



Department of  
**Environment &  
Conservation**

# Underground Storage Tank Compliance Training

Version 3.0  
October, 2015

# Benefits of Compliance Training

- Greater awareness of compliance issues
- Better trained tank owners and operators
- Fewer operational compliance violations
- Greater protection for the environment
- To meet Operator Training/Re-training requirements

# UST Operator Training

- Each facility must have three classes of Operators:
  - Class A – overall responsibility for UST operation and maintenance
  - Class B – daily, on site responsibility for UST compliance
  - Class C – responsibility for release emergencies
- Specific training requirements for each Operator class.
- Tank owners must use the Tennessee Tank Helper online program to designate Class A and B Operators for each facility they own.

<https://apps.tn.gov/ustop/>

# UST Operator Training

- Several viable options available for meeting Operator Training requirements:
  - ✓ Tennessee Tank Helper;
  - ✓ ICC UST System Operator Exam - Class A and/or Class B;
  - ✓ Tank School - Successful completion: 70% or greater correct on final exam
- If SOC violations found at inspections, operator(s) must be retrained by Division approved method.

# Most Frequent Violations

**Do you know what the most frequently found violations are?**

# Most Frequent Violations

- 1 Failure to Have Leak Detection Records
- 2 Failure to Test Automatic Line Leak Detectors
- 3 Failure to Do Annual Line Tightness Test
- 4 Failure to Test Cathodic Protection
- 5 Failure to Report a Suspected Release

These violations can be very costly to you...

# Some Common Civil Penalties

Violation	Civil Penalty
Failure to have leak detection records	\$200 / month / tank
Failure to tightness test pressurized piping	\$1,200 / line
Failure to test automatic line leak detector	\$1,200 / line
Failure to test cathodic protection	\$1,200
Failure to report a suspected release	\$2,000 / event
Failure to do release detection	\$2,400 / tank
Failure to have spill prevention	\$2,000 / tank
Failure to have overfill protection	\$2,000 / tank
Failure to close a substandard UST system	\$3,200 / system
Illegal delivery of petroleum	\$1,000 / delivery

# A few words about Illegal deliveries...

- Occurs when deliveries are made to tanks that have been red tagged.
- Violation for the tank owner AND delivery company
- Web listing to inform delivery companies of locations with red tags.

<http://www.state.tn.us/environment/underground-storage-tanks/index.shtml>

# Red Tags



 Search

- TDEC Home
- About Us
- Environment
- Conservation
- Parks & Recreation
- Permits
- Dataviewers
- Public Participation
- Enforcement
- Newsroom
- Sitemap
- Contact Us

- Related Topics
- Tennessee Energy
  - Education Initiative
  - Sustainable Tourism
  - U.S. EPA

## Division of Underground Storage Tanks

The mission of the Division of Underground Storage Tanks is to protect human **health and environment by preventing future petroleum underground storage tank** releases and remediating existing petroleum underground storage tank contamination.

### Division News



We are now accepting online Credit Card Payments:



Effective July 1, 2012, TDEC began accepting online credit card payments for annual UST Tank Fees and Civil Penalties.

[Click Here for instructions](#)

[Draft Standardized Inspection Manual](#)

### Above Ground Storage Tanks

The Tennessee Division of Underground Storage Tanks regulates petroleum underground storage tanks (USTs) in Tennessee. Non-petroleum USTs are regulated by US EPA in Atlanta. Above ground storage tanks are not regulated by this Division. [Click for more information](#)

### Contact UST

Stan Boyd, Director  
William R. Snodgrass Tennessee Tower  
312 Rosa L. Parks Avenue, 12th Floor  
Nashville, TN 37243  
(615) 532-0945  
[Questions? Ask UST](#)  
[UST Field Office Contacts](#)

### Division Resources

- [Sites Under Delivery Prohibition](#)
- [If You Have or Suspect A Release](#)
- [Brownfields](#)
- [Compliance, Inspections and Enforcement](#)
- [Corrective Action Contractors](#)
- [Forms](#)
- [Guidance Documents](#)
- [News](#)
- [Registration, Fees & Database](#)
- [Tank Closure](#)
- [UST Act, Rules and Policies](#)
- [UST Fund](#)
- [Operator Training](#)
- [Underground Storage Tanks and Solid Waste Disposal Control Board](#)



TENNESSEE  
State Parks

### Featured Sites

- Employment Opportunities
- Internships
- Fleming Training Center
- Tennessee Conservationist Magazine
- Tennessee State Parks

### TN.gov Services

- Renew Driver License
- Renew Health License
- Renew Professional Non-health License
- New!** Get Your Driving History Online
- [More »](#)

# Training Process

- ✓ Pre-test
- Slide Show Presentation/ Discussion
  - Describe equipment / methods
  - Explain what must be done to be in compliance
  - Illustrations
- Pause to Check your Understanding
- Opportunity for Questions/ Review
- Final Exam

# We Will Also Cover...

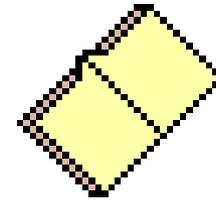
- Installation and Notification
- Repairs
- Release Reporting
- Tank Closure
- Record Keeping
- Financial Responsibility

# On the Horizon

- New Federal UST rules passed July 2015; effective October 15, 2015.
- Does not apply to Tennessee tank owners at this time.
- Projected effective date for Tennessee - October 13, 2018.
- Effective date in each state may vary.
- Future operational changes will affect all tank owners.
- Check UST website for more information for TN tank owners.
- Check EPA website for more information about federal rule.

# 4 Things You Must Know:

- 1 What equipment is at your facility.
- 2 What must be done,
- 3 When it must be done,
- 4 What you must have for an inspection.

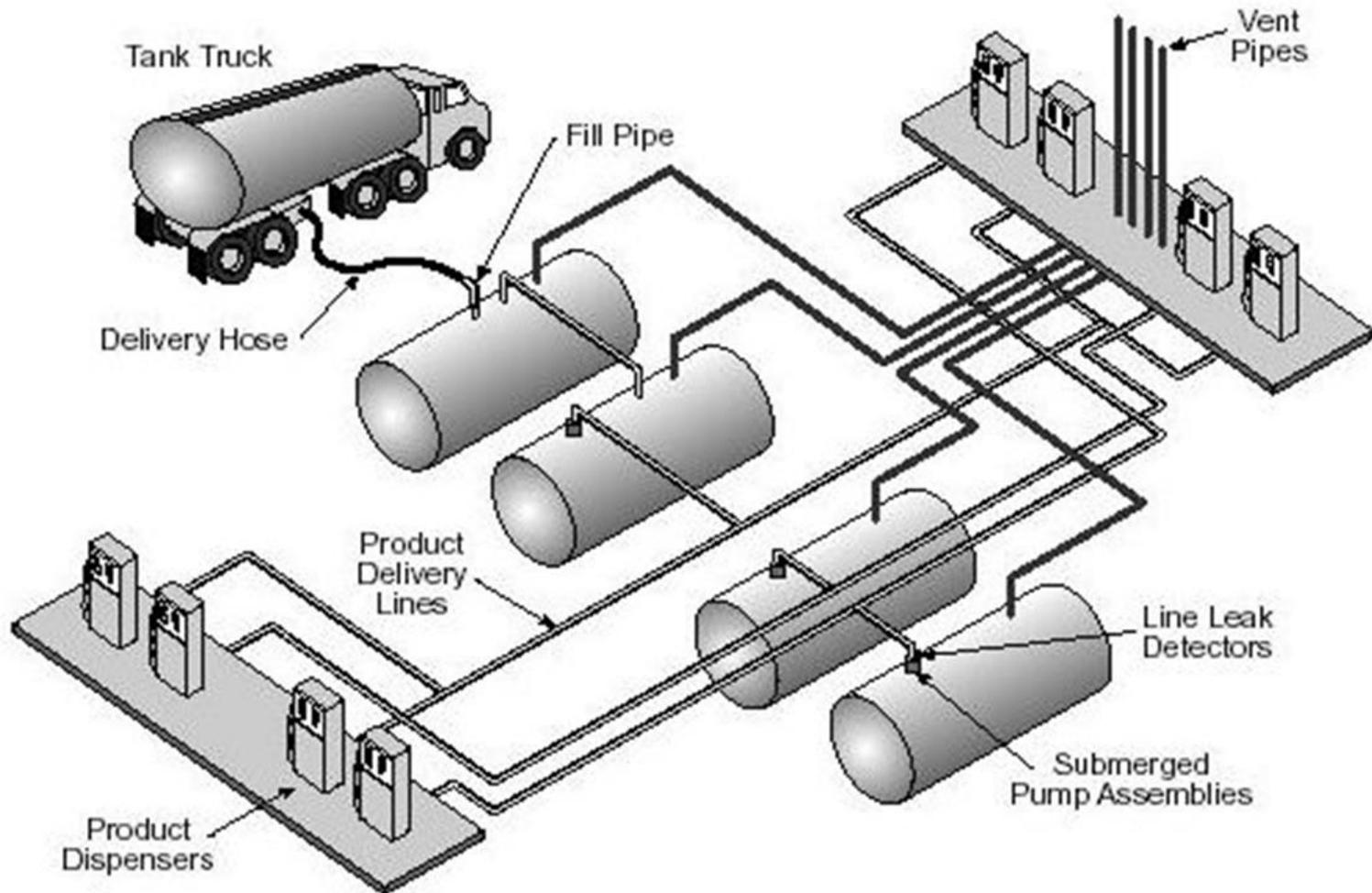


# Understanding Your UST System

Know what you have. Most Underground Storage Tank (UST) systems consist of:

- One or more Tanks
- Piping
- Spill Prevention
- Overfill Prevention
- Corrosion Protection
- Leak Detection System

# Typical UST System



# Disclaimer

The State of Tennessee does not endorse any specific brands, manufacturers, or vendors of equipment, products or services.

Any brand names mentioned or depicted of any equipment, products, or services in this presentation are used for illustrative purposes only and are neither endorsements nor recommendations for such equipment, products, or services and shall not be construed as such.

# Different Kinds of Tanks

- **Cathodically Protected Steel**
- **Fiberglass-clad Steel**
- **Jacketed Steel**
- **Fiberglass Reinforced Plastic (FRP)**

# Cathodically Protected Steel Tank

An example of a coated and cathodically protected steel tank is the sti-P3<sup>®</sup> tank.

This tank has a dielectric coating on the outside and has galvanic (sacrificial) anodes attached to the outside of the tank.



# Clad Steel Tank

A steel tank that has a thick layer of non-corrodible material such as fiberglass or urethane mechanically bonded (clad) to the outside of the tank.

The clad coating helps protect the outside of the steel wall from corroding.

Examples of clad tank brands include:  
Buffhide, Glasteel<sup>®</sup>,  
and Plasteel.



Sample Clad Tank

# Clad Steel Tanks Being Installed



# Jacketed Steel Tank

A steel tank that is encapsulated (or jacketed) in a noncorrodible, nonmetallic material such as fiberglass or polyethylene.

This tank is secondarily contained. There is a space between the steel wall and the jacket material. This space may be monitored for a breach of either wall.

Examples of jacketed tank brands include:  
Permatank®,  
Glasteel II®,  
Titan®, Elutron®,  
Total Containment®



# Fiberglass Reinforced Plastic (FRP) Tank

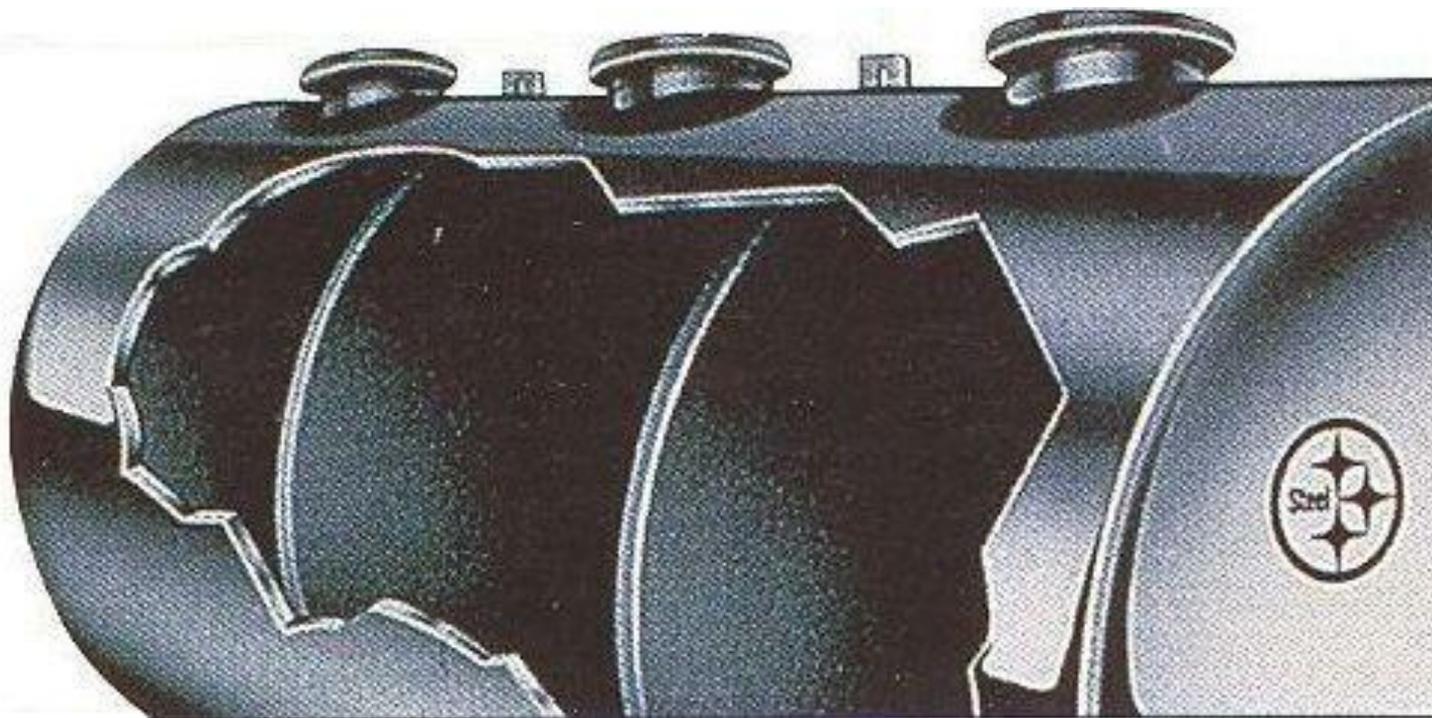
These tanks are made of fiberglass reinforced plastic.

FRP tanks were made by Owens Corning, Xerxes, Cardinal, Fluid Containment, and Containment Solutions.



# Compartment Tanks

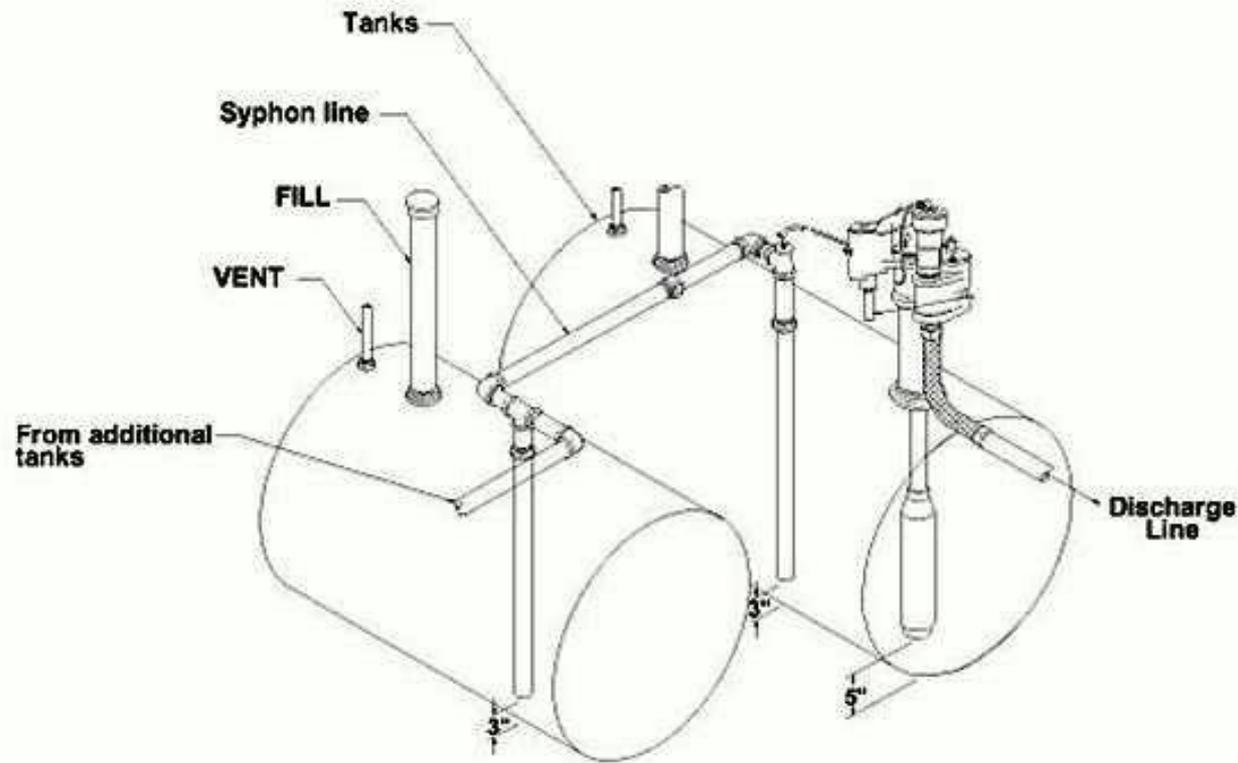
Tanks which are divided into **two or more compartments**. These usually hold different product grades; i.e., Regular & Premium



# Manifolded Tanks

Two or more **tanks connected by piping.**

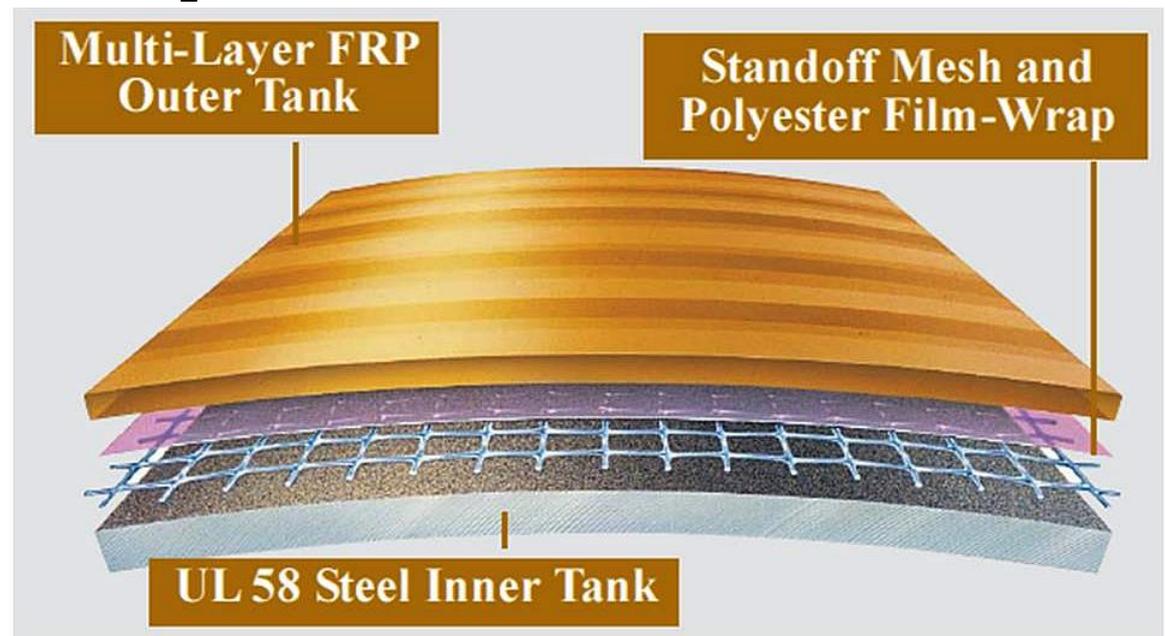
These always hold the same product grade and usually only one submersible pump is used.



# Double Wall Tanks

A tank with two shells (a tank within a tank)

Since July 24, 2007, secondary containment has been required for all new or replacement tanks installed in Tennessee.



PERMATANK® Structure

# Different Kinds of Piping

- **Fiberglass**
- **Flexible Plastic**
- **Cathodically Protected Steel**



# Fiberglass Reinforced Plastic Piping (FRP)

This piping is nonmetal and is made of fiberglass reinforced plastic. It is rigid piping (not flexible).

FRP piping makers include Ameron and Smith Fiberglass Products.

FRP piping installed before 7/24/2007 can be single wall or double wall



Sample FRP Piping



# Flexible Plastic Piping

Flexible piping brand names include: Poly-Tech, Dualoy 3000, EnviroFlex, GeoFlex, Perma-Flexx, Omniflex, and Co-Flex™ Titan®, Total Containment®, and Elutron®.



Sample Flexible Piping



Sample Flexible Piping



Sample Flexible Piping



Sample Flexible Piping In A Sump



Close-up Of Flexible Piping In A Sump

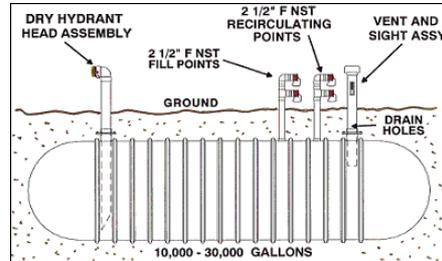
# Semi-rigid Piping

Semi-rigid piping is nonmetallic and thicker than most flexible plastic piping. It is manufactured by companies like NUPI, Petrofuse, and Petrotechnik UPP and usually has electrofusion piping connections.



# How Do You Know What Is Present?

- **Installation Records**



- **Visual observation**



- **Testing**



- **Previous Inspection Records**



# Can You Identify...?



# What Kind of Piping is This?



# Upgraded tanks/piping

You may have tanks or piping that was upgraded prior to December, 1999.

Upgraded systems are:

- **Bare steel** tanks with an Impressed Current cathodic protection system added for corrosion protection.
- Steel piping with an Impressed Current cathodic protection system, sacrificial anodes added, OR replaced with *fiberglass* or *flexible plastic piping*.
- Spill and overflow prevention added.

# Upgraded tanks/piping

It is very important to know that if you have upgraded tanks or piping, adequate **corrosion protection** is essential.

If the corrosion protection system fails to protect the steel tank or piping, and it fails due to corrosion, then the tank or piping will have to be repaired or replaced.

Replacement tanks must be **double wall** and replacement piping must be **double wall** or **secondarily contained**.

# We Have Covered...

✓ **Tanks and Piping**

**Next:**  
**Spill Prevention**

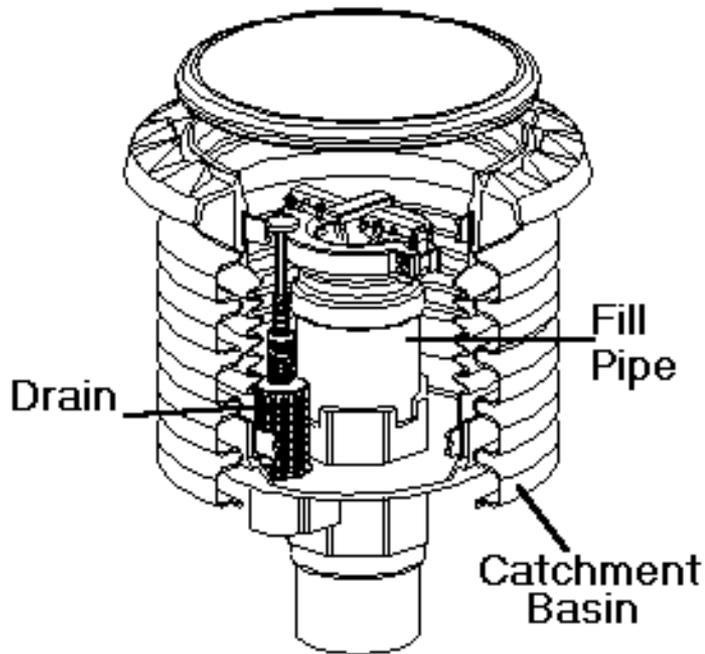
# What You Should Know About Spill Prevention

- Any tank filled with **25 gallons or more** at one time MUST have spill prevention.
- Spill prevention devices must contain spills that may occur when the delivery hose is disconnected from the fill pipe.
- They are often called “spill buckets” or “catchment basins”.



# What You Should Know About Spill Prevention

- Some have drain valves to allow product to drain into the tank.
- When spill bucket contents are drained into a tank, any collected water or debris *may also enter the tank*.



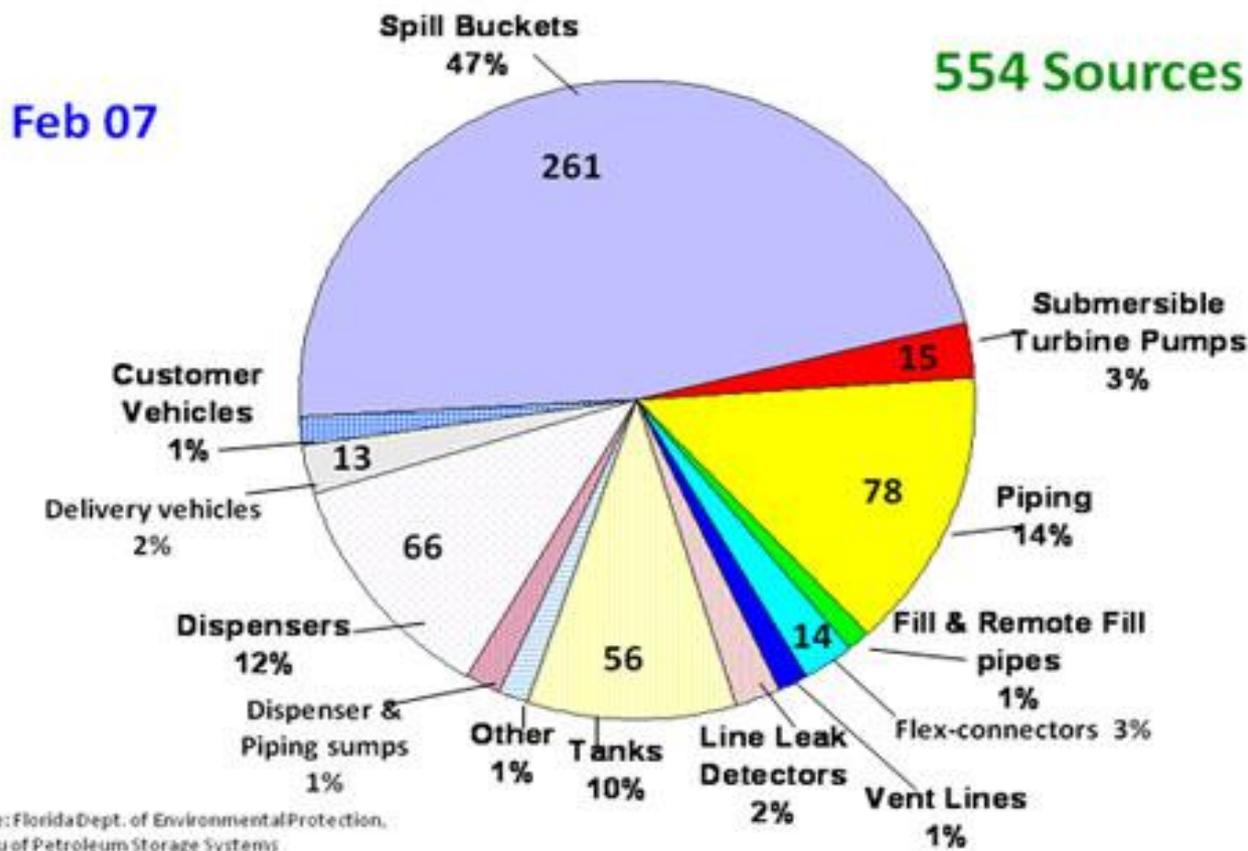
# What You Should Know About Spill Prevention

- They are **not** designed to hold product for long periods of time.
- Spill buckets often have a shorter “life- span” than tanks or piping.
- Spill buckets must be inspected at least once per month.



# Why the Concern with Spill Buckets?

## UST Leak Sources in Florida



# Rules on Spill Prevention

1. Spill buckets must be kept free of water, dirt, debris or other substances.
2. Spill buckets must be visually inspected once per month and a log\* kept showing the last 12 months of spill bucket inspections.
3. Lids are required on all spill buckets.

\* Monthly spill bucket inspection form available on UST website.

# Spill Prevention

## What You Must Do:

- **Inspect** your spill prevention for signs of wear, cracks, or holes once each month.
- **Make sure** your spill prevention is empty of liquid and debris before and after each delivery.
- **Keep a record** of monthly spill prevention inspections.

# Spill Bucket Inspection Form



STATE OF TENNESSEE  
 DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
 DIVISION OF UNDERGROUND STORAGE TANKS  
 William R. Snodgrass Tennessee Tower  
 312 Rosa L. Parks Avenue, 12th Floor  
 Nashville, Tennessee 37243

## Monthly Spill Bucket Inspection Log Instructions

Tennessee Underground Storage Tank Rules require that visual inspections be made of all spill buckets on a monthly basis. Rule 0400-18-01-.02(3)(b)3. states;

"Spill catchment basins shall be visually inspected by the owner and/or operator at least once per month to assure the integrity of the storage space provided for spill containment. A log of these inspections showing at a minimum the last twelve (12) months shall be maintained by the owner and/or operator."

- Use this form to record results of visual inspections of each spill bucket at the facility once each month.
- A separate form should be used for each facility. Indicate the year this form is for in the space provided.
- The front of this form has space for up to six spill buckets. If there are more than six spill buckets at this facility, use the back of this form or make additional copies.
- If no standing liquid or spill bucket defects (cracks, torn connectors, etc.) are noted, write "OK" in the appropriate column and row.
- If any standing liquid or spill bucket defects are noted, write "Not OK" in the appropriate column and indicate what action was taken.
- You must take measures to repair any spill bucket defects observed. If there are spill bucket defects and indications of released petroleum, it must be reported as a suspected release according to rule 0400-18-01-.05 and .06.
- Maintain the last 12 months of these inspections and have them available for state inspection.

UST FACILITY INFORMATION							
NAME:				FACILITY ID #:		YEAR:	
ADDRESS:				CITY:		ZIP:	
Checked MM/DD/YY	Monthly Spill Bucket Visual Inspections						Action taken if SB not OK
	Record condition in each block for the appropriate spill bucket (SB)						
	SB # 1	SB # 2	SB # 3	SB # 4	SB # 5	SB # 6	
/ /							
/ /							
/ /							
/ /							
/ /							

# What's Wrong With This?



# What Should You Do?

- Replace spill bucket
  - If contamination is found, report as a suspected release.
- Repair spill bucket
  - Only in accordance with manufacturer's recommendations.
    - Spill bucket liners not approved by most spill bucket manufacturers.
- Conduct hydrostatic testing of spill bucket
  - Follow Division guidance or PEI - RP1200
  - Pass = no replacement; Fail = replace the spill bucket

# Check your understanding

- ✓ Which tanks do NOT have to have spill buckets?  
Tanks filled with 25 gallons or less *at one time*, like waste oil tanks
- ✓ What are three requirements for spill buckets?  
Inspect monthly for problems,  
Keep free of water, dirt, debris,  
Keep log of monthly inspections
- ✓ Do you have proper spill buckets on your tanks?
- ✓ Are they in good working order?  
You should be able to answer “Yes” to these questions

# We Have Covered...

- ✓ **Tanks and Piping**
- ✓ **Spill Prevention**

**Next:**  
**Overfill Prevention**

# Overfill Prevention

Any tank that is filled with **25 gallons or more** *at one time* MUST have overfill prevention.

Overfill prevention must prevent tanks from being overfilled during delivery.

Overfill prevention is designed to either:

1. stop product flow, or
2. reduce product flow, or
3. alert the delivery person before the tank becomes full and begins releasing product

# 3 Types of Overfill Prevention

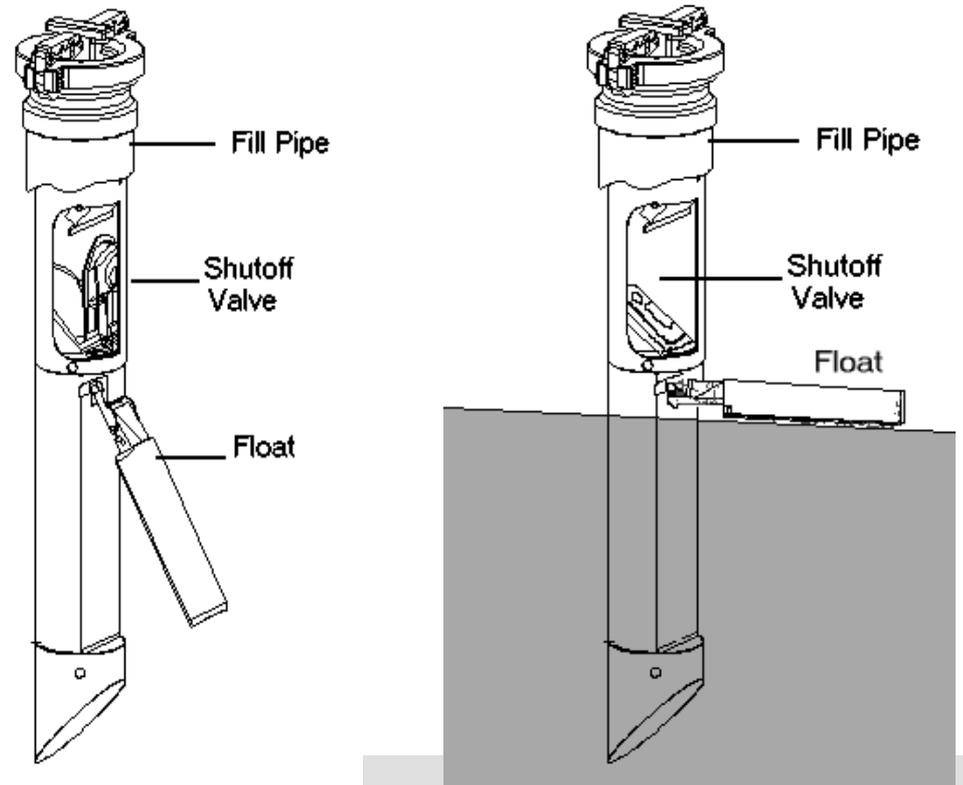
The 3 most common types of overfill prevention:

- ➡ Automatic Shutoff (sometimes called ‘flapper valves’)
- ➡ Flow Restriction (sometimes called ‘ball floats’)
- ➡ Overfill Alarm (sometimes called ‘high level alarms’)

Let’s examine each type...

# Automatic Shutoff Devices

- An **automatic shutoff device** or “flapper valve” slows down and stops product flow when the product has reached a certain level in the tank.
- Automatic shutoff devices are located **in the fill pipe.**



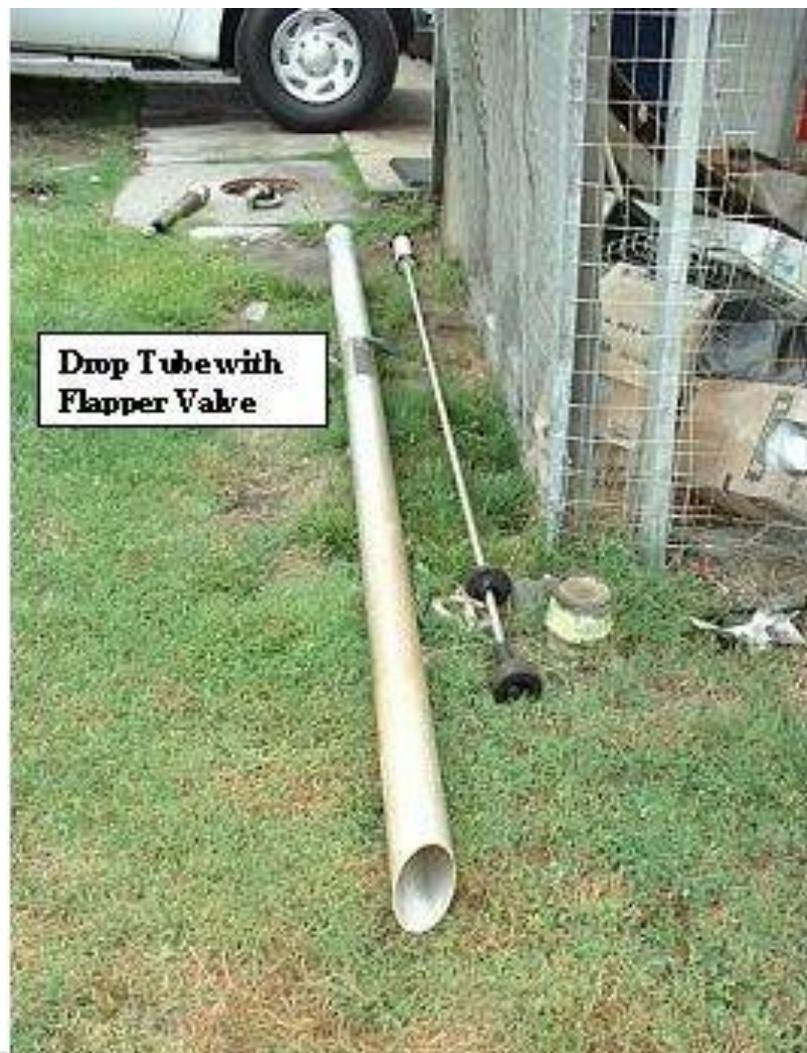
# Automatic Shutoff Devices

- Look down the fill pipe to see part of this device.
- You will see what appears to be a line cutting through the fill pipe (or a half moon shape in your fill pipe).



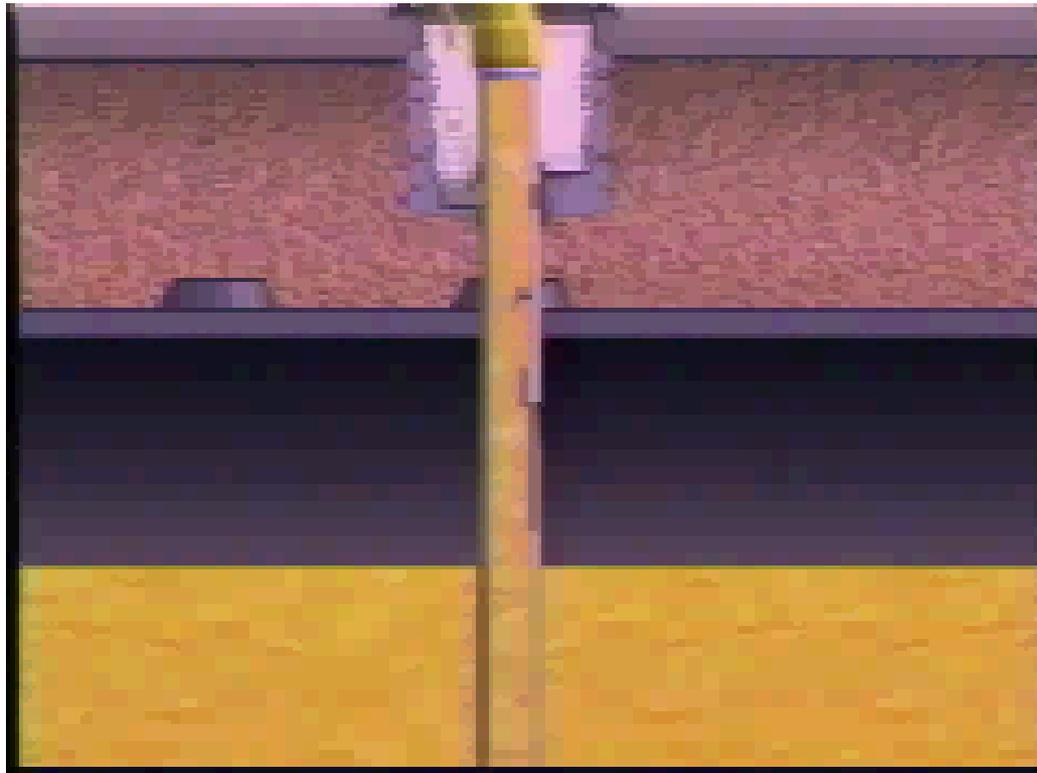
Looking Through The End  
Of Automatic Shutoff  
Device

# Examples of Automatic Shutoff Devices



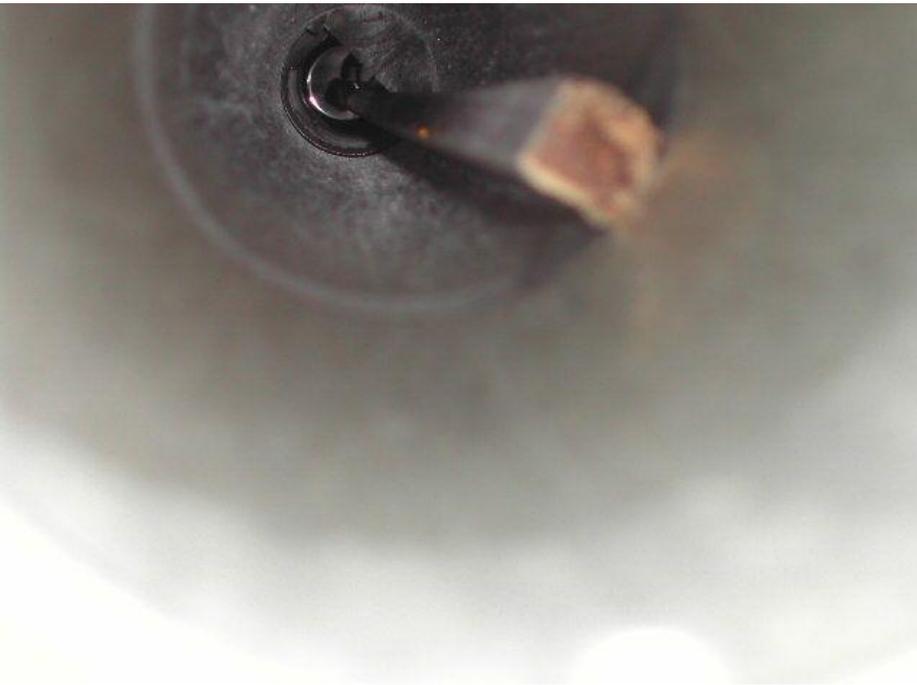
# Automatic Shutoff Devices

- These devices normally stop product flow when tank is **95%** full.



# What we don't want to see...

If a Tank Gauging stick is left in the fill pipe, then overfill prevention is disabled for these tanks



This is a **felony** under Tennessee state law

# Short Pause...

## Are there any questions about....

## Flapper Valves?

# Ball Float Valves

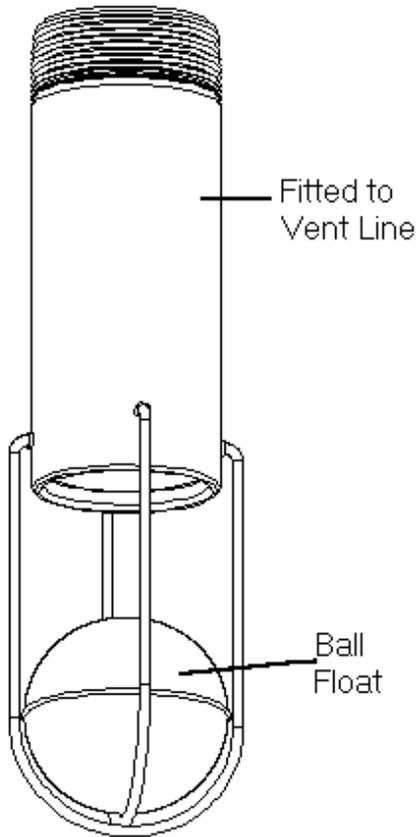
- A ball float valve is located inside the tank in the vent piping.



Sample  
Ball Float  
Valve



# Examples of Ball Float Valves



Sample  
Ball Float  
Valve



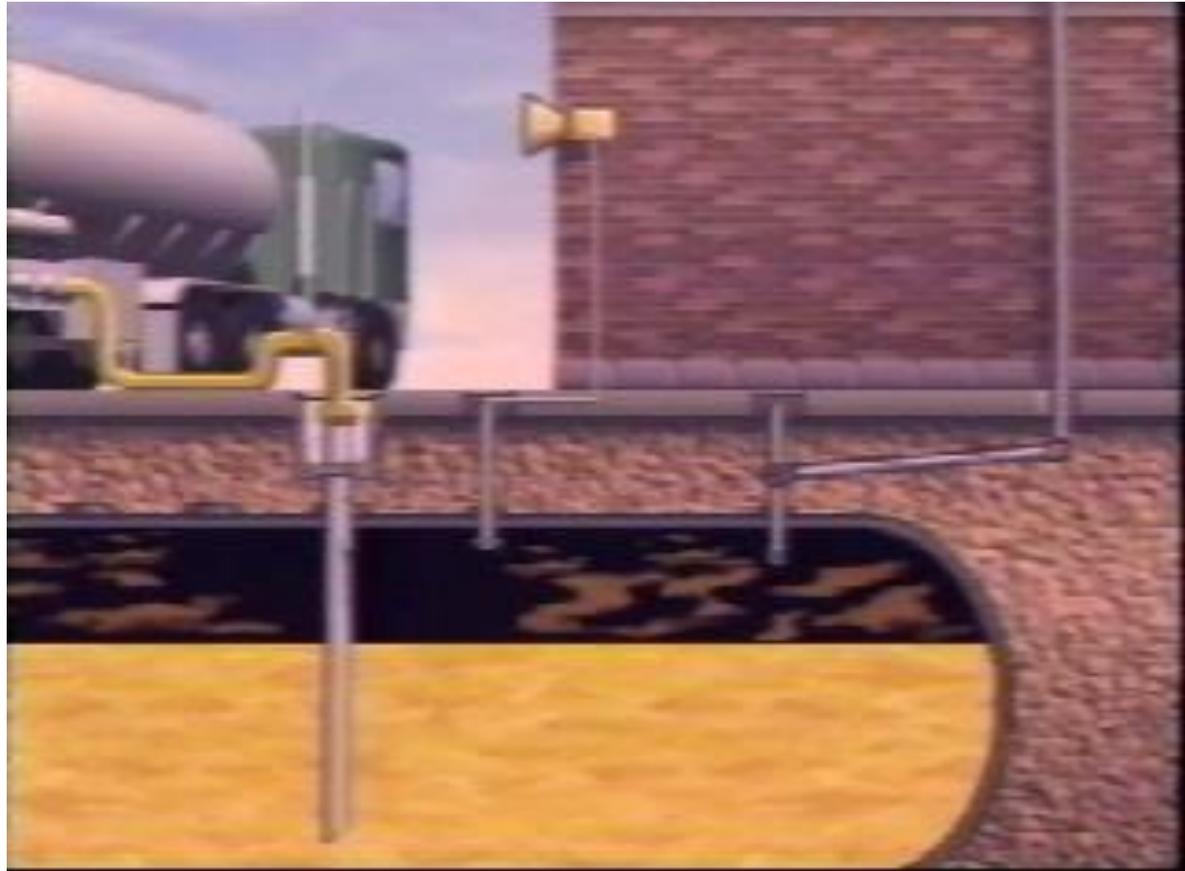
Close-up Of Extractor  
Port

# How Ball Float Valves Work

As the tank fills, a ball in the valve rises and restricts the flow of vapors out of the tank.

The flow rate decreases and alerts the delivery person to stop the delivery.

Ball float valves engage when the tank is **90%** full.



# Location of Ball Float Valves

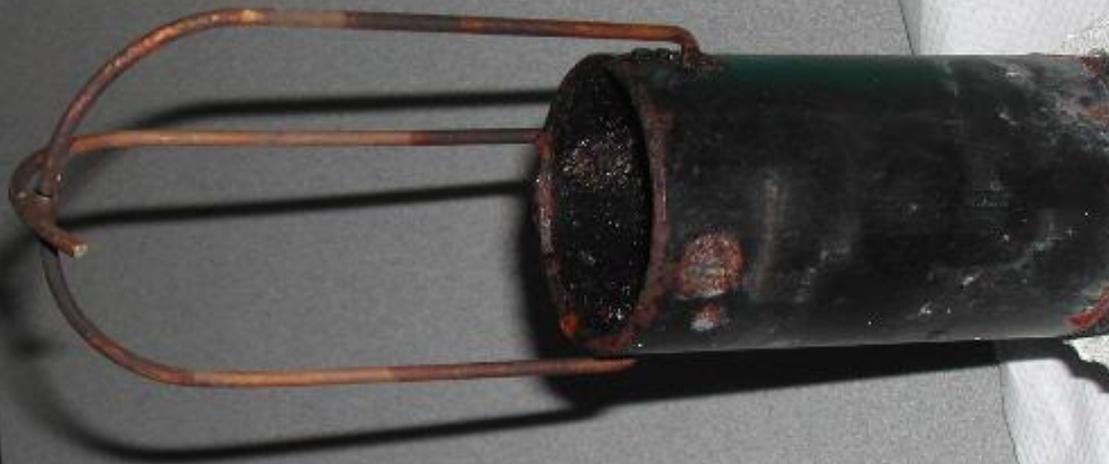


# Ball Float Valves

- Ball float valves may not be used in all tank applications.
- Facility records may indicate whether a tank has this device, or the contractor who installed the tanks may know if they are present.
- Inspectors will be asking tank owners to verify presence of ball float valves



# Damaged Ball Float Valve



**Wire  
restraining  
cage is broken  
and ball is  
missing.**

**No overfill  
prevention on  
this tank.**

# Damaged Ball Float Valve



# Limited Application for Ball Float Valves

Ball float valves may not be used for overfill prevention:

- With suction piping systems.
- With pressurized deliveries.
- On tanks with both remote fills and regular gauge openings.
- On emergency generator or heating oil tanks.
- On tanks with coaxial Stage I vapor recovery unless the appropriate delivery fittings are installed.

# Short Pause...

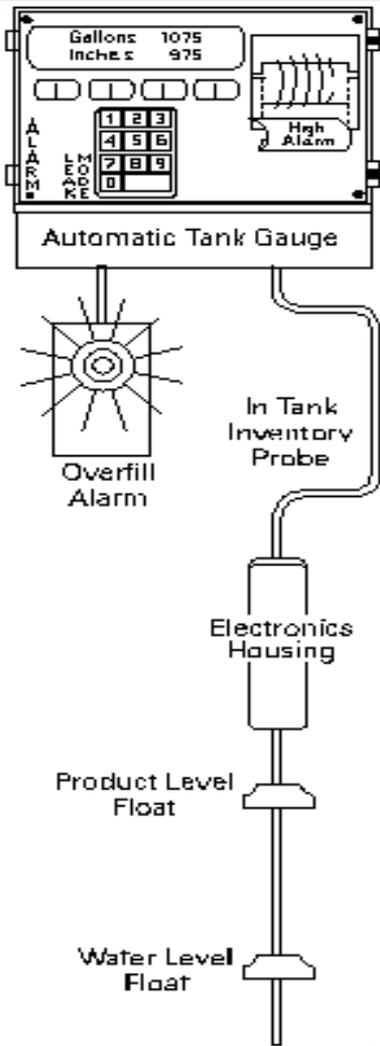
**Are there any questions about....**

**Ball Float Valves?**

# Overfill Alarms

- An **overfill alarm** uses a sensor in the tank located on the automatic tank gauge (ATG) probe.
- An overfill alarm provides **a warning** when the tank is close to being full that can be seen or heard (or both) by the delivery person.
- When the alarm activates, the **delivery person** should **stop the flow** of product to the tank **immediately**.

# Examples of Overfill Alarms



**These signaling devices must be located where the delivery driver can see and hear them to know when to stop product delivery**



Sample Overfill Alarm



**If delivery is not stopped quickly after alarm sounds, it is possible the tank could be overfilled**

# Example of Overfill Alarm



# Short Pause...

## Are there any questions about...

### Overfill Alarms?

# Overfill Prevention

There is one means of overfill prevention that  
always works.....

and we haven't discussed it.

Do you know what it is?

# Overfill Prevention

0400-18-01-.02(3)(b)

For as long as the UST system is used to store petroleum, owners and/or operators shall ensure that releases due to spilling or overfilling do not occur.

The owner and/or operator shall ensure that the volume available in the tank is greater than the volume of petroleum to be transferred to the tank before the transfer is made and that the transfer operation is monitored constantly to prevent overfilling and spilling.

# Calculating Delivery Amounts

## Problem

**Owner has:**

**10,000 gallon tank with  
Flapper valve overflow device,**

**5000 gallons of product  
remaining in tank**

**What is the maximum amount  
of fuel that should be ordered?**

# Calculating Delivery Amounts

## Problem

Owner has:

10,000 gallon tank with  
Flapper valve overflow device,

5000 gallons of product  
remaining in tank

What is the maximum amount  
of fuel that should be ordered?

## Solution

10,000 gallon tank  
– 5,000 gallons remaining in tank  
5,000 gallons ullage

Flapper valve overflow device activates  
when tank is 95% full, so 5% of 10,000 =  
500 gallon space which cannot be used

5,000 gallons ullage  
– 500 gallons  
4,500 gallons maximum

# Check your understanding

- ✓ How do the 3 types of overfill prevention devices function?
  1. Stop flow, 2. Reduce flow, 3. Alarms to alert driver
- ✓ Which tanks are NOT required to have overfill prevention?

Tanks filled with 25 gallons or less *at one time*, like waste oil tanks
- ✓ Which overfill device can be seen by looking in the fill pipe?

Flapper valve (automatic shutoff)
- ✓ Do you have overfill prevention on all your tanks?

# We Have Covered...

- ✓ **Tanks and Piping**
- ✓ **Spill Prevention**
- ✓ **Overfill Prevention**

**Next:**  
**Corrosion Protection**

# Corrosion Protection For Tanks and Piping

## All regulated underground tanks *and piping* must be protected from corrosion

- Portions of UST systems in contact with soil and/or water must be corrosion protected.
- Water as well as petroleum must be removed from sumps.

Some kinds of underground tanks and piping do not need *additional* corrosion protection.

# Tanks that do **NOT** need Additional Corrosion Protection

- ✓ **Fiberglass-clad Steel**
- ✓ **Jacketed Steel**
- ✓ **Fiberglass Reinforced Plastic (FRP)**



# Piping that does **NOT** need Additional Corrosion Protection



Fiberglass Piping



Flexible plastic piping

# Other UST Components that DO require Additional Corrosion Protection

- Steel Flex Connectors
- Remote fill piping
- Steel manifold siphon piping

# Bare Steel Tanks & Piping

Bare steel tanks or piping which were never upgraded by adding cathodic protection or lining may no longer be upgraded.

These must be placed Permanently Out of Service and closed in accordance with Division guidelines.

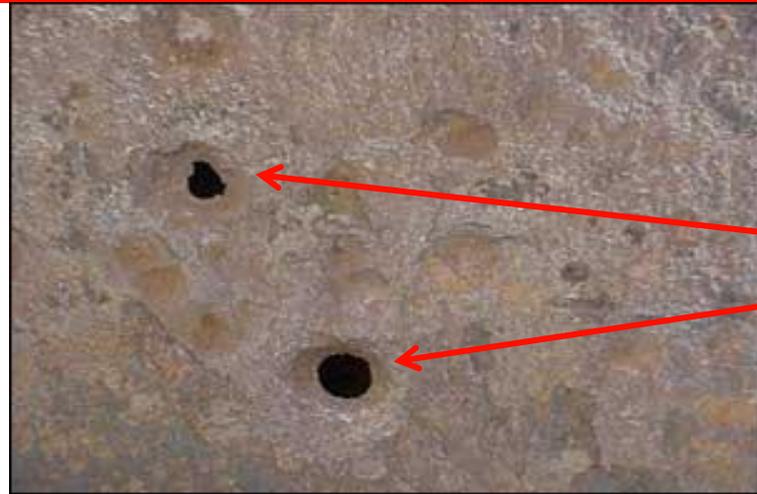
# These Components Need Additional Corrosion Protection



**Metallic components must be corrosion protected**



# Here's Why: Steel Corrodes



“point corrosion” acts like a drill on metal surfaces



# 3 ways to Achieve Corrosion Protection

- 1. Galvanic (Sacrificial Anodes)**
- 2. Impressed Current**
- 3. Internal Tank Lining and Cathodic Protection**

# 1. Galvanic (Sacrificial Anodes)

**Galvanic systems** use buried anodes attached to underground tanks or piping.

A galvanic system cannot be seen.

There is no rectifier in a galvanic system.



# 1. Galvanic (Sacrificial Anodes)

Anodes are installed on tanks at the factory (such as on the sti-P3<sup>®</sup> tank) and can be installed on piping and other underground metal components in the field.



Bag anodes attached to metal piping



# 2. Impressed Current System

Impressed current cathodic protection systems use a **rectifier** to provide current to the tank, piping, or other components for corrosion protection.



# 2. Impressed Current System

- The rectifier is always located somewhere at the facility. It may be found inside or outside the building.

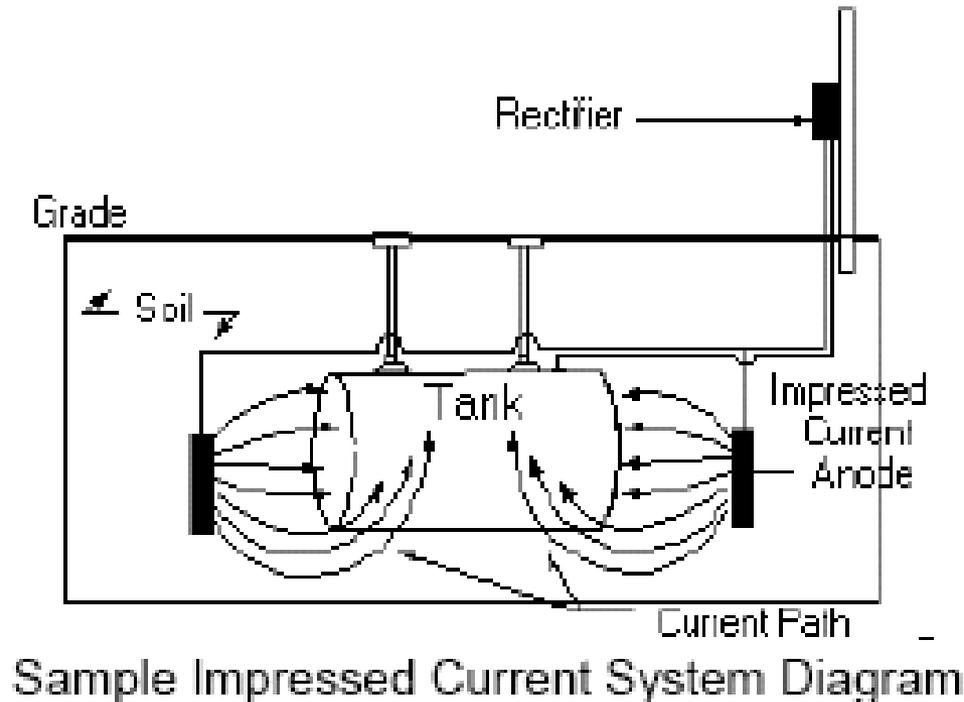


Sample Rectifier



# 2. Impressed Current System

- Electric power to the rectifier must be on continuously.
- Impressed current cathodic protection systems are always installed in the field.



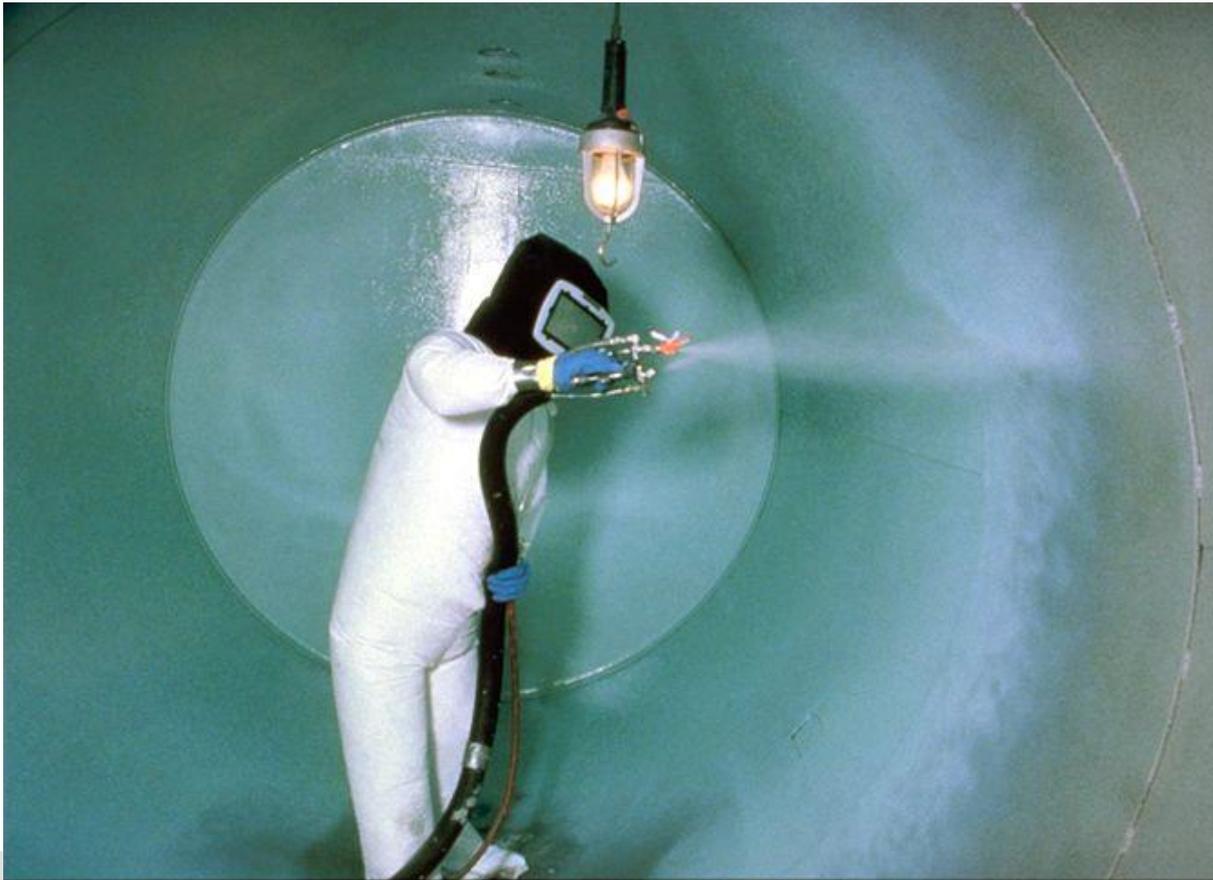
### 3. Internally Lined & Cathodically Protected Steel Tank

A tank may have both an internal lining and a cathodic protection system.

Cathodic protection may be either impressed current or galvanic (sacrificial anodes).

# Applying Internal Tank Lining

This is a steel tank with an **internal lining** being applied to the inside wall of the tank.



# Internally Lined Steel Tanks

**EFFECTIVE DECEMBER 22, 2012:**

Internally lined tanks with no external corrosion protection system must be closed.

# If you have Internally Lined Steel Tanks

## YOU MUST KEEP:

-  All records of the lining installation and manufacturer's warranty.
-  All records of any repairs made to the tank or lining.
-  All records of lining inspections.

# Steel Flex Connectors

Steel flex connectors must be protected from corrosion by one of the following:

1. **Isolating the flex connector** from contact with soil and water by putting a protective covering or boot on the flex connector,

OR...

shrink wrap boot isolates  
flex connector from soil



# Steel Flex Connectors

2. Removing soil and/or water in contact with flex connector,  
OR...



Any water in sump must not be in contact with flex connector



Gravel or soil must not be in contact with flex connector

# Steel Flex Connectors

## 3. Adding Cathodic Protection to the flex connector



drive- in rod anode

# Testing Cathodic Protection

**Both** Galvanic and Impressed Current cathodic protection systems must be tested periodically by a cathodic protection tester to ensure they are working properly.



# Testing Cathodic Protection

## For Galvanic (Sacrificial Anode) Systems:

- A test must be conducted within six months of installation and then at least every three years.
- Keep records of the last **two** cathodic protection tests.

# Testing Cathodic Protection

For Impressed Current cathodic protection systems:

The rectifier must be inspected at least every 60 days to make sure it is on and operating properly.

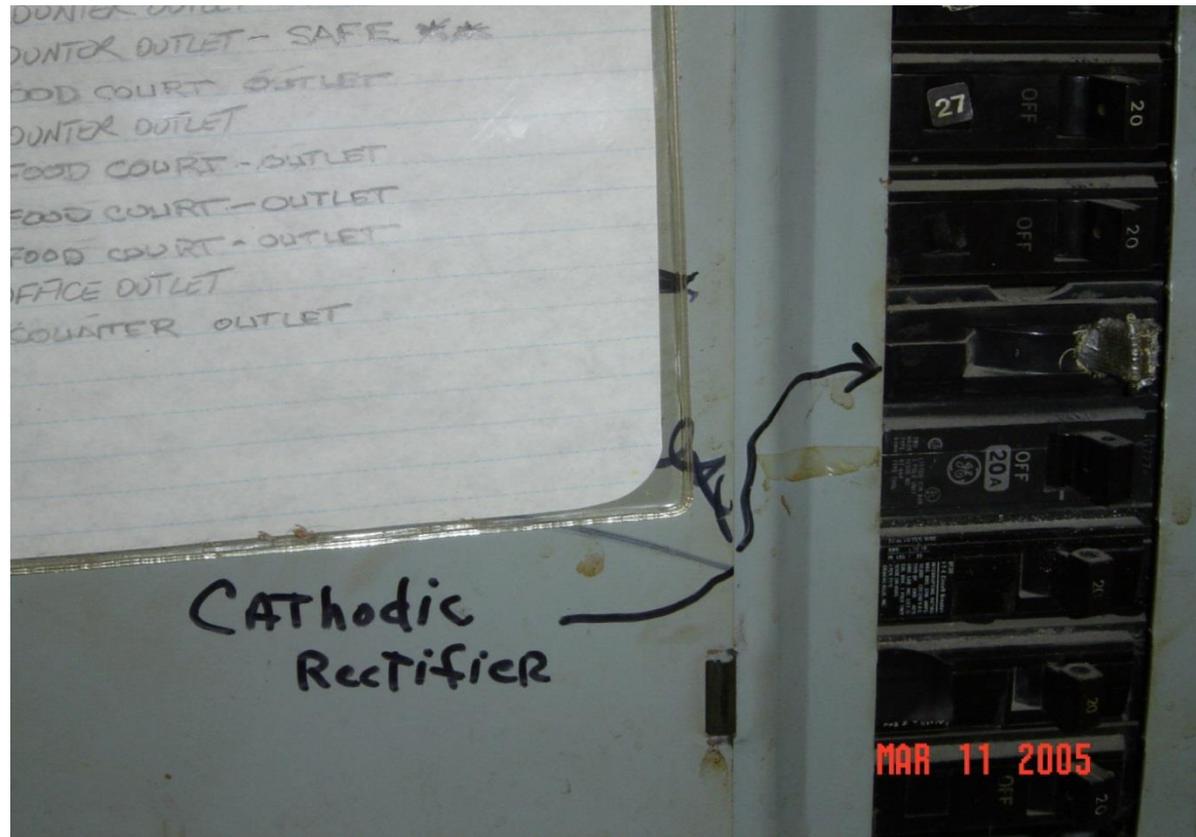
→ Keep records of the last two cathodic protection tests,

AND

→ Keep records of the last three rectifier inspections.

# CP System Power

The Impressed Current Cathodic Protection system should be on a separate circuit from other electrical components



# Checking the CP Rectifier





# What You Must Remember About Cathodic Protection

1. Cathodic protection systems must operate **continuously** and protect all metal tanks and piping in contact with the ground, standing water, or other liquids.
2. If CP system is **turned off or inoperable** for 12 months or more, tanks must be taken out of service and closed.



# What You Must Remember About Cathodic Protection

3. Cathodic protection systems must be tested:
  - a. every three years
  - b. within 6 months of installation
  - c. within 6 months of any repair
  
4. IC Rectifiers must be checked every 60 days.

# What's Wrong With This?



# Check your understanding

- ✓ What is the difference between Galvanic and Impressed Current Cathodic Protection?

Galvanic - factory installed anodes, can't be seen;  
Impressed Current - field installed anodes, rectifier present

- ✓ Which tanks and piping are NOT required to have additional corrosion protection?

Fiberglass, fiberglass clad, jacketed tanks; fiberglass and flexible plastic pipe

- ✓ How often must all Cathodic Protection systems be tested?

Every 3 years, rectifiers checked every 60 days

- ✓ Do you know if your tanks and piping have CP, and has it been tested within the last 3 years?

# We Have Covered...

- ✓ **Tanks and Piping**
- ✓ **Spill Prevention**
- ✓ **Overfill Prevention**
- ✓ **Corrosion Protection**

**Next:**  
**Leak Detection**

# Available Leak Detection Methods

- Automatic Tank Gauging
- Statistical Inventory Reconciliation
- Interstitial Monitoring (*must be used on tanks or pressurized piping installed after 7/24/2007*)
- Manual Tank Gauging

# What You Must Know About Leak Detection

- All tanks and pressurized piping **installed after July 24, 2007** must be double-walled and use **interstitial monitoring** release detection.
- This also applies to emergency generator tanks\*.
- Leak Detection must be performed **every 30 days**.
- Leak detection records must be kept for **at least the last 12 consecutive months**.

\*emergency generator tanks installed before July 24, 2007 are deferred from release detection until October, 2018.

# Ethanol Blended Fuels

## Ethanol blended fuels:

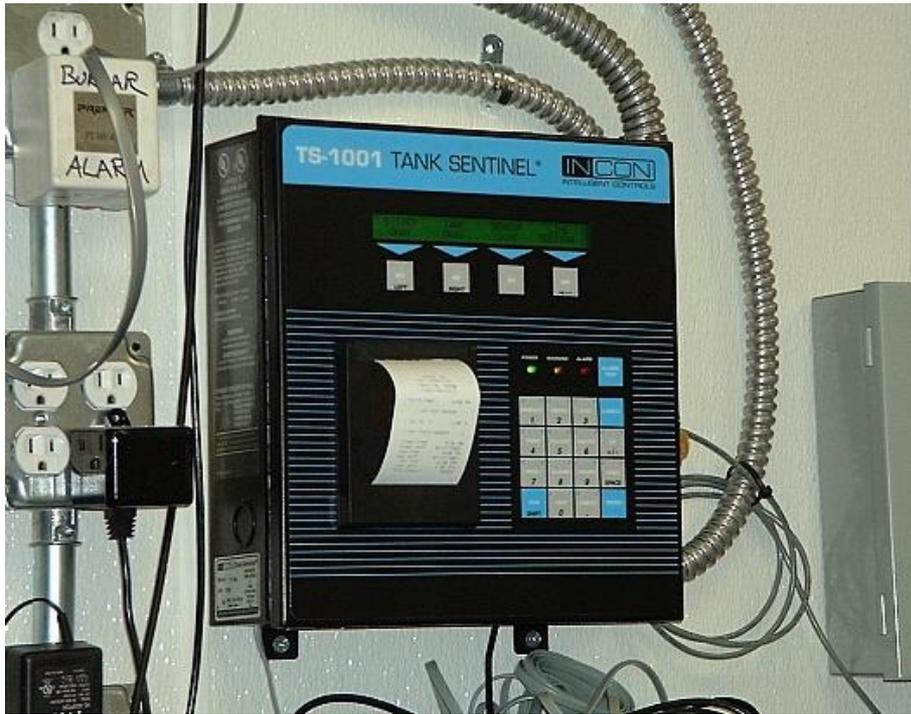
- ✓ E 10 - up to 10% ethanol, most common fuel in TN.
- ✓ E 15 - beginning to be commercially available in TN.
- ✓ E 85 - limited availability in TN; for flex fuel vehicles only

**Very critical to keep water out of tanks**

storing ethanol blended fuels.  
Excess water in tank can result in “phase separation” where water/ethanol separates from gasoline - fuel is out of specification and ruined.



# Automatic Tank Gauging (ATG)



# Automatic Tank Gauging (ATG)

An ATG system consists of a *permanently installed probe* that collects information such as product level and temperature, and a *console* inside the facility which calculates changes in product volume that can indicate a leak. The console should signal an **alarm** when there is a suspected problem. An ATG must be able to detect a **0.2 gph leak**.



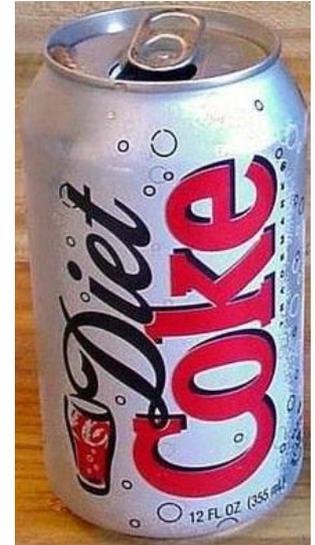
# How much is two tenths of a gallon?

?



?

?



?



# Monthly ATG Leak Detection

This is the size of monthly leak an ATG must be able to detect:



Two tenths of a  
gallon  
0.2 gal.

# Automatic Tank Gauge Components



**Probes**  
(inside the tank)



**Console**  
(inside the building)

# Automatic Tank Gauge Probe Locations



# What you should know about ATGs

- Some ATGs can be programmed to automatically test every 30 days. If your ATG does not test automatically, you must take tanks out of service and conduct a leak test. (*this is called a static test*)
- All ATGs require a certain minimum amount of product in the tank to conduct a valid test.
- Some ATGs can be combined with computer programs that allow tanks to remain in service while conducting testing. This is known as CSLD or CITLDS (used at high volume locations).
- It is not a recommended practice to rely on the ATG memory to store leak detection records. *Why?*

# Automatic Tank Gauging

## What you must do:

- Conduct leak test at least once per month for each tank if it isn't done automatically.
- Print out and keep at least **one** passing monthly leak test result for each tank from the ATG. *It is best if this is done monthly.*
- Keep your ATG user manual handy.
- Perform routine maintenance required by manufacturer.
- Pay attention to any and all alarms and respond appropriately.
- Report all suspected releases within 72 hours.
- Keep the last 12 consecutive months of leak detection results.

# Never Ignore ATG Alarms



# Interstitial Monitoring using Secondary Containment

**Interstitial monitoring** checks the space between tank walls or piping walls, or single wall piping and a barrier separating it from the environment (sump or chase pipe).

The outer barrier is often called “**secondary containment**”.

The space between the barriers is called the interstitial space or interstice, and for tanks and piping, must be monitored continuously.

This method must be capable of detecting a release from the inner wall of a tank or piping.

# Interstitial Monitoring using Secondary Containment

All tanks installed after July 24, 2007 must be double-walled or jacketed, and use **interstitial monitoring**.

All **pressurized piping** installed after July 24, 2007 must be double-walled or secondarily contained and use **interstitial monitoring**.

Interstitial monitoring is not required for **safe suction** piping.

# Interstitial Monitoring using Secondary Containment

This is a double wall tank.

The space between the walls is the interstitial space.

It can be monitored in several ways.

Interstitial Monitoring may also be used with secondarily contained piping.

Electronic sensors, vacuum, pressure, or liquid may be used to monitor the interstitial space.



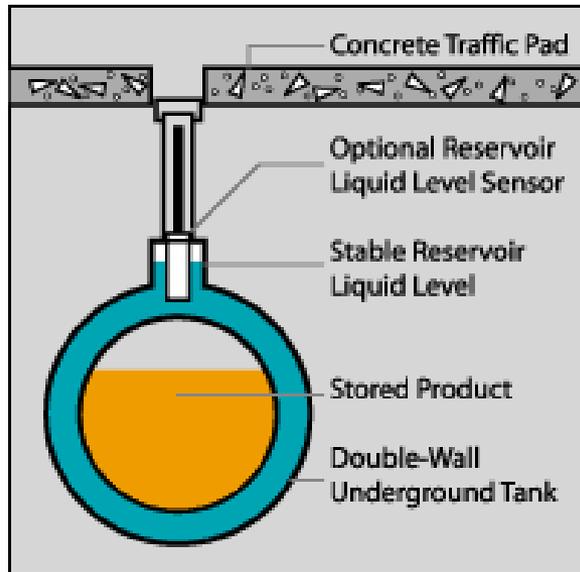
# Interstitial Monitoring

## There are several ways:

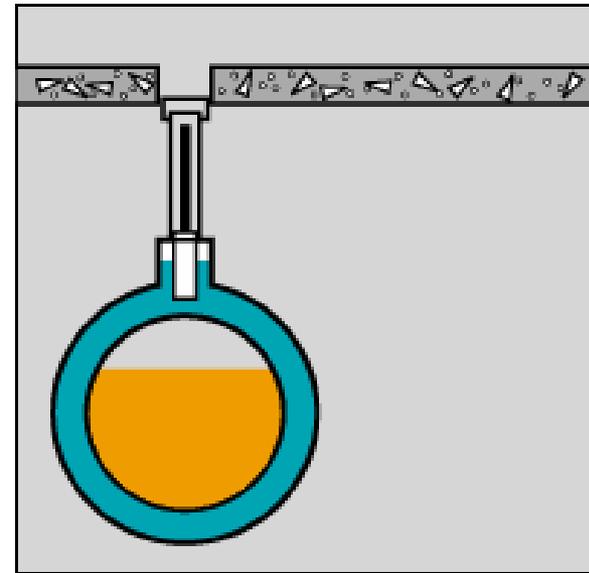
- **Hydrostatic Methods** - use liquid-filled interstice with a reservoir where the liquid level is monitored.
- **Pressure/Vacuum Methods** - apply pressure or vacuum to interstice and monitor changes in pressure or vacuum.
- **Electronic sensors** - placed in interstice to send a signal when liquid is detected.

Sensors are the most common and least expensive way to conduct interstitial monitoring.

# Hydrostatic monitoring in double wall tanks

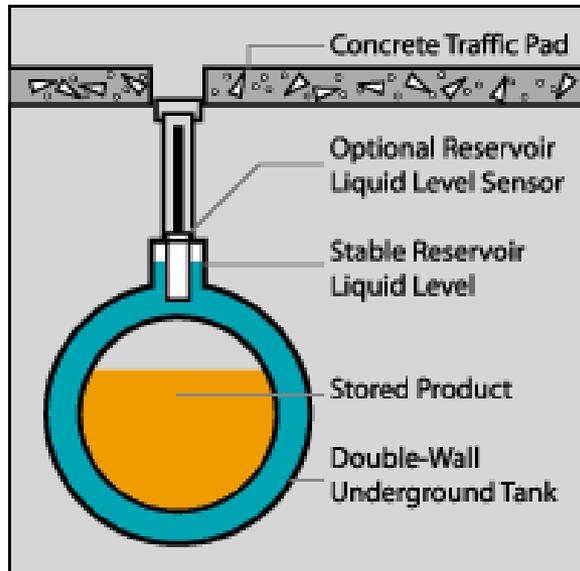


Normal leak sensing position

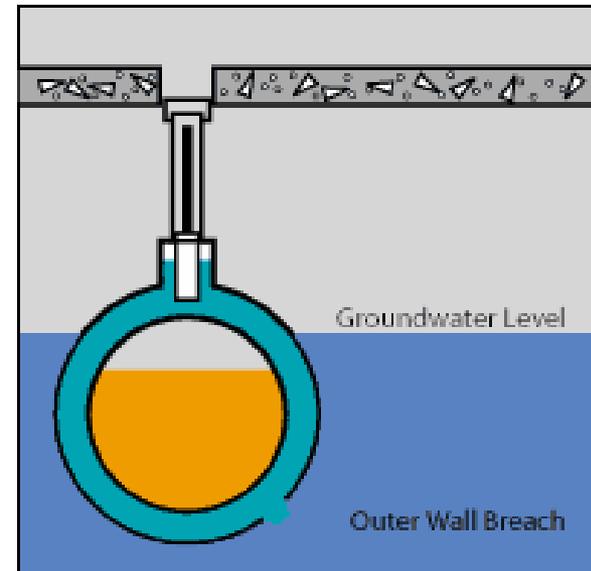


Leak in primary wall

# Hydrostatic monitoring in double wall tanks

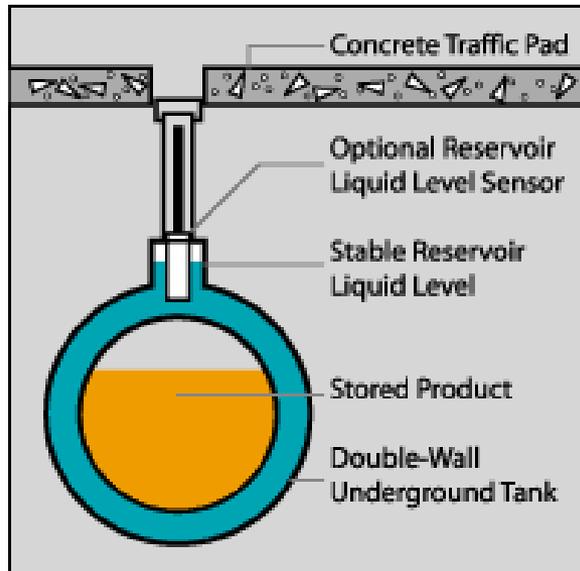


Normal leak sensing position

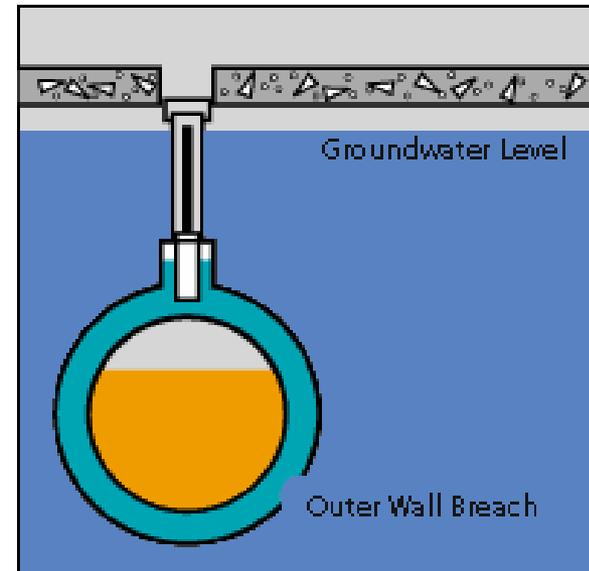


Leak in secondary wall

# Hydrostatic monitoring in double wall tanks



Normal leak sensing position



Leak in secondary wall  
high ground water

# Interstitial Monitoring Sensors



sensor for fiberglass tanks



sensor for steel tanks



dual float and single float hydrostatic sensors

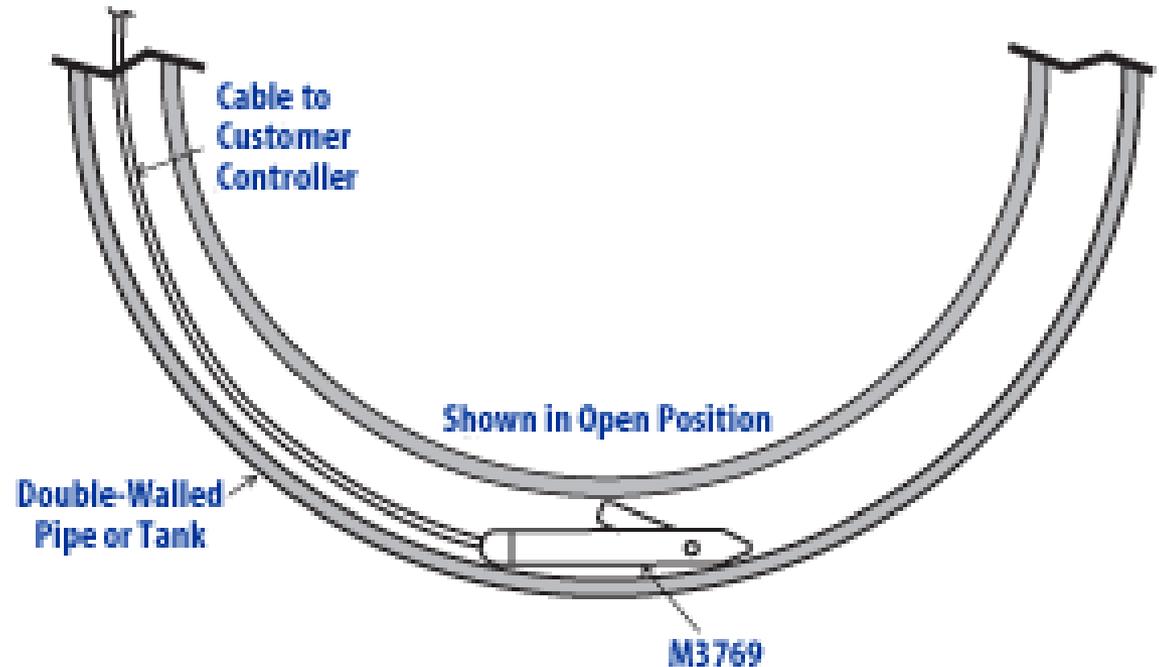


discriminating sensor



microsensor

# Sensor use in double wall FRP Tanks



sensor for fiberglass tanks

# Pressurized Piping Interstitial Monitoring

## Sump sensor usage

Monthly visual observation of pressurized piping is not acceptable. You must have an electronic or otherwise **continuous** means of monitoring secondarily contained pressurized piping.

If sump sensors are used for pressurized piping, they must be installed in every sump where product can leak and accumulate. A single tank top sensor for the entire product piping run is not acceptable.



# Views of Sump Sensors



Under dispenser  
sump with  
interstitial  
monitoring  
sensor

# Views of Sump Sensors



Tank-top sump sensor with secondary containment piping

# Interstitial Monitoring

## What else you must know:

- Sump Sensors may sound false alarms from water in sumps.
- Disabling or tampering with a sensor is a *criminal offense*.
- Moving a sensor out of position to detect liquid is a violation.
- Sensors can malfunction; therefore, you must conduct testing of sensors annually to ensure proper function.
- If a sensor detects petroleum between the walls of a double wall tank, it is treated as *a suspected release*.
- If water can enter the outer wall of a double wall tank, the tank no longer has secondary containment. This condition must be investigated.

# Interstitial Monitoring

## What you must do:

- Monitor release detection system to determine if a leak was detected within the last 30 days.
- If using electronic sensors, you must conduct annual testing to ensure proper sensor function.
- If using liquid-filled or sealed pressure/vacuum system, you must refer to the user's manual to determine if system is remaining within correct parameters.

# Interstitial Monitoring

## What you must do:

- If IM equipment does not produce an electronic monthly record, tank owner must create a paper record to satisfy recordkeeping requirements.
- IM records must be maintained on the Division approved form available on the UST website.
- Keep the last 12 consecutive months of leak detection results.
- Report all suspected releases within 72 hours.

# Monthly IM Form



STATE OF TENNESSEE  
 DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
 DIVISION OF UNDERGROUND STORAGE TANKS  
 William R. Snodgrass Tennessee Tower  
 312 Rosa L. Parks Avenue, 12<sup>th</sup> Floor  
 Nashville, Tennessee 37243

MONTHLY ELECTRONIC INTERSTITIAL MONITORING REPORT						
This report is used to document interstitial monitoring of underground storage tanks (UST) systems equipped with secondary containment. Interstitial monitoring is required on all UST systems installed after July 24, 2007.						
<ul style="list-style-type: none"> <li>➤ Document the status of any alarms reported during the monitoring period.</li> <li>➤ Maintain these records for a minimum of 12 months and submit them for review upon request by the division.</li> <li>➤ Attach copies of all monthly sensor status and alarm history reports for the monitoring period.</li> <li>➤ Report any unusual operating conditions or suspected releases discovered to the division within 72 hours of discovery.</li> </ul>						
I. UST FACILITY			II. PERSON CONDUCTING MONITORING			
UST Facility ID #:			Name:			
Facility Name:			Company:			
Address:			City:		State:	
City:		County:		Phone #:		
III. INTERSTITIAL MONITORING DEVICE INFORMATION						
UST System Components Monitored (Check all that apply)						
<input type="checkbox"/> Double-wall Tank <input type="checkbox"/> Double-wall Pipe <input type="checkbox"/> STP Sumps <input type="checkbox"/> Dispenser Sumps <input type="checkbox"/> Transition Sumps						
Interstitial Space:						
<input type="checkbox"/> Atmospheric (dry) <input type="checkbox"/> Hydrostatically Monitored (Brine Filled) <input type="checkbox"/> Vacuum Monitored <input type="checkbox"/> Pressure Monitored						
IV. MONTHLY ELECTRONIC INTERSTITIAL MONITORING RESULTS (Attach additional pages as needed)						
MONTH:			YEAR:			
Sensor ID						
Tank, Sump, or Dispenser						
Result						
Alarm Status						
V. INTERSTITIAL MONITORING ALARM LOG						
<ul style="list-style-type: none"> <li>➤ Document all sensor alarms that occurred during the previous 30 days using this section of the report.</li> <li>➤ Document that all alarms or suspected releases have been investigated and, if necessary, attach the appropriate documentation to this report.</li> <li>➤ If your monitoring device is capable of producing an "alarm history" report, attach a copy of the report to this form.</li> </ul>						
Date of Alarm	Cause of Alarm			Describe Action Taken:		

# Annual IM Testing Form



STATE OF TENNESSEE  
 DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
 DIVISION OF UNDERGROUND STORAGE TANKS  
 William R. Snodgrass Tennessee Tower  
 312 Rosa L. Parks Avenue, 12<sup>th</sup> Floor  
 Nashville, Tennessee 37243

ANNUAL ELECTRONIC INTERSTITIAL MONITORING TEST REPORT									
This report is used to document functional testing of electronic interstitial monitoring devices. <ul style="list-style-type: none"> <li>➤ In the absence of an approved 3<sup>rd</sup> party test procedure or manufacturer's recommended practice, the procedure outlined below may be used to verify the interstitial monitoring devices are working properly.</li> <li>➤ Interstitial monitoring is required on all UST systems installed after July 24, 2007.</li> <li>➤ Report any unusual operating conditions or suspected releases discovered during this test to the division within 72 hours of discovery. Failure to do so could affect fund coverage in the event of a release.</li> <li>➤ Attach documentation of all completed repairs, service invoices, or leak detection equipment replacement to this report, and maintain these records for a period of 12 months.</li> </ul>									
I. UST FACILITY					II. PERSON CONDUCTING TEST				
UST Facility ID #:					Name:				
Facility Name:					Company:				
Address:					City:			State	
City:		County:			ZIP:		Phone:		
Tester Signature:					Test Date:				
III. TEST AND MONITORING DEVICE INFORMATION (Attach additional pages as necessary)									
Sensor ID									
Manufacturer									
Model #									
Location:									
Type of Sensor(s) (Check all that apply)	<input type="checkbox"/> Float Switch- Type:      ( <input type="checkbox"/> discriminating <input type="checkbox"/> non-discriminating) <input type="checkbox"/> Optical Sensor <input type="checkbox"/> Electrical Conductivity Sensor <input type="checkbox"/> Pressure Monitoring Device <input type="checkbox"/> Vacuum Monitoring Device <input type="checkbox"/> Other (specify):								
System Setup (Check all that apply)	If a sensor is activated, the interstitial monitoring system responds with the following actions: <input type="checkbox"/> Visual Alarm <input type="checkbox"/> Audible Alarm <input type="checkbox"/> Tank Monitor Leak Alarm <input type="checkbox"/> Submersible Pump Shutdown <input type="checkbox"/> Off Site Telemetry Alarm <input type="checkbox"/> Other (specify)								
IV. ELECTRONIC INTERSTITIAL MONITORING TEST PROCEDURE									
Check Completed	Task								

# What's Wrong in This Picture?



# Statistical Inventory Reconciliation (SIR)

SIR uses a computer program to perform a *statistical analysis* of inventory, delivery, and dispensing data every 30 days. A gauging stick or ATG is used to gather inventory data.

SIR requires the tank owner to follow specific data collection procedures. (daily 1/8 inch fuel measurements, monthly water readings, annual meter calibration, deliveries through drop tubes)



# Statistical Inventory Reconciliation (SIR)

- SIR may be conducted by a **SIR vendor** for the tank owner, or by a tank owner using an acceptable SIR program.
- SIR results must be reported as *pass, fail, or inconclusive*.
- SIR results apply only for monthly leak detection for tanks and piping.

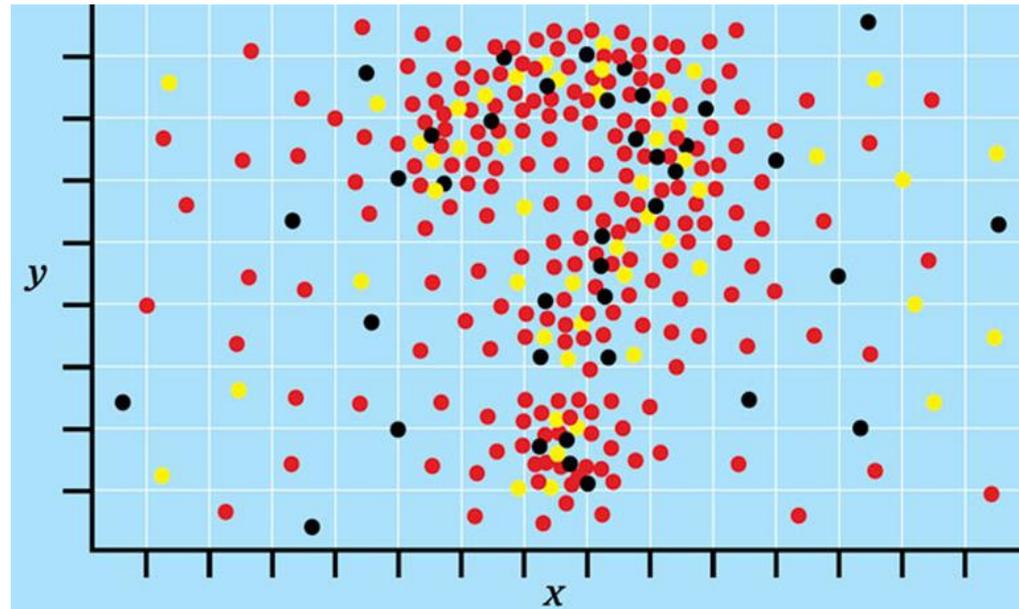
# Statistical Inventory Reconciliation (SIR)

- Inventory data is sent to a **SIR vendor** (or entered into a computer program leased to the tank owner by the SIR vendor) at least once every 30 days.
- Once data is analyzed, results must be provided within 10 days of the end of the reporting period.
- You must keep **complete**\* SIR records and provide them upon inspection.

\*Complete SIR records consist of: the monthly SIR result, **plus** all raw data (stick readings, product delivered, product sold, water readings, etc.)

# SIR Inconclusive Results

- A SIR inconclusive result means you do not have a passing leak detection result for the month.
- The problem might be poor measurements, miscalibrated meters, missed deliveries, or something else. Contact your SIR vendor for help.
- If an inconclusive monthly result is received, you must **investigate immediately** and correct any problem.
- Document results of the investigation and keep with leak detection records.



# SIR Inconclusive Results

- If you receive inconclusive results for **2 consecutive months**, it is a **suspected release**, and this must be reported to the Division within 72 hours.
- Report all **FAIL** SIR results to the Division within 72 hours.
- Follow instructions given by the Division after reporting **2 consecutive monthly inconclusive** or one **Fail** SIR result.

# Statistical Inventory Reconciliation (SIR)

## What you must have:

- A contract with a SIR provider to analyze monthly leak detection records, or a SIR program which can be operated on your computer to conduct SIR analysis.
- A means to collect product inventory data (gauging stick, or ATG) on a daily basis.
- A means to convert measurements to gallons (tank chart).

Be sure your measuring equipment is in good shape – not like this worn out stick



# Statistical Inventory Reconciliation (SIR)

## What you must do:

- Collect and record adequate inventory data every 30 days using inventory control data collection requirements.
- Have records analyzed every 30 days either by a SIR provider or a computer program leased to the tank owner by a SIR vendor.
- Investigate, determine the reasons, and correct the causes for any inconclusive results.
- Keep the last 12 consecutive months of leak detection results.
- Report all suspected releases within 72 hours. (any FAIL, or any two consecutive INCONCLUSIVE results)

# Check your understanding

- ✓ What should you do if you receive a SIR inconclusive monthly result?

Investigate, and correct any sources of error found. Consult with SIR vendor for suggestions, recheck math, possibly check meter calibration, etc.

- ✓ What should you do if you receive a second consecutive monthly SIR inconclusive result?

Investigate as before, AND report this as a suspected release to the Division within 72 hours.

- ✓ What should you do if you receive a SIR FAIL result?

Report this as a suspected release to the Division within 72 hours.

Investigate, and consult with SIR vendor for suggestions to determine the reason for the FAIL result.

# Manual Tank Gauging and Tank Tightness Testing

- Manual Tank Gauging measures product level and compares readings to weekly and monthly standards to determine if the tank is tight.
- A tank gauging stick is generally used to take measurements to the nearest 1/8 inch.
- Tanks must be taken out of operation for a specified period of time each week.
- For tanks installed before July 24, 2007, this method may only be used for up to ten years.
- Tanks installed after July 24, 2007, may NOT use this method of release detection.

# Manual Tank Gauging and Tank Tightness Testing

- Manual Tank Gauging (MTG) **alone** may be used for tanks 1,000 gallons or less (as long as specific tank dimensions are met).
- Tanks from 1,001 gal. to 2,000 gal. **must** use Tank Tightness Testing *in addition* to MTG.
- Tanks over 2,000 gal. may not use MTG.

# Manual Tank Gauging and Tank Tightness Testing

Manual Tank Gauging (MTG) may be applied to the following tank sizes:

1. 550 gallons or less
2. 551 – 1,000 gal. which meet specific tank diameters.
3. 551 – 1,000 gal. which do not meet specific tank diameters must use Tank Tightness Testing *in addition* to MTG.

# Manual Tank Gauging

## What You Must Do:

- Determine how long the weekly test must be.
- **Remove tank from service** for the test period.
- Record the average of **two** inventory readings at the ***beginning*** of the test period.
- Record the average of **two** inventory readings at the ***end*** of the test period.
- Compare the difference with the standards in the chart.
- Repeat **weekly** and compare with weekly standard.
- **Average 4 weeks** and compare with monthly standard.
- Report all suspected releases within 72 hours.
- Keep the last 12 consecutive months of leak detection results.

# Manual Tank Gauging Leak Test Standards

<b>Tank Size</b>	<b>Minimum Test Period</b>	<b>Weekly Standard (one test)</b>	<b>Monthly Standard (four test average)</b>
<b>Up to 550 gallons</b> (any tank diameter)	<b>36 hours</b>	<b>10 gallons</b>	<b>5 gallons</b>
<b>551 – 1,000 gallons</b> (any tank diameter)	<b>36 hours</b>	<b>13 gallons</b>	<b>7 gallons</b>
<b>551 – 1,000 gallons</b> (tank diameter = 64")	<b>44 hours</b>	<b>9 gallons</b>	<b>4 gallons</b>
<b>551 – 1,000 gallons</b> (tank diameter = 48")	<b>58 hours</b>	<b>12 gallons</b>	<b>6 gallons</b>
<b>1001– 2,000 gallons</b>	<b>36 hours</b>	<b>26 gallons</b>	<b>13 gallons</b>

# Manual Tank Gauging Leak Test Standards

Tank Size	Minimum Test Period	Weekly Standard (one test)	Monthly Standard (four test average)
<b>Up to 550 gallons</b> (any tank diameter)	<b>36 hours</b>	<b>10 gallons</b>	<b>5 gallons</b>
<b>551 – 1,000 gallons</b> (any tank diameter)	<b>36 hours</b>	<b>13 gallons</b>	<b>7 gallons</b>
<b>551 – 1,000 gallons</b> (tank diameter = 64")	<b>44 hours</b>	<b>9 gallons</b>	<b>4 gallons</b>
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<b>1001– 2,000 gallons</b>	<b>36 hours</b>	<b>26 gallons</b>	<b>13 gallons</b>

# Manual Tank Gauging

When do you have a suspected release?

- A leak is suspected when the weekly **or** monthly test exceeds the numbers in the chart.
- This is a failing result and must be reported to the division within 72 hours.

Example: 1100 gallon tank

1st weekly test = 20 gallons, 2nd weekly test = 18 gallons

3rd weekly test = 16 gallons, 4th weekly test = 20 gallons

Average of 4 weekly tests = 18.5 gallons

Chart value = 13 gallons

Result = **Fail**

# Manual Tank Gauging Leak Test Standards

Tank Size	Minimum Test Period	Weekly Standard (one test)	Monthly Standard (four test average)
Up to 550 gallons (any tank diameter)	36 hours	10 gallons	5 gallons
551 – 1,000 gallons (any tank diameter)	36 hours	13 gallons	7 gallons
551 – 1,000 gallons (tank diameter = 64")	44 hours	9 gallons	4 gallons
551 – 1,000 gallons (tank diameter = 48")	58 hours	12 gallons	6 gallons
1001– 2,000 gallons	36 hours	26 gallons	13 gallons

# What You Must Remember About Manual Tank Gauging

1. Can only be used on tanks 2,000 gallons or less.
2. Must be combined with Tank Tightness Testing if tank is greater than 1,000 gallons (or greater than 550 gallons if specific tank dimensions are not met).
3. Both weekly **and** monthly standards must be met in order to pass.

# We Have Covered...

- ✓ Tanks and Piping
- ✓ Spill Prevention
- ✓ Overfill Prevention
- ✓ Corrosion Protection
- ✓ Tank Leak Detection

Next:

**Piping Leak Detection**

# Piping Leak Detection

Two types of piping systems:

- **Pressurized**
  - **Suction**
- › Leak detection requirements *differ* depending on whether piping is pressurized or suction. You **must** know the difference.

We will examine each type.

First.....Pressurized Piping

# Pressurized Piping Sump

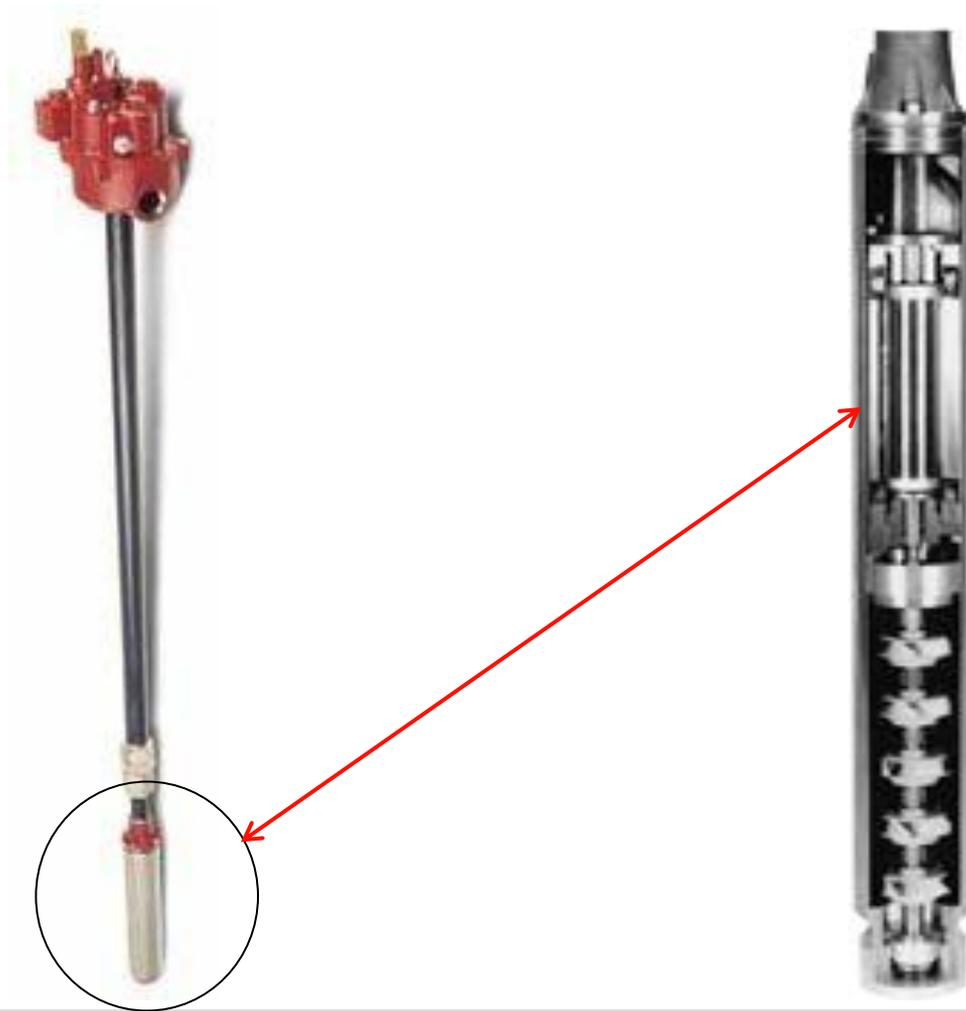
- Uses a submersible turbine pump (STP) located inside the tank that pushes product to the dispenser.
- A pressurized piping system should have a STP head in a sump above the tank.
- These sumps are covered with a lid and may also have a sump cover under the lid.



# Submersible Turbine (STP) Heads



# Submersible Turbine Pump



# Pressurized Piping Requirements

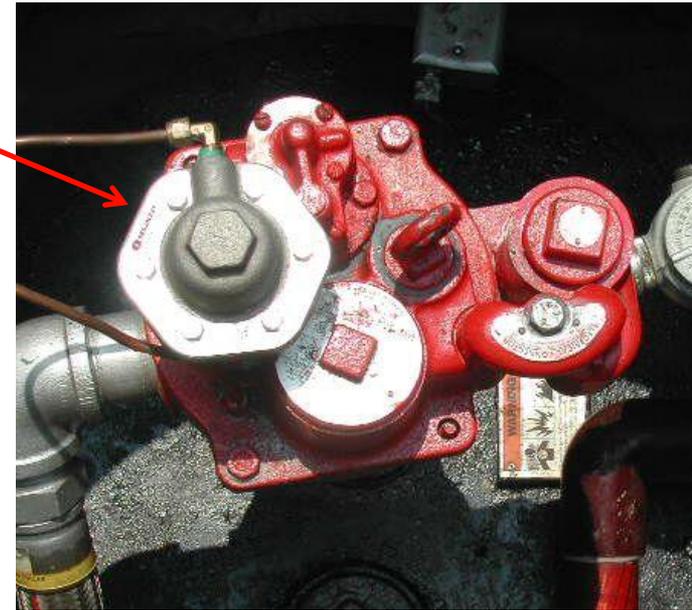
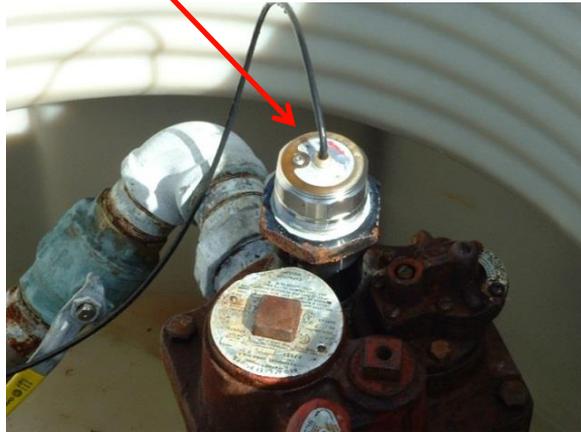
Pressurized piping **must** have two forms of Leak Detection:

1. Catastrophic - to detect large sudden releases, such as a piping failure
2. Periodic - to detect smaller, less noticeable releases

Let's look at each kind....

# Automatic Line Leak Detectors

*Catastrophic line leak detection* is done by Automatic Line Leak Detectors (LLDs or ALLDs).



# Automatic Line Leak Detectors

ALLDs are located on the submersible turbine pump (STP) head in the sump above the tank.

There are two types of ALLDs:

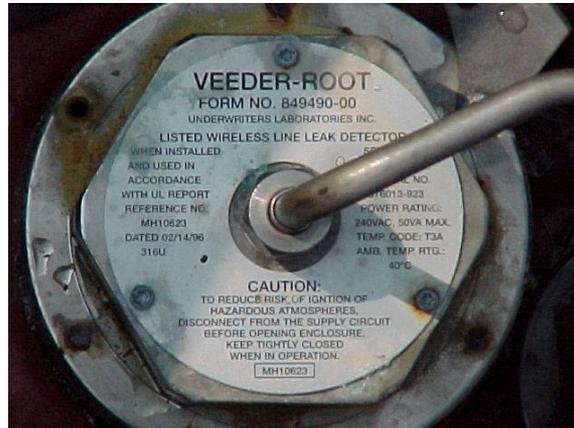
1. **Mechanical** - pressure valves that test for piping leaks each time someone tries to pump fuel.



# Automatic Line Leak Detectors

and

2. **Electronic** - electronic pressure sensors that communicate with an ATG control panel.



# Automatic Line Leak Detector Requirements

- ALLDs must be tested at least every 12 months.
- ALLDs must perform according to manufacturer's specifications; if they cannot detect a leak of at least 3.0 gph @ 10 psi they must be replaced or adjusted to detect 3.0 gph @ 10 psi.
- ALLD test results must be kept for at least one year.

# Pressurized Piping Requirements

*Periodic line leak detection* must be done either monthly or annually.

You have three choices:

1. *Monthly Monitoring, or*
2. *Annual Line Tightness Testing, or*
3. *Electronic Line Leak Detectors 'ELLDs' (doing monthly or annual testing)*

# Monthly Monitoring for Pressurized Piping

## 1. *Monthly Monitoring*

If you choose a monthly method, you must use one of two tank leak detection methods:

- Interstitial Monitoring (required for new and replacement piping installed after 7/24/2007)

OR

- Statistical Inventory Reconciliation (SIR)

# Annual Line Testing for Pressurized Piping

## 2. *Annual Line Tightness Test*

If you do not use a monthly release detection method for pressurized piping, then you must conduct an Annual line tightness test.



# ELLDs with Pressurized Piping

## 3. *Electronic Line Leak Detectors (ELLDs)*

- These devices communicate with an ATG console at the facility.
- They are able to detect a 3.0 gph catastrophic leak, as well as perform periodic 0.2 gph and 0.1 gph line tests when programmed correctly.
- They must be programmed in ATG setup to shut down the submersible pump whenever catastrophic line leaks are detected.

# Pressurized Piping Summary

Pressurized Piping Leak Detection requires one from **Column A**, AND one from **Column B**

Column A		Column B (choose one)
Automatic Line Leak Detector	<b>AND</b>	Annual Line Tightness Test <b>or</b>
		<u>Monthly:</u>
		Interstitial Monitoring <small>mandatory for piping installed after 7/24/07</small>
		SIR

OR,

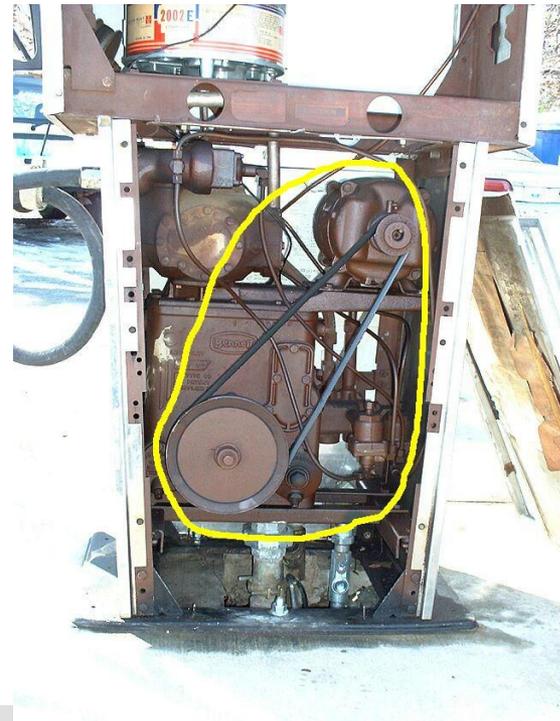
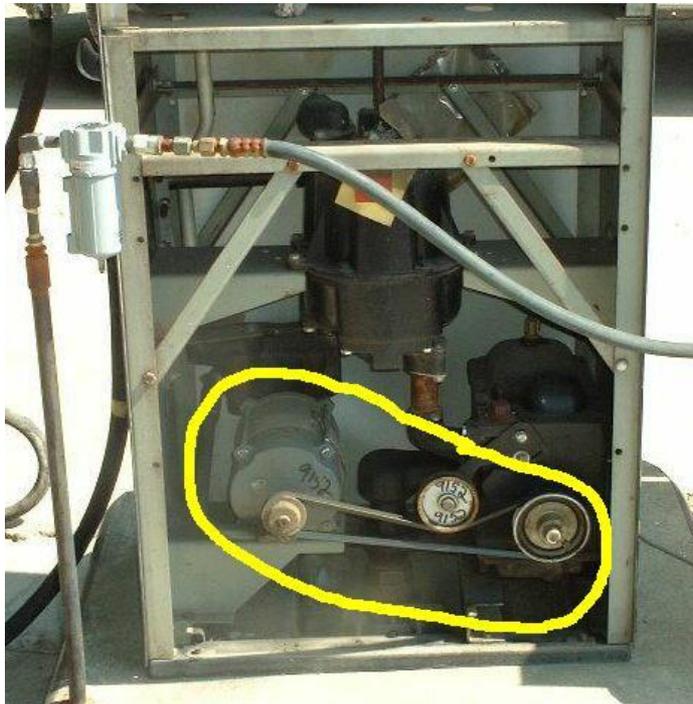
An Electronic Line Leak Detector programmed to conduct BOTH catastrophic AND periodic leak detection.

# Suction Piping

Pulls product from the tank using a suction pump in the dispenser.

Suction piping is indicated by the presence of a suction pump inside the dispenser (look for pulleys and belts).

There is no Submersible pump head in a sump above the tank.



# Safe Suction a.k.a. ‘European Suction’

Leak detection is NOT required for suction piping that meets both the following conditions:

1. The *pipng is sloped* so product will drain back to the tank if suction is lost;

AND

2. There is *only one check valve* located near the suction pump beneath the dispenser (and not at the tank).

Piping that meets these criteria is called “**safe suction**”.

If these two criteria are not met, leak detection is required for suction piping.

# Suction Piping Leak Detection

If you do not have “**safe suction**”, you must conduct

## Suction Piping Leak Detection

by choosing

one from **Column A**,

**OR**

one from **Column B**

<b>Column A</b>		<b>Column B (choose one)</b>
Line Tightness Test <b><u>Every 3 years</u></b>	<b>OR</b>	<i>Monthly:</i>
		Interstitial Monitoring <small>mandatory for piping installed after 7/24/07</small>
		SIR

# What You Must Know About Piping Leak Detection

- > Know how to tell the difference between pressurized piping and suction piping.
- > Pressurized piping must have **two forms** of leak detection. (catastrophic and periodic)
- > Suction piping does not require leak detection **if it meets certain requirements**. (**safe suction**)
- > Emergency generator piping is not *currently* required to have leak detection if **it was installed before 7/24/2007**.

# Check your understanding

1. Which kind of piping uses a submersible pump?

Pressurized piping

2. What two forms of leak detection are used with pressurized piping?

Catastrophic (for large leaks) and periodic (small leaks)

3. What devices are used on pressurized piping to detect large releases?

Automatic line leak detectors

4. What piping conditions do not require leak detection?

Piping sloped back to tank; only one check valve under dispenser  
This is “safe suction”

# We Have Covered...

- ✓ **Tanks and Piping**
- ✓ **Spill Prevention**
- ✓ **Overfill Prevention**
- ✓ **Corrosion Protection**
- ✓ **Leak Detection**

**Next:**

**New Installation and Notification**

# All New Installations Require Secondary Containment

- All new and replacement tanks and **pressurized piping** installed after July 24, 2007 must be Double-walled, or Secondarily Contained with interstitial monitoring leak detection.
- All new and replacement **motor fuel dispensers** must have secondary containment (under dispenser containment sumps).
- Secondary containment must prevent releases to the environment and contain a release until it can be detected and removed.
- Safe suction piping does not require secondary containment.

# Secondary Containment at New Installation



Dispenser containment sumps with secondarily contained piping

# Double Wall Piping Secondarily Contained Piping



Double wall piping with test boots



Double Wall Piping



Chase Piping

# Installation Notification

Notice of Installation is a 2- step process:

1. 15 days prior to installation, submit a Pre-installation notification form and tank fees, and
2. 15 days after placing a tank in service submit Notification form, CN 1260.

Alternative fuel forms must be submitted for tanks holding fuels containing more than 15% ethanol. (E85)

# Before Placing Tank in Service

**Before** putting product in a tank for the first time:

1. The tank(s) must be registered and fees paid.
2. Spill and overflow prevention must be in place.
3. Air pressure or vacuum test must be conducted.
4. Cathodic protection must be operational.

**When product is first placed into tank:**

1. Begin leak detection.
2. Conduct tank and line tightness test **before**  
**dispensing fuel.**

# Report These Changes

The following changes in status must be reported to the Division within 30 days:

- Change of ownership;
- Change of Owner or Operator address;
- Replacement of tank or piping;
- Change in service (closure or temporary closure)

# Notification Form

☰ The Notification Form is available on the Division website:

<http://tn.gov/environment/article/ust-forms-and-guidance>

☰ A notification form can be picked up at:

Division of Underground Storage Tanks

William R. Snodgrass Tennessee Tower

312 Rosa L. Parks Avenue, 12<sup>th</sup> Floor

Nashville, Tennessee 37243

or at any of the 8 regional Environmental Field Office locations.

# We Have Covered...

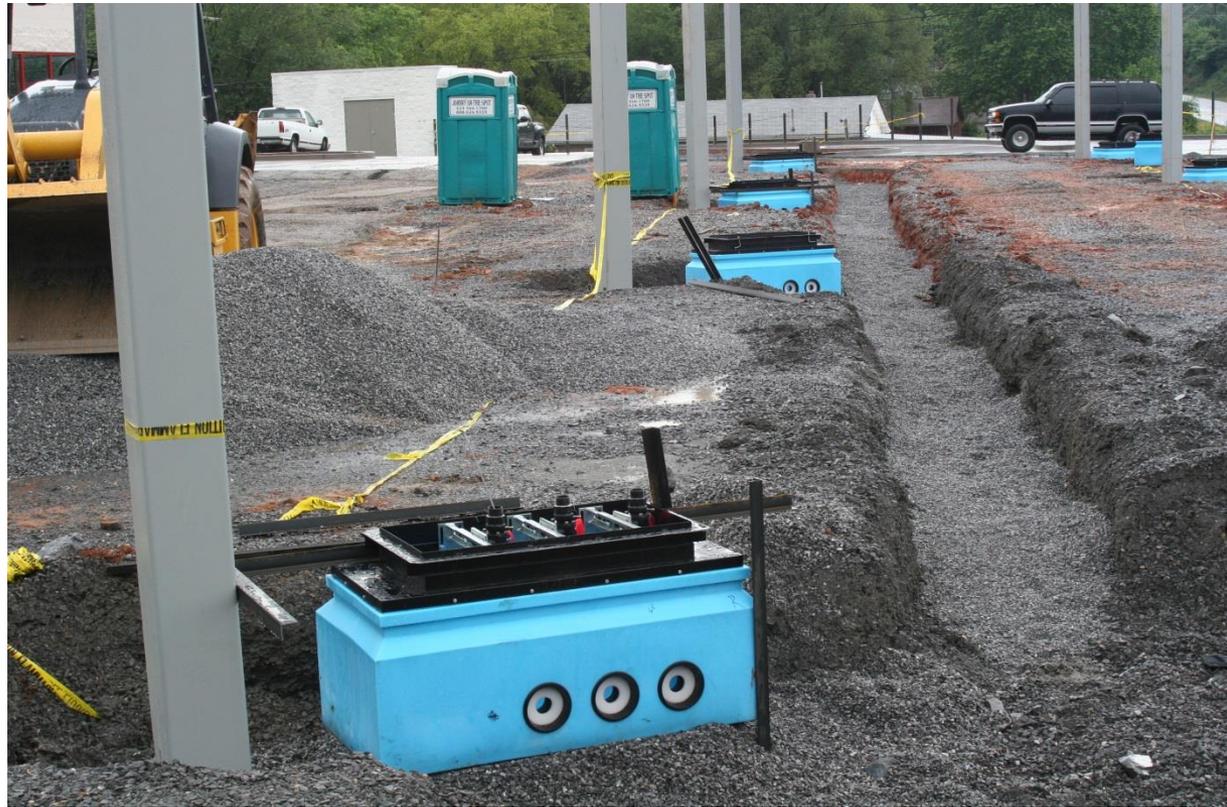
- ✓ **Tanks and Piping**
- ✓ **Spill Prevention**
- ✓ **Overfill Prevention**
- ✓ **Corrosion Protection**
- ✓ **Leak Detection**
- ✓ **New Installation and Notification**

**Next:**

**Motor Fuel Dispensers**

# Motor Fuel Dispensers

- Under dispenser containment (UDC) is required for new or replacement motor fuel dispensers installed after July 24, 2007.



# Motor Fuel Dispensers

- Under Dispenser Containment:
  - must be liquid tight.
  - must be product compatible.
  - must allow for visual inspection.
- All dispensers must be inspected quarterly.
- A log of inspections\* must be maintained.

\*a form for this can be found on the Division website.

# Dispenser Inspection Form



STATE OF TENNESSEE  
 DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
 DIVISION OF UNDERGROUND STORAGE TANKS  
 William R. Snodgrass Tennessee Tower  
 312 Rosa L. Parks Avenue, 12th Floor  
 Nashville, Tennessee 37243

## QUARTERLY DISPENSER INSPECTION LOG

### Instructions

Tennessee Underground Storage Tank Rules require that quarterly visual inspections be made at all petroleum dispensers. Rule 0400-18-01-.04(1)(f) requires dispenser covers to be opened and a visual inspection for petroleum releases, including seeps and drips, be performed at least once every three (3) months. A log of these inspections showing at a minimum the last twelve (12) months shall be maintained by the owner and/or operator.

Rule 0400-18-01-.04(1)(g) requires visual inspections of dispenser sumps for the presence of petroleum.

- Use this form to record results of visual inspections of each dispenser at the facility once each quarter.
- A separate form should be used for each facility. Indicate the year this form is for in the space provided.
- The front of this form has space for seven dispensers. If there are more than seven dispensers at this facility, use the back of this form.
- If no leaks, seeps, or drips are noted, mark OK in the appropriate column and row.
- If a leak, seep, or drip is observed, note it in the appropriate column and indicate the action taken. Remove any product in the dispenser sump.
- You must take measures to repair any leaks, seeps, or drips observed. If there is no dispenser containment sump, seeps and drips must be reported as confirmed releases according to rule 0400-18-01-.05 and .06.
- Maintain the last 12 months of these inspections and have them available for state inspection.

UST FACILITY INFORMATION													
NAME:										FACILITY ID #:			
ADDRESS:							CITY:			ZIP:			

YEAR \_\_\_\_\_

Date Inspected	Dispenser #1		Dispenser #2		Dispenser #3		Dispenser #4		Dispenser #5		Dispenser #6		Dispenser #7	
	OK	leak												
	<input type="checkbox"/>													

Actions taken if leak observed \_\_\_\_\_

Signature(s) of person(s) doing inspections \_\_\_\_\_

Date Inspected	Dispenser #1		Dispenser #2		Dispenser #3		Dispenser #4		Dispenser #5		Dispenser #6		Dispenser #7	
	OK	leak												
	<input type="checkbox"/>													

# MPD (Multi-Product Dispenser)



MPD with  
under  
dispenser  
containment

# UDC (Under Dispenser Containment)



Under  
dispenser  
containment  
sumps



Impact/Shear  
valves



# UDC and piping installation



Series of dispenser  
containment sumps  
with fiberglass  
piping

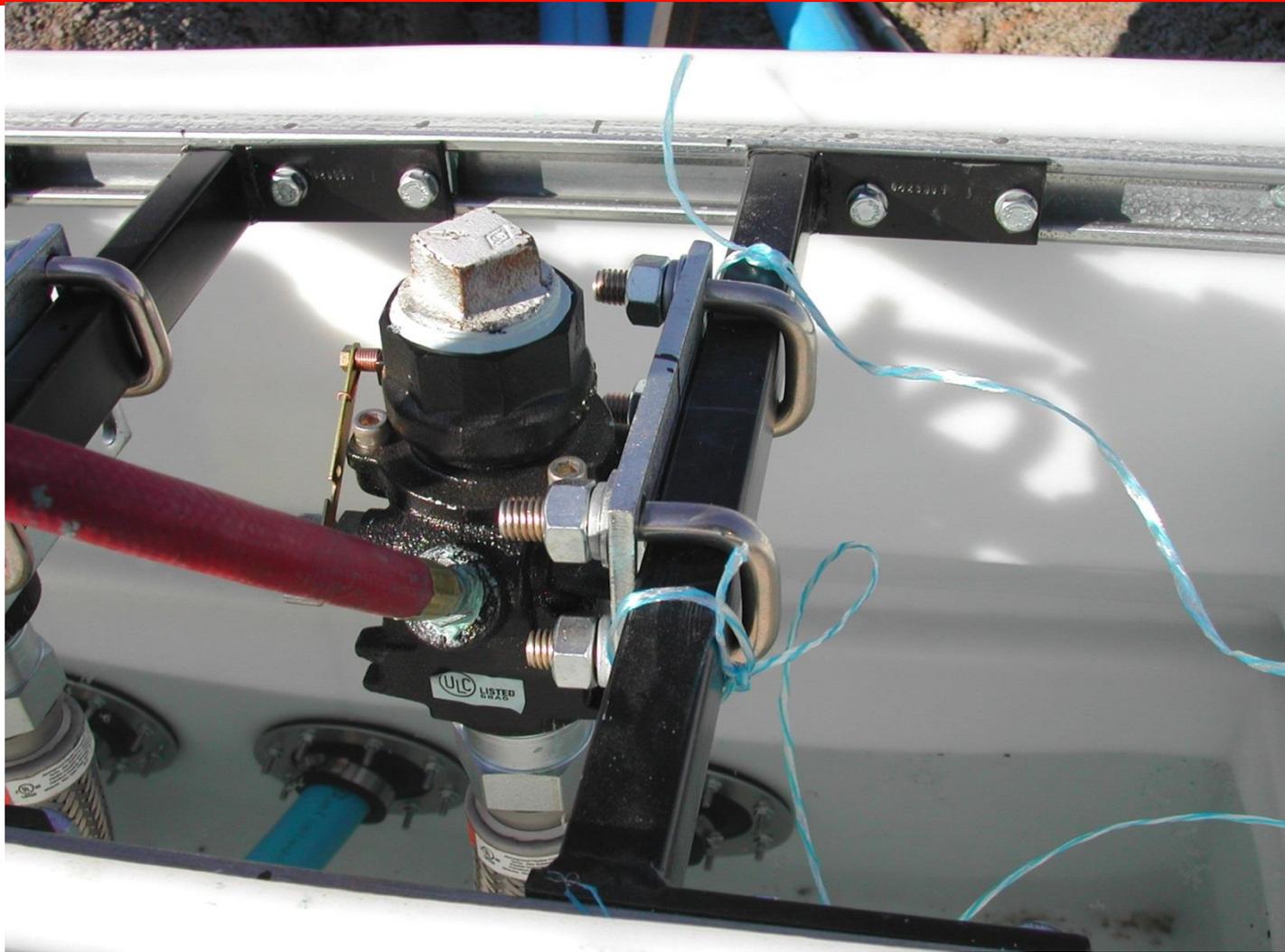
# Shallow UDC sumps

Sump sensor with dispenser sump



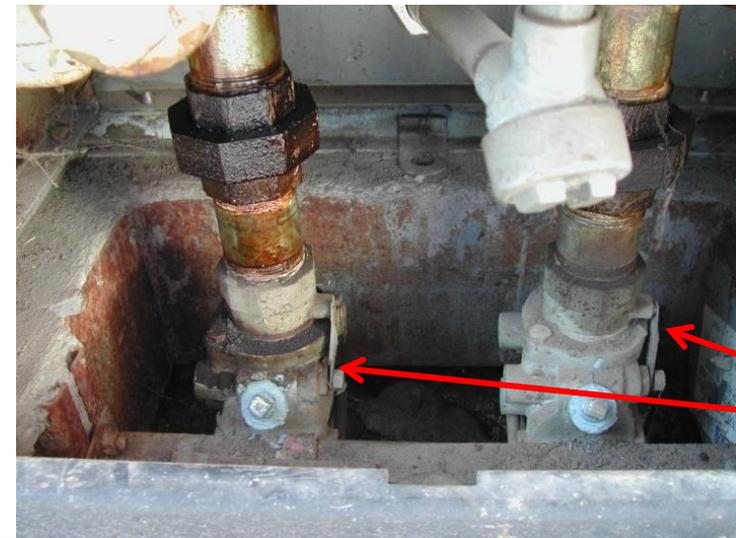
Shallow dispenser sump

# Rigid Shear Valve Anchoring



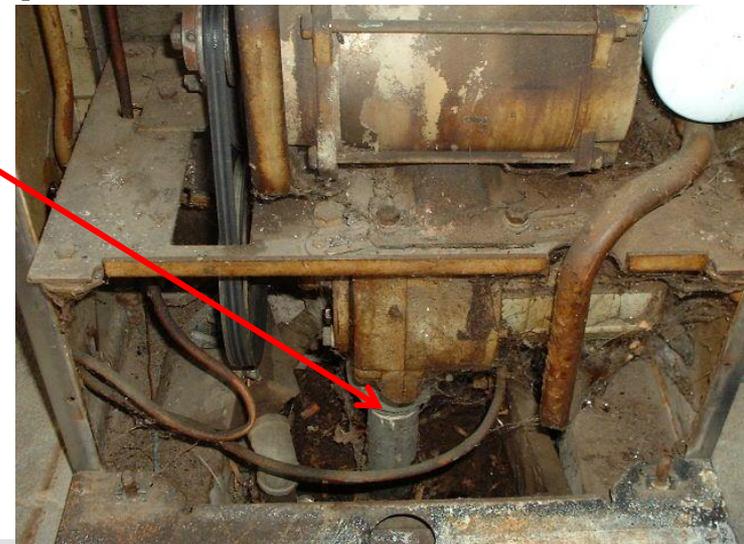
# UDC and Dispenser Replacement

- UDC is required when dispenser and “connecting equipment” is replaced.
- Connecting equipment is equipment below the:
  - Impact/Shear valve in pressurized systems
  - Union check valve in suction systems



union check valve

impact valve



# We Have Covered...

- ✓ Tanks and Piping
- ✓ Spill Prevention
- ✓ Overfill Prevention
- ✓ Corrosion Protection
- ✓ Leak Detection
- ✓ New Installation and Notification
- ✓ Motor Fuel Dispensers

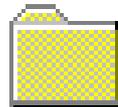
Next:

Repairs, TOS, Suspected Releases

# Record Keeping Requirements

You must keep the following records:

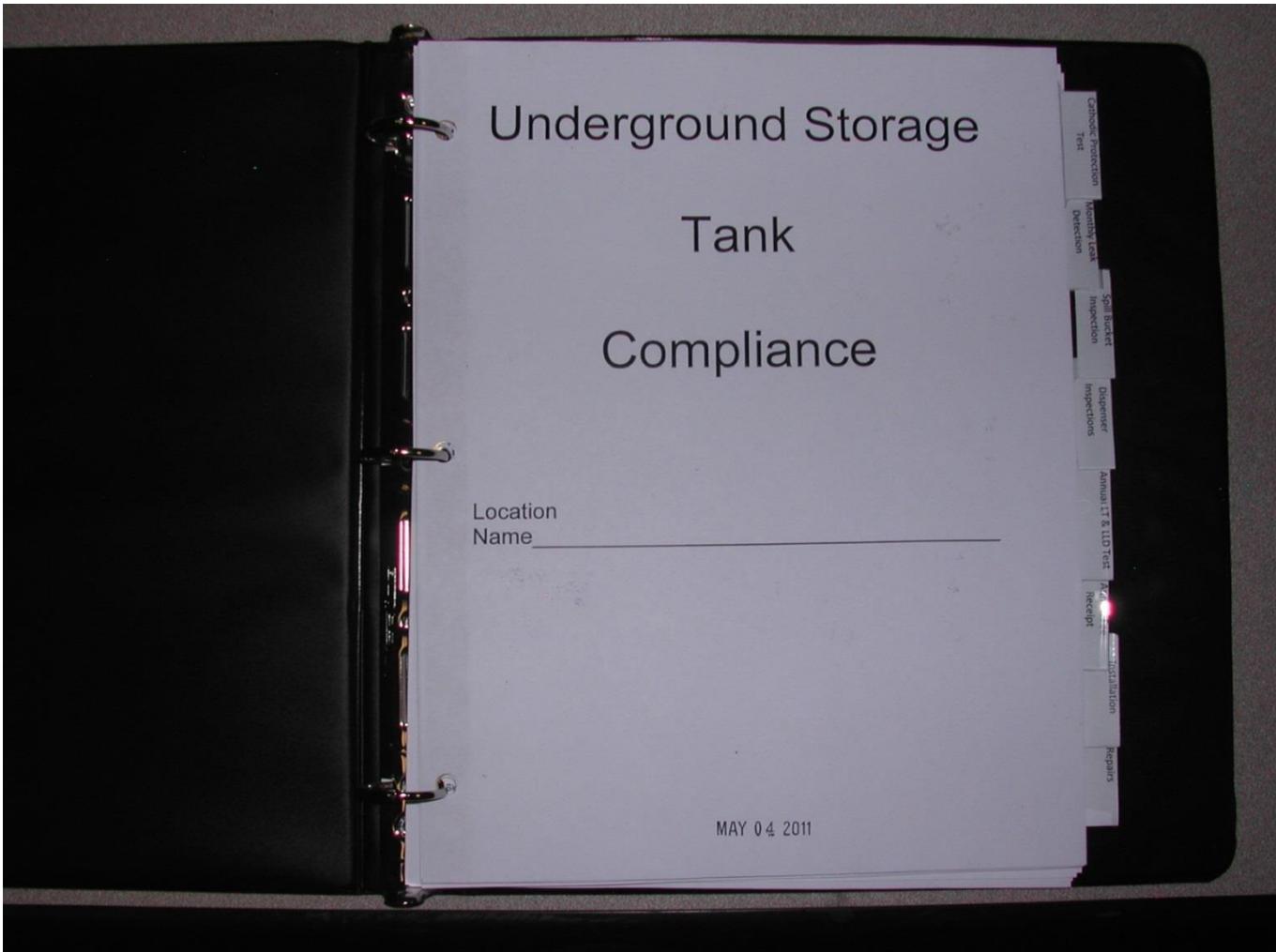
1. Leak Detection Records
2. Cathodic Protection Records
3. Repair Records
4. Closure Records
5. Certain Installation and Operational Records



# This is NOT Record Keeping



# Best Management Practice for Record Keeping



Maintaining compliance documentation in a 3-ring binder with tabs/dividers can make locating information for inspections much easier.

# Keep the following Leak Detection Records

1. Monthly monitoring leak detection results for at least 1 year.

*VERY IMPORTANT* → Have the last 12 consecutive monthly records available for review

2. Records of all leak detection system maintenance, service, or repairs 1 year from date of repair.
3. All written *performance claims* about the leak detection system and any *schedules of required calibration* and maintenance 5 years from the date of installation.

# Keep the following Leak Detection Records

4. Line Leak Detector test results must be kept for at least **1 year.** (Must be tested annually)
5. Line tightness test results must be kept for at least **1 year.** (Must be tested annually)
6. Suction piping tightness test results must be kept for at least **3 years.** (Must be tested every 3 years)

Testing is **NOT** required for safe suction piping.

# Keep the following Cathodic Protection Records

1. The last **two** cathodic protection **tests**.  
(these must be done **every 3 years** by a **cathodic protection tester**)
2. The last **three** **rectifier inspection checks** when impressed current is used.  
(these must be done **every 60 days** typically by **a tank owner or operator**)

# Keep the following Repair Records

1. Keep all *tank and piping repair records* for the life of the UST system.
2. Keep records of tank lining or tank upgrading for the life of the UST system.

# Closure Record Keeping

Records that demonstrate compliance with **closure** requirements and results of closure assessment must be maintained for **3 years** after completion by:

-  - the former owner who closed the UST system, **or**
-  - the current owner of the location, **or**
-  - mailing these records to the Division.

# Installation/Operational Records

Keep these records for the life of the system:

1. Pressure or vacuum test results before putting product into tank.
2. Initial tank/line tightness test results.
3. Any and all records regarding tank installation or tank upgrade.
4. All records regarding CP system repairs.
5. Tank/line tightness testing results following CP system repair.

\*\*\*These records must be passed on to subsequent tank owner\*\*\*

# Financial Responsibility

The law says a tank owner or operator must be financially responsible for a leak from a UST system. This means:

1. You must be able to pay for the cost of cleaning up contamination, and/or for
2. Compensating third parties for property damage and/or bodily injury.

The cost of cleaning up a release can be

**high**

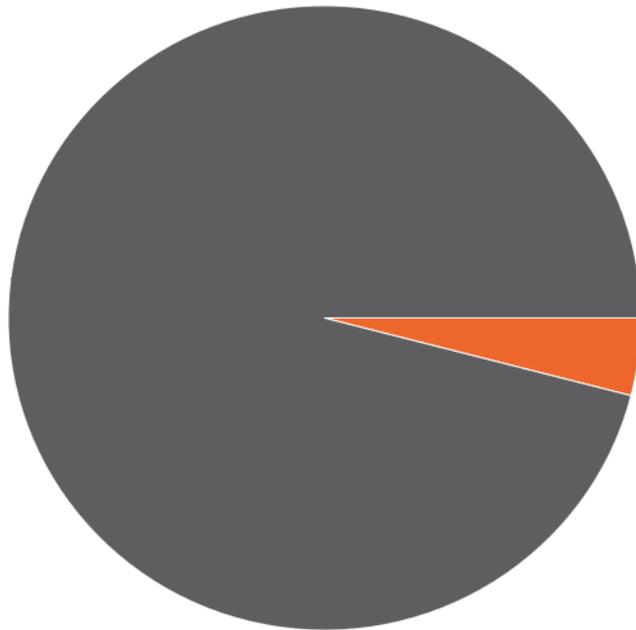
# Cleanups Can Be Costly

The average cost for a cleanup of a UST release in Tennessee is more than:

- \$16,000
- \$38,000
- \$52,000
- \$77,000
- \$102,000
- \$126,000

# Help Is Available

Tennessee has a Fund to help with these expenses, but tank owners must pay a portion of cleanup costs.



Cost of cleanup

Which portion of these costs would you prefer to pay?

# Fund Information

To date, the fund has paid out over \$344 million in cleanup costs.

The fund covers up to \$2 million dollars for a release and up to \$1 million dollars for third party damages.

Fund entry level (“deductible”) is \$20,000 per occurrence.

Tank owners must pay the first \$20,000 of **eligible expenses** related to cleanups and/or the first \$20,000 for damages caused to a third party pursuant to a court awarded judgment before assistance can be received from the fund.

Some incentive credit for higher technology can be applied to deductible if it was in place prior to a release.

# Accessing the fund

In order to access this fund, you must do certain things...

- You must establish and maintain **fund eligibility** for your location.
- A release from a *fund eligible* location must be **fund covered**.
- To receive Fund assistance, a **facility** must be Fund eligible and a **release** must be Fund covered.

# What is Fund Eligibility and Fund Coverage?

Fund *coverage* is not the same as Fund *eligibility*

- A facility may be Fund eligible only if an owner has met all the conditions necessary to receive assistance from the Fund if a release occurs.
- A release can receive Fund coverage only if the tank owner can document compliance with all applicable requirements.

# The bottom line...

Although a facility may be *Fund eligible*, a claim for cleaning up a release at the facility might be denied if a facility was not in compliance when the release occurred.

Don't let this happen to you.



# What You Must Know about FR

So how can you help ensure you can access the fund if you have a release?

You must establish fund eligibility by properly registering every tank you own prior to a release.

You must maintain and be sure you can properly document compliance with applicable UST construction, operational, and leak detection requirements prior to a release.

# Contact Information

Tennessee Division of Underground Storage Tanks

William R. Snodgrass Tennessee Tower

312 Rosa L. Parks Avenue, 12<sup>th</sup> Floor

Nashville, Tennessee 37243

(615) 532-0945

<http://www.state.tn.us/environment/underground-storage-tanks/index.shtml>

Call 1-888 891-TDEC  
for the Field Office Nearest You