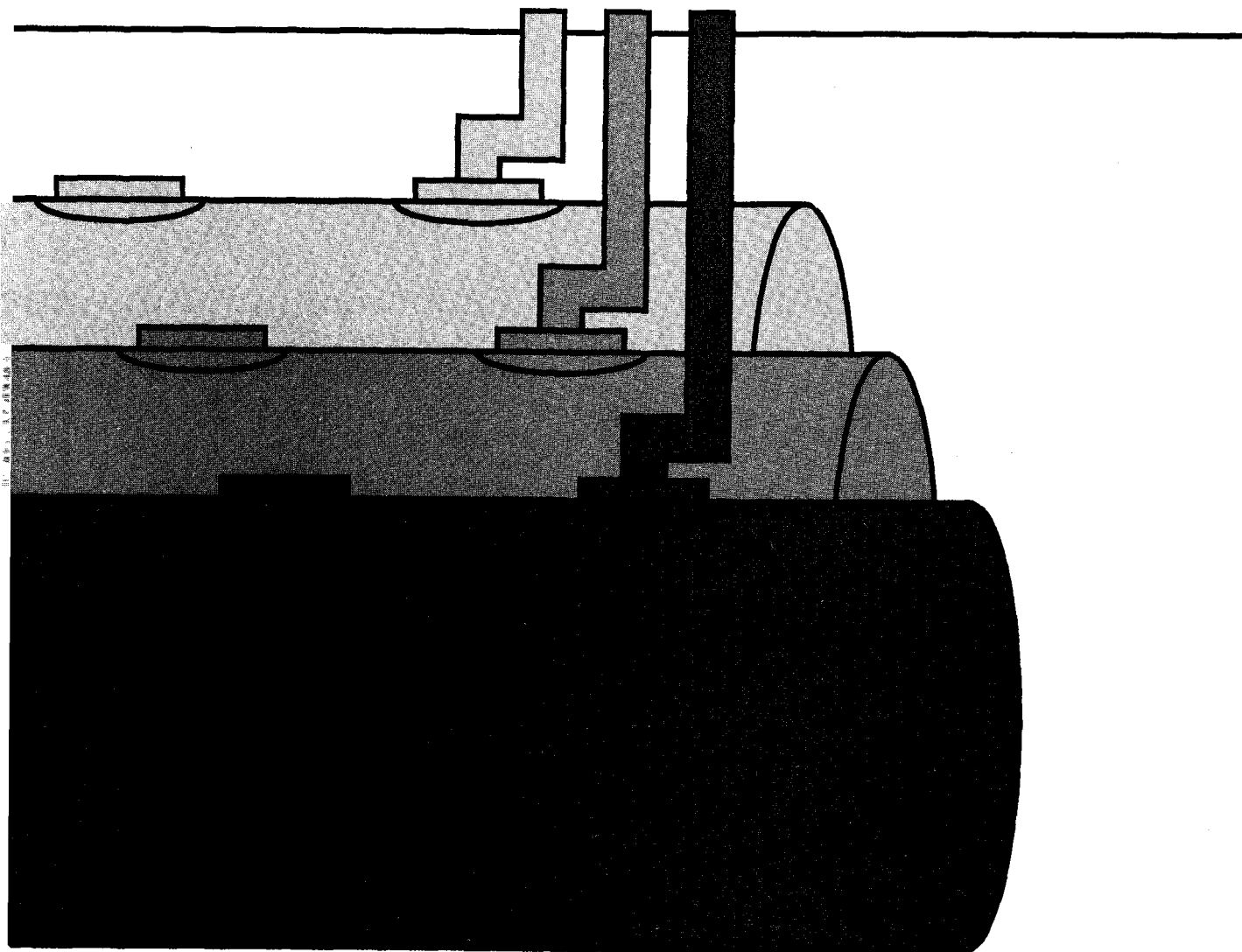




Proposed Regulations for Underground Storage Tanks:

What's In The Pipeline?



Acknowledgement

The text of this brochure was prepared by Jay Evans for EPA's Office of Underground Storage Tanks.

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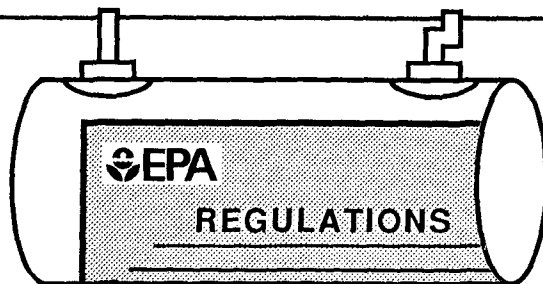
What's In The Pipeline?

The U.S. Environmental Protection Agency (EPA) has recently proposed regulations for many of the nation's underground storage tanks. Although the complete proposal appears in the **Federal Register** (April 17, 1987), this brochure briefly describes the proposed technical requirements. Comments from the general public will be considered before EPA issues final regulations early next year.

Why Is EPA Proposing These New Regulations?

Several million underground tanks in the United States contain petroleum or hazardous chemicals. Thousands of these underground storage tanks --often called USTs--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 (see map on page 2).

Congress responded to the problem of leaking USTs when, in 1984, it added Subtitle I to the Resource Conservation and Recovery Act. Subtitle I requires EPA to develop regulations to protect human health and the environment from leaking USTs.



How Will These Proposed Regulations Affect You?

The proposed regulations describe the steps you --the tank owner or operator--may have to take to help protect our drinking water resources. These steps will also help you avoid the high cost of cleaning up the environment and settling legal suits that can result if your tank leaks.

There are four major points you should note:

- Final regulations are not far off. EPA will issue them in early 1988. Until then, all new USTs must meet the requirements of the Interim Prohibition described below.
- Within 3 to 5 years after the regulations become final, your USTs will have to meet leak detection requirements.
- Within 10 years, your USTs must also be protected from corrosion and equipped with devices to prevent spills or overfills.
- You will be financially responsible for the cost of cleaning up a leak and compensating other people for bodily injury and property damage caused by your leaking tank.

These points are discussed in the following sections. Additional detailed explanations appear on page 15 in the technical "Questions & Answers" section.

What's an "UST"?

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

The requirements for both petroleum and chemical USTs are basically the same. However, please note that additional requirements for chemical USTs are described separately on page 11 in the "For Chemical USTs Only" section.

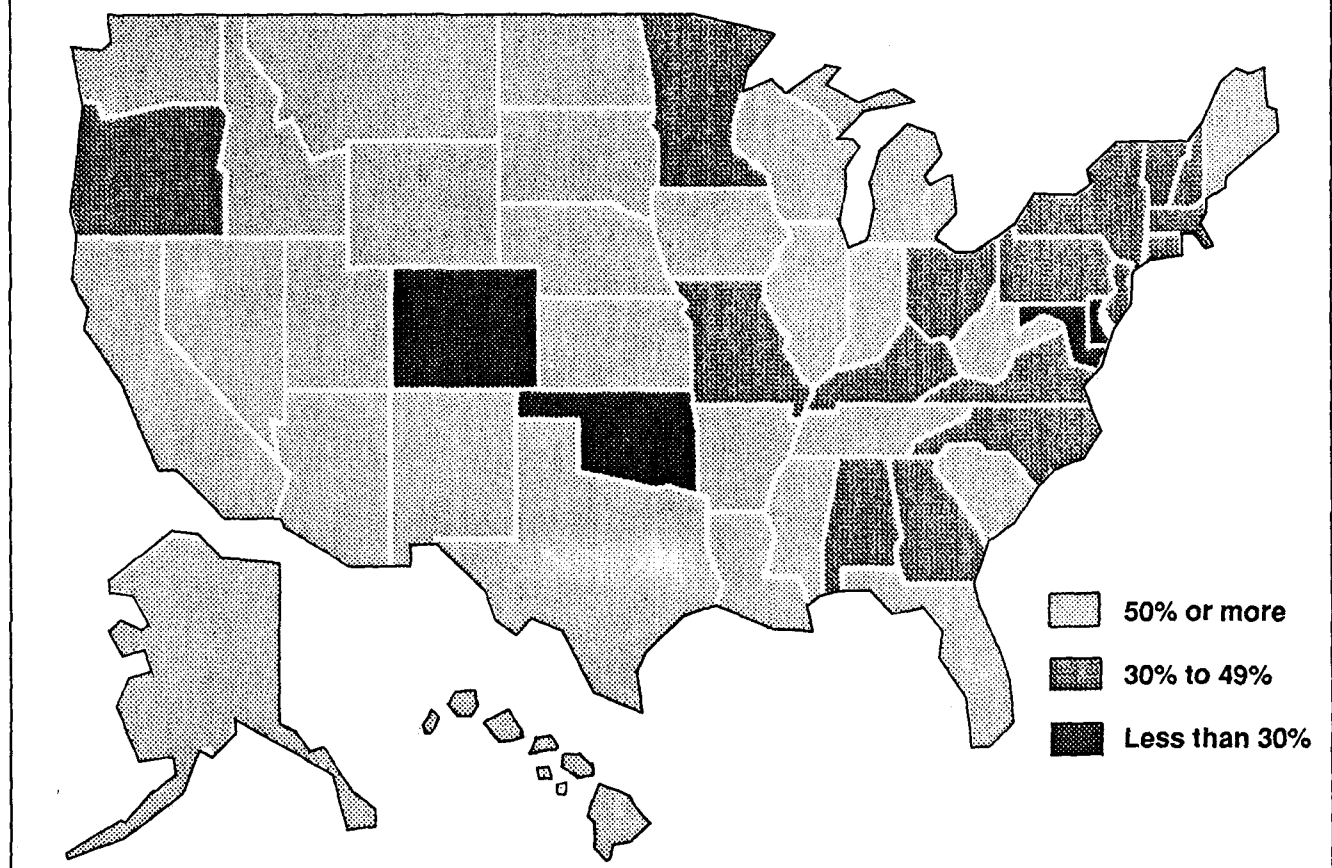
Some kinds of tanks are **not** covered by these regulations:

- Farm and residential tanks holding less than 1,100 gallons of motor fuel used for non-commercial purposes.

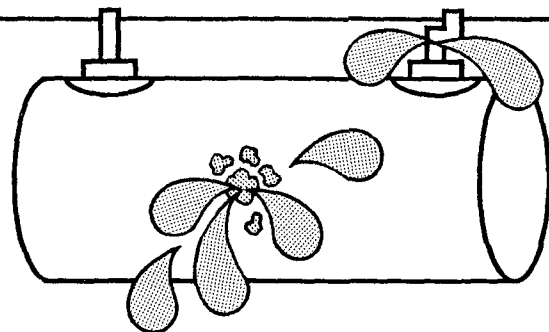
- Tanks storing heating oil burned on the premises where it is stored.
- Tanks on or above the floor of underground areas, such as basements or tunnels.
- Septic tanks and systems for collecting storm water and waste water.
- Flow-through process tanks.

Other storage areas that might be considered "tanks" are also excluded, such as surface impoundments and pits. The proposed regulations published in the **Federal Register** include detailed definitions of these and other terms used in the UST regulations.

Estimated Ground Water Use By States



Why Do USTs Leak?



No Corrosion Protection

Most of the USTs already in the ground are made of bare steel. When steel is buried in the ground, it can be eaten away by corrosion. However, bare steel USTs can be protected from corrosion by two forms of "cathodic" protection: "sacrificial anode" and "impressed current" protection systems. (These terms are explained in the technical "Questions & Answers" section.)

Steel USTs can also be protected from corrosion if they are coated with a material, such as fiberglass-reinforced plastic, that will not corrode. Another way to avoid the problem of corrosion is to build the entire tank of a noncorrodible material.

Installation Mistakes

Tanks and piping also leak if they are not put in the ground properly. For example, if poor backfill material is used when covering the UST or if pipe fittings are inadequately attached to the UST, then leaking often results. These mistakes made during installation can be avoided by having the installer follow approved installation procedures. (Approved installation procedures are referenced in the technical "Questions & Answers" section.)

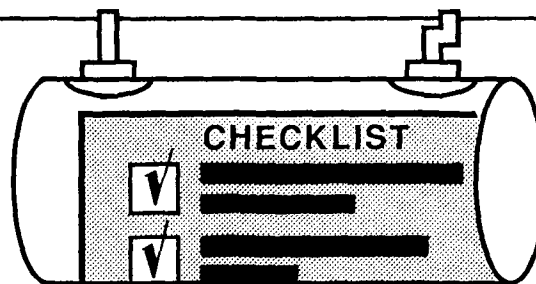
Piping Failures

EPA studies show that many leaks result from piping failure. In fact, piping fails more often than tanks. Because piping is smaller and less sturdy than tanks, it may be more likely to suffer from installation mistakes and the effects of corrosion. It is important to remember that the proposed regulations will apply to the entire UST system--both **tanks** and **piping**.

Are Leaks The Only Problem?

In addition to leaks from tanks and piping, the UST can be the site of another type of accidental release: spills and overfills. These spills are usually the result of human error and can be avoided by following correct tank filling practices. Mechanical devices, such as overfill alarms, also reduce spills and overfills.

What Requirements Will All New USTs Need To Meet?



The proposed regulations create four **minimum** requirements for all **new** USTs:

- The owner or operator must certify that the UST is installed properly. (EPA is developing materials that will help with that task.)
- The UST must be protected from corrosion. A steel UST must be "cathodically" protected, as described above, and coated with a corrosion-resistant coating. Other USTs must be made totally of a noncorrodible material or of a composite of steel and noncorrodible material.
- The UST must be equipped with devices that prevent spills and overfills. Also, correct tank filling practices must be followed.
- The UST must have a leak detection method that provides monitoring for leaks at least every 30 days.

(Additional requirements for new chemical USTs are described in the "For Chemical USTs Only" section.)

A leak detection method must be able to detect a leak in any part of the UST, including the piping. Leak detection can consist of one or a combination of the following methods:

- Tank tightness testing (twice yearly) and inventory control (measured daily).
- Automatic monitoring of product level and inventory control.
- Monitoring for vapors in the soil.
- Monitoring for liquids in the ground water.
- Monitoring an interception barrier.
- Interstitial monitoring within secondary containment.

- Other methods approved by EPA.

(These methods are described in the technical "Questions & Answers" section and illustrated in the chart on page 5.)

When you use methods such as soil or ground-water monitoring--which are **external** leak detection methods--a site assessment must be performed so that they can be properly applied to the particular site.

What Requirements Will Apply To Existing Petroleum USTs?

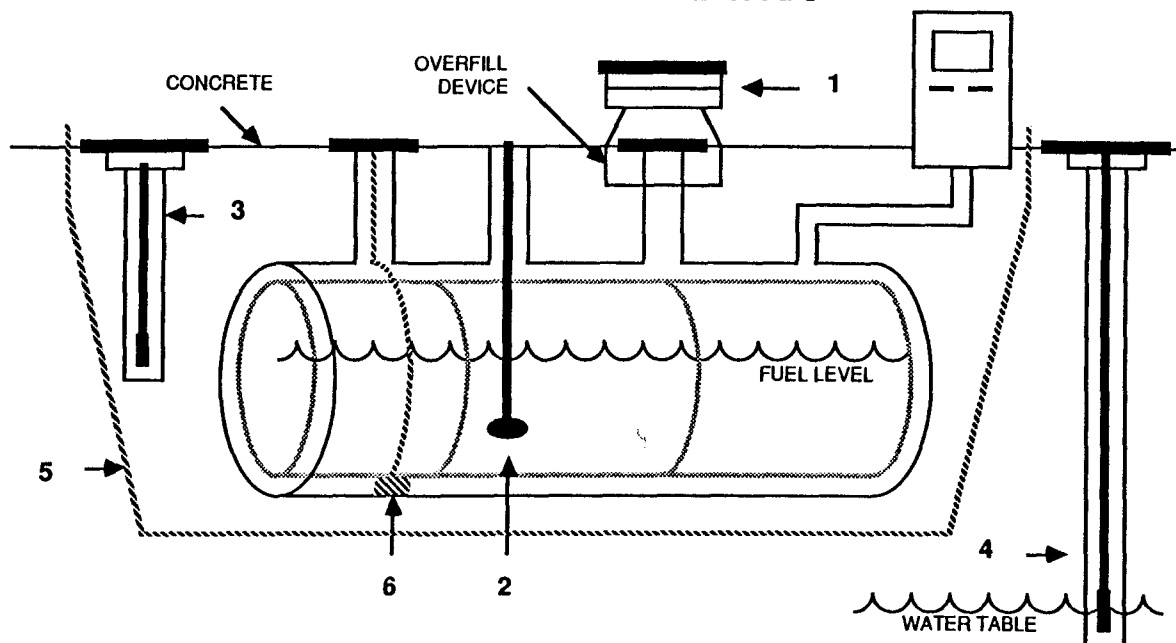
The goal of the proposed regulations is--over the next 10 years--to improve petroleum USTs already in the ground so that they will meet the more demanding requirements for new USTs, as described above. (Requirements for chemical USTs already in the ground are described in the "For Chemical USTs Only" section.)

What All Existing Petroleum USTs Must Be Like In 10 Years

At the **end** of this 10-year period, all USTs in the ground **now** will need to show three required improvements:

- They must meet the same requirements for **corrosion protection** that apply to new USTs.
- They must meet the new UST requirements for having a **leak detection** method.
- They must be equipped with devices that **prevent spills and overfills**.

LEAK DETECTION METHODS



1 - TANK TIGHTNESS TESTING

3 - VAPOR MONITORING IN THE SOIL

5 - INTERCEPTION BARRIER

7 - OTHER METHODS APPROVED BY EPA

2 - IN TANK MONITOR

4 - GROUND-WATER MONITORING WELL

6 - DOUBLE-WALL TANK WITH INTERSTITIAL MONITOR

Leak Detection Requirements During The 10-Year Period

Certain leak detection requirements apply before this 10-year period ends. These requirements differ for USTs not protected from corrosion (bare steel) and those that are protected from corrosion (all others).

Because bare steel USTs are the most likely to leak, they must have a leak detection method within 3 years. Tanks that are already protected from corrosion must have a leak detection method within 5 years. The same leak detection methods noted above for new tanks will meet the leak detection requirements for existing USTs.

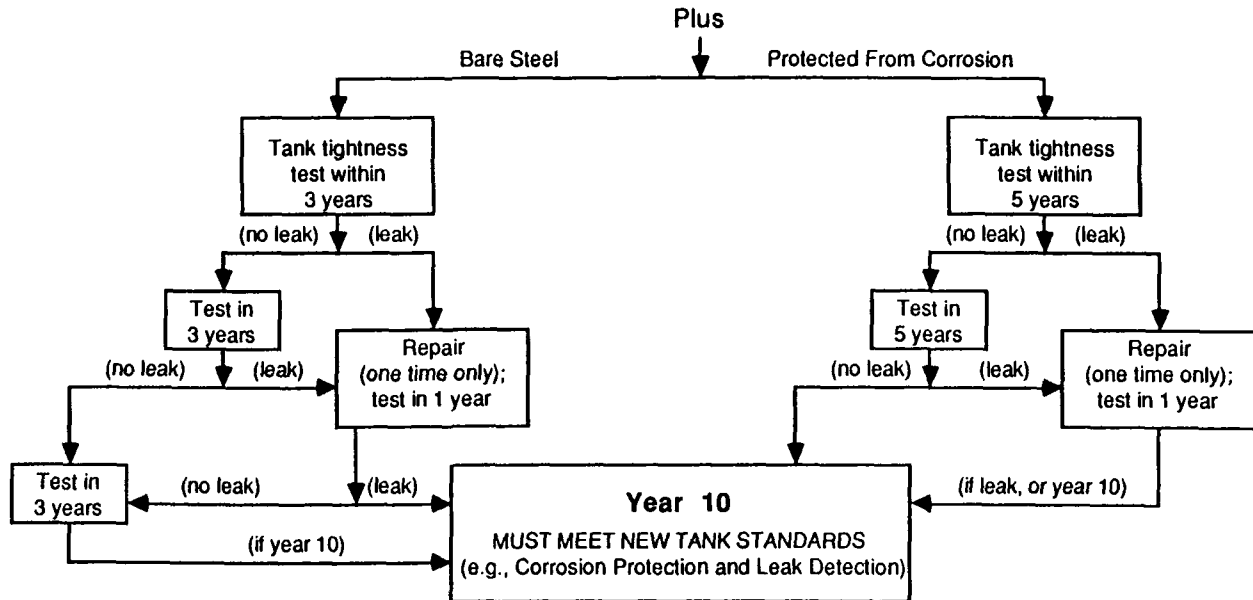
Because it would be very difficult--within 10 years--for all USTs already in the ground to have the leak detection methods noted above, another method can temporarily satisfy the leak detection requirement. This method allows a combination of daily inventory control and periodic tank tightness testing. The amount of time between tests varies, again depending on whether the tank is protected from corrosion. Bare steel tanks must be tested every 3 years. Protected tanks must be tested every 5 years.

Please note, however, that this method is allowed **only** during the 10 years following the publication of the final regulations. After that, **all** USTs must meet the leak detection requirements for new USTs.

Existing Petroleum Tanks

Minimum Leak Detection Requirements

Use Daily Inventory Control



(Simplified -- Does not reflect **all** requirements)

No matter which of the above leak detection methods you use, they must be working by the deadlines described above (3 years for bare steel USTs; 5 years for protected USTs). If not, you must close or upgrade your tank.

The chart above illustrates the minimum requirements for interim leak detection using daily inventory control plus tank tightness testing.

What Do You Do When Leaks Or Spills Happen At Your Petroleum UST?

Under the proposed regulations, your response to a petroleum leak or spill would appear in two stages: **immediate** and **long-term**.

Five Immediate Steps

1. Tell the regulatory authority within 24 hours that there is a leak or spill. The only exception is for aboveground petroleum spills and overfills of less than 25 gallons. These small spills do not have to be reported if they are immediately contained and cleaned up.
2. Take immediate action to stop the leak or spill and make sure it poses no hazard to human health and safety.
3. Remove any **visibly** contaminated soil.
4. Report your actions to the regulatory authority no later than 20 days after a leak is confirmed.

-
5. Conduct a complete site investigation to determine the extent of the leak and how much it has damaged nearby soil and ground water. Within 30 days of confirming a leak, you must submit a plan for removing leaked petroleum, if it has been detected in the ground water.

These immediate actions are required for all petroleum leaks or spills, but some leaks will require long-term attention to correct the problem.

Two Long-Term Steps

In long-term cases, the site must be cleaned up to meet environmental requirements established at each site by the regulating authority.

1. Develop a Corrective Action Plan--an officially approved plan for cleaning up your site--that shows how you will meet cleanup requirements established at your site by the regulating authority.
2. Make sure you meet the cleanup requirements approved by the regulatory authority for your site.

Can Leaking Tanks Be Repaired?

You can repair a tank only **once**.

Damaged piping **cannot** be repaired and must be replaced.

The proposed regulations set minimum standards for tank repair; for example, an open seam more than 3 inches long cannot be repaired. These minimum standards follow codes used by the tank industry. The tank must pass special vacuum and ultrasonic tests proving that the tank is repairable and that repairs are conducted correctly.

Also, when a tank is repaired, corrosion protection must be added and a coating must be applied to the inside of the tank.

How Can You Take Tanks Out Of Service?

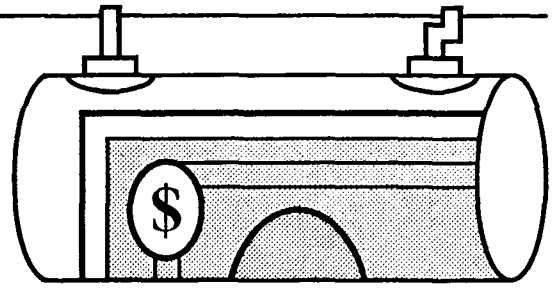
You may decide to close your UST temporarily or permanently. Any tank not used for over 3 months must follow four requirements for **temporary closure**:

- You must maintain corrosion protection systems at the tank.
- You must continue to operate a leak detection method to identify leaks. If a leak is found, you will have to respond just as you would for a leak from an active UST, as described above.
- You must cap all lines, except the vent line, attached to the UST.
- You must notify the regulatory authority of your actions.

If your tank remains closed for more than 2 years, then you must follow the requirements for **permanent closure**:

- You must determine if your tank has damaged the surrounding environment. If there is damage, then you will have to follow the corrective action steps described above.
- You can either remove the UST from the ground or leave it in the ground. Before taking the UST out of the ground, you must remove all liquids, vapors, and pipes from the UST. If you leave the UST in the ground, then you must remove all liquids and pipes from the tank and fill it with a harmless, chemically inactive solid, like sand.

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



Owners or operators of petroleum USTs must be able to demonstrate--at any time--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 (as described above) and compensating other people for bodily injury and property damage.

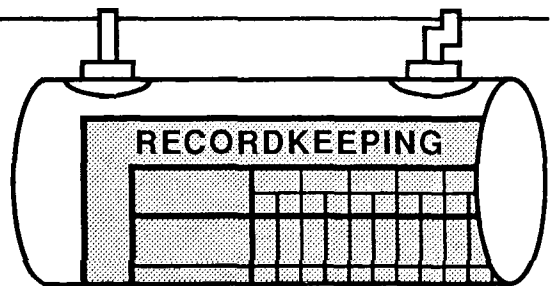
The minimum coverage for each facility is \$1 million. The more tanks you have, the greater the risk, and the more coverage you must have. The maximum coverage required is \$6 million.

You can use one or a combination of several mechanisms to meet your financial responsibility: insurance, guarantees, indemnity contracts, risk

retention groups, surety bonds, letters of credit, and state-assured mechanisms.

A complete explanation of these financial responsibility requirements appears in another EPA brochure, "Proposed Regulations for Underground Storage Tanks: Your Financial Responsibilities." If you want to study these **proposed** financial responsibility requirements in detail, see the **Federal Register** (April 17, 1987). Congress has also created a Trust Fund that EPA or states can use to clean up sites meeting certain requirements.

How Do You Keep Track Of All This?



You will need to be able to show the regulatory authority a written record of four major activities at your UST:

- **Leak Detection Method.** You will have to keep records for 5 years of any manufacturers' claims of how well their leak detection devices will perform. You will need to keep monitoring results for the past 12 months. Tank tightness test results must be kept until the tank is tested again.
- **Corrosion Protection System.** If your protection system was applied at a factory, the last service check conducted under the tank warranty must be kept. If the system was applied "in the field," then reporting periods depend on the type of protection system installed. For the "impressed current" type, the results of the last three inspections and two annual service readings must be kept; for the "sacrificial anode" type, the last two annual service readings must be kept.
- **Tank Repair.** As long as you use a repaired tank, you must keep records that show that the tank was properly repaired and passed ultrasonic and vacuum tests.

-
- **Closing an UST.** For at least 1 year, you must keep a record of the test results required for temporary closure. For at least 3 years, you must keep a record of the test results required for permanent closure. (These test results show what impact your UST has had on the surrounding area.)

Generally, you should follow this useful rule of thumb for recordkeeping: When in doubt, keep it!

Will The Final Regulations Differ From The Proposed Regulations?

The complete proposal explains a number of options EPA considered. For example, one option required "secondary containment" at all new petroleum USTs. Secondary containment adds a second wall between the UST and the surrounding environment. Another option identified certain locations where more stringent requirements should apply because of the danger those sites pose to nearby ground water. Those sites needing maximum protection would be required to use secondary containment. Those needing less protection could use a single-walled system. EPA will continue to consider a variety of options as it develops final regulations for USTs.

What Other Requirements Should You Be Aware Of?

Congress established two other requirements that are already in place regarding USTs: the "Interim Prohibition" and "Notification."

The Interim Prohibition

Since May 1985, any UST being installed in the ground must meet minimum requirements:

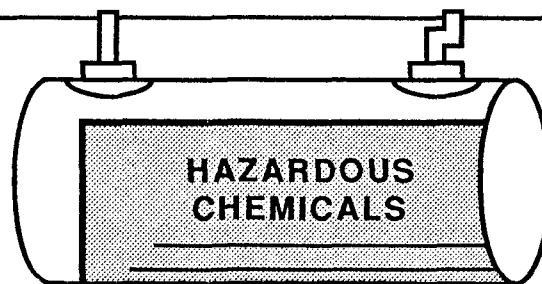
- The UST must prevent releases due to corrosion or structural failure.
- The stored contents must be compatible with the tank's interior wall.

(See 40 CFR Part 280 for a complete explanation of the "Interim Prohibition." Also, you can refer to the EPA document, "The Interim Prohibition: Guidance for Design and Installation of Underground Storage Tanks.")

Notification

If you have an UST already in the ground or if you are installing one, you must notify a State agency of that tank's existence. (See **Federal Register** of November 8, 1985 for a complete explanation of the "Notification" requirements. EPA can also supply you with a "List of Agencies Designated to Receive Notifications.")

For Chemical USTs Only



What Chemicals Are "Hazardous"?

A number of 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". With one exception, the proposed UST regulations apply to the same hazardous chemicals identified by CERCLA.

The exception concerns substances that are hazardous **wastes**, which are already regulated under Subtitle C of the Solid Waste Disposal Act. Therefore, these hazardous wastes are **not** covered by the proposed UST regulations. (See 40 CFR Parts 260-270 for the hazardous waste regulations.)

A list of the CERCLA hazardous chemicals is available from EPA through the Hotline (800-424-9346). Although this list contains discarded commercial chemical products, the proposed UST regulations would cover only those hazardous chemicals on the list that are not discarded or in the process of being discarded as wastes.

If an UST contains both petroleum and hazardous chemicals, it will be regulated as a chemical UST if the principal part of the stored mixture is made up of hazardous chemicals.

What Additional Requirements Are There For *New* Chemical USTs?

In addition to the proposed requirements for new petroleum USTs described earlier, chemical USTs would need to satisfy the following requirements for "secondary containment" and "interstitial monitoring."

Secondary Containment

All new chemical USTs must have "secondary containment." The UST itself makes up the first or "primary" containment. Using only primary containment, a leak can escape into the environment. By enclosing an UST within a second wall, leaks can be contained in a relatively small and controllable area.

There are several ways to construct secondary containment:

- Placing one tank inside another tank (making them double-walled tank systems).
- Placing the tank inside a concrete vault.
- Lining the excavation area surrounding the tank with natural or synthetic liners 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 area between the primary and secondary walls. Several devices are available to monitor this confined "interstitial" area. The proposed regulations describe these various methods and the requirements for their proper use.

Are There Any Exceptions To These Additional Requirements For New Chemical USTs?

You can apply for an exception, called a **variance**, from the requirements for secondary containment and interstitial monitoring. This variance will be granted only if the chemical UST meets the following requirements:

- A leak detection method must be available for the stored chemical. The leak detection method must meet the same general requirements for leak detection discussed earlier.
- USTs made of one wall only (single-walled USTs) must be protected from corrosion.
- All pressurized piping not provided with interstitial or continuous monitoring must have an emergency cutoff pressure monitor.

How Can You Get A "Variance" From The New Chemical UST Requirements?

The regulatory authority can grant a variance after reviewing your request. You will have to satisfy the regulatory authority that your leak detection system will work effectively for the substance stored in the tank. EPA is working on guidance to assist in the development and review of variance applications.

What Requirements Will Apply To Chemical USTs Already In The Ground?

The goal of the proposed regulations is--over the next 10 years--to improve chemical USTs already in the ground so that they will meet the requirements for new chemical USTs, as described above.

What All Existing Chemical USTs Must Be Like In 10 Years

At the end of this 10-year period, all chemical USTs in the ground **now** will need to show these required improvements:

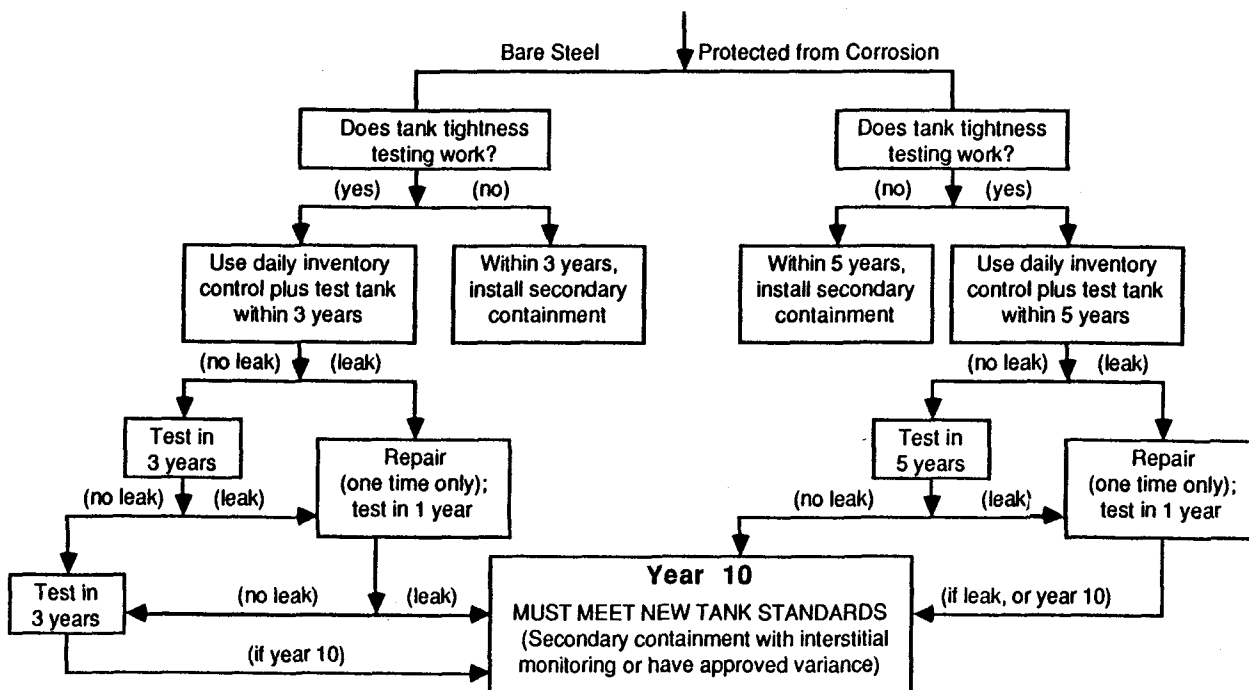
- They must meet the same requirements for secondary containment and interstitial monitoring that apply to new chemical USTs. As with new chemical USTs, a variance can be granted for single-walled USTs protected from corrosion and equipped with an approved leak detection method.
- They must be equipped with devices that prevent spills and overfills.

Leak Detection Requirements During The 10-Year Period

Certain leak detection requirements apply before this 10-year period ends. These requirements are the same as those described earlier for petroleum USTs already in the ground. However, the leak detection methods noted for petroleum USTs can be applied to your chemical UST **only** if those methods work with the stored chemical. If an effective leak detection method is not in place by the deadlines described earlier (3 years for bare steel USTs; 5 years for protected USTs), you would have to close or upgrade your UST. The chart on the next page illustrates these interim leak detection requirements.

Existing Chemical Tanks

Minimum Leak Detection Requirements



(Simplified -- Does not reflect all requirements.)

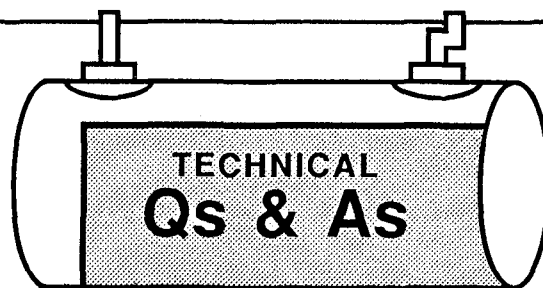
What Do You Do If You Have A Chemical Leak or Spill?

You would follow the same immediate and long-term steps described earlier for petroleum leaks and spills--**except** for the following important difference. You have to report all aboveground chemical leaks or spills, unless they are smaller than the "reportable quantities" identified under CERCLA and they are immediately contained and cleaned up.

Will Owners And Operators Of Chemical USTs Need To Show "Financial Responsibility"?

Yes. EPA will later propose separate financial responsibility requirements for chemical UST owners and operators.

Technical "Questions & Answers"



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

A Corrosion attacks unprotected steel USTs mainly through "galvanic" corrosion. When this happens, the tank and its underground surroundings act like a battery. Part of the tank can become negatively charged and another part positively charged. Various soil conditions provide the connecting link that finally turns these UST "batteries" on. Then, the negatively charged part of the tank--where the current exits from the tank--begins to deteriorate. As electric current passes through this part, the hard metal begins to turn into soft ore, holes form, and the tank leaks.

Bare steel USTs can be protected, however, by reversing the electrical circuit causing the corrosion. This "cathodic protection" 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. Since these anodes are more active, the electric current will exit from them rather than the tank. Thus, the "cathode" of the tank remains protected and free of corrosion while the attached "anode" is sacrificed.
- An "impressed current" protection system introduces an electric current into the ground through a series of anodes **not** attached to the UST. Because the electric current flowing from these anodes to the tank system is greater than the corrosive current flowing away from the tank, the UST is protected from galvanic corrosion.

Steel USTs can also be protected from corrosion if they are adequately coated by a noncorrodible material, such as fiberglass-reinforced plastic.

For more information on how corrosion works and how USTs can be protected from corrosion, see the Preamble of the proposed regulations (Sections III.B.1; III.C.1; VI.C.2) or the proposed rule (Subpart B, 280.20; Subpart C, 280.31). A comprehensive discussion of corrosion and corrosion-protection methods appears in EPA's "The Interim Prohibition: Guidance for Design and Installation of Underground Storage Tanks" (EPA/530-SW-85-023; August 1986).

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 (which EPA calls the "tank system"). 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 anchoring, backfilling, inadequate cover, and insufficient tightening of loose fittings can also lead to system failures.

Installation problems result from careless installation practices that do not follow recognized industry codes and procedures. If owners and operators would follow the correct installation procedures called for by industry codes, the number of installation mistakes would be significantly reduced. Some of these industry-recommended codes are provided by the Petroleum Equipment Institute (PEI RP100-86); the National Fire Protection Association (NFPA 30); the American

Petroleum Institute (API 1615); and, for installation of cathodic protection, the National Association of Corrosion Engineers (RP-01-69 and RP-02-85).

Installation is discussed in more detail in the Preamble to the proposed regulations (Sections III.B.2 and VI.B.1) and in the proposed rule (Subpart B, 280.20(c)). In addition, EPA's document on "The Interim Prohibition" cited above provides an extended discussion of UST installation.

Q What leak detection methods will satisfy the leak detection requirements for new petroleum USTs?

A The UST must have a "leak detection method" that provides monitoring results at least every 30 days. The leak detection method must be capable of effectively detecting the stored product.

A leak detection method must be able to detect a leak in any part of the UST, including the piping. Leak detection can consist of one or a combination of the following methods:

Tank Tightness Testing and Inventory Control

This method combines inventory control information (measured daily and compiled monthly) with tank tightness testing conducted twice a year. Tank tightness testing uses a wide variety of techniques, which are described in the proposed regulations. These tests require taking the UST out of service while either volume changes over time or other properties are measured.

Automatic Monitoring of Product Level and Inventory Control

This method combines two automated processes. Both processes rely on frequent measurements of the tank's contents. The proposed regulations

describe several requirements for this combination of processes. For example, certain measurements must be automatically measured to a 0.125 inch accuracy.

Monitoring for Vapors in the Soil

This method samples vapors in the soil surrounding the UST. Leaked petroleum produces vapors that can be detected in the soil. The proposed regulations describe several requirements for the appropriate use of this leak detection method. For example, use of this method requires a thorough assessment of the site, proof that the site is **clean**, and use of spill and overfill prevention devices.

Monitoring for Liquids in the Ground Water

This method monitors the ground water near an UST to determine if petroleum has contaminated the ground water. Monitoring wells near the UST are checked frequently to see if petroleum can be detected. The proposed regulations describe several ways to detect petroleum in monitoring wells. The proposed regulations also describe several requirements for the use of this method. For example, this method cannot be used if the UST is more than 20 feet above ground water.

Monitoring an Interception Barrier

Interception barriers are basin-shaped liners partially surrounding an UST. Because they are made of dense materials that cannot be penetrated by petroleum, these barriers can funnel leaks to the type of leak detection methods described above for detecting vapors and liquids. The barrier does not detect leaks, but it can help leak detection methods to work more efficiently by directing the leak to a leak detector. The proposed regulations describe several requirements restricting the use of this method.

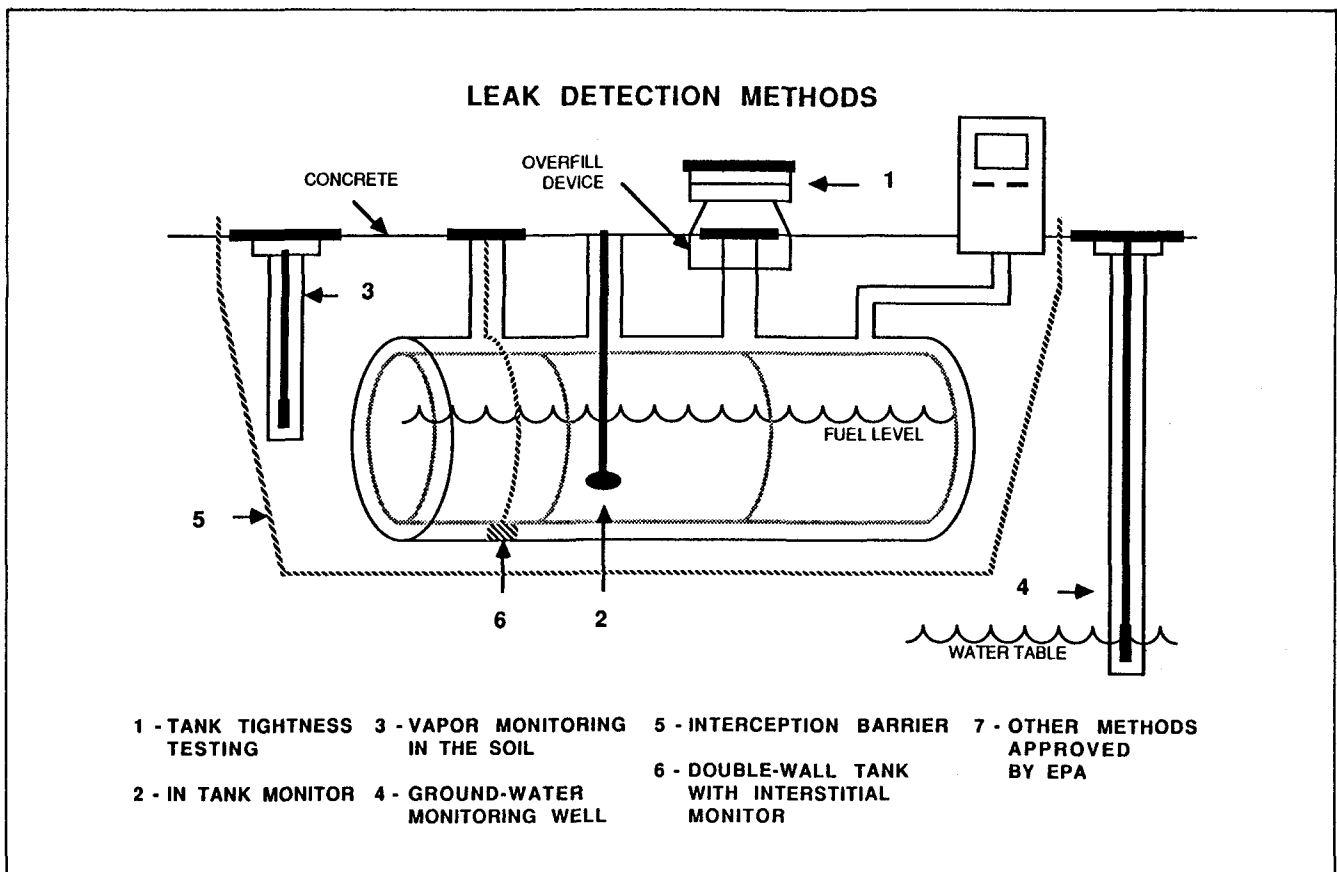
Interstitial Monitoring within Secondary Containment

This method detects leaks in the space between the UST and a second barrier that more completely surrounds the UST than the interception barrier described above. The proposed regulations describe several requirements for the application of interstitial monitoring.

Other Methods Approved by EPA

Many other leak detection methods are being developed.

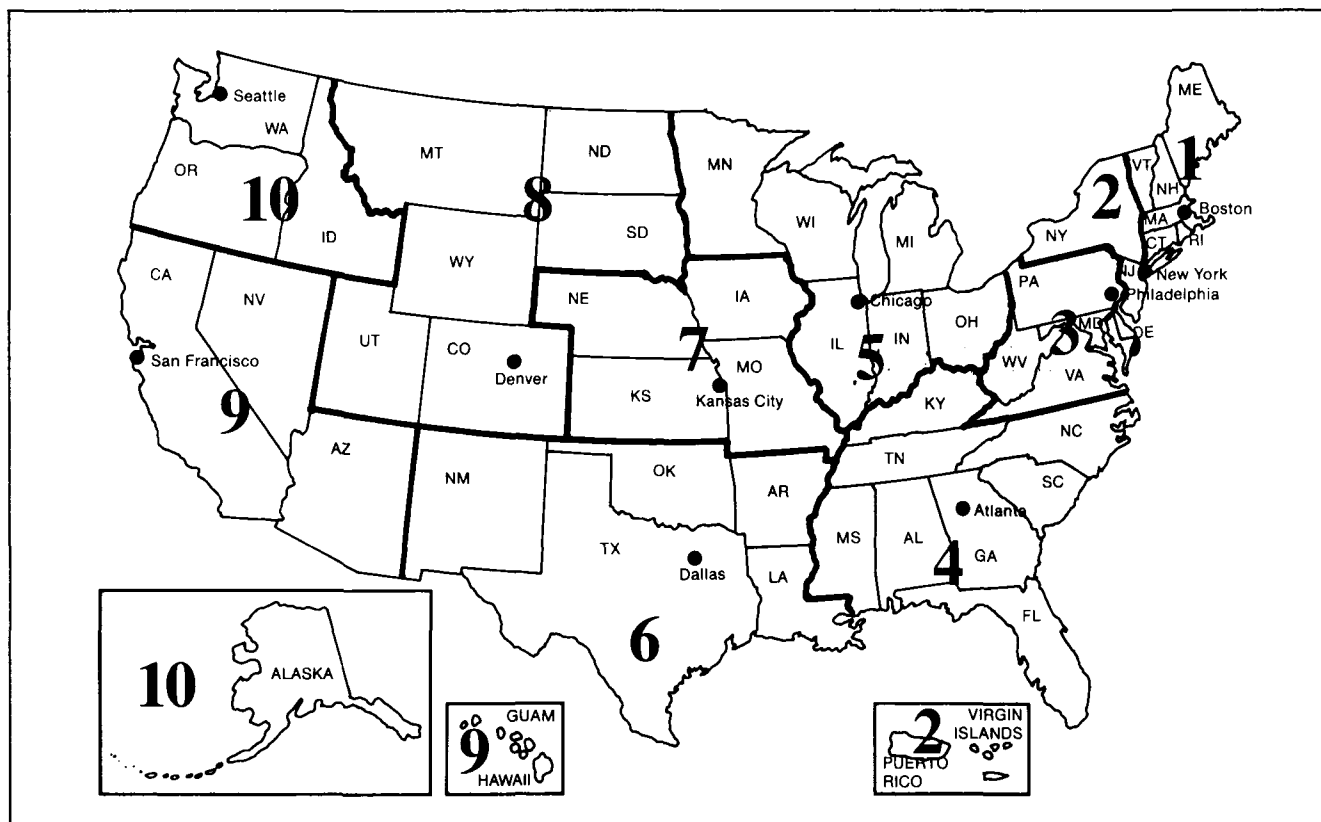
A full description of leak detection methods is presented in the Preamble to the proposed regulations (Sections III.C.6. and VI.D.) and in the proposed rule (Subpart B, 280.20; Subpart D, 280.40-41).



How Can You Get More Information?

You can call the Hotline (800-424-9346) or contact one of the UST Regional Coordinators listed below.

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