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Agency

Office of
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July 1990

EPA

Musts for USTs

Musts for USTs

A Summary of the Regulations for Underground Storage Tank Systems

U.S. Environmental Protection Agency
Office of Underground Storage Tanks

July 1990

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TABLE OF CONTENTS

What Are These Regulations About? 1

What Do New Petroleum USTs Need? 7

What About Existing Petroleum USTs? 13

How Do You Correct Problems Caused By Leaks? 19

How Do You Close USTs? 23

What About Reporting And Recordkeeping? 25

For Chemical USTs Only 27

Technical Questions & Answers 31

Videos, Brochures, and Handbooks on USTs 37

Industry Codes And Standards 40

WHAT ARE THESE REGULATIONS ABOUT?

The U.S. Environmental Protection Agency (EPA) has written regulations for many of the nation's underground storage tank systems. This booklet briefly describes the **technical requirements** for these systems, which include **tanks and piping**. You can find the complete regulations in the **Federal Register** (September 23, 1988). Properly managed, underground storage tank systems -- often called USTs -- will not threaten our health or our environment.

Why Has EPA Written These Regulations?

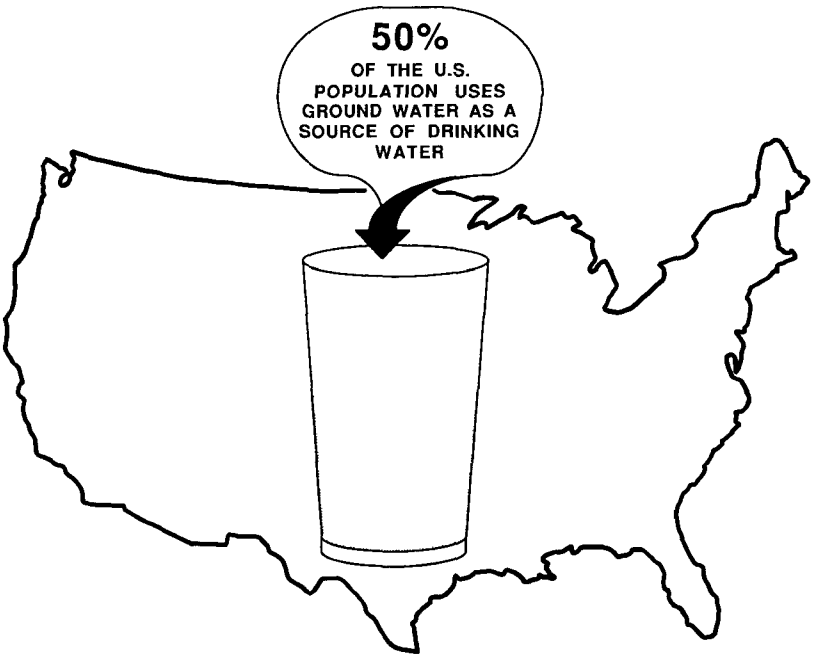
Several million underground storage tank systems in the United States contain petroleum or hazardous chemicals. Tens of thousands of these USTs, including their piping, are currently leaking. Many more are expected to leak in the future. Leaking USTs can cause fires or explosions that threaten human safety. In addition, leaking USTs can contaminate nearby ground water. Because many of us depend on ground water for the water we drink, Federal legislation seeks to safeguard our nation's ground-water resources.

Congress responded in 1984 to the problem of leaking USTs by adding Subtitle I to the Resource Conservation and Recovery Act (RCRA). Subtitle I requires EPA to develop regulations to protect human health and the environment from leaking USTs.

What Are The Goals Of The UST Regulations?

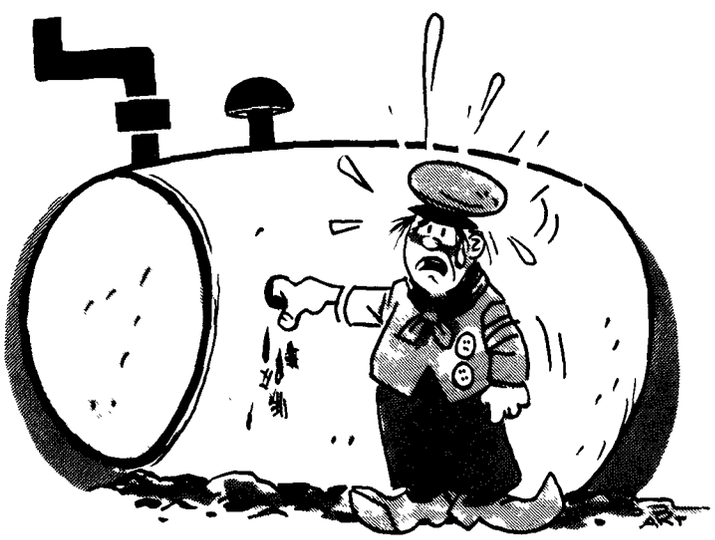
EPA has developed the UST regulations to make sure the following goals are reached:

- To **prevent** leaks and spills.
- To **find** leaks and spills.
- To **correct** the problems created by leaks and spills.
- To make sure that **owners and operators** of USTs **can pay** for correcting the problems created if their USTs leak.
- To make sure each **State** has a regulatory program for USTs that is as strict as or stricter than the Federal regulations.



WHY WORRY ABOUT LEAKS AND SPILLS?

◆ ***Because* your *tank or its piping may leak.*** As many as 25 percent of all underground storage tanks (USTs) may now be leaking. Many more will leak in the near future, possibly including yours. Your tank or its piping might be leaking right now. If a tank system is past its prime (over 10 years old), especially if it's not protected against corrosion, the potential for leaking increases dramatically. Newer tank systems (especially the piping) can also leak, and spills can happen anytime. Don't let your profits drain away.



◆ ***Because it's in* your *best interest.*** Leaking UST sites can be very costly to clean up. Imagine how much money you'd lose if your tank could not be used for weeks during lengthy cleanups or if local residents sued you for property damages. The costs can run into the thousands, perhaps as much as $100,000 and more. Detect and clean up spills or leaks -- before they hurt you financially.

◆ ***Because it's the law.*** But it's the law for good reason. Much of our country depends on ground water for drinking water, and leaked or spilled petroleum can contaminate this vital resource. Explosions are another potential hazard. Many State and local governments, therefore, already require specific steps to prevent, detect, or clean up leaks and spills. Others will soon have similar requirements. Check with your local and State governments to learn what requirements apply to you.

◆ ***Because it's for the good of the community and the environment.*** Leaks and spills can have serious consequences. Petroleum can contaminate soil, drinking water supplies, and air. Petroleum and its resulting vapors can also accumulate in nearby confined spaces, such as septic tanks, sewers, and the basements of homes. These vapors are poisonous and can cause a fire or explosion.

How Will These Regulations Affect You?

The regulations describe the steps you -- the tank owner or operator -- need to take to help protect our health and environment. These steps will also help you avoid the high cost of cleaning up the environment and defending yourself in legal actions that can result if your tank or its piping leaks.

You should note the following major points of the UST regulations:

- If you install an UST after December 1988, it must meet the requirements for new USTs concerning correct installation, spill and overfill prevention, corrosion protection, and leak detection (see pages 7-11).
- If you have an UST that was installed before December 1988, it must meet two major requirements --
  1) Requirements for corrosion protection and spill and overfill prevention (see page 13).
  2) Leak detection requirements (see pages 14-15).
- You must take corrective action in response to leaks (see pages 19-20).
- You must follow closure requirements for tanks you temporarily or permanently close (see pages 23-24).
- You are financially responsible for the cost of cleaning up a leak and compensating other people for bodily injury and property damage caused by your leaking UST.

Although these points are discussed in the following sections, additional information appears in the "Technical Questions & Answers" section starting on page 31.

What's Your "Financial Responsibility" For Petroleum Leaks?

A complete explanation of your financial responsibility requirements appears in the **Federal Register** (October 26, 1988) and in an EPA brochure, "Dollars and Sense."

In general, owners or operators of petroleum USTs must be able to demonstrate their ability to pay for damage that could be caused if their tanks leaked. These payments would need to cover the costs of cleaning up a site (see page 20) and compensating other people for bodily injury and property damage.

Who Is "The Regulatory Authority"?

This booklet describes EPA's basic requirements for USTs, but your State or local regulatory authority may have requirements that are somewhat different or more strict. You will need to identify your regulatory authority and its specific requirements for your USTs. If you are not sure who your regulatory authority is, call your local fire marshall for help.

What's An "UST"?

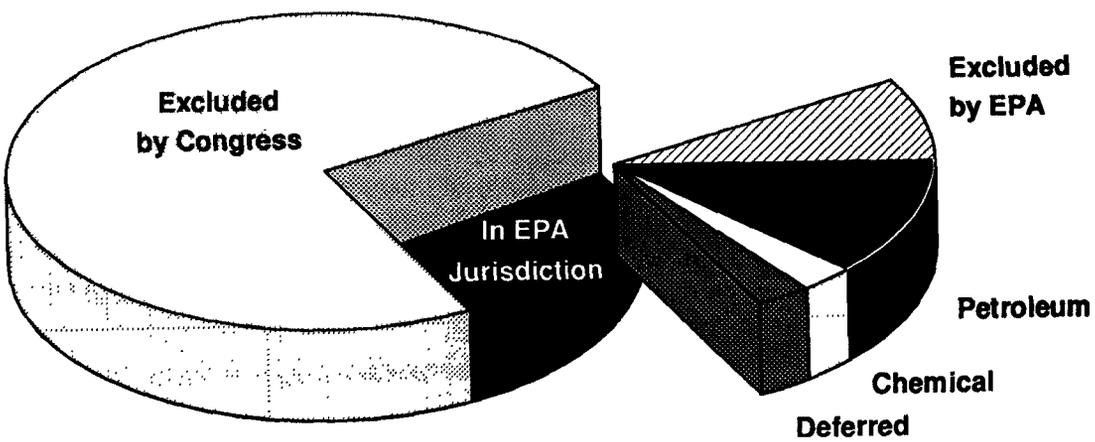
An UST is any tank, including underground piping connected to the tank, that has at least 10 percent of its volume underground. The regulations apply only to USTs storing either petroleum or certain hazardous chemicals.

The "For Chemical USTs Only" section starting on page 27 identifies hazardous chemicals and special requirements for chemical USTs. Generally, the requirements for both petroleum and chemical USTs are very similar.

Some kinds of tanks are **not** covered by these regulations:

- Farm and residential tanks holding 1,100 gallons or less of motor fuel used for noncommercial purposes.
- Tanks storing heating oil used on the premises where it is stored.
- Tanks on or above the floor of underground areas, such as basements or tunnels.
- Septic tanks and systems for collecting storm water and wastewater.
- Flow-through process tanks.
- Tanks holding 110 gallons or less.
- Emergency spill and overfill tanks.

Other storage areas that might be considered "tanks" are also excluded, such as surface impoundments and pits. Some "tanks," such as field-constructed tanks, have been deferred from most of the regulations. The regulations published in the **Federal Register** fully identify various tank types and which requirements apply to them.



UST Program Scope

WHY DO USTs CAUSE PROBLEMS?

No Corrosion Protection

Most of the UST systems already in the ground have tanks and piping made of bare steel. When unprotected steel is buried in the ground, it can be eaten away by corrosion. The UST regulations require corrosion protection for all USTs. The "Technical Questions & Answers" section explains how corrosion works and ways to defeat it (see pages 31 and 32).

Spills and Overfills

In addition to leaks from tanks and piping, spills and overfills cause many UST releases. When more petroleum is delivered into the tank than it can hold, an overfill happens. When the delivery truck's hose is disconnected incorrectly, a spill results. The "Technical Questions & Answers" section identifies ways to combat spills and overfills (see page 33).

Installation Mistakes

Tanks and piping also leak if they are not put in the ground properly. For example, if poorly selected or compacted backfill material is used when covering the UST, or if pipe fittings are inadequately attached to the UST, then leaking can result. You can avoid mistakes made during installation by using an installer who carefully follows approved installation procedures. The "Technical Questions & Answers" section identifies approved installation procedures (see page 33).

Piping Failures

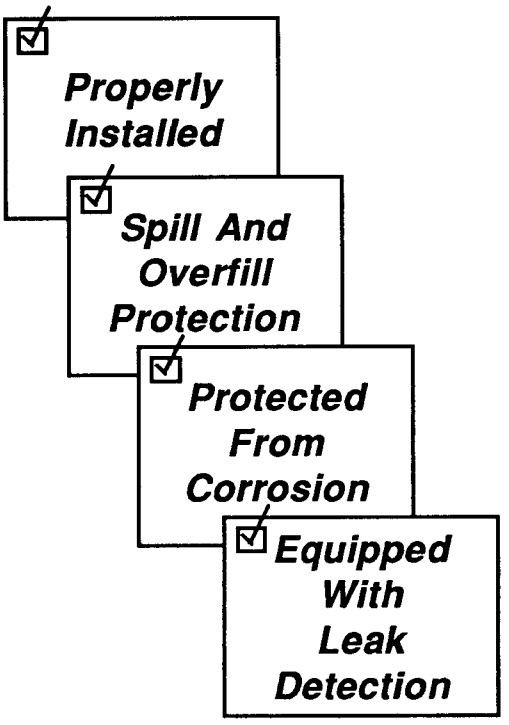
EPA studies show that most leaks result from piping failure. Piping is smaller and less sturdy than tanks. It is assembled in the field with numerous connections and usually installed near the ground's surface. As a result, piping suffers much more than tanks from the effects of installation mistakes, excessive surface loads, the stress of underground movement, and corrosion. Using a skilled installer is even more critical to the proper installation of piping. It is important to remember that the regulations apply to the entire UST system -- both **tanks and piping**.

WHAT DO NEW PETROLEUM USTs NEED?

You must meet four requirements when you install a new UST system:

- You must certify that the tank and piping are installed properly according to industry codes.
- You must equip the UST with devices that prevent spills and overfills. Also, you must follow correct tank filling practices.
- You must protect the tank and piping from corrosion.
- You must equip both the tank and piping with leak detection.

The following sections provide basic information on these requirements. Also, see the "Technical Questions & Answers" section starting on page 31 for more information.



REMEMBER...

New UST systems are those that are installed after December 1988.

Those USTs installed between May 1985 and December 1988 must meet two minimum requirements:

- The UST must prevent releases due to corrosion or structural failure.
- The stored contents must be compatible with the tank's interior wall.

After December 1988, these older USTs must meet the requirements for existing USTs (see pages 13-17).

Installing UST Systems The Right Way

First, **install** USTs correctly by using qualified installers who follow industry codes. Faulty installation is a significant cause of UST failures, particularly piping failures. (See pages 33, 37 and 40 for information on correct installation practices and industry codes.) You must also make sure that the contents you store are compatible with the UST system.

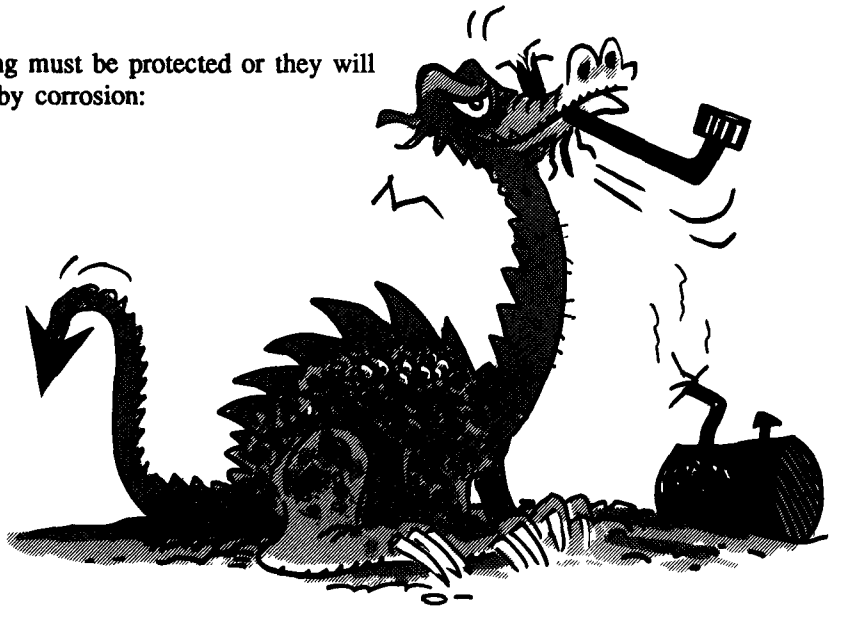
Second, you will also need to **certify** on a **notification form** (see page 25) that you have used a qualified installer who can assure you that your UST has been installed correctly.

Preventing Spills And Overfills

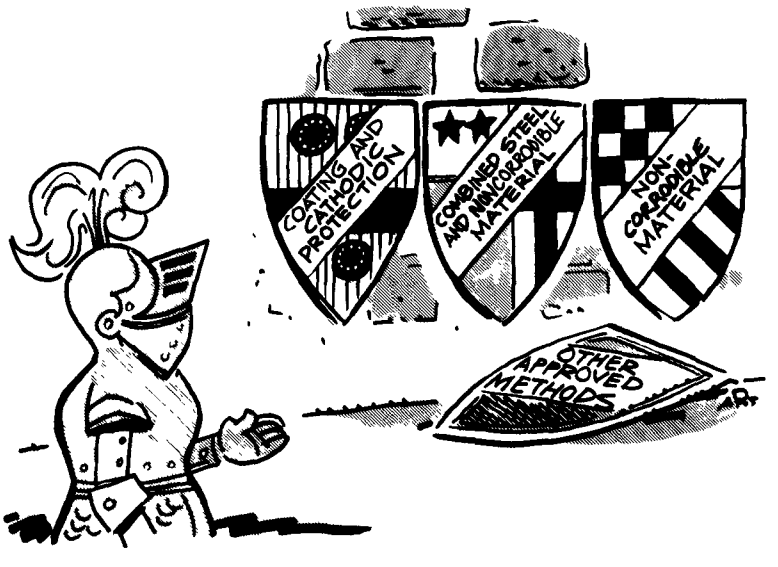
Because human error causes most spills and overfills, these mistakes can be avoided by following the correct tank filling practices required by the UST regulations. If you and your distributor follow these practices, nearly all spills and overfills can be prevented from happening. Also, the UST regulations require the use of mechanical devices, such as spill catchment basins and overfill alarms, to prevent these releases from harming the environment. (Correct tank filling practices and preventive devices are identified on page 33.)

Protecting Tanks And Piping From Corrosion

Tanks and piping must be protected or they will be eaten away by corrosion:



- Steel tanks and piping can be coated with a corrosion-resistant coating and "cathodically" protected. (Cathodic protection uses either sacrificial anodes or impressed current, methods described on page 31.)
- Tanks and piping can be made totally of a noncorrodible material, such as fiberglass-reinforced plastic. (Metal piping connected to noncorrodible tanks still requires corrosion protection.)
- Tanks and piping can be protected by other methods approved by the regulatory authority.
- Steel tanks (but not piping) can be protected using a method in which a thick layer of noncorrodible material is bonded to the tank.



Detecting Leaks From Tanks

You must check your tanks at least once a month to see if they are leaking.

You **must** use one (or a combination) of the following monthly monitoring methods:

- Automatic tank gauging.
- Monitoring for vapors in the soil.
- Interstitial monitoring.
- Monitoring for liquids on the ground water.
- Other approved methods.

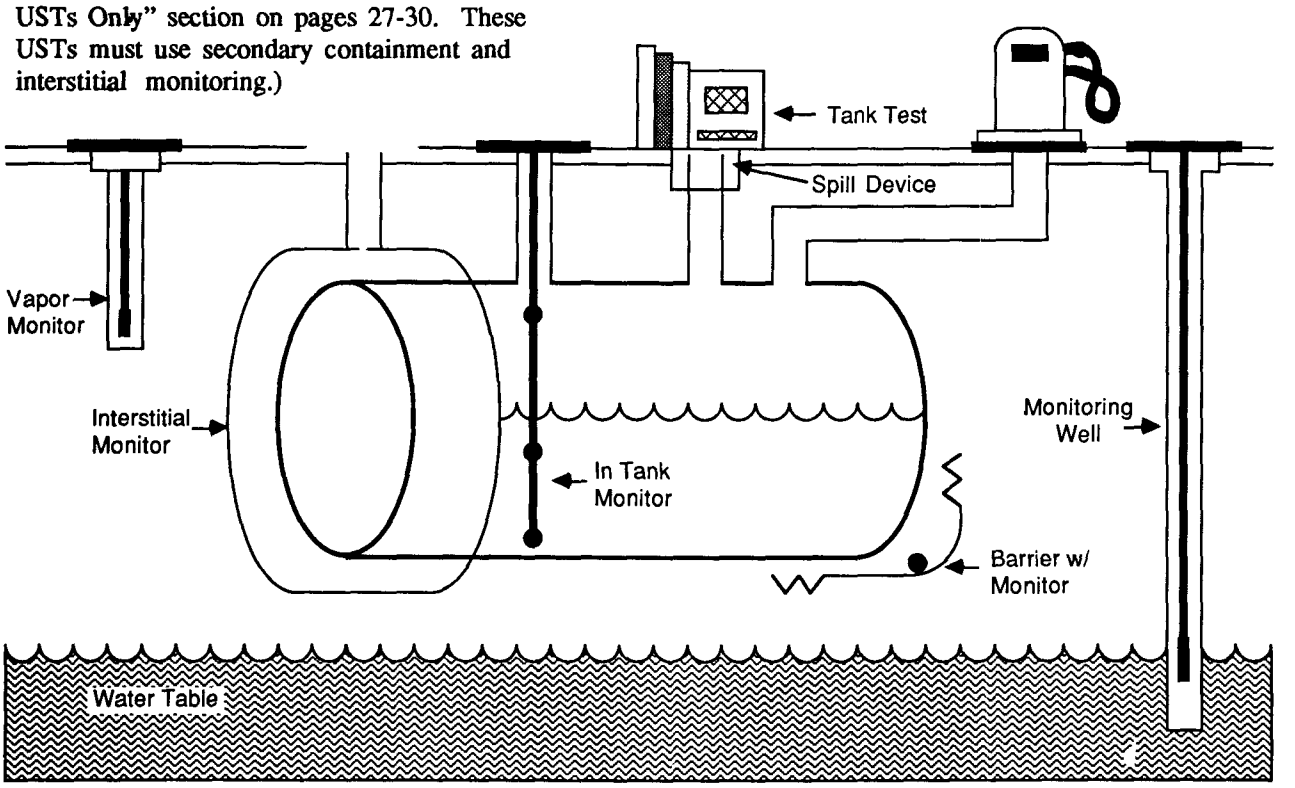
Information on these leak detection methods appears in the "Technical Questions & Answers" section on pages 34-35. (Special requirements for USTs containing hazardous chemicals are described in the "For Chemical USTs Only" section on pages 27-30. These USTs must use secondary containment and interstitial monitoring.)

For Young Tanks...
An Alternate Leak Detection Method

You have one additional leak detection choice, but **only for 10 years** after you install your UST. Instead of using one of the monthly monitoring methods noted above, you can check for leaks by combining monthly inventory control with tank tightness testing every 5 years. After 10 years, you must use one of the monthly monitoring methods listed above.

For Small Tanks...
An Alternate Leak Detection Method

Some small tanks may be able to use **manual tank gauging** as a leak detection method, either by itself or in combination with tank tightness testing. The several requirements of manual tank gauging are described on page 35.



Leak Detection Alternatives

Detecting Leaks From Piping

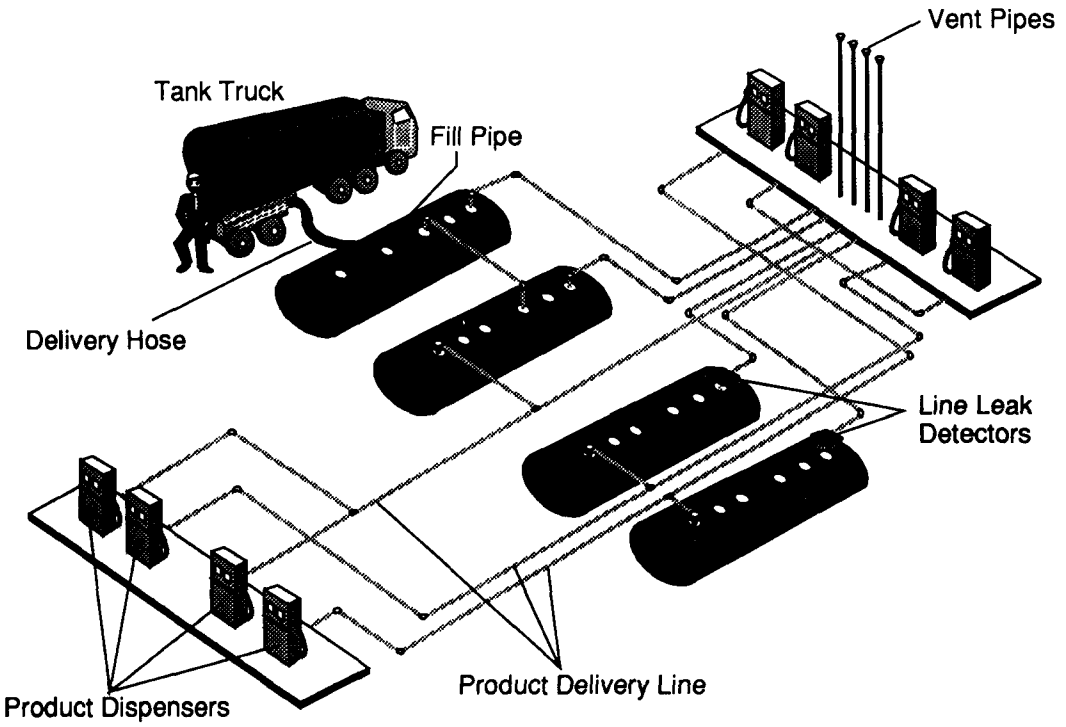
Because most leaks come from piping, your piping must have leak detection.

If your piping is **pressurized,** you must meet the following requirements:

- The piping must have devices to automatically shut off or restrict flow or have an alarm that indicates a leak.
- You must either conduct an **annual** tightness test of the piping or use one of the following monthly methods noted above for tanks: vapor monitoring, ground-water monitoring, interstitial monitoring, or other approved monthly methods.

If your UST has **suction** piping, your leak detection requirements will depend on which type of suction piping you have:

- The most commonly used suction piping requires either monthly monitoring (using one of the four monthly methods noted above for use on pressurized piping) or tightness testing of the piping every 3 years.
- Another kind of suction piping is safer and does **not** require leak detection. This safer method has two main characteristics:
  - Below-grade **piping** is sloped so that the piping's contents will drain back into the storage tank if the suction is released.
  - Only one **check valve** is included in each suction line and is located directly below the suction pump.



A Typical Tank Facility

WHAT ABOUT EXISTING PETROLEUM USTs?

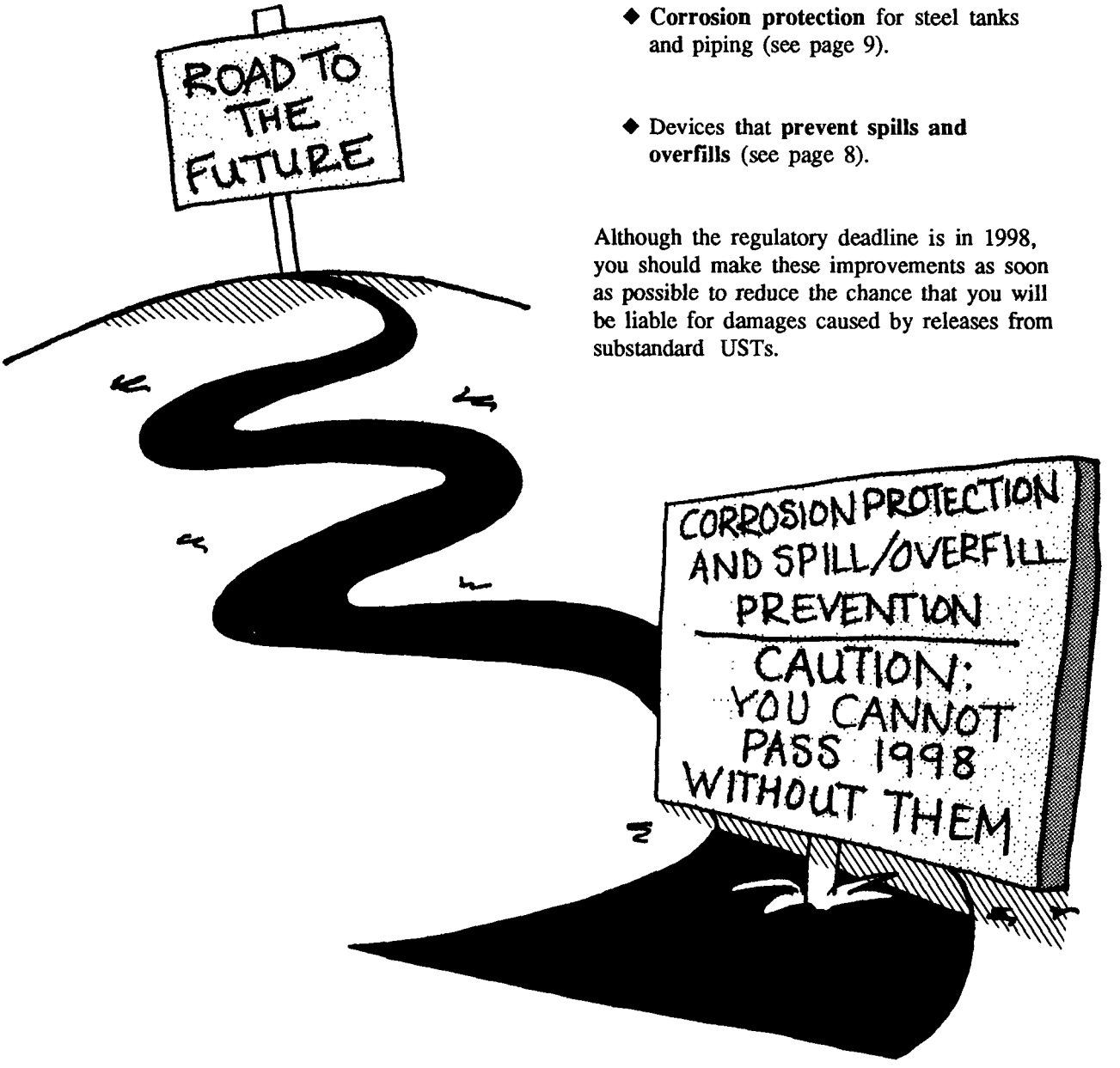
Existing UST systems are those installed before December 1988. In addition to immediately starting **tank filling** procedures that will prevent spills and overfills, you will need to meet the following requirements for corrosion protection, spill and overfill prevention, and leak detection. (The chart on pages 16-17 displays these requirements and when you must meet them.)

Deadline For Corrosion Protection And For Devices To Prevent Spills And Overfills

By December 1998 (10 years after the UST regulations become effective), USTs that were installed **before** December 1988 must have:

- **Corrosion protection** for steel tanks and piping (see page 9).
- Devices that **prevent spills and overfills** (see page 8).

Although the regulatory deadline is in 1998, you should make these improvements as soon as possible to reduce the chance that you will be liable for damages caused by releases from substandard USTs.



Deadlines And Choices For Leak Detection

Deadlines...

Leak detection requirements are being phased in for existing USTs depending on their age:

If the tank was installed...	It must have leak detection by December of...
before 1965 or unknown	1989
1965-1969	1990
1970-1974	1991
1975-1979	1992
1980-Dec.1988	1993

This schedule will make sure that the older USTs, which are more likely to leak, have leak detection first.

Choices For Existing Tanks...

You have three basic choices for making sure your tanks are checked at least monthly to see if they are leaking:

- You can use any of the **monthly monitoring methods** listed for new tanks on page 10. Also, very small tanks may be able to use manual tank gauging, as described on page 35.

- If your UST has corrosion protection or internal tank lining and devices that prevent spills and overfills, you can **combine monthly inventory control with tank tightness testing every 5 years.** This choice, however, can only be used for 10 years after adding corrosion protection or internally lining the tank (or until December 1998, whichever date is later). After 10 years, you must use one of the monthly monitoring methods on page 10.

- If your UST does not have corrosion protection or internal tank lining and devices that prevent spills and overfills, you can **combine monthly inventory control with *annual* tank tightness testing.** Please note, however, that this method is allowed **only until December 1998.** After that, your UST -- now equipped with corrosion protection or an internal tank lining, and devices that prevent spills and overfills -- must use one of the first two leak detection choices noted above.

Some Choices May Be Better...

You have a leak detection advantage if your UST has been "upgraded" with corrosion protection and devices to prevent spills and overfills. For 10 years after "upgrading," you can use a leak detection method that will be less costly and easier to apply than most other leak detection methods. This method requires you to conduct monthly inventory control and to have tank tightness tests performed every 5 years (see page 14). By contrast, USTs that have **not** been "upgraded" must have tank tightness tests **every year**.

***Choices For Existing* Piping...**

You have two basic choices of leak detection for piping depending on the type of piping you use:

- By **December 1990,** existing **pressurized** piping must meet the leak detection requirements for new **pressurized** piping (see page 11).
- Existing **suction piping** must meet the requirements for new suction piping (see page 11) at the same time the tank meets the leak detection schedule given above.

REMEMBER...

No matter which leak detection methods you use for tanks and piping, they must be working by the deadlines described above. If not, you must close your UST or replace it with a new UST.

The chart on pages 16-17 displays all these leak detection requirements and the ones for corrosion protection and spill and overfill prevention.

WHAT DO YOU HAVE TO DO? Minimum Requirements

You must have Leak Detection, Corrosion Protection, and Spill/Overfill Prevention.
For WHEN you have to add these to your tank system, see the chart on the right. →

LEAK DETECTION	
NEW TANKS *2 Choices*	• Monthly Monitoring* • Monthly Inventory Control and Tank Tightness Testing Every 5 Years (You can only use this choice for 10 years after installation.)**
EXISTING TANKS *3 Choices* *The chart at the bottom of the next page displays these choices.*	• Monthly Monitoring* • Monthly Inventory Control and Annual Tank Tightness Testing (This choice can only be used until December 1998.) • Monthly Inventory Control and Tank Tightness Testing Every 5 Years (This choice can only be used for 10 years after adding corrosion protection and spill/overfill prevention or until December 1998, whichever date is later.)**
NEW & EXISTING PRESSURIZED PIPING *Choice of one from each set*	• Automatic Flow Restrictor • Automatic Shutoff Device • Continuous Alarm System -and- • Annual Line Testing • Monthly Monitoring* (except automatic tank gauging)
NEW & EXISTING SUCTION PIPING *3 Choices*	• Monthly Monitoring* (except automatic tank gauging) • Line Testing Every 3 Years • No Requirements (if the system has the characteristics described in the final regulations)
CORROSION PROTECTION	
NEW TANKS *3 Choices*	• Coated and Cathodically Protected Steel • Fiberglass • Steel Tank clad with Fiberglass
EXISTING TANKS *4 Choices*	• Same Options as for New Tanks • Add Cathodic Protection System • Interior Lining • Interior Lining and Cathodic Protection
NEW PIPING *2 Choices*	• Coated and Cathodically Protected Steel • Fiberglass
EXISTING PIPING *2 Choices*	• Same Options as for New Piping • Cathodically Protected Steel
SPILL / OVERFILL PREVENTION	
ALL TANKS	• Catchment Basins -and- • Automatic Shutoff Devices -or- • Overfill Alarms -or- • Ball Float Valves

* Monthly Monitoring includes: Automatic Tank Gauging, Vapor Monitoring, Interstitial Monitoring, Ground-Water Monitoring, Other Approved Methods

** Very small tanks may also be able to use manual tank gauging (see page 35).

WHEN DO YOU HAVE TO ACT? Important Deadlines

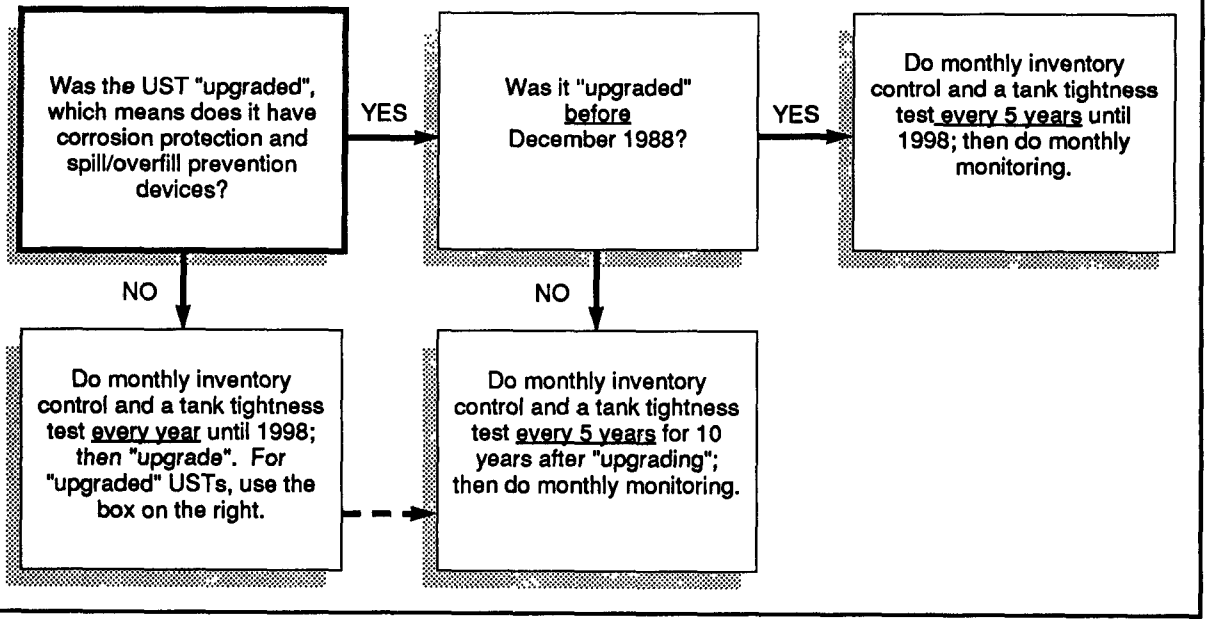
← For WHAT you have to do, see the chart on the left.

TYPE OF TANK & PIPING	LEAK DETECTION	CORROSION PROTECTION	SPILL / OVERFILL PREVENTION
New Tanks and Piping*	At installation	At installation	At installation
Existing Tanks** Installed:	By No Later Than:		
Before 1965 or unknown	December 1989	December 1998	December 1998
1965 - 1969	December 1990		
1970 - 1974	December 1991		
1975 - 1979	December 1992		
1980 - December 1988	December 1993		
Existing Piping**			
Pressurized	December 1990	December 1998	Does not apply
Suction	Same as existing tanks	December 1998	Does not apply

* New tanks and piping are those installed after December 1988
** Existing tanks and piping are those installed before December 1988

IF YOU CHOOSE TANK TIGHTNESS TESTING AT EXISTING USTs . . .

If you don't use monthly monitoring at existing USTs, you must use a combination of periodic tank tightness tests and monthly inventory control. This combined method can only be used for a few years, as the chart below displays.



HOW DO YOU CORRECT PROBLEMS CAUSED BY LEAKS?

What Do You Do When You Suspect Your Petroleum UST Is Leaking?

Various warning signals indicate that your UST may be leaking and creating problems for the environment and your business. You can avoid most of these problems by paying careful attention to these warning signals and by taking the appropriate actions.

Warnings From Equipment

You should suspect a leak when you discover the following warning signals from equipment:

- Unusual operating conditions (such as erratic behavior of the dispensing pump).
- Results from leak detection monitoring and testing that indicate a leak.

You need to confirm quickly whether these suspected leaks are real. What at first appears to be a leak may be the result of faulty equipment that is part of your UST system or its leak detection. Double check this equipment carefully for failures. You may simply need to repair or replace equipment that is not working.

If repair or replacement of faulty equipment does not solve the problem, then you must report this finding to the regulatory authority and conduct tightness tests of the entire UST system. If these tests indicate a leak, you need to report to the regulatory authority and follow the actions for a **confirmed** leak (see page 20).

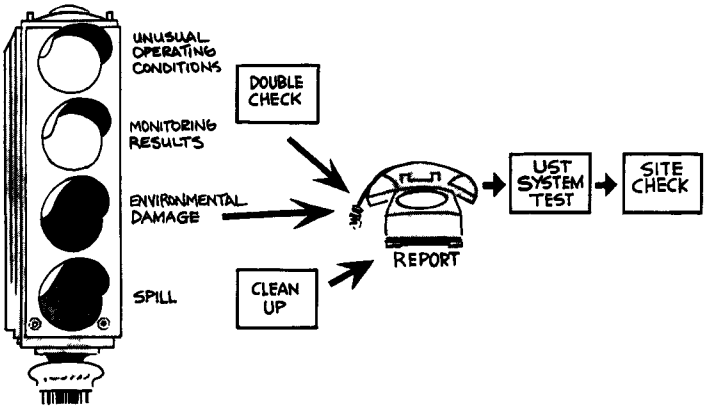
Warnings In The Environment

You should also suspect a leak if evidence of leaked petroleum appears at or near your site. For example, neighbors might tell you they have smelled petroleum vapors in their basements or tasted petroleum in their drinking water. You might even discover evidence of environmental damage as you investigate the suspected equipment failures discussed above.

Whenever evidence of environmental damage is discovered, you must take the following actions:

- Report this discovery **immediately** to the regulatory authority.
- Conduct tightness tests of the entire UST system.
- Investigate the UST site for additional information on the extent and nature of the environmental damage.

The results of these system tests and site checks will help answer the crucial question: "Is my UST leaking?" If the answer is **yes**, then you will need to follow the actions for responding to **confirmed** leaks (see page 20).



What Do You Do When Your Petroleum UST Leaks?

Your response to **confirmed** leaks and spills (including overfills) comes in two stages: **short-term and long-term.**

Short-Term Actions

- Take immediate action to stop and contain the leak or spill.

- Tell the regulatory authority within 24 hours that there is a leak or spill. However, petroleum spills and overfills of less than 25 gallons do not have to be reported if you immediately contain and clean up these releases.

- Make sure the leak or spill poses no immediate hazard to human health and safety by removing explosive vapors and fire hazards. Your fire department should be able to help or advise you with this task. You must also make sure you handle contaminated soil properly so that it poses no hazard (for example, from vapors or direct contact).

- Find out how far the petroleum has moved and begin to recover the leaked petroleum (such as product floating on the water table).

- Report your progress and any information you have collected to the regulatory authority no later than 20 days after you have confirmed a leak or spill.

- Investigate to determine if the leak has damaged or might damage the environment. You must report to the regulatory authority what you have learned from a full investigation of your site within 45 days of confirming a leak or spill. At the same time, you must also submit a report explaining how you plan to remove the leaked petroleum, if you have found contaminated ground water. Additional site studies may be required if necessary.

These actions are fully explained in the UST regulations and in a brochure (see page 38).

Some leaks and spills will require additional, **long-term** attention to correct the problem.

Long-Term Actions

Based on the information you have provided, the regulatory authority will decide if you must take further action at your site. You may need to take two more actions:

- Develop and submit a Corrective Action Plan that shows how you will meet requirements established for your site by the regulatory authority.

- Make sure you meet the requirements approved by the regulatory authority for your site.

Can Leaking Tanks Be Repaired?

You can repair a leaking tank if the person who does the repair carefully follows standard industry codes that establish the correct way to conduct repairs. (See page 40 for repair codes.)

Within 30 days of the repair, you must prove that the tank repair has worked by doing one of the following:

- Having the tank inspected internally or tightness tested following standard industry codes.
- Using one of the monthly leak detection monitoring methods (except for the method combining inventory control and tank tightness testing).
- Using other methods approved by the regulatory authority.

Within 6 months of repair, USTs with cathodic protection must be tested to show that the cathodic protection is working properly.

You must keep records for each repair as long as you keep the UST in service.

Can Leaking Piping Be Repaired?

Damaged **metal** piping **cannot** be repaired and must be replaced. Loose fittings can simply be tightened, however, if that solves the problem.

Piping made of **fiberglass-reinforced plastic**, however, can be repaired, but **only** in accordance with the manufacturer's instructions or national codes of practice. Within 30 days of the repair, piping must be tested in the same ways noted above for testing tank repairs (except for internal inspection).

HOW DO YOU CLOSE USTs?

You can close your UST **permanently or temporarily.**

Closing Permanently

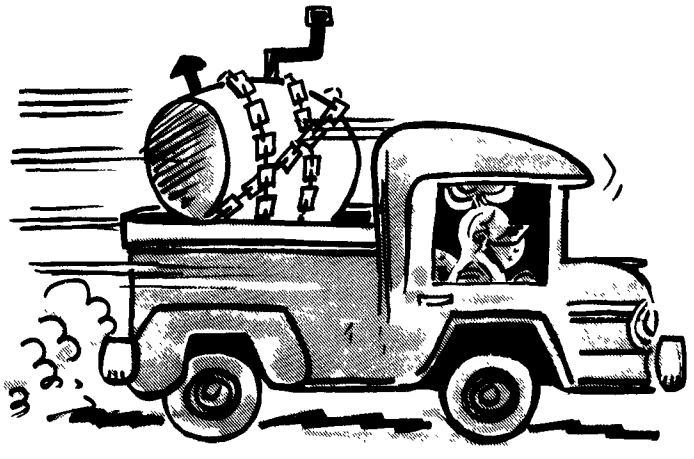
If your tank is not protected from corrosion and it remains closed for **more than 12 months** or you decide to close it permanently, you must follow requirements for **permanent closure**:

- You must notify the regulatory authority 30 days before you close your UST.
- You must determine if leaks from your tank have damaged the surrounding environment. If there is damage, then you will have to take the corrective actions described on page 20.
- You can either remove the UST from the ground or leave it in the ground. In both cases, the tank must be emptied and cleaned by removing all liquids, dangerous vapor levels, and accumulated sludge. These potentially very hazardous actions need to be carried out carefully by following standard safety practices. (See pages 37 and 40 for sources of information on good closure practices.) If you leave the UST in the ground, you must also fill it with a harmless, chemically inactive solid, like sand. The regulatory authority will help you decide how best to close your UST so that it meets all local requirements for closure.

Three Exceptions To Permanent Closure

The requirements for permanent closure may not apply to your UST if it meets one of the following conditions:

- If your UST meets the requirements for a new or upgraded UST, then it can remain "temporarily" closed indefinitely as long as it meets the requirements below for a temporarily closed UST.
- The regulatory authority can grant an extension beyond the 12-month limit on temporary closure for USTs unprotected from corrosion.
- You can change the contents of your UST to an unregulated substance, such as water. Before you make this change, you must notify the regulatory authority, clean and empty the UST, and determine if any damage to the environment was caused while the UST held regulated substances. If there is damage, then you must take the corrective actions described on page 20.



Closing Temporarily

Tanks not used for 3 to 12 months must follow requirements for **temporary closure**:

- If your UST has corrosion protection and leak detection, you must continue to operate these protective systems. If a leak is found, you will have to respond just as you would for a leak from an active UST, as described on page 20. (If your UST is empty, however, you do not need to maintain leak detection.)

- You must cap all lines, except the vent-line, attached to your UST.

WHAT ABOUT REPORTING AND RECORDKEEPING?

What Do You Need To Report?

In general, you will only need to report to the regulatory authority at the beginning and end of your UST system's operating life:

- When you install an UST, you have to fill out a **notification form** available from your State. This form provides information about your UST, including a certification of correct installation. (You should have already used this form to identify your existing USTs. If you haven't done that yet, be sure you do so now.)
- You must report suspected releases to the regulatory authority (see page 19).
- You must report confirmed releases to your regulatory authority. You must also report follow-up actions you plan or have taken to correct the damage caused by your UST (see page 20).
- You must notify the regulatory authority 30 days before you permanently close your UST (see page 23).

You need to check with your regulatory authority about the particular reporting requirements in your area, including any additional or more stringent requirements than those noted above.

What Records Must You Keep?

You will have to keep records that can be provided to an inspector during an on-site visit that prove your facility meets certain requirements. These records must be kept long enough to show your facility's recent compliance status in four major areas:

- You will have to keep records of **leak detection** performance and upkeep:

  -- The last year's monitoring results, and the most recent tightness test.

  -- Copies of performance claims provided by leak detection manufacturers.

  -- Records of recent maintenance, repair, and calibration of leak detection equipment installed on-site.

- You will have to keep records showing that the last two inspections of your **corrosion protection** system were carried out by properly trained professionals.

- You must keep records showing that a **repaired or upgraded UST system** was properly repaired or upgraded.

- For at least 3 years after **closing an UST**, you must keep records of the site assessment results required for permanent closure. (These results show what impact your UST has had on the surrounding area.)

You should check with your regulatory authority about the particular recordkeeping requirements in your area. Generally, you should follow this useful rule of thumb for recordkeeping: When in doubt, keep it.

FOR CHEMICAL USTs ONLY

What Chemicals Are Included In The UST Regulations?

Several hundred chemicals were designated as "hazardous" in Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, better known as CERCLA or "Superfund."

The UST regulations apply to the same hazardous chemicals identified by CERCLA, except for those listed as hazardous **wastes**. These hazardous wastes are already regulated under Subtitle C of the Resource Conservation and Recovery Act and are **not** covered by the UST regulations. (See 40 **CFR** Parts 260-270 for the hazardous waste regulations.)

Information on the CERCLA hazardous chemicals is available from EPA through the RCRA/CERCLA Hotline at 1-(800)-424-9346 or (202) 382-3000.

The following pages describe requirements for USTs that contain hazardous chemicals -- more simply referred to as **chemical USTs.**

REMEMBER...

New UST systems are those that are installed after December 1988.

Those USTs installed between May 1985 and December 1988 must meet two minimum requirements:

- The UST must prevent releases due to corrosion or structural failure.
- The stored contents must be compatible with the tank's interior wall.

After December 1988, these older USTs must meet the requirements for existing chemical USTs (see page 29).

HAZARDOUS SUBSTANCE LIST
(Partial Listing Only)

HAZARDOUS SUBSTANCE	CASRN*
Acenaphthene	83329
Acenaphthylene	208968
Acetaldehyde	75070
Acetaldehyde, chloro-	107200
Acetaldehyde, tricloro-	75876
Chromic sulfate	10101538
Choromium	7440473
CHROMIUM AND COMPOUNDS	--
Chromous chloride	10049055
Chrysene	218019
Cobaltous bromide	7789437
Cobaltous formate	544183
Cobaltous sulfamate	14017415
Copper	7440508
Copper cyanide	544923
Famphur	52857
Ferric ammonium citrate	1185575
Ferric ammonium oxalate	2944674
Ferric chloride	7705080
Ferric dextran	9004664
Ferric fluoride	7783508
Ferric nitrate	10421484
Ferric sulfate	10028225
Keithane	115322
Kepone	143500
Lasiocarpine	303344
LEAD AND COMPOUNDS	--
Lead	7439921
Lead acetate	301042
Lead arsenate	7784409
Lead chloride	7758954
Lead fluoborate	13814965
Lead iodide	10101630
Zinc nitrate	7779886
Zinc phenosulfonate	127882
Zinc phosphide	1314847
Zinc silicoflouride	16871719
Zinc sulfate	7733020
Zirconium nitrate	13746899
Zirconium sulfate	14644612
Zirconium tetrachloride	10026116

*Chemical Abstracts Service Registry Number

What Requirements Apply To New Chemical USTs?

New chemical USTs have to meet the same requirements described earlier for new petroleum USTs concerning correct installation, corrosion protection, spill and overfill prevention, corrective action, and closure.

However, they must have secondary containment and interstitial monitoring as described below.

Secondary Containment

All new chemical USTs must have "secondary containment." A single-walled tank is the first or "primary" containment. Using only primary containment, a leak can escape into the environment. But by enclosing an UST within a second wall, leaks can be contained and detected quickly before harming the environment.

There are several ways to construct secondary containment:

- Placing one tank inside another tank or one pipe inside another pipe (making them double-walled systems).
- Placing the UST system inside a concrete vault.
- Lining the excavation zone around the UST system with a liner that cannot be penetrated by the chemical.

Interstitial Monitoring

The chemical UST must have a leak detection system that can indicate the presence of a leak in the confined space between the first and the second wall. Several devices are available to monitor this confined "interstitial" space. ("Interstitial" simply means "between the walls.") The UST regulations describe these various methods and the requirements for their proper use.

You can apply for an exception, called a **variance**, from the requirement for secondary containment and interstitial monitoring. Getting a variance will require a lot of work. You will have to convince your regulatory authority that your alternative leak detection method will work effectively by providing detailed studies of your site, proposed leak detection method, and available methods for corrective action. Also, some States may not allow variances.

What About Existing Chemical USTs?

Existing UST systems are those installed before December 1988. In addition to immediately starting tank filling procedures that prevent spills and overfills, you will need to meet the following requirements for existing USTs.

Protection From Corrosion And Prevention Of Spills And Overfills

By December 1998 (10 years after the UST regulations become effective), you must improve your USTs installed **before** December 1988:

- By adding **corrosion protection** to steel tanks and piping.
- By using devices that **prevent spills and overfills.**

Although the regulatory deadline is in 1998, you should make these improvements as soon as you can to reduce the chance that you will be liable for damages caused by your substandard UST.

Leak Detection

Leak detection requirements are being phased in for existing USTs depending on their age:

If the tank was installed...	It must have leak detection by December of...
before 1965 or unknown	1989
1965-1969	1990
1970-1974	1991
1975-1979	1992
1980-Dec.1988	1993

This schedule will make sure that the older USTs, which are more likely to leak, have leak detection first.

There is a special deadline for **pressurized** piping in **December 1990.** At that time, **existing** pressurized piping must meet the requirements for **new** pressurized piping (described on page 11).

Choosing Leak Detection Methods For Existing Chemical USTs

You can meet the leak detection requirements in one of the following three ways:

- After December 1998, your UST must meet the same requirements for secondary containment and interstitial monitoring that apply to new chemical USTs.
- After December 1988, a **variance** can be granted if you meet the same requirements described above for getting a variance for a new chemical UST.
- **Until December 1998,** you can use any of the leak detection methods, other than interstitial monitoring, described on page 14 **but only if** the method you choose can effectively detect releases of the hazardous chemical stored in the UST. (Variances are not required in these cases before December 1998.)

  After December 1998, you must either use secondary containment and interstitial monitoring or get a variance.

NOTE..

No matter which leak detection methods you use for tanks and piping, they must be working by the deadlines described above. If not, you must close your UST or replace it with a new UST.

What Do You Do If You Have A Hazardous Chemical Leak Or Spill?

You must follow the same short-term and long-term actions described earlier for petroleum leaks and spills -- except for two modified short-term actions.

First, you must immediately report hazardous chemical spills or overfills that meet or exceed their "reportable quantities" to the National Response Center at 1-(800)-424-8802 or (202) 267-2675.

Second, you must also report hazardous chemical spills or overfills that meet or exceed their "reportable quantities" to the regulatory authority within 24 hours. However, if these spills or overfills are smaller than their "reportable quantities" and are immediately contained and cleaned up, they do not need to be reported.

You can get information on the "reportable quantities" by calling the RCRA/CERCLA Hotline 1-(800)-424-9346 or (202) 382-3000.

TECHNICAL QUESTIONS & ANSWERS

Q. How does "corrosion" cause USTs to leak? How can USTs be protected from corrosion?

A. Unprotected steel USTs are frequently damaged by corrosion. When this happens, the metal UST system and its underground surroundings act like a battery. Part of the UST can become negatively charged and another part positively charged. Moisture in the soil provides the connecting link that finally turns these UST "batteries" on. Then, the negatively charged part of the UST system -- where the current exits from the tank or its piping -- begins to deteriorate. As electric current passes through this part, the hard metal begins to turn into soft ore, holes form, and leaks begin.

Steel tanks and piping can be protected by coating them with a corrosion-resistant coating and by using "cathodic" protection. Cathodic protection reverses the electric current that causes corrosion and comes in two forms:

- "Sacrificial anodes" can be attached to the UST. Sacrificial anodes are pieces of metal more electrically active than the steel UST. Because these anodes are more active, the electric current will exit from them rather than the UST. Thus, the UST is the "cathode" and is protected from corrosion while the attached "anode" is sacrificed.

- An "impressed current" protection system introduces an electric current into the ground through a series of anodes that are **not** attached to the UST. Because the electric current flowing from these anodes to the tank system is greater than the corrosive current attempting to flow from it, the UST is protected from corrosion.

In addition, steel USTs can also be protected from corrosion if they are bonded to a thick layer of noncorrodible material, such as fiberglass-reinforced plastic. Cathodic protection is not needed with this method of corrosion protection. Also, the corrosion problem can be totally avoided by using tanks and piping made completely of noncorrodible material, such as fiberglass.

For more information on how corrosion works and how USTs can be protected from corrosion, contact the National Association of Corrosion Engineers or other corrosion professionals. See page 40 for industry codes on corrosion protection.

Q. How can existing USTs (those installed before December 1988) be "upgraded" to meet the corrosion protection requirements by December 1998?

A. When you add corrosion protection to existing UST systems, you have several choices. Your first choice is to meet the corrosion protection requirements for new tanks and piping (see page 9). Your other choices, described below, depend on whether you are protecting the tank or the piping.

Protecting Tanks

You have three choices for "upgrading" your tank for corrosion protection:

- The interior of a tank can be lined according to industry codes (see page 40 for codes). Tanks using only an interior lining for corrosion protection must pass an inspection in 10 years and reinspections every 5 years after that to ensure that the lining and tank are structurally sound.

- Tanks using only cathodic protection must meet the general requirements for cathodic protection **and** satisfy **one** of the methods below to make sure that the tank is structurally sound:

  -- If the tank is **less than 10 years old,** you can use one of the monthly leak detection monitoring methods noted on page 10.

  -- If the tank is **less than 10 years old,** you can have two tank tightness tests conducted. The first test must take place before you install cathodic protection, and the second test must take place between 3 and 6 months later.

  -- If the tank is **10 years old or more,** it must be internally inspected and assessed to make sure that the tank is structurally sound and free of corrosion holes before a cathodic protection system is installed.

- You can combine tank interior lining with cathodic protection. If you use this combined method, you are not required to have the interior lining periodically inspected.

Protecting Piping

Unless the existing piping is made of noncorrodible material, it must meet the requirements for cathodic protection of new metal piping, <u>except</u> that the existing piping does not need to be coated with a corrosion-resistant coating (see page 9).

Q. What are "installation mistakes" and how can they be avoided?

A. Improper installation is a significant cause of fiberglass-reinforced plastic (FRP) and steel UST failures, particularly piping failures. Proper installation is crucial to ensure the structural integrity of both the tank and its piping. Installation includes excavation, tank system siting, burial depth, tank system assembly, backfilling of the tank system, and surface grading. Many mistakes can be made during installation. For example, mishandling of the tank during installation can cause structural failure of FRP tanks or damage to steel tank coatings and cathodic protection. Improper layout of piping runs, incomplete tightening of joints, inadequate cover pad construction, and construction accidents can lead to failure of delivery piping.

Installation problems result from careless installation practices that do not follow recognized industry codes and procedures. If owners and operators make sure that their installers carefully follow the correct installation procedures called for by industry codes, the number of installation mistakes will be significantly reduced. See page 40 for industry codes on installation. See page 37 for sources of information on installation.

Q. What are spills and overfills? How can they be stopped?

A. Many of the leaks at UST systems are actually the result of spills and overfills (which are two separate problems). In fact, these releases are at least twice as numerous as tank or piping releases. Spills most often occur at the fill pipe opening when the delivery truck's hose is disconnected, usually releasing only a few gallons. Repeated releases of even small volumes, however, can create real environmental problems. Overfills occur less frequently but usually release much larger volumes. When a tank is overfilled, large volumes can be released through untight fittings on the top of the tank or the vent pipe. The tightness of these fittings normally would not be a problem as long as the tank was not filled beyond its capacity.

There are three keys to solving the problems of spills and overfills. **First,** you must make sure that the volume available in the tank is greater than the volume of product to be transferred to the tank <u>before</u> the transfer is made.

Second, you have to make sure that the transfer operation is watched constantly to prevent overfilling and spilling. See page 40 for appropriate industry codes.

Third, you must use equipment that can prevent or severely limit spills and overfills (see below for <u>when</u> you have to do this). Spill prevention devices, such as spill catchment basins or dry disconnect couplings, are readily available. Overfill prevention devices automatically shut off flow when the tank is nearly full. Other overfill devices either restrict flow or trigger an alarm when the tank is nearly full.

Your new UST system must be equipped with both spill <u>and</u> overfill prevention devices when it is installed. Your existing USTs must have these devices by December 1998. The only exception to this requirement is if your UST system is filled only by separate transfers of no more than 25 gallons. In these cases, you do not have to follow the spill and overfill equipment requirements.

Q. What leak detection methods will satisfy the leak detection requirements for new or "upgraded" petroleum USTs?

A. You must provide your UST system with a method, or combination of methods, of leak detection that allows you to meet the following three basic requirements:

- You can detect a leak from any portion of the tank or its piping that **routinely** contains petroleum;
- Your leak detection equipment is installed, calibrated, operated, and maintained in accordance with the manufacturer's instructions; and
- Your leak detection equipment meets the performance requirements described in the Federal regulations, sections 280.43 or 280.44.

EPA is developing materials that fully describe the various ways you can meet the leak detection requirements (see page 38). One of these materials is "Straight Talk on Tanks," a booklet summarizing leak detection methods for petroleum USTs. The descriptions below briefly identify leak detection methods for tanks and piping.

Leak Detection for Tanks

Leak detection for tanks can consist of one or a combination of the following methods:

Automatic Tank Gauging Systems

This method uses automated processes to monitor product level and inventory control.

Monitoring for Vapors in the Soil

This method samples vapors in the soil gas surrounding the UST. Leaked petroleum produces vapors that can be detected in the soil gas. The regulations describe several requirements for using this leak detection method. For example, this method requires using porous soils in the backfill and locating the monitoring devices in these porous soils near the UST system.

Monitoring for Liquids on the Ground Water

This method monitors the ground water table near an UST for the presence of released free product on the water table. Monitoring wells near the UST are checked frequently to see if petroleum can be detected. The regulations allow manual and automatic methods for detecting petroleum in the monitoring wells. The regulations also describe several requirements for the use of this method. For example, this method cannot be used if the water table is more than 20 feet below the surface of the ground.

Interstitial Monitoring

This method detects leaks in the space between the UST and a second barrier or wall. The regulations describe several general performance requirements for the application of interstitial monitoring with double-walled USTs, USTs fitted with internal liners, and USTs using partial interception barriers located below the UST.

Other Methods Approved by the Regulatory Authority

If other methods can be shown to work as effectively as the methods described above for leak detection, then these alternative methods can be approved by the regulatory authority.

Tank Tightness Testing Combined with Inventory Control

This method combines manual inventory control information (measured daily and compiled monthly) with tank tightness testing every 5 years. Tank tightness testing requires taking the UST out of service while changes in level or volume over time are measured. This method can be used only by new or upgraded USTs during their first 10 years of operation (or until 1998, whichever is later). After that, one of the monthly monitoring methods below must be used.

One Additional Method with Restricted Use

Manual tank gauging can be used as the sole method of leak detection *only for small tanks up to 1,000 gallons.* This method involves keeping the tank undisturbed for at least 36 hours, during which you measure the tank's contents each week, twice at the beginning and twice at the end of the test period. Tanks between 1,000 and 2,000 gallons can use this method *only in combination with tank tightness testing.* This combined method, however, can be used only during the first 10 years following tank installation or upgrade.

Leak Detection for Piping

If you have **pressurized** piping, you need to do two things:

- Install an automatic line leak detector, and
- **Either** conduct an annual line tightness test,

  Or conduct monthly leak detection monitoring using one of the following methods noted above for tanks: vapor monitoring, ground-water monitoring, interstitial monitoring, or other approved monthly methods.

If you have **suction** piping, you need to do one of two things:

- **Either** conduct line tightness tests every 3 years,

  Or conduct monthly leak detection monitoring as described above for pressurized piping.

You do **not** need to have leak detection if your **suction piping** meets some basic design requirements:

- Below-grade **piping** is sloped so that the piping's contents will drain back into the storage tank if the suction is released.
- Only one **check valve** is included in each suction line and is located directly below the suction pump.

AUDIOVISUALS, BROCHURES, AND HANDBOOKS ON USTs

Audiovisual Programs...

Installation

"Doing It Right" -- Installation for the crews who do it	Order from: American Petroleum Institute 1220 L Street, N.W. Washington, DC 20005 or Petroleum Equipment Institute Box 2380 Tulsa, OK 74101 $16.00 prepaid
"Recommended Practices on Tank Installation" -- Companion booklet	Available from both API and PEI $10.00 prepaid

"A Question of When: Tank Installation for Inspectors" **"In Your Own Backyard"** -- Shorter version of inspector video for tank owners	Order from: National Fire Protection Association Attn: Jim Smalley Batterymarch Park Quincy, MA 02269 $22.85 each prepaid

Leak Detection

"Straight Talk on Leak Detection"	Available from: Environmental Media Center 1050 17th Street, N.W. Washington, DC 20036 $25.00

Closure

"Tank Closure Without Tears: An Inspector's Safety Guide"	Order from: New England Interstate Water Pollution Control Commission Attn: VIDEOS 85 Merrimac Street Boston, MA 02114 $20.00 prepaid Companion booklet $5.00 prepaid To borrow: New England Regional Wastewater Institute 2 Fort Road South Portland, ME 04106 Video and booklet $5.00 prepaid

Closure (cont.)

"What Do We Have Here?: A Guide to Site Assessment at Closure"	Order from: New England Interstate Water Pollution Control Commission Attn: VIDEOS 85 Merrimac Street Boston, MA 02114 $40.00 prepaid Companion booklet $5.00 prepaid

Tank Program Management

"Managing Underground Storage Tanks" -- 185-Slide Presentation Action Plan	Order from: National Audiovisual Center Customer Services Section/WD 8700 Edgeworth Drive Capitol Heights, MD 20743-3701 (301) 763-1891 $120.00 prepaid

Brochures...

Technical Requirements

"Musts for USTs" -- A Summary of the Regulations for Underground Storage Tank Systems Stock No. 055-000-00294-1 $2.50	Order from: Superintendent of Documents U.S. Government Printing Office Washington, DC 20402 (202) 783-3238

"Normas y Procedimientos para T.S.A." -- Spanish Language Version of "Musts for USTs" Free	Order from: U.S. Environmental Protection Agency Office of Underground Storage Tanks P.O. Box 6044 Rockville, MD 20850

Financial Responsibility

"Dollars and Sense" -- A Summary of the Financial Responsibility Regulations for Underground Storage Tank Systems Stock No. 055-000-00293-2 $1.25	Order from: Superintendent of Documents U.S. Government Printing Office Washington, DC 20402 (202) 783-3238

Leak Detection

"Leak Lookout" -- Using External Leak Detectors to Prevent Petroleum Contamination from Underground Storage Tanks
Free

"Straight Talk on Tanks" -- A Summary of Leak Detection Methods for Petroleum Underground Storage Tank Systems
Free

Order from:
U.S. Environmental Protection Agency
Office of Underground Storage Tanks
P.O. Box 6044
Rockville, MD 20850

Emergency Response

"Oh No!" -- Petroleum Leaks and Spills: What Do You Do?
Free

Order from:
U.S. Environmental Protection Agency
Office of Underground Storage Tanks
P.O. Box 6044
Rockville, MD 20850

Handbooks...

Technology

"Cleanup of Releases from Petroleum USTs: Selected Technologies"
Stock No. 055-000-00272-0
$7.50

"Petroleum Tank Releases Under Control: A Compendium of Current Practices for State UST Inspectors"
Stock No. 055-000-00295-9
$8.50

"Processes Affecting Subsurface Transport of Leaking Underground Tank Fluids"
Stock No. 055-000-00269-0
$3.25

"Survey of Vendors of External Petroleum Leak Monitoring Devices for Use with USTs"
Stock No. 055-000-00277-1
$4.25

Order from:
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402
(202) 783-3238

INDUSTRY CODES AND STANDARDS*

Installation

API Publication 1615, 1987, "Installation of Underground Petroleum Storage Systems," Recommended Practice, 4th Edition

PEI RP-100-90, 1990, "Recommended Practices for Installation of Underground Liquid Storage Systems"

Tank Filling Practices

API Publication 1621, 1977, "Recommended Practice for Bulk Liquid Stock Control at Retail Outlets," 3rd Edition (A revised edition is now available.)

NFPA 385, 1985, "Standard for Tank Vehicles for Flammable and Combustible Liquids"

Closure

API Bulletin 1604, 1987, "Removal and Disposal of Used Underground Petroleum Storage Tanks," Recommended Practice, 2nd Edition

Lining

API Publication 1631, 1987, "Interior Lining of Underground Storage Tanks," Recommended Practice, 2nd Edition

NLPA Standard 631, 1990, "Spill Prevention: Minimum 10 Year Life Extension of Existing Steel Underground Storage Tanks by Lining Without the Addition of Cathodic Protection"

Corrosion Protection

API Publication 1632, 1987, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems," Recommended Practice, 2nd Edition

NACE RP-0169-83, 1983, "Recommended Practice: Control of Corrosion on Underground or Submerged Metallic Piping Systems"

NACE RP-0285-85, 1985, "Recommended Practice: Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems"

General (Repair, Spill and Overfill, Installation, Compatibility)

API Publication 1626, 1985, "Storing and Handling Ethanol and Gasoline-Ethanol Blends at Distribution Terminals and Service Stations," 1st Edition

API Publication 1627, 1986, "Storage and Handling of Gasoline-Methanol/Cosolvent Blends at Distribution Terminals and Service Stations"

API Recommended Practice 1635, 1987, "Management of Underground Petroleum Storage Systems at Marketing and Distribution Facilities," Recommended Practice, 3rd Edition

NFPA 30, 1987, "Flammable and Combustible Liquids Code"

NFPA 30A, 1987, "Automotive and Marine Service Station Code"

*This list includes the most relevant codes and standards for underground storage tank systems. Organizations are identified on page 41.

ORGANIZATIONS TO CONTACT FOR TANK INFORMATION

ACT -- Association for Composite Tanks
1900 Frankfurst Ave.
Baltimore, MD 21226
(301) 235-6000 (for information requests)

API -- American Petroleum Institute
1220 L Street, N.W.
Washington, DC 20005
(202) 682-8000

Fiberglass Petroleum Tank and
Pipe Institute
One SeaGate, Suite 1001
Toledo, OH 43604-1560
(419) 247-5412
FAX: (419) 247-5421

NACE -- National Association of Corrosion
Engineers
Box 218340
Houston, TX 77218
(713) 492-0535

NFPA -- National Fire Protection Association
1 Batterymarch Park
P.O. Box 9109
Quincy, MA 02269
(617) 770-3000

NLPA -- National Leak Prevention Association
7685 Fields Ertel Rd.
Cincinnati, OH 45241
(513) 489-9844
1-(800)-322-6572

PEI -- Petroleum Equipment Institute
Box 2380
Tulsa, OK 74101
(918) 494-9696

Steel Tank Institute
570 Oakwood Rd.
Lake Zurich, IL 60047
(708) 438-TANK [8265]

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