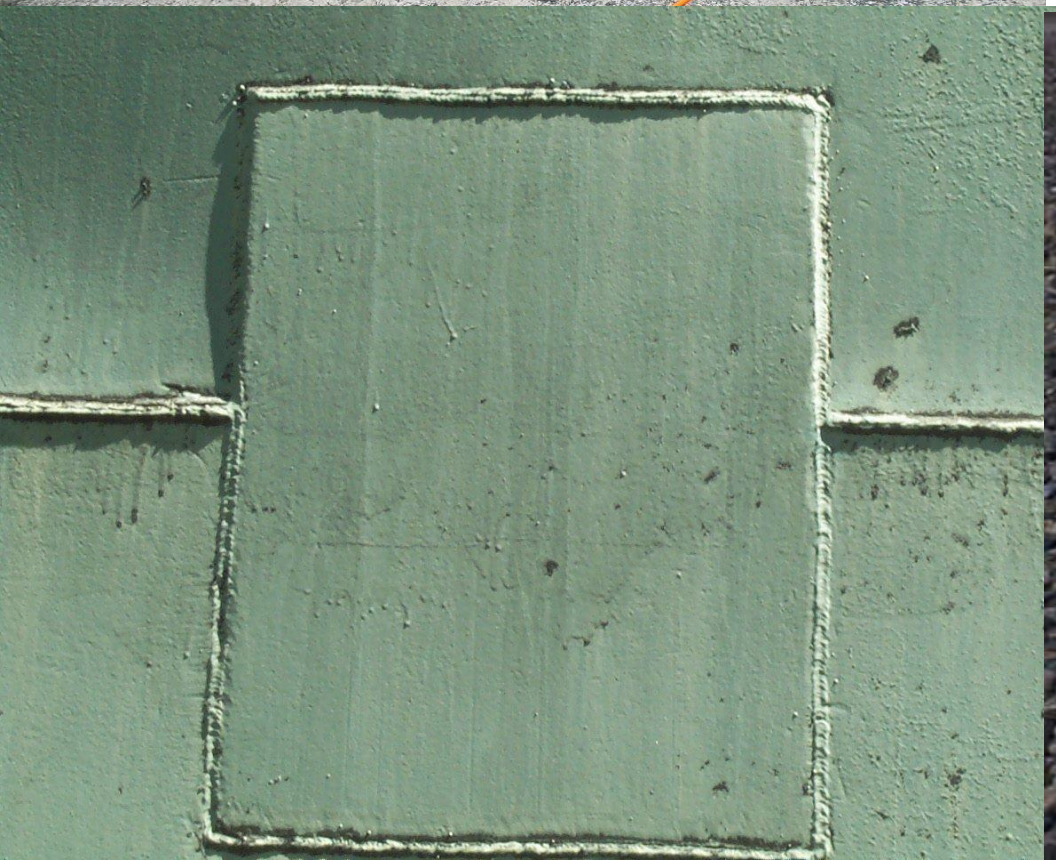

Quality work is essential!

Piping Connections, Sumps, Manways, & Shell Penetrations

Reference Standards- API-650

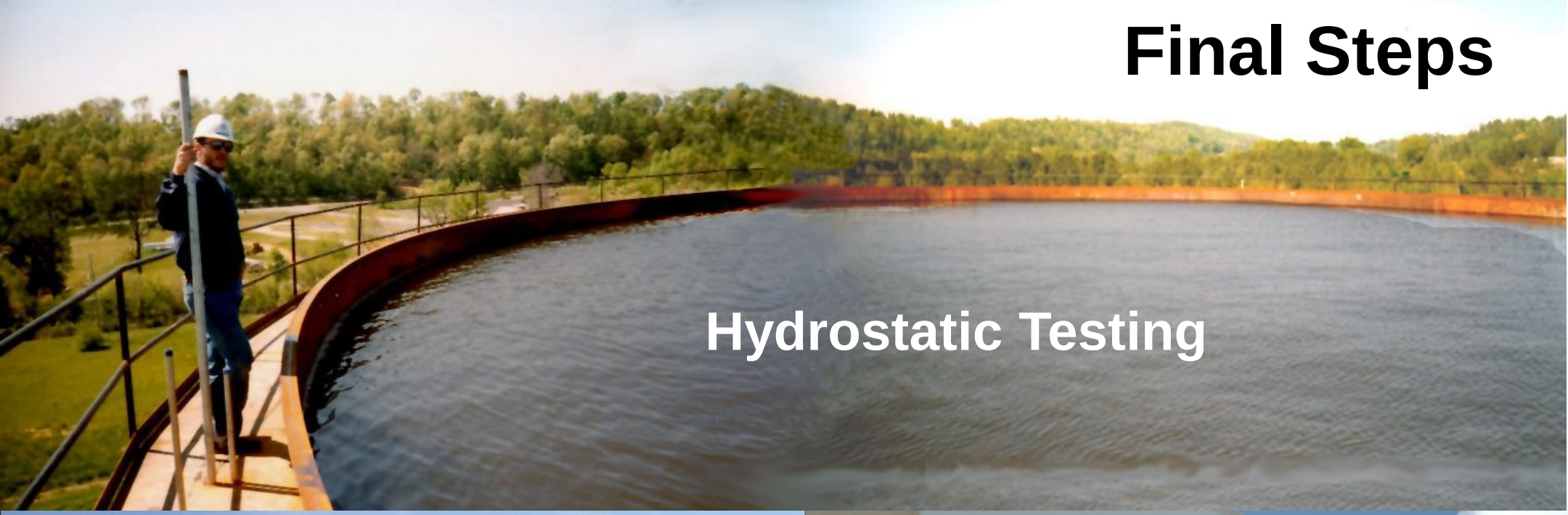


API 650 Work That Doesn't meet the Standards




MAXIM

Final Steps




New Tanks

API 650 Optional/Traditional Double-Bottom Designs

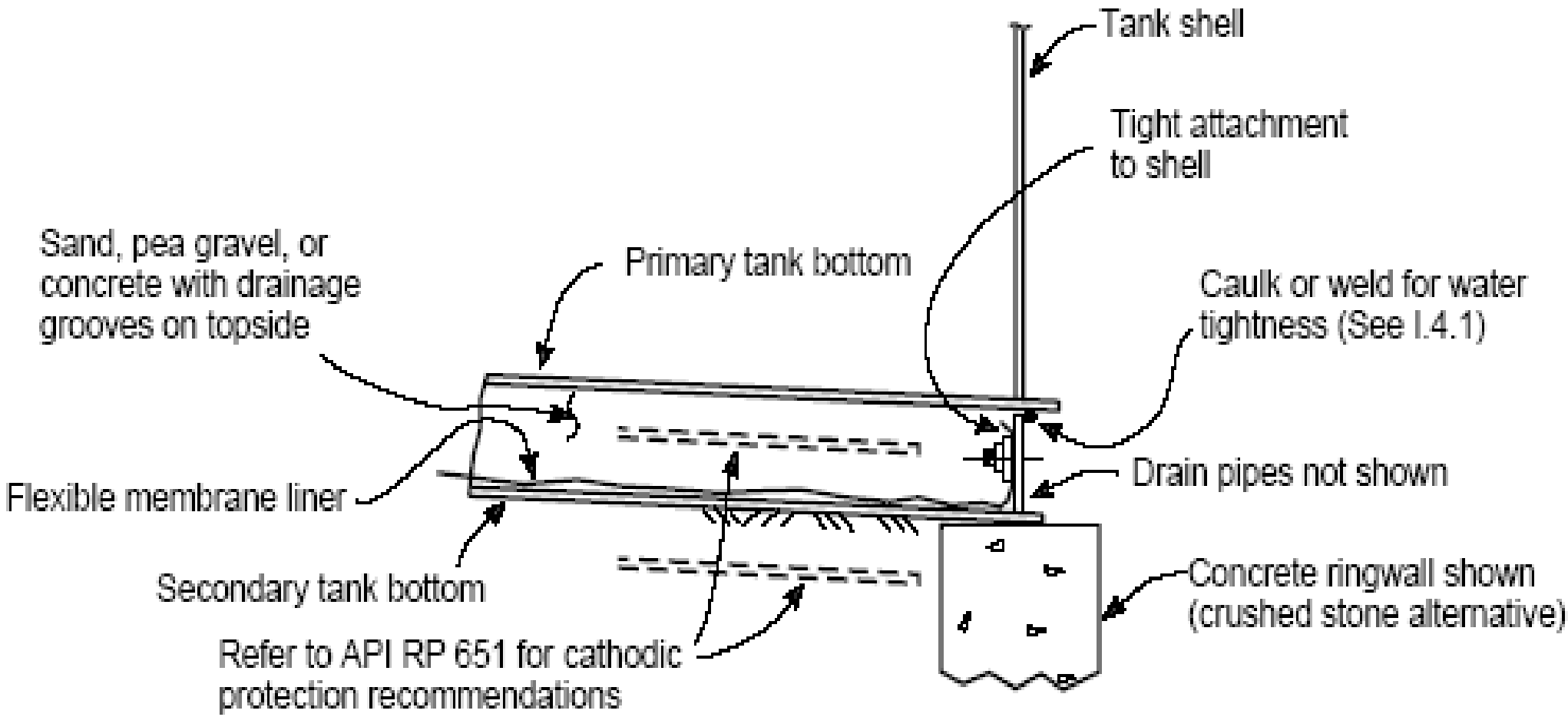


Figure I-4—Double Steel Bottom with Leak Detection at the Tank Perimeter (Typical Arrangement)


German
Double-
Bottom
Design

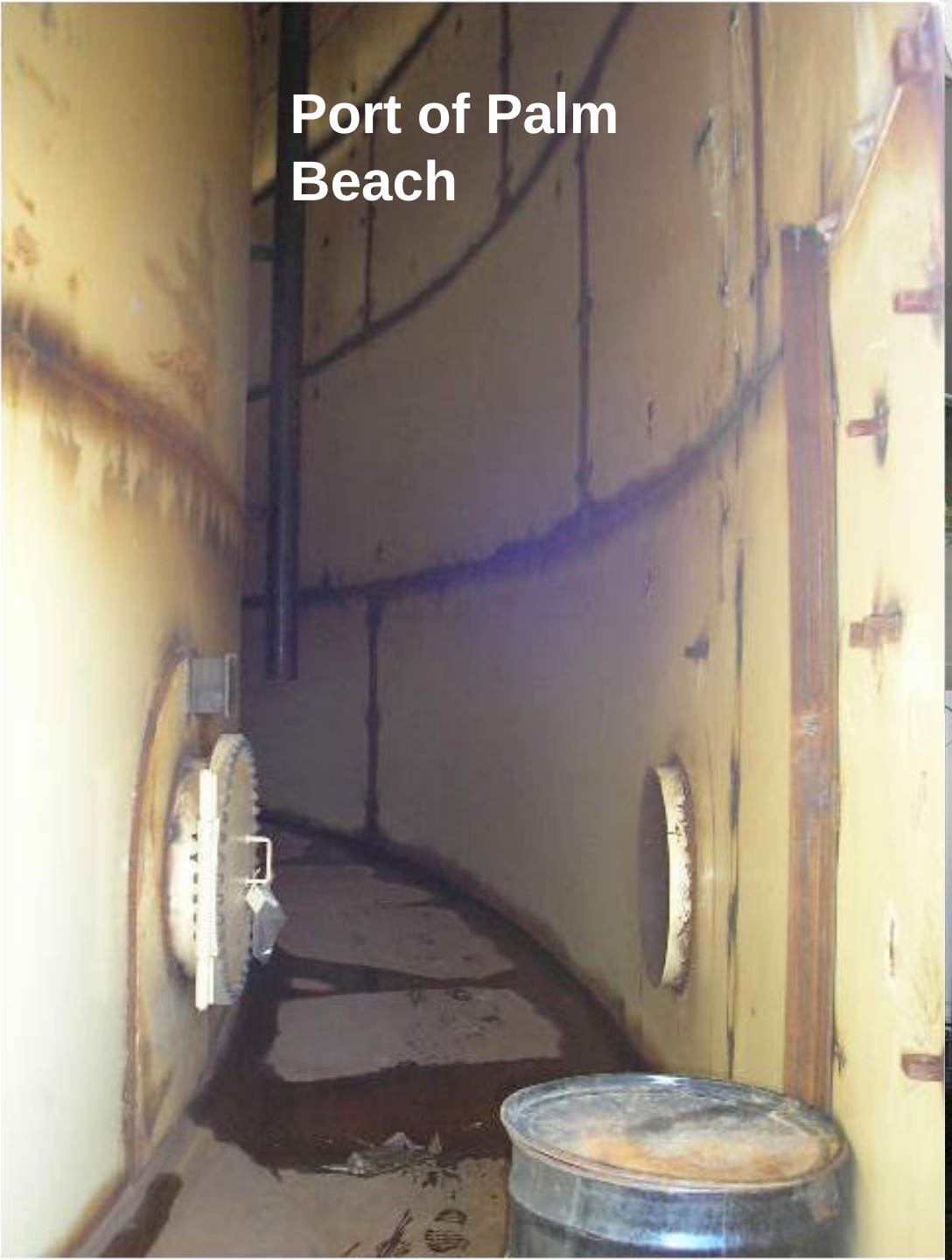
El Segundo Bottoms

Cone-Down

El-Segundo Designs

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

Double-Wall Tanks


Port of Palm Beach

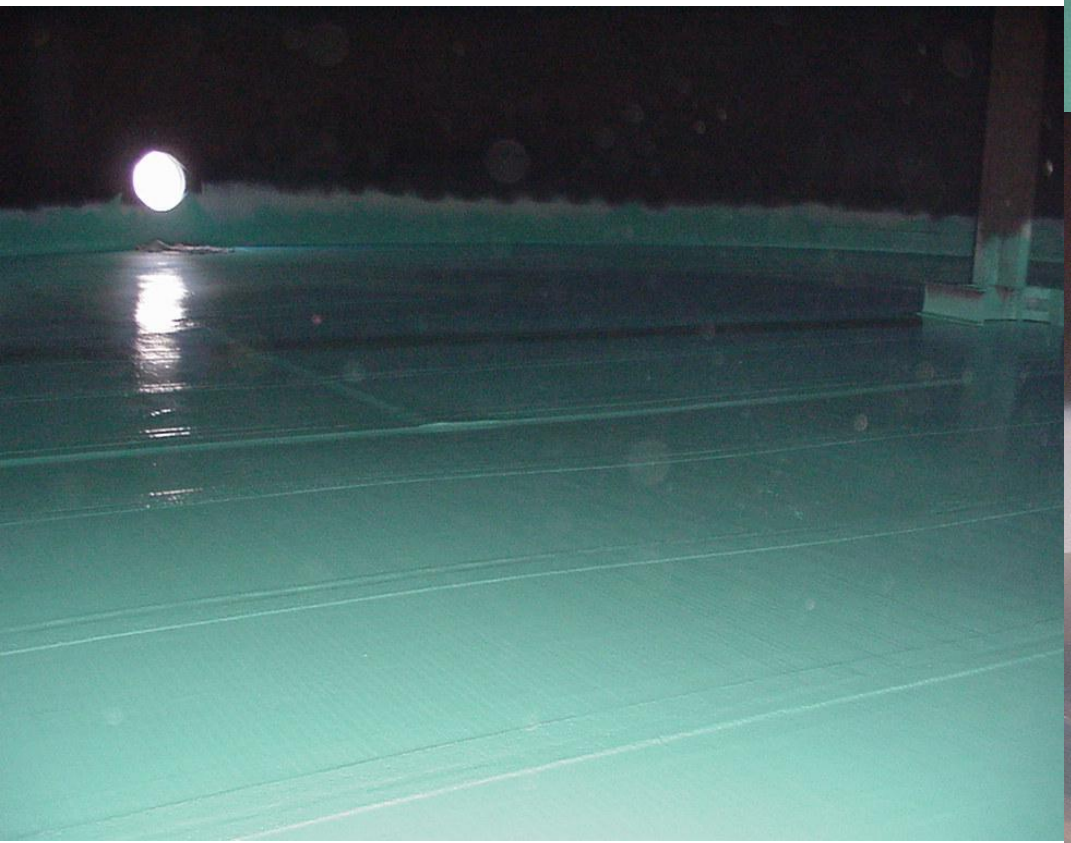

Germany


Port Canaveral

Impervious Synthetic Liners Beneath the Tank

Upgrading Existing Single-Bottom ASTs with Secondary Containment

Internal Secondary Containment Using Parabeam



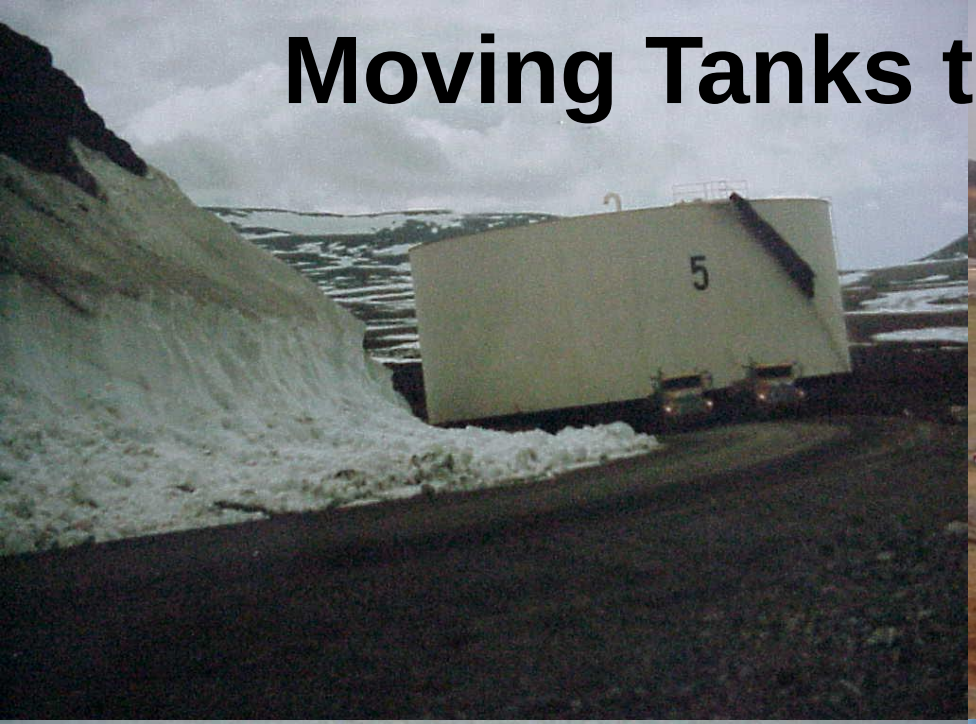
Tankbau (Germany) Internal Secondary Containment System

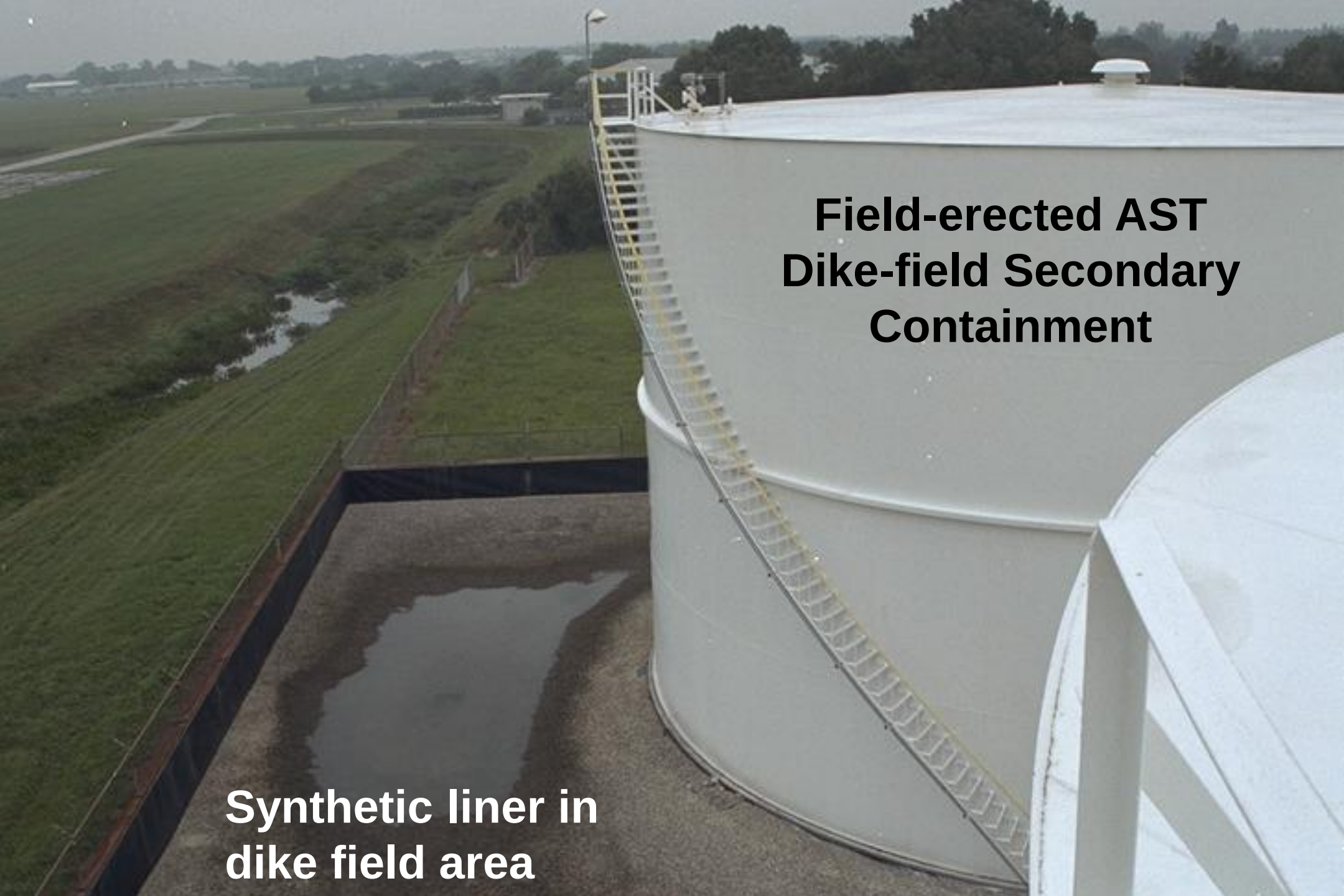
Steel Internal Secondary Containment

Tank-Jacking to Install Secondary Containment

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

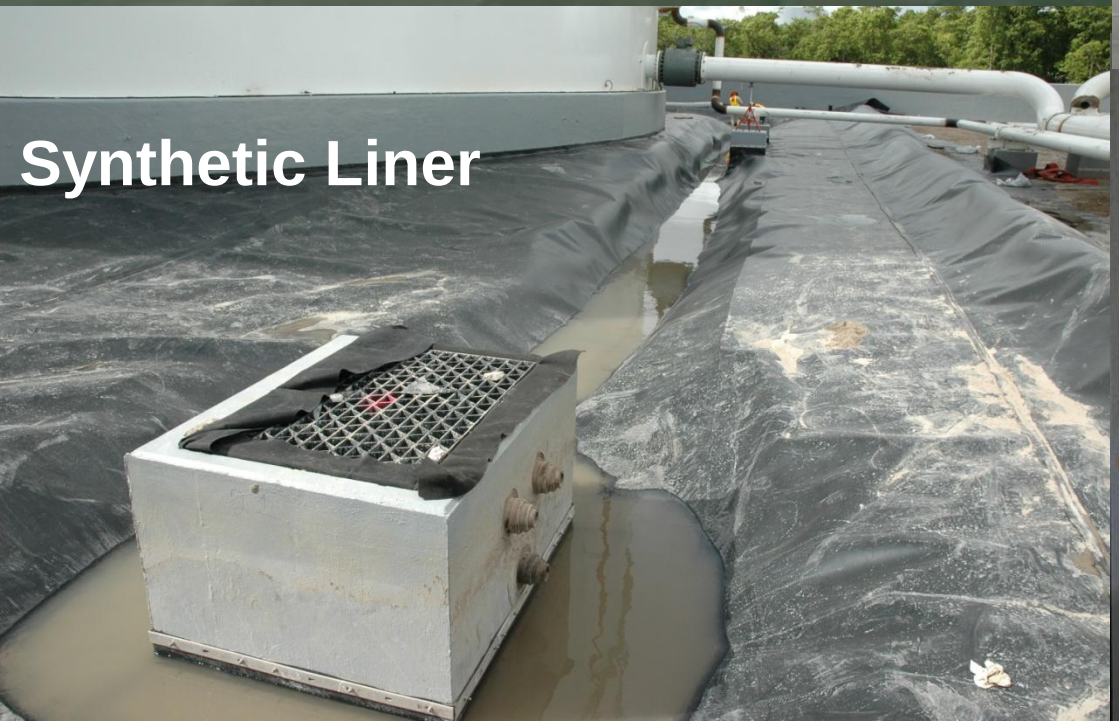
Moving Tanks to Different Locations



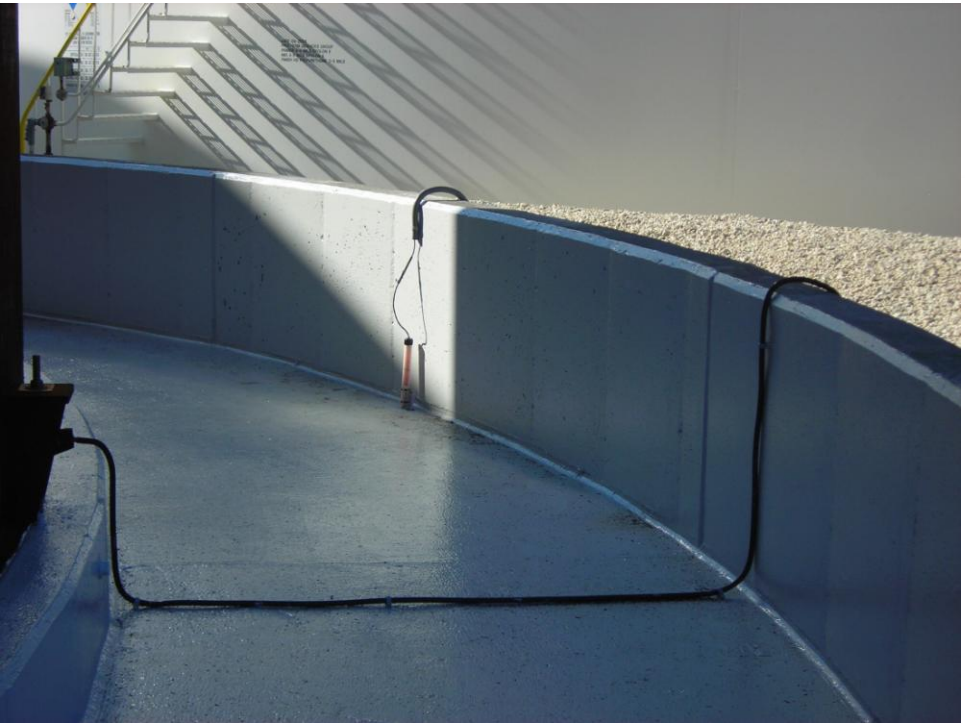

Field-erected AST
Dike-field Secondary
Containment
Synthetic liner in
dike field area


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

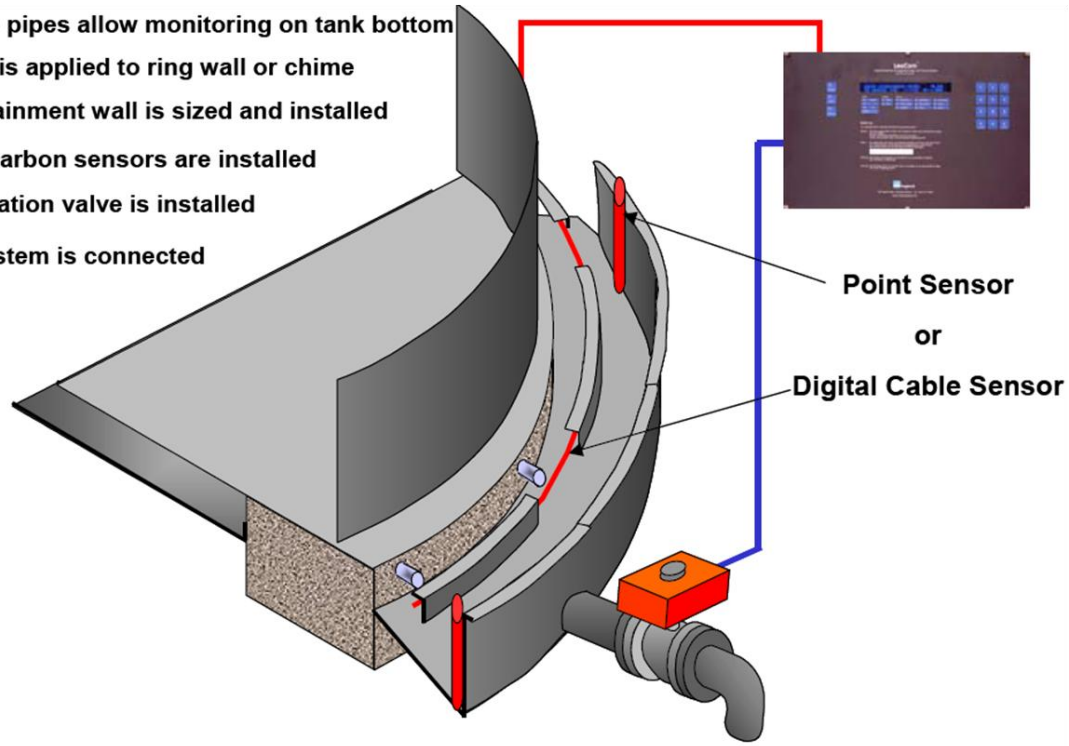

Double-walled


Synthetic Liner


Alternative Dike-field containment



- ✓ 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


GASOLINE


envirosafe
OVERSIZE LOAD


1 11:48AM


TANK 1
TANK ID #551N
JP-5
30,000 GALLONS
NO SMOKING

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

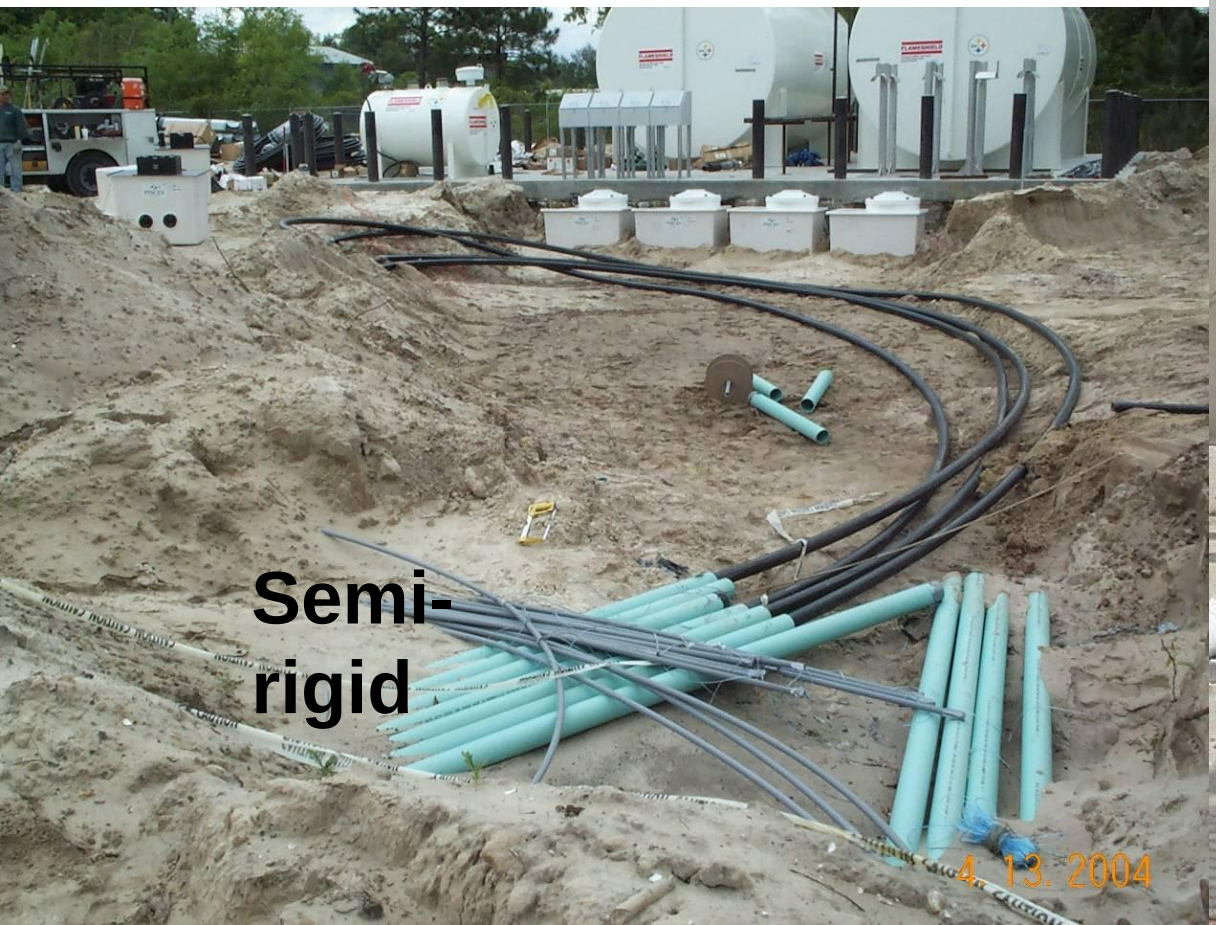
Shop-fabricated ASTs should have secondary containment at the time of installation

AST Secondary Containment - Shop-fabricated Tanks

Piping -

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

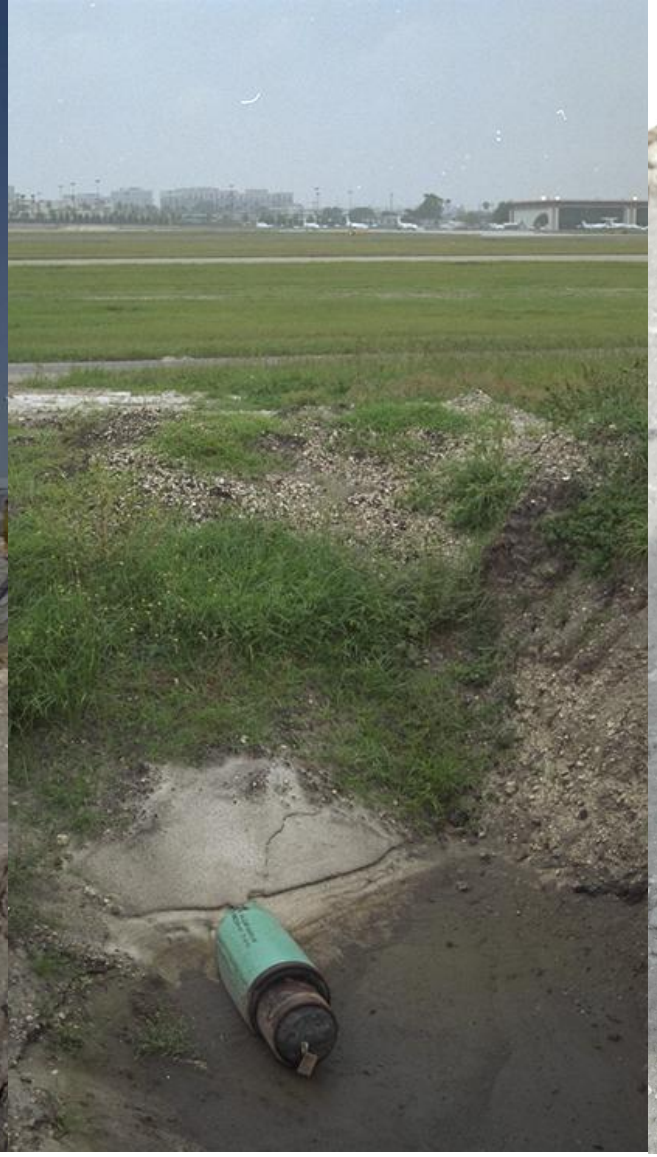
Small Diameter Piping with Secondary Containment



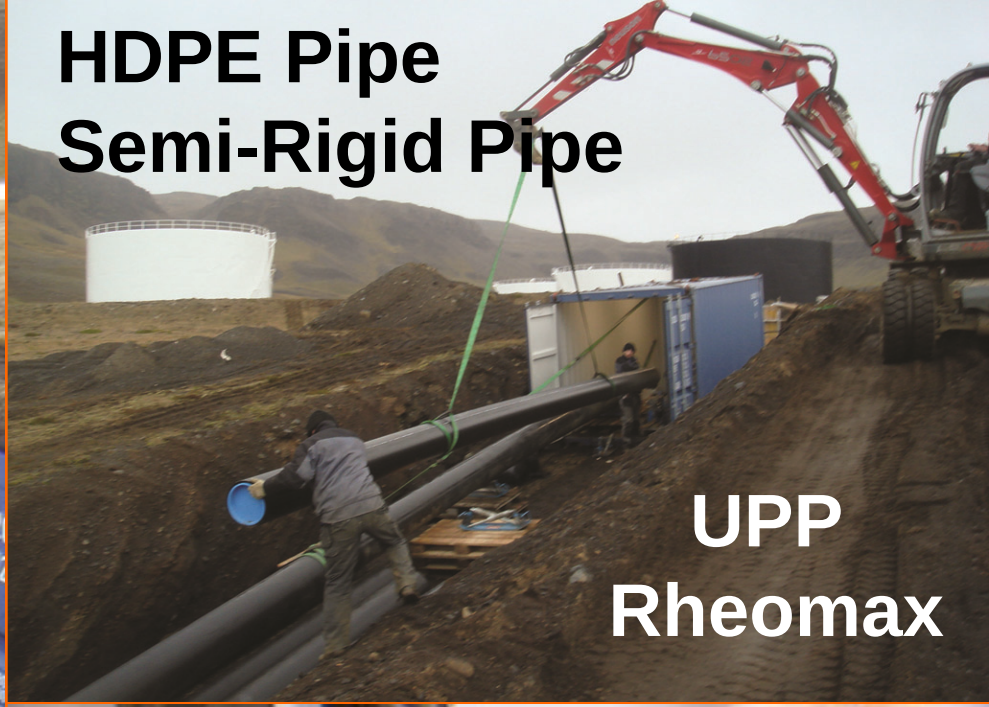

Be sure to install the proper valves for shop-fab ASTs with STPs serving dispensers

Single-wall Large Diameter Piping Above Ground

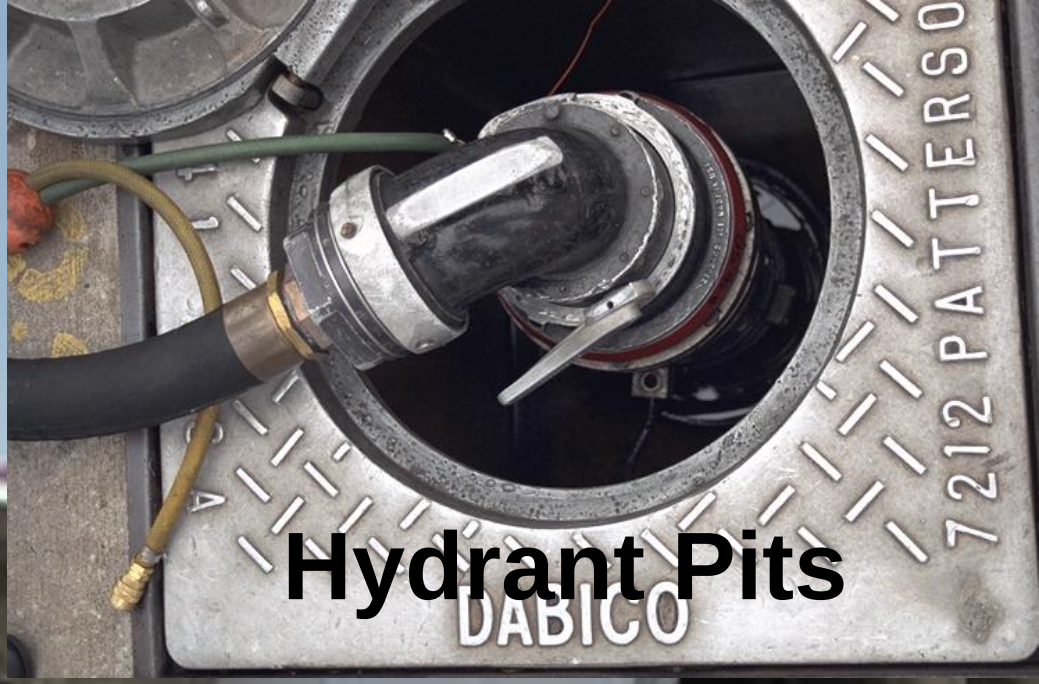
Steel Bulk Product Piping with Secondary Containment for Piping in Contact with the Soil


Steel Bulk Product Piping with Secondary Containment - Installation concerns


HDPE Pipe
Semi-Rigid Pipe
UPP
Rheomax

IPP HDPE Semi-Rigid Petrol Pipe

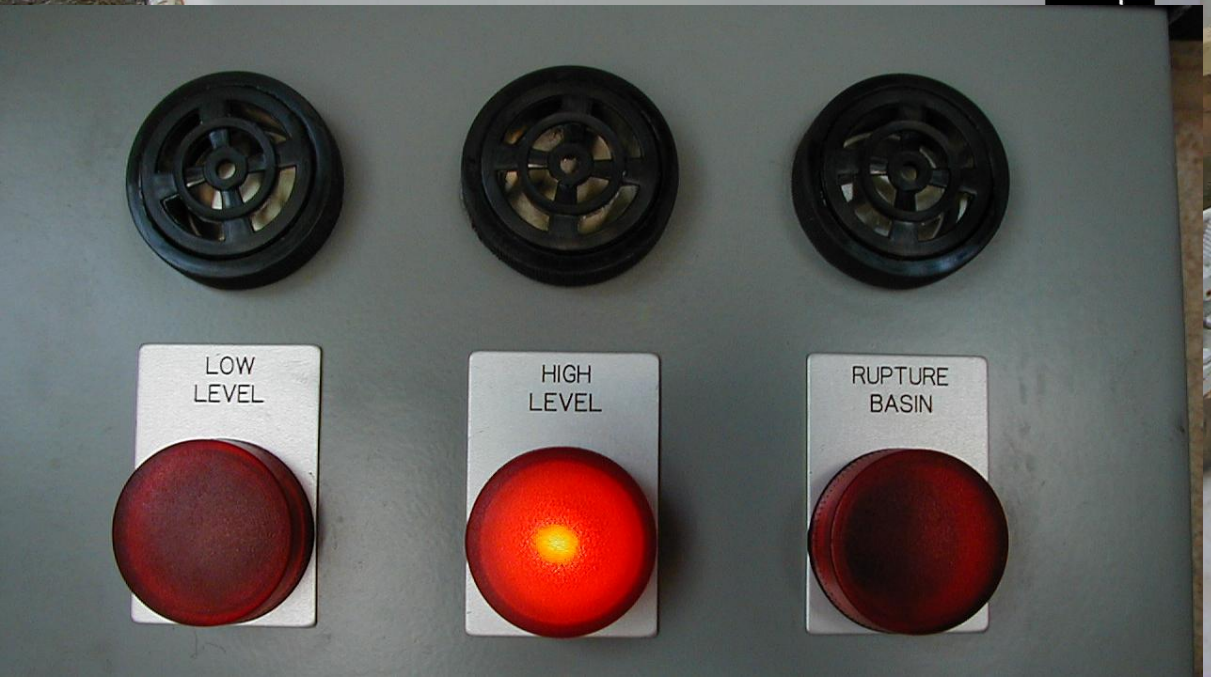


Hydrant Pits

Airport Hydrant Piping

AST Spill Protection

AST Overfill Protection



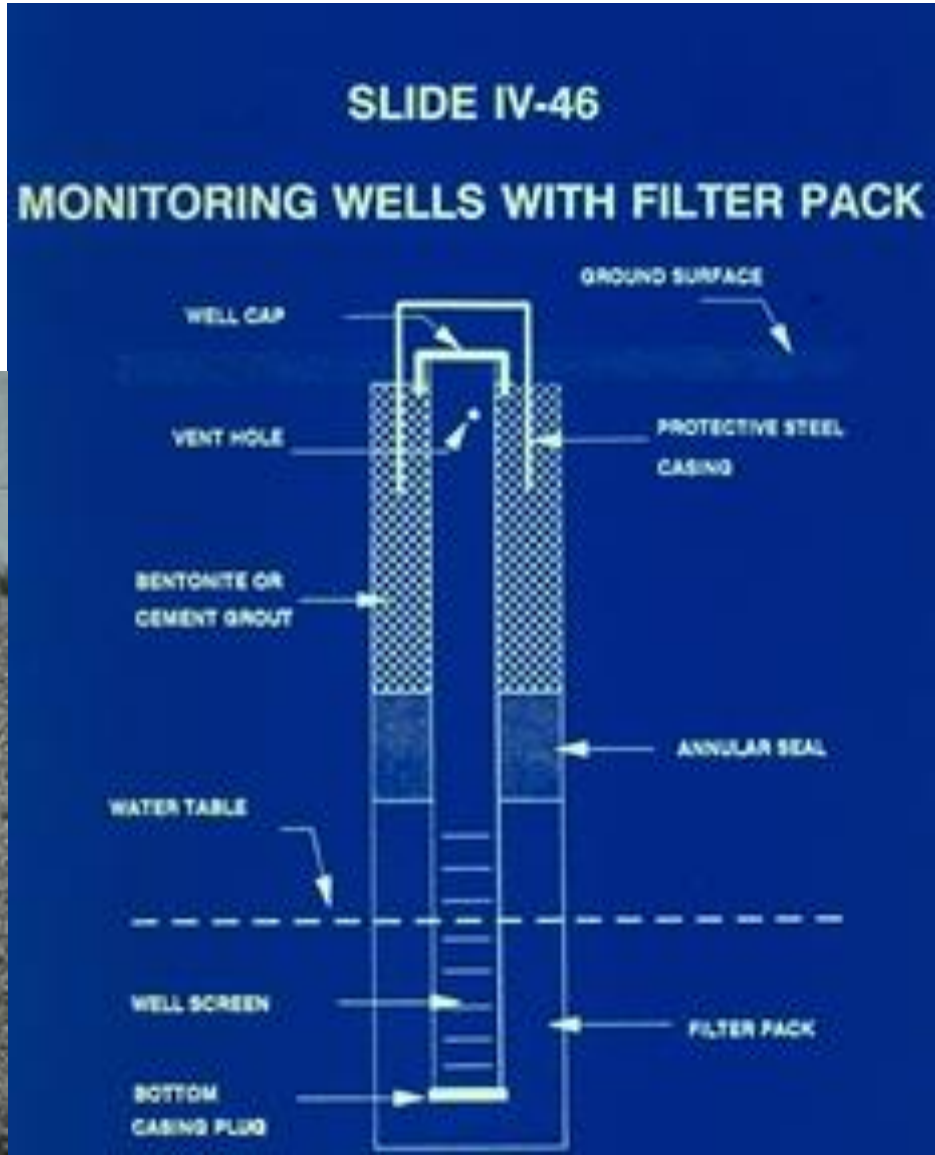
Release Detection Standards

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

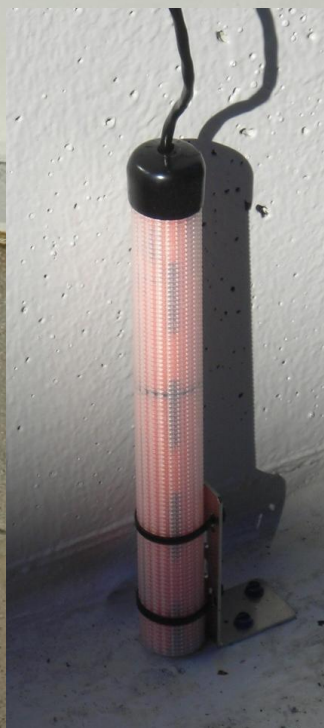


Release Detection for Double-wall Systems

Internal Interstitial Monitoring

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

Leak Detection with Interstitial Monitoring for Tanks and Piping

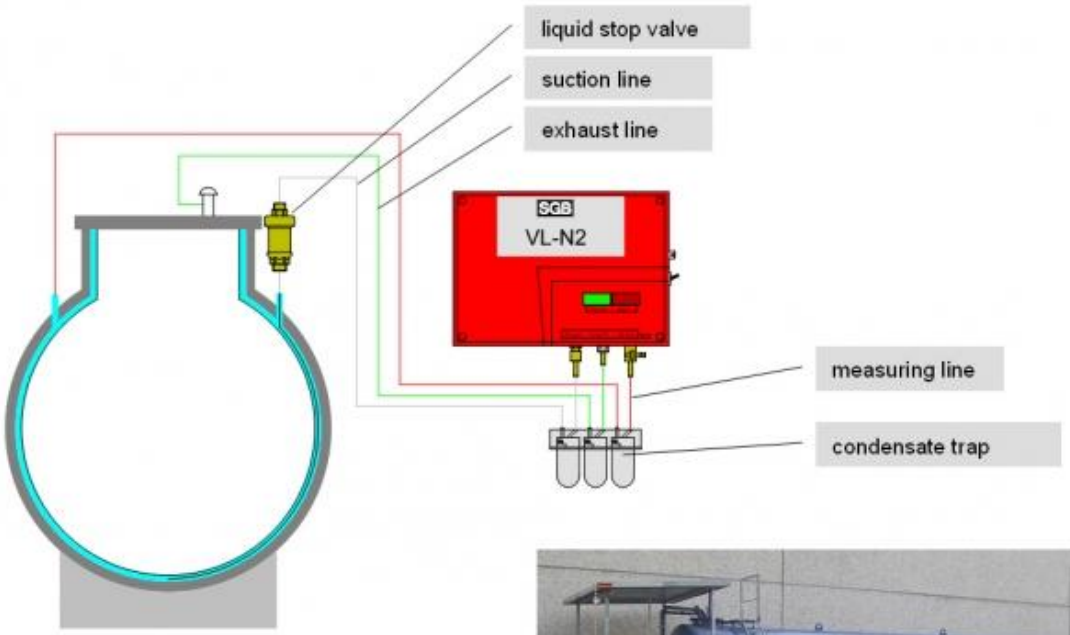



PLUS!
VEEDER-ROOT
ASLD CURRENT TST RESULTS
PRESS <ENTER>
ALARM
WARNING
POWER
TLS-350
ASAP104

Recommendation for Release Detection…

"First Class" Version

Vacuum or Pressure Continuous Monitoring



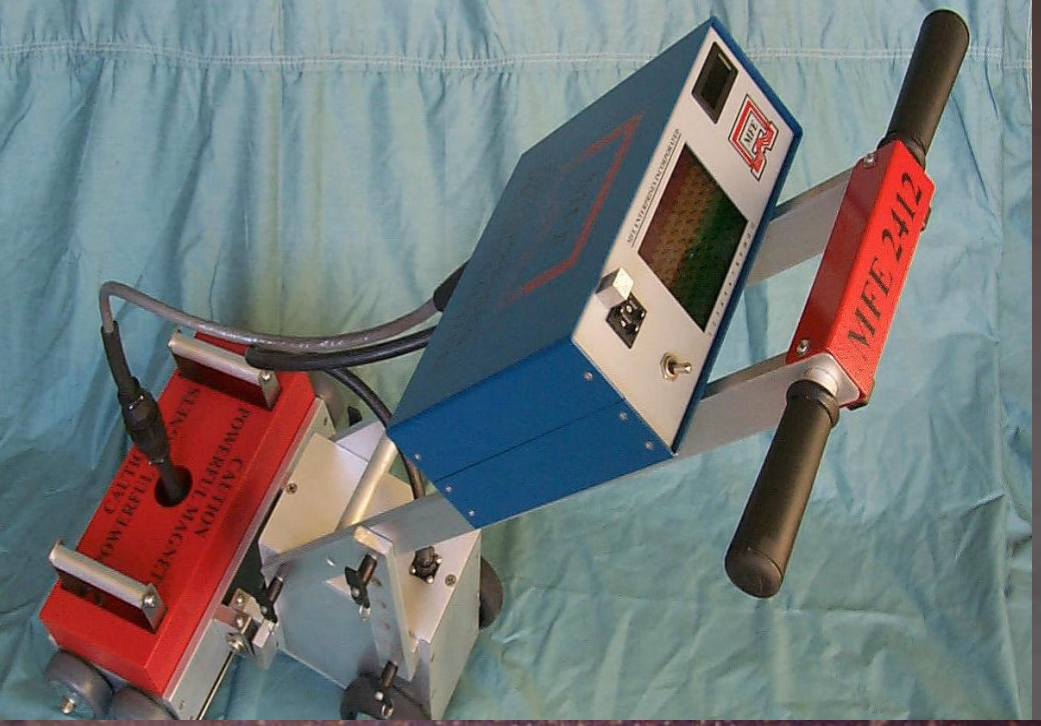
The "Economy" Version

Visual Inspections!

General Operation & Maintenance

Stormwater Management

Stormwater retention and removal , and dike field liners

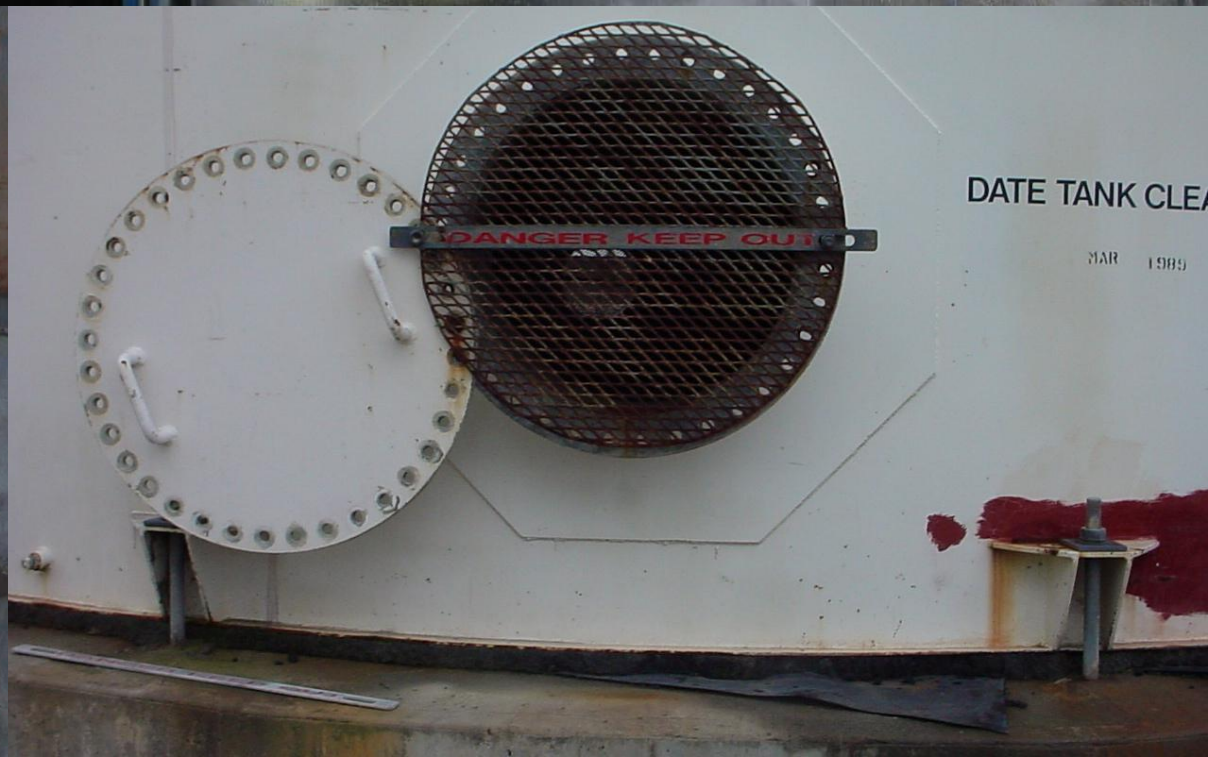


API 653 Inspections

API 570 tests for Bulk Product Piping

Unusual Situations

AST Out-of-Service



AST Closure

Two Choices – Removal, or abandon-in-place


KOMATSU


KOMATSU


3

Closure Assessments

Recommendation: Hire a qualified, experienced professional environmental consulting firm

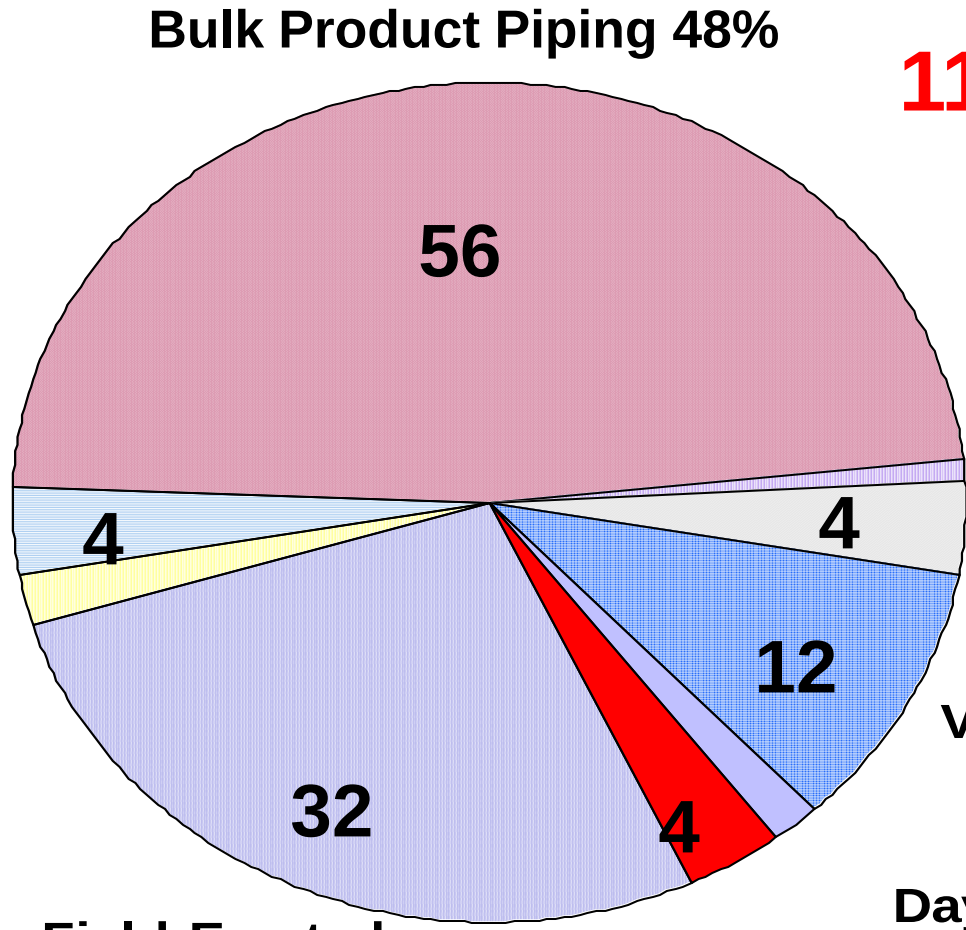
Incident and Discharges

Incident and Discharge Reporting

Discharges

Incidents

Sources of Discharges - Field-Erected AST Systems

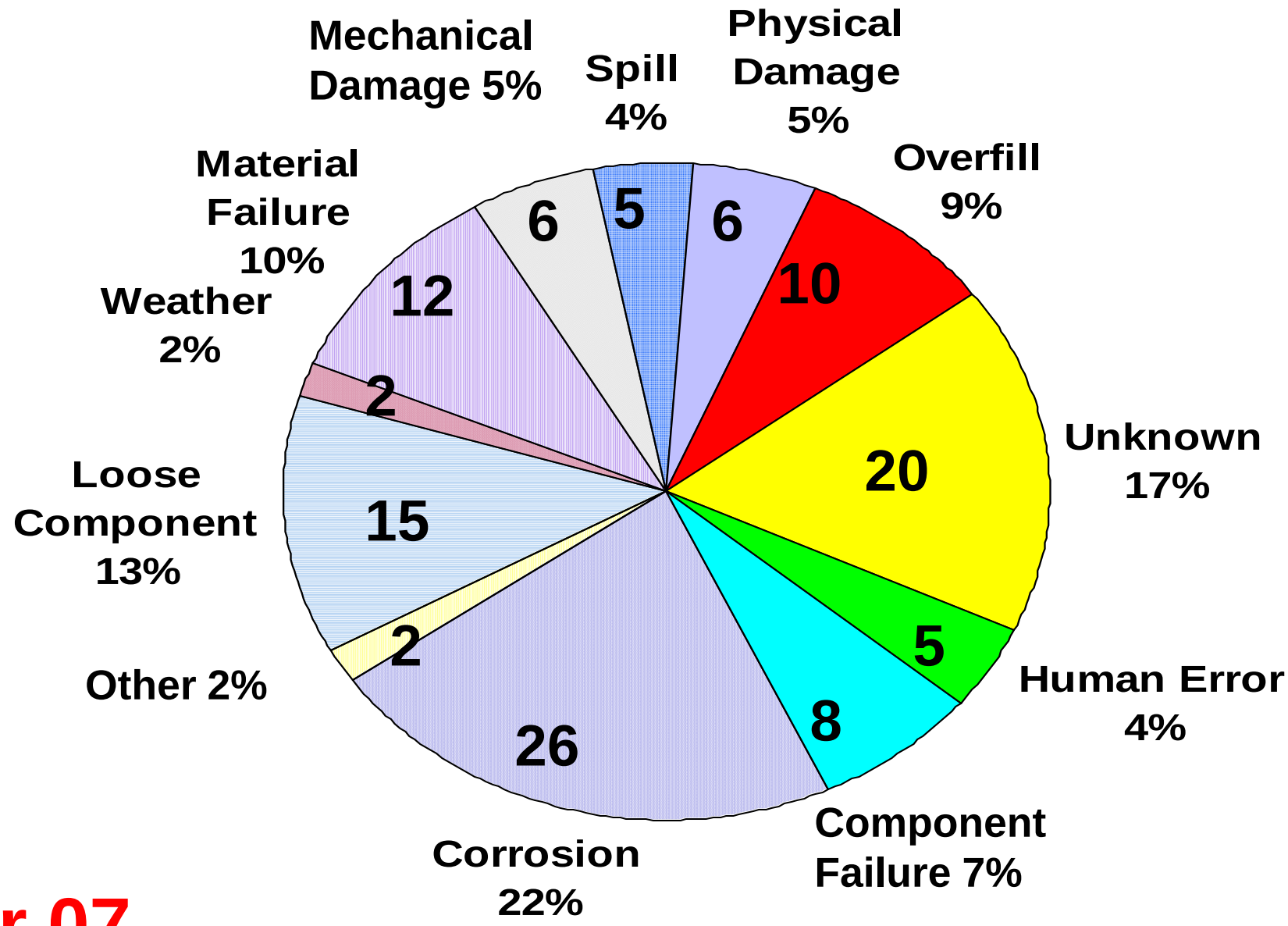


117 Discharges

Apr 07

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

Causes of Discharges from All Sources



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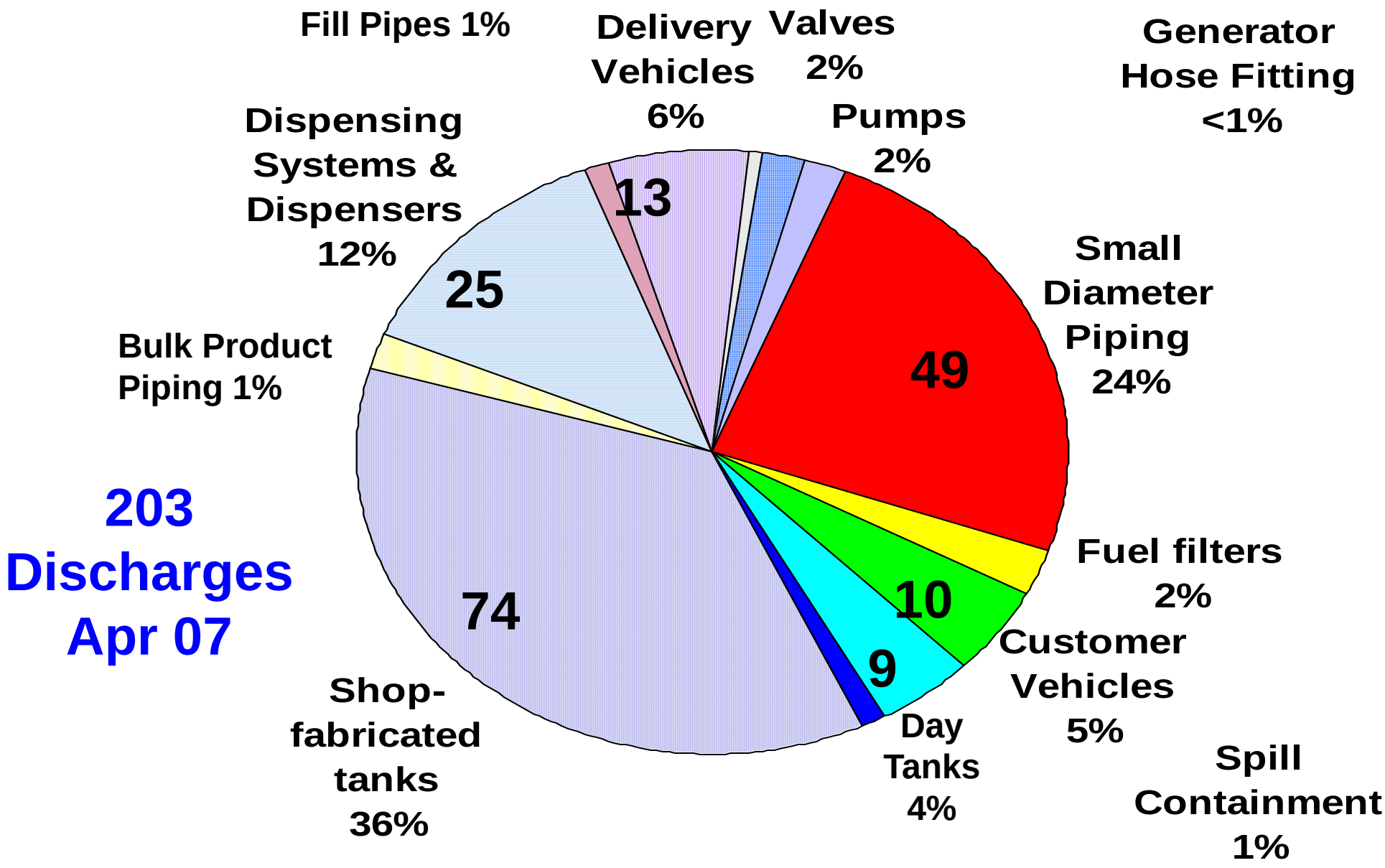
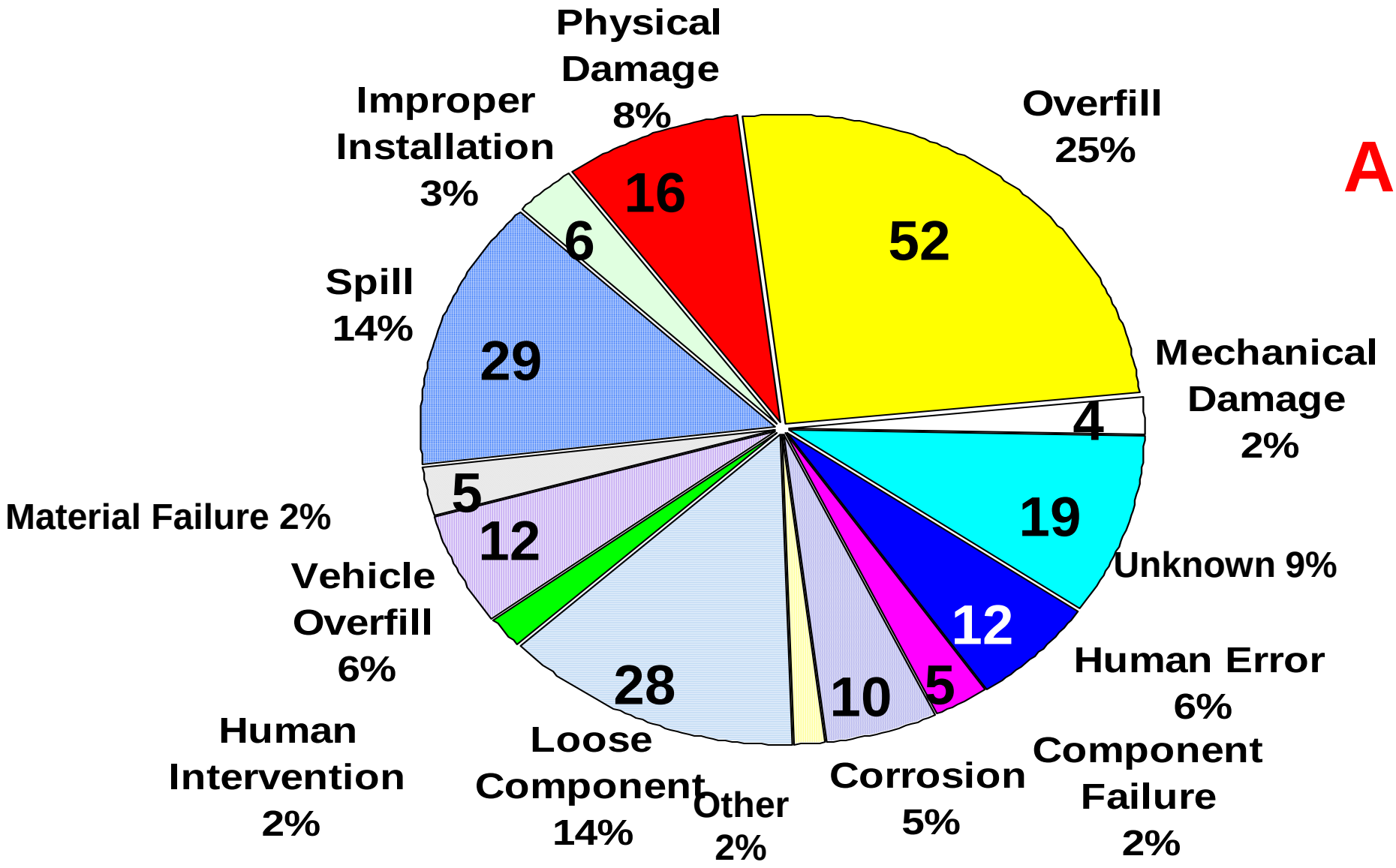
Field-Erected AST Systems

Sources of Discharges - Shop-fabricated ASTs



Causes of Discharges from All Sources



Apr 07

Shop-fabricated AST Systems

Shop-Fab Fires & Explosions


Buncefield,
England,
2005


The End