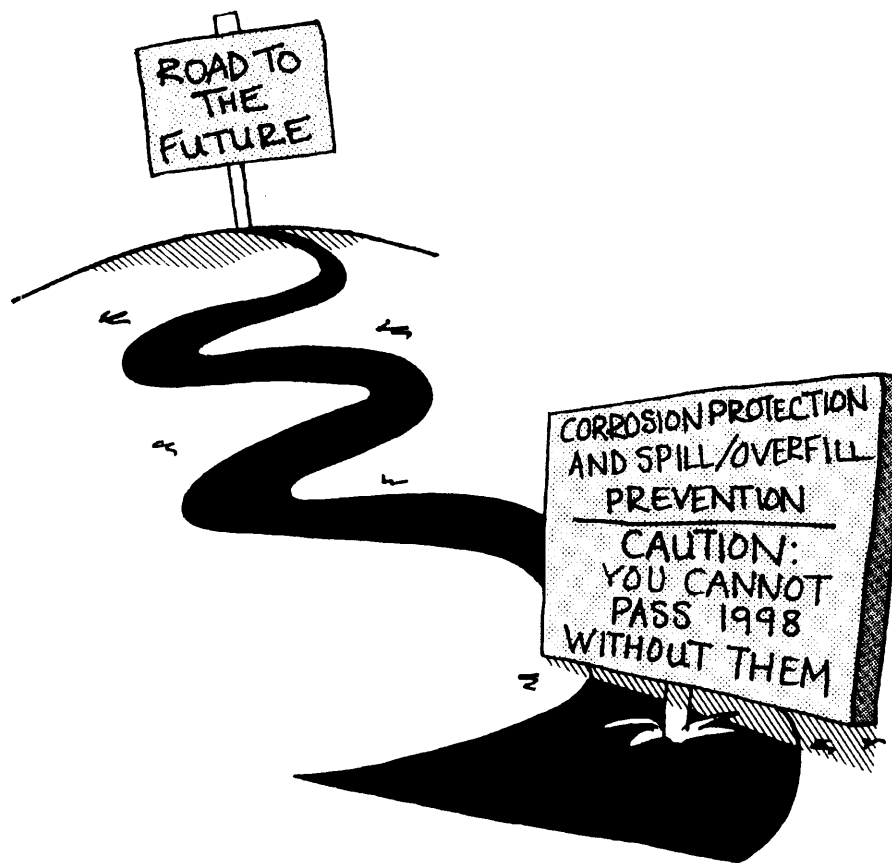


US EPA ARCHIVE DOCUMENT



Don't Wait Until 1998

Spill, Overfill, And Corrosion Protection for Underground Storage Tanks



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NOTE: The requirements for underground storage tanks referred to in this booklet can be found in the Code of Federal Regulations (CFR), see 40 CFR, Part 280. Sections of the CFR can be ordered from the Superintendent of Documents, Box 371954, Pittsburgh, PA 15250-7954.

DISCLAIMER: Any reference to or depiction of commercial products in this booklet is solely for explanatory purposes and is not intended as an endorsement of these products.

Why Should You Read This Booklet?

This booklet contains information to help you meet requirements for underground storage tank systems (USTs) *installed before December 22, 1988*. We call these older tank systems "*existing USTs*."

Federal rules require you to make sure your existing USTs have the following by **December 22, 1998**:

- **Spill protection**
- **Overfill protection**
- **Corrosion protection**

Check with your state regulatory agency to find out if the state has an earlier deadline or additional requirements.

You must choose one of the following actions for an existing UST:

- **Add spill, overfill, and corrosion protection by December 22, 1998**
- **Close the existing UST by December 22, 1998**
- **Replace the closed existing UST with a new UST**

You should act as soon as possible. Without the protection provided by upgrading or replacing, your UST is more likely to leak, damage the environment, and leave you with costly cleanups. The next page lists several advantages of acting early.

This booklet focuses on how you can meet upgrade requirements. The basic upgrade requirements are listed on page 3. Some information on properly closing an UST appears on page 12. You can find more information on the requirements for new UST systems (those installed after December 22, 1988) in EPA's publication "Musts for USTs" (ordering information on page 15).

This booklet uses "upgrading" and "upgrade" to mean adding spill, overfill, and corrosion protection to existing USTs.

If your existing USTs have not been upgraded or have not been properly closed by the 1998 deadline, you can be cited for violations and fined.

Why Should You Upgrade Or Replace Early?

***Start planning your
upgrade, closure,
or replacement
NOW!***

1994
1995
1996
1997
1998

- Early upgrading or replacing prevents leaks that would otherwise occur between now and December 1998. Avoiding leaks benefits the environment and your business. If your UST does not leak, you will not face costly mandatory cleanups or potential criminal suits or civil suits for damage claims.
- As December 1998 nears, increased customer demand to upgrade, close, or replace USTs may result in higher charges for these services. Also, you may have trouble finding available contractors and supplies needed to meet the deadline.
- It can take several months to upgrade, close, or replace your system. Bad weather or contractor delays are not unusual. Before work can start, local construction and regulatory permits may be necessary. The sooner you get started, the better the chance you will meet or beat the 1998 deadline.
- If you miss the 1998 deadline for any of the reasons noted above, you can be cited for violations and fined. Failure to be in compliance may reduce or eliminate coverage provided by insurance firms or state reimbursement funds—just when you may need these financial resources.
- Your state reimbursement fund or insurance company may offer financial incentives to upgrade or replace earlier, such as lower deductibles or premiums.
- Current state assistance programs that provide low cost loans to upgrade or replace USTs may be gone by 1998. Acting sooner may allow you to take advantage of these programs.
- If you discover a leak during upgrading or closing and need help from your state reimbursement fund, you may find the state fund bottlenecked with multiple claims around 1998.

***Don't let 1998
arrive before you
are ready!***

What Are The Basic Upgrade Requirements For *Existing* USTs?

Spill Protection (see pages 4–5)

Existing tanks must have catchment basins to contain spills from delivery hoses.

Overfill Protection (see pages 6–7)

Existing tanks must use ONE of the following:

- Automatic shutoff devices
- Overfill alarms
- Ball float valves

Corrosion Protection (see pages 8–11)

Existing tanks must match ONE of the following:

- Steel tank has corrosion-resistant coating AND cathodic protection (such as an sti-P₃® tank)
- Tank made of noncorrodible material (such as fiberglass)
- Steel tank clad with noncorrodible material (such as an ACT-100® tank) or tank enclosed in noncorrodible material
- Uncoated steel tank has cathodic protection system
- Uncoated steel tank has interior lined with noncorrodible material
- Uncoated steel tank has cathodic protection AND interior lined with noncorrodible material

Existing piping must match ONE of the following:

- Uncoated steel piping has cathodic protection
- Steel piping has a corrosion-resistant coating AND cathodic protection
- Piping made of (or enclosed in) noncorrodible material (such as fiberglass)

1998 Deadline:
Existing USTs must be protected from spills, overfills, and corrosion by December 1998.

ALL tanks and piping must already have leak detection. See EPA's "Straight Talk on Tanks" (ordering information on page 15).

When new USTs are installed, they must have leak detection and protection from spills, overfills, and corrosion. See EPA's "Musts for USTs" (ordering information on page 15).

How Can You Protect Against Spills?

You and your fuel deliverer should see "Keeping It Clean," a video that shows how deliveries can be made safely with no spills (ordering information on page 15).

Many releases at UST sites come from spills. Spills often occur at the fill pipe when the delivery truck's hose is disconnected. Although these spills are usually small, repeated small releases can cause big environmental problems.

Human error causes most spills. These mistakes can be avoided by following standard tank filling practices. For example, you must make sure there is room in the UST for the delivery, and the delivery driver must watch the delivery at all times. If you and the delivery driver follow standard practices, nearly all spills can be prevented. For this reason, federal UST regulations require that you follow standard filling practices now.

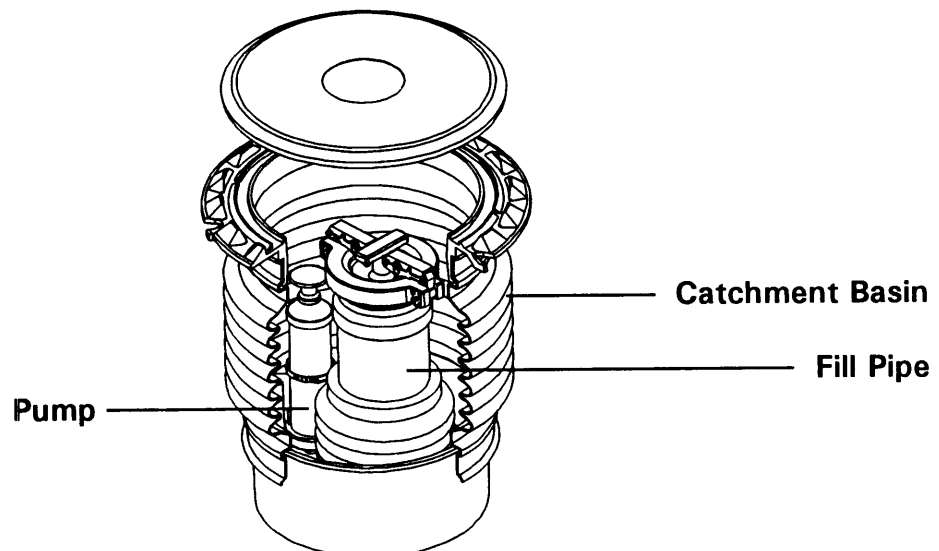
In addition, **USTs must have catchment basins to contain spills.** New USTs must have catchment basins when they are installed.

Federal rules require that existing USTs must have catchment basins by December 1998.

If an UST never receives more than 25 gallons at a time, the UST does not have to meet the spill protection requirements. For example, many small used oil tanks fall in this category.

What Are Catchment Basins?

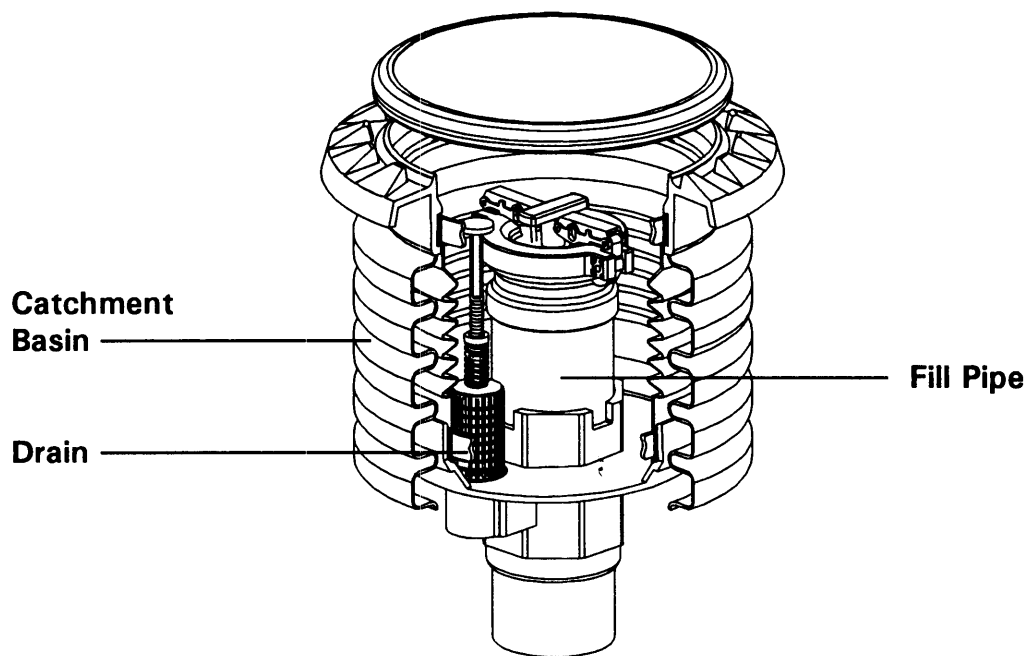
Catchment basins are also called "spill containment manholes" or "spill buckets." Basically, a catchment basin is a bucket sealed around the fill pipe (see illustration below).



To protect against spills, the basin should be large enough to contain what may spill when the delivery hose is uncoupled from the fill pipe. Basins range in size from those capable of holding only a few gallons to those that are much larger—the larger the catchment basin, the more spill protection it provides.

You need a way to remove liquid from catchment basins. Manufacturers equip catchment basins with either pumps or drains to remove liquid. The illustration on the previous page shows a catchment basin with a pump; the illustration below shows a catchment basin with a drain.

Your equipment supplier can help you choose the size and type of catchment basin that meets your needs.



You should try to keep water out of catchment basins. Some catchment basins can collect enough water and sediment, along with spilled product, to make draining this mixture into the tank unwise. If this happens, you may pump out the catchment basin and dispose of the liquid properly. If the liquid contains fuel or chemicals, it could be considered a hazardous waste. Contact your state agency responsible for hazardous waste for information on testing and handling requirements.

Having the surrounding surface slope away from the top of catchment basins helps keep water out of them.

How Can You Protect Against Overfills?

If an UST never receives more than 25 gallons at a time, the UST does not have to meet the overfill protection requirements. For example, many small used oil tanks fall in this category.

Overfills usually release much larger volumes than spills. When a tank is overfilled, large volumes can be released at the fill pipe and through loose fittings on the top of the tank or a loose vent pipe. The tightness of these fittings normally would not be a problem if the tank were not filled beyond its capacity.

You can solve overfill problems by:

- Making sure there is enough room in the tank for the delivery BEFORE the delivery is made;
- Watching the entire delivery to prevent overfilling or spilling; and
- Using equipment that protects against overfills.

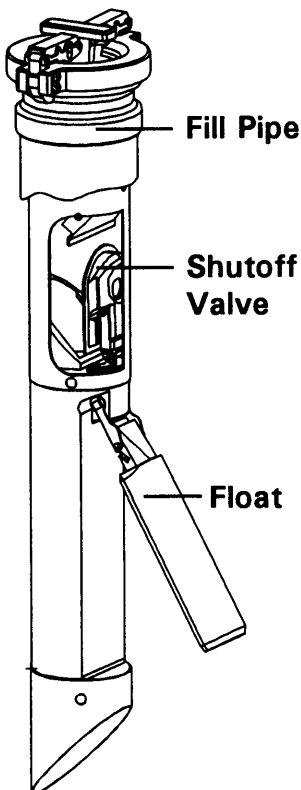
Federal rules require that existing USTs must have overfill protection devices by December 1998.

New USTs must have overfill protection devices when they are installed. The three main types of overfill protection devices (automatic shutoff devices, overfill alarms, and ball float valves) are described below and on the next page.

NOTE: If you have "pumped delivery" where fuel is delivered under pressure, you must make sure your overfill protection device works compatibly with pumped deliveries. Also, remember that overfill protection devices are effective only when combined with careful filling practices.

1. What Are Automatic Shutoff Devices?

An automatic shutoff device installed in an UST's fill pipe can slow down and then stop the delivery when the product has reached a certain level in the tank. This device—sometimes simply called a "fill pipe device"—has one or two valves that are operated by a float mechanism (the illustration on the left shows one kind of automatic shutoff device).



Some automatic shutoff devices work in two stages. The first stage drastically reduces the flow of product to alert the driver that the tank is nearly full. The driver can then close the delivery valve and still have room in the tank for the product left in the delivery hose.

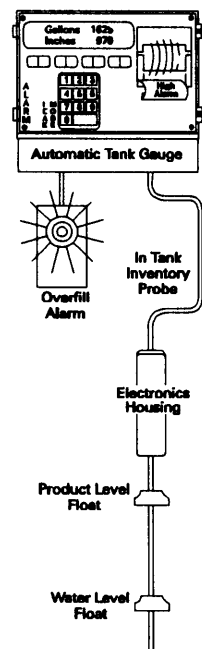
If the driver does not pay attention and the liquid level rises higher, the valve closes completely and no more liquid can be delivered into the tank, leaving the driver with a delivery hose full of product.

To work properly, all overfill devices must be installed carefully at the correct distance below the tank top specified by the manufacturer.

2. What Are Overfill Alarms?

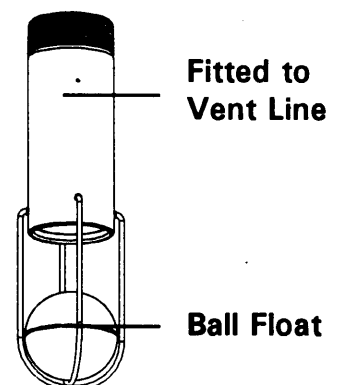
Overfill alarms use probes installed in the tank (see illustration on the right) to activate an alarm when the tank is either 90 percent full or within 1 minute of being overfilled. Either way, the alarm should provide enough time for the driver to close the truck's shutoff valve before an overfill happens. Alarms must be located where the driver can see or hear them easily. (Overfill alarms are often a part of automatic tank gauging systems.)

Overfill alarms work only if they alert the driver at the right time and the driver responds quickly. Remember to put the alarm on an electrical circuit that is active all the time so that the alarm will always work. Many deliveries are made at night when the facility is closed. You don't want to turn off your alarm when you turn off the office lights.



3. What Are Ball Float Valves?

Ball float valves (see illustration on the right) are placed at the bottom of the vent line several inches below the top of the UST. The ball floats on the product and rises with product level during delivery until it restricts vapor flowing out the vent line—before the tank is full. If all tank fittings are tight, the ball float valve can create enough back pressure to restrict product flow into the tank—which can notify the driver to close the truck's shutoff valve. However, if the UST has loose fittings, sufficient back pressure may not develop and will result in an overfill. *Note: Manufacturers do not recommend using ball float valves with suction piping, pressurized delivery, or coaxial Stage I vapor recovery.*



How Can You Protect Against Corrosion?

Federal rules require corrosion protection for USTs because unprotected steel USTs corrode and release product through corrosion holes.

You already meet the requirements for corrosion protection if your UST system matches one of the following performance standards for new USTs:

Corrosion results when bare metal and soil and moisture conditions combine to produce an underground electric current that destroys hard metal. Over time, corrosion creates holes and leaks develop.

- **Tank and piping completely made of noncorrodible material, such as fiberglass.** Corrosion protection is also provided if tank and piping are completely isolated from contact with the surrounding soil by being enclosed in noncorrodible material (sometimes called "jacketed" with noncorrodible material).
- **Tank and piping made of steel having a corrosion-resistant coating AND having cathodic protection** (such as an sti-P₃[®] tank with appropriate piping). A corrosion-resistant coating electrically isolates the coated metal from the surrounding environment to help protect against corrosion. *Asphaltic coating does not qualify as a corrosion-resistant coating.* Methods of cathodic protection are briefly explained on page 11.
- **Tank made of steel clad with a thick layer of noncorrodible material** (such as an ACT-100[®] tank). This option does not apply to piping. *Galvanized steel is not a noncorrodible material.*

It is not practical to add coatings or claddings to existing steel USTs that have no corrosion protection. Instead, you must choose one of the following three methods to add corrosion protection to existing steel tanks:

1. Add cathodic protection or
2. Add interior lining to tank or
3. Combine cathodic protection and interior lining.

These methods are described on the following pages.

1. **Add cathodic protection.** If you are adding only cathodic protection, you must do the following:

■ **First, assess tank integrity.** Satisfy ONE of the following methods to make sure that the tank is structurally sound:

- If the tank is LESS THAN 10 YEARS OLD, you can use results from one of the monthly leak detection methods to show the UST is not leaking (groundwater monitoring, vapor monitoring, interstitial monitoring, automatic tank gauging, statistical inventory reconciliation, or other approved methods).
- If the tank is LESS THAN 10 YEARS OLD, you can use results from two tank tightness tests to show the UST is not leaking. The first test takes place before you install cathodic protection, and the second test takes place between 3 and 6 months after installation.
- If the tank is 10 YEARS OLD OR MORE, it must be internally inspected, tested, and assessed to make sure that the tank is structurally sound and free of corrosion holes (see page 14 for industry codes).
- You can assess the tank for corrosion holes by a method that the implementing agency determines is no less protective than those above. (For example, a national consensus code may be developed for assessing tank integrity without internal inspection.)

■ **Second, install cathodic protection.** Regulations require a qualified cathodic protection expert to design, supervise installation, and inspect cathodic protection systems installed at the UST site. The system must be tested by a qualified cathodic protection tester within 6 months of installation and at least every 3 years thereafter. You will need to keep the results of the last two tests to prove that the cathodic protection is working. In addition, you must inspect an impressed current system every 60 days to verify that the system is operating. Keep results of your last three inspections to prove that the impressed current system is operating properly.

Only tanks proven to be structurally sound can have cathodic protection added to them.

Using cathodic protection requires periodic tests and inspections, as well as consistent recordkeeping (see page 14 for industry codes).

***Only tanks proven
to be structurally
sound can be lined.***

2. **Add interior lining to the tank.** The interior of a tank can be lined with a thick layer of noncorrodible material (see page 14 for industry codes). Tanks using only an interior lining for corrosion protection must pass an internal reinspection in 10 years and every 5 years after that to make sure that the lining is sound. Keep records of the inspection results.
3. **Combine cathodic protection and interior lining.** You can add both cathodic protection and interior lining. The advantages for you of this combined method are simple: your USTs receive more cathodic protection; and you are not required to have the interior lining periodically inspected (which saves you the cost of these inspections). You will still need to have the cathodic protection system periodically tested and inspected and to keep records (as explained on page 9).

And what about piping?

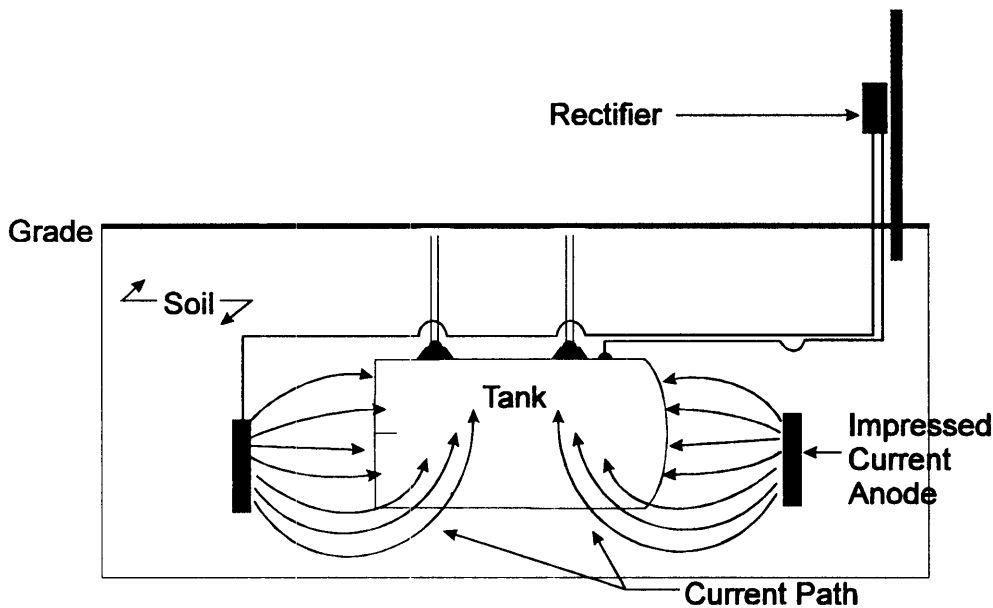
Existing steel piping must have cathodic protection. Note that cathodic protection needs to be tested and inspected periodically and records kept as described on page 9.

Piping entirely made of (or enclosed in) noncorrodible material, such as fiberglass, does not need cathodic protection.

What Are Cathodic Protection Methods?

IMPRESSED CURRENT SYSTEM

An impressed current system uses a rectifier to convert alternating current to direct current (see illustration below). This current is sent through an insulated wire to the "anodes," which are special metal bars buried in the soil near the UST. The current then flows through the soil to the UST system, and returns to the rectifier through an insulated wire attached to the UST. The UST system is protected because the current going to the UST system overcomes the corrosion-causing current normally flowing away from it.



SACRIFICIAL ANODE SYSTEM

Another type of cathodic protection (not illustrated here) is called a sacrificial anode or galvanic system. Although sacrificial anode systems work with new USTs, corrosion protection experts generally agree that ***sacrificial anodes do not work effectively or economically with most existing steel USTs***. Only a qualified cathodic protection expert can determine what kind of cathodic protection will work at your UST site.

For more information on corrosion and how USTs can be protected from it, contact NACE International (formerly the National Association of Corrosion Engineers) or other professionals in this field (see page 14).

What If You Close Or Replace The UST?

If you do not upgrade your existing UST, then you must properly close it. After closing the UST, you may replace it by installing a new UST. Basically, federal rules require the following when closing or replacing an UST:

- Notify your regulatory authority at least 30 days before you take an UST out of service for closure or replacement. (The regulatory authority may want to monitor the actions you take.)
- Determine if releases from your UST have contaminated the surrounding environment. You can use the results of monthly vapor or groundwater monitoring to show that your site is not contaminated. Otherwise you will need to do a site assessment. *Check to see if your state requires additional closure assessment measures.* If you find contamination, you will have to take corrective action (see page 15 for ordering EPA's booklet on taking corrective action).
- Have the tank emptied of liquids, dangerous vapor levels, and accumulated sludge. These potentially very hazardous actions need to be carried out by trained personnel who carefully follow standard safety practices. After the tank has been properly emptied, you can have it removed. If you want to leave the UST in the ground, you must fill it with a harmless and chemically inactive solid. *However, you should check to see if your state requires removal of the UST.*

WARNING: People are killed or injured every year while closing or removing tanks. Use safe removal practices (see page 14 for a safe closure standard). Only qualified contractors should close or remove USTs.

What About Hazardous Substance USTs?

Several hundred substances are designated as "hazardous" in Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, better known as CERCLA. The UST regulations apply to tanks that store the same hazardous substances identified by CERCLA, except for those listed as hazardous wastes. Information on CERCLA hazardous substances is available through EPA's RCRA/Superfund Hotline at 800 424-9346.

If your hazardous substance UST was installed before December 22, 1988, you have until December 22, 1998 to add spill, overfill, and corrosion protection (see pages 4-11). Otherwise, you must properly close the UST (see page 12). By this same date, hazardous substance USTs must also have leak detection systems that include **secondary containment and interstitial monitoring**. The leak detection system must be able to detect a leak in the interstitial space within 30 days of occurrence. (Some regulatory authorities may allow you to apply for permission to use another leak detection method.)

Secondary containment is created by placing a barrier inside or outside the tank and piping so that any leaks are contained within the space between the barrier and the tank and piping. **This containment space is called the "interstitial space" and must be monitored for leaks.** Methods that create an interstitial space for existing systems are currently limited in number and not available everywhere.

For more information on hazardous substance USTs, see "Musts for USTs" (ordering information on page 15).

PARTIAL LIST OF
HAZARDOUS SUBSTANCES

HAZARDOUS SUBSTANCE	CASRN*
Acenaphthene	83329
Acenaphthylene	208968
Acetaldehyde	75070
Acetaldehyde, chloro-	107200
Acetaldehyde, trichloro-	75876

Chromic sulfate	10101538
Chromium	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
Kepon	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 silicofluoride	16871719
Zinc sulfate	7733020
Zirconium nitrate	13746899
Zirconium sulfate	14644612
Zirconium tetrachloride	10026116

* Chemical Abstracts Service Registry Number

NOTE: *You may find the "Quick Compliance Checklist" on page 16 to be helpful.*

ORGANIZATIONS TO CONTACT FOR TANK INFORMATION

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

ASTM (American Society for Testing and
Materials)
1916 Race Street
Philadelphia, PA 19103
215 299-5585

Fiberglass Petroleum Tank and
Pipe Institute
9801 Westheimer, Suite 606
Houston, TX 77042-3951
713 465-3310

NACE International (formerly the National
Association of Corrosion Engineers)
Box 218340
Houston, TX 77218-8340
713 492-0535

National Fire Protection Association
1 Batterymarch Park
Box 9109
Quincy, MA 02269-9101
617 770-3000

NLPA (National Leak Prevention
Association)
Box 1643
Boise, ID 83701
208 389-2074

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

STI (Steel Tank Institute)
570 Oakwood Road
Lake Zurich, IL 60047
708 438-8265

INDUSTRY CODES AND STANDARDS

Assessing Tank Integrity and Interior Lining of Tank

API Recommended Practice 1631 (1992),
"Interior Lining of Underground Storage
Tanks"

NLPA Standard 631 (1991), "Entry,
Cleaning, Interior Inspection, Repair, and
Lining of Underground Storage Tanks"

[An ASTM consensus code may be
published to standardize alternatives to
internal inspections that assess tank
integrity.]

Cathodic Protection

API Recommended Practice 1632 (1987),
"Cathodic Protection of Underground
Petroleum Storage Tanks and Piping
Systems"

NACE RP-0169-92 (1992), "Recommended
Practice: Control of Corrosion on External
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"

STI R892-91 (1991), "Recommended
Practice for Corrosion Protection of
Underground Piping Networks Associated
with Liquid Storage and Dispensing
Systems"

Closing USTs

API Recommended Practice 1604 (1987),
"Removal and Disposal of Used
Underground Petroleum Storage Tanks"

General

API Recommended Practice 1615 (1987), "Installation of Underground Petroleum Storage Systems"

PEI RP100-94 (1994), "Recommended Practice for Installation of Underground Liquid Storage Systems"

EPA PUBLICATIONS

Leak Detection Requirements

"Straight Talk On Tanks: A Summary of Leak Detection Methods for Petroleum Underground Storage Tanks." To order this free publication, call EPA's toll-free RCRA/Superfund Hotline at 800 424-9346 and ask for EPA 530/UST-90/012.

Installing New USTs and General Information

"Musts for USTs: A Summary of the Regulations for Underground Storage Tank Systems." Order from Superintendent of Documents, Box 371954, Pittsburgh, PA 15250-7954; order #055-000-00294-1 (\$2.50 a copy).

Taking Corrective Action

"Oh No! Petroleum Leaks and Spills: What Do You Do?" To order this free publication, call EPA's toll-free RCRA/Superfund Hotline at 800 424-9346 and ask for EPA 530/UST-88/004.

Tank Filling

"Keeping It Clean: Making Safe and Spill-Free Motor Fuel Deliveries." For ordering information call EPA's toll-free RCRA/Superfund Hotline at 800 424-9346 (video costs about \$60).

Closure

"Tank Closure Without Tears" and "What Do We Have Here?" Videos and companion booklets available (\$20 to \$45) from New England Interstate Water Pollution Control Commission, ATTN: VIDEOS, 2 Fort Road, South Portland, ME 04106.

Quick Compliance Checklist

You should be in compliance with the "upgrade" requirements if you can check off the major items below for each of your *existing* UST systems by December 1998:

- ☐ **Spill protection** provided by a catchment basin
- ☐ **Overfill protection** provided by an automatic shutoff device, overfill alarm, or ball float valve
- ☐ **Corrosion protection for the tank** provided by one of the following:
 - ☐ Steel tank has corrosion-resistant coating AND cathodic protection
 - ☐ Tank made of noncorrodible material (such as fiberglass)
 - ☐ Steel tank clad with (or enclosed in) noncorrodible material
 - ☐ Uncoated steel tank has cathodic protection system
 - ☐ Uncoated steel tank has interior lined with noncorrodible material
 - ☐ Uncoated steel tank has cathodic protection AND interior lined with noncorrodible material steel tank
- ☐ **Corrosion protection for piping** provided by one of the following:
 - ☐ Uncoated steel piping has cathodic protection
 - ☐ Steel piping has a corrosion-resistant coating AND cathodic protection
 - ☐ Piping made of (or enclosed in) noncorrodible material
- ☐ If you have decided not to upgrade your *existing* UST system with the items above, you have properly closed the UST system. If you subsequently install a new UST system, the new installation meets all the regulatory requirements for installations after December 22, 1988.



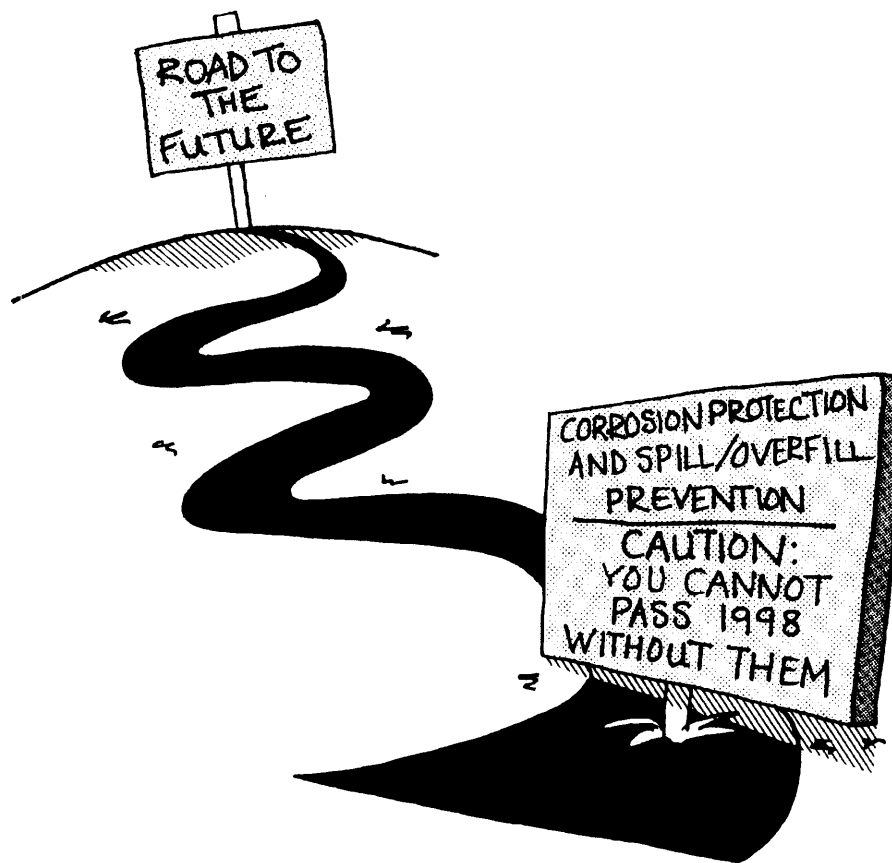
United States
Environmental Protection
Agency
5403W
Washington, DC 20460

Official Business
Penalty for Private Use
\$300



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- **Overfill protection**
- **Corrosion protection**

Check with your state regulatory agency to find out if the state has an earlier deadline or additional requirements.

You must choose one of the following actions for an existing UST:

- **Add spill, overfill, and corrosion protection by December 22, 1998**
- **Close the existing UST by December 22, 1998**
- **Replace the closed existing UST with a new UST**

You should act as soon as possible. Without the protection provided by upgrading or replacing, your UST is more likely to leak, damage the environment, and leave you with costly cleanups. The next page lists several advantages of acting early.

This booklet focuses on how you can meet upgrade requirements. The basic upgrade requirements are listed on page 3. Some information on properly closing an UST appears on page 12. You can find more information on the requirements for new UST systems (those installed after December 22, 1988) in EPA's publication "Musts for USTs" (ordering information on page 15).

This booklet uses "upgrading" and "upgrade" to mean adding spill, overfill, and corrosion protection to existing USTs.

If your existing USTs have not been upgraded or have not been properly closed by the 1998 deadline, you can be cited for violations and fined.

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1997
1998

- Early upgrading or replacing prevents leaks that would otherwise occur between now and December 1998. Avoiding leaks benefits the environment and your business. If your UST does not leak, you will not face costly mandatory cleanups or potential criminal suits or civil suits for damage claims.
- As December 1998 nears, increased customer demand to upgrade, close, or replace USTs may result in higher charges for these services. Also, you may have trouble finding available contractors and supplies needed to meet the deadline.
- It can take several months to upgrade, close, or replace your system. Bad weather or contractor delays are not unusual. Before work can start, local construction and regulatory permits may be necessary. The sooner you get started, the better the chance you will meet or beat the 1998 deadline.
- If you miss the 1998 deadline for any of the reasons noted above, you can be cited for violations and fined. Failure to be in compliance may reduce or eliminate coverage provided by insurance firms or state reimbursement funds—just when you may need these financial resources.
- Your state reimbursement fund or insurance company may offer financial incentives to upgrade or replace earlier, such as lower deductibles or premiums.
- Current state assistance programs that provide low cost loans to upgrade or replace USTs may be gone by 1998. Acting sooner may allow you to take advantage of these programs.
- If you discover a leak during upgrading or closing and need help from your state reimbursement fund, you may find the state fund bottlenecked with multiple claims around 1998.

***Don't let 1998
arrive before you
are ready!***

What Are The Basic Upgrade Requirements For *Existing* USTs?

Spill Protection (see pages 4–5)

Existing tanks must have catchment basins to contain spills from delivery hoses.

Overfill Protection (see pages 6–7)

Existing tanks must use ONE of the following:

- Automatic shutoff devices
- Overfill alarms
- Ball float valves

Corrosion Protection (see pages 8–11)

Existing tanks must match ONE of the following:

- Steel tank has corrosion-resistant coating AND cathodic protection (such as an sti-P₃® tank)
- Tank made of noncorrodible material (such as fiberglass)
- Steel tank clad with noncorrodible material (such as an ACT-100® tank) or tank enclosed in noncorrodible material
- Uncoated steel tank has cathodic protection system
- Uncoated steel tank has interior lined with noncorrodible material
- Uncoated steel tank has cathodic protection AND interior lined with noncorrodible material

Existing piping must match ONE of the following:

- Uncoated steel piping has cathodic protection
- Steel piping has a corrosion-resistant coating AND cathodic protection
- Piping made of (or enclosed in) noncorrodible material (such as fiberglass)

1998 Deadline:
Existing USTs must be protected from spills, overfills, and corrosion by December 1998.

ALL tanks and piping must already have leak detection. See EPA's "Straight Talk on Tanks" (ordering information on page 15).

When new USTs are installed, they must have leak detection and protection from spills, overfills, and corrosion. See EPA's "Musts for USTs" (ordering information on page 15).

How Can You Protect Against Spills?

You and your fuel deliverer should see "Keeping It Clean," a video that shows how deliveries can be made safely with no spills (ordering information on page 15).

Many releases at UST sites come from spills. Spills often occur at the fill pipe when the delivery truck's hose is disconnected. Although these spills are usually small, repeated small releases can cause big environmental problems.

Human error causes most spills. These mistakes can be avoided by following standard tank filling practices. For example, you must make sure there is room in the UST for the delivery, and the delivery driver must watch the delivery at all times. If you and the delivery driver follow standard practices, nearly all spills can be prevented. For this reason, federal UST regulations require that you follow standard filling practices now.

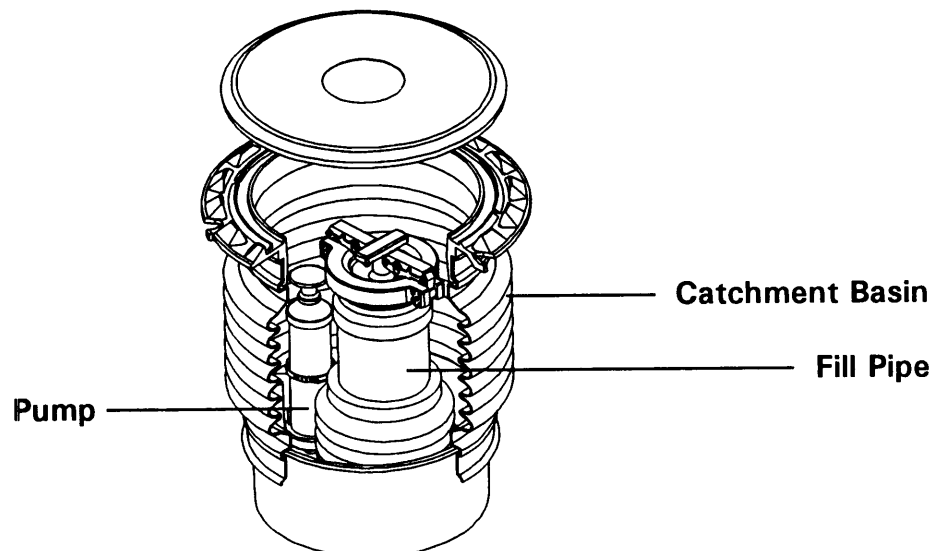
In addition, **USTs must have catchment basins** to contain spills. New USTs must have catchment basins when they are installed.

Federal rules require that existing USTs must have catchment basins by December 1998.

If an UST never receives more than 25 gallons at a time, the UST does not have to meet the spill protection requirements. For example, many small used oil tanks fall in this category.

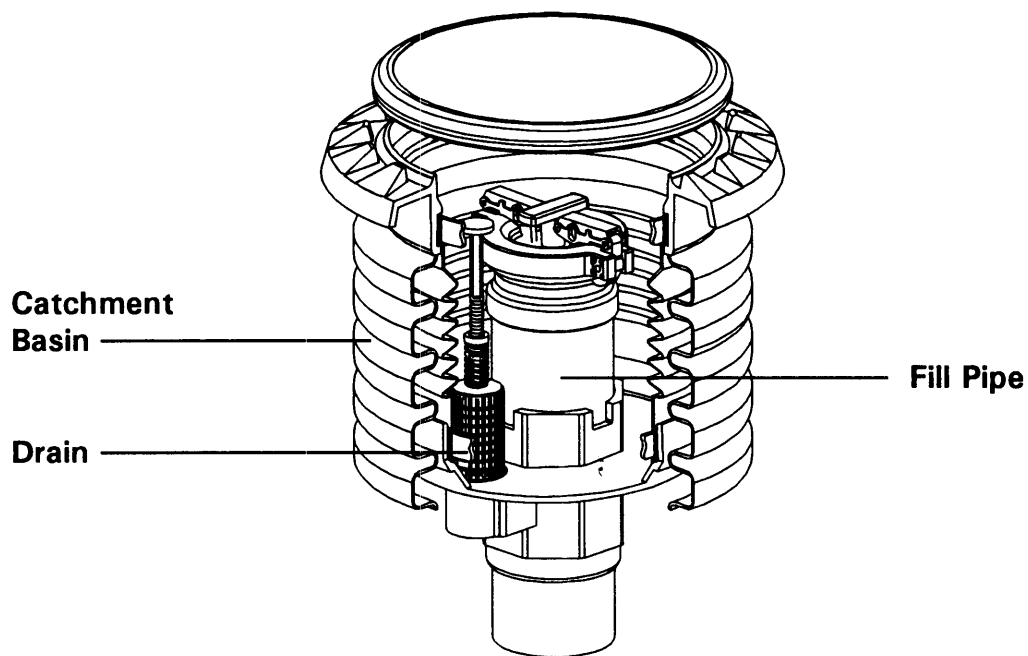
What Are Catchment Basins?

Catchment basins are also called "spill containment manholes" or "spill buckets." Basically, a catchment basin is a bucket sealed around the fill pipe (see illustration below).



To protect against spills, the basin should be large enough to contain what may spill when the delivery hose is uncoupled from the fill pipe. Basins range in size from those capable of holding only a few gallons to those that are much larger—the larger the catchment basin, the more spill protection it provides.

You need a way to remove liquid from catchment basins. Manufacturers equip catchment basins with either pumps or drains to remove liquid. The illustration on the previous page shows a catchment basin with a pump; the illustration below shows a catchment basin with a drain.



Your equipment supplier can help you choose the size and type of catchment basin that meets your needs.

You should try to keep water out of catchment basins. Some catchment basins can collect enough water and sediment, along with spilled product, to make draining this mixture into the tank unwise. If this happens, you may pump out the catchment basin and dispose of the liquid properly. If the liquid contains fuel or chemicals, it could be considered a hazardous waste. Contact your state agency responsible for hazardous waste for information on testing and handling requirements.

Having the surrounding surface slope away from the top of catchment basins helps keep water out of them.

How Can You Protect Against Overfills?

If an UST never receives more than 25 gallons at a time, the UST does not have to meet the overfill protection requirements. For example, many small used oil tanks fall in this category.

Overfills usually release much larger volumes than spills. When a tank is overfilled, large volumes can be released at the fill pipe and through loose fittings on the top of the tank or a loose vent pipe. The tightness of these fittings normally would not be a problem if the tank were not filled beyond its capacity.

You can solve overfill problems by:

- Making sure there is enough room in the tank for the delivery BEFORE the delivery is made;
- Watching the entire delivery to prevent overfilling or spilling; and
- Using equipment that protects against overfills.

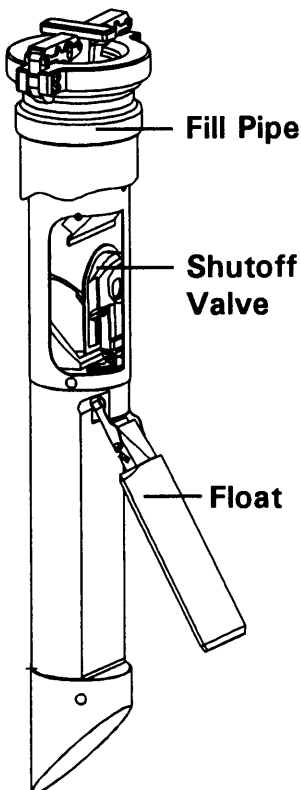
Federal rules require that existing USTs must have overfill protection devices by December 1998.

New USTs must have overfill protection devices when they are installed. The three main types of overfill protection devices (automatic shutoff devices, overfill alarms, and ball float valves) are described below and on the next page.

NOTE: If you have "pumped delivery" where fuel is delivered under pressure, you must make sure your overfill protection device works compatibly with pumped deliveries. Also, remember that overfill protection devices are effective only when combined with careful filling practices.

1. What Are Automatic Shutoff Devices?

An automatic shutoff device installed in an UST's fill pipe can slow down and then stop the delivery when the product has reached a certain level in the tank. This device—sometimes simply called a "fill pipe device"—has one or two valves that are operated by a float mechanism (the illustration on the left shows one kind of automatic shutoff device).



Some automatic shutoff devices work in two stages. The first stage drastically reduces the flow of product to alert the driver that the tank is nearly full. The driver can then close the delivery valve and still have room in the tank for the product left in the delivery hose.

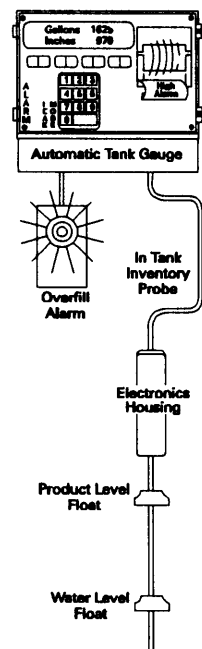
If the driver does not pay attention and the liquid level rises higher, the valve closes completely and no more liquid can be delivered into the tank, leaving the driver with a delivery hose full of product.

To work properly, all overfill devices must be installed carefully at the correct distance below the tank top specified by the manufacturer.

2. What Are Overfill Alarms?

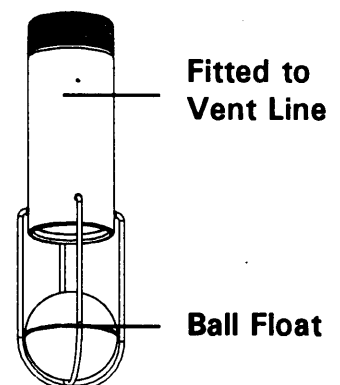
Overfill alarms use probes installed in the tank (see illustration on the right) to activate an alarm when the tank is either 90 percent full or within 1 minute of being overfilled. Either way, the alarm should provide enough time for the driver to close the truck's shutoff valve before an overfill happens. Alarms must be located where the driver can see or hear them easily. (Overfill alarms are often a part of automatic tank gauging systems.)

Overfill alarms work only if they alert the driver at the right time and the driver responds quickly. Remember to put the alarm on an electrical circuit that is active all the time so that the alarm will always work. Many deliveries are made at night when the facility is closed. You don't want to turn off your alarm when you turn off the office lights.



3. What Are Ball Float Valves?

Ball float valves (see illustration on the right) are placed at the bottom of the vent line several inches below the top of the UST. The ball floats on the product and rises with product level during delivery until it restricts vapor flowing out the vent line—before the tank is full. If all tank fittings are tight, the ball float valve can create enough back pressure to restrict product flow into the tank—which can notify the driver to close the truck's shutoff valve. However, if the UST has loose fittings, sufficient back pressure may not develop and will result in an overfill. *Note: Manufacturers do not recommend using ball float valves with suction piping, pressurized delivery, or coaxial Stage I vapor recovery.*



How Can You Protect Against Corrosion?

Federal rules require corrosion protection for USTs because unprotected steel USTs corrode and release product through corrosion holes.

You already meet the requirements for corrosion protection if your UST system matches one of the following performance standards for new USTs:

Corrosion results when bare metal and soil and moisture conditions combine to produce an underground electric current that destroys hard metal. Over time, corrosion creates holes and leaks develop.

- **Tank and piping completely made of noncorrodible material, such as fiberglass.** Corrosion protection is also provided if tank and piping are completely isolated from contact with the surrounding soil by being enclosed in noncorrodible material (sometimes called "jacketed" with noncorrodible material).
- **Tank and piping made of steel having a corrosion-resistant coating AND having cathodic protection** (such as an sti-P₃[®] tank with appropriate piping). A corrosion-resistant coating electrically isolates the coated metal from the surrounding environment to help protect against corrosion. *Asphaltic coating does not qualify as a corrosion-resistant coating.* Methods of cathodic protection are briefly explained on page 11.
- **Tank made of steel clad with a thick layer of noncorrodible material** (such as an ACT-100[®] tank). This option does not apply to piping. *Galvanized steel is not a noncorrodible material.*

It is not practical to add coatings or claddings to existing steel USTs that have no corrosion protection. Instead, you must choose one of the following three methods to add corrosion protection to existing steel tanks:

1. Add cathodic protection or
2. Add interior lining to tank or
3. Combine cathodic protection and interior lining.

These methods are described on the following pages.

1. **Add cathodic protection.** If you are adding only cathodic protection, you must do the following:

■ **First, assess tank integrity.** Satisfy ONE of the following methods to make sure that the tank is structurally sound:

- If the tank is LESS THAN 10 YEARS OLD, you can use results from one of the monthly leak detection methods to show the UST is not leaking (groundwater monitoring, vapor monitoring, interstitial monitoring, automatic tank gauging, statistical inventory reconciliation, or other approved methods).
- If the tank is LESS THAN 10 YEARS OLD, you can use results from two tank tightness tests to show the UST is not leaking. The first test takes place before you install cathodic protection, and the second test takes place between 3 and 6 months after installation.
- If the tank is 10 YEARS OLD OR MORE, it must be internally inspected, tested, and assessed to make sure that the tank is structurally sound and free of corrosion holes (see page 14 for industry codes).
- You can assess the tank for corrosion holes by a method that the implementing agency determines is no less protective than those above. (For example, a national consensus code may be developed for assessing tank integrity without internal inspection.)

■ **Second, install cathodic protection.** Regulations require a qualified cathodic protection expert to design, supervise installation, and inspect cathodic protection systems installed at the UST site. The system must be tested by a qualified cathodic protection tester within 6 months of installation and at least every 3 years thereafter. You will need to keep the results of the last two tests to prove that the cathodic protection is working. In addition, you must inspect an impressed current system every 60 days to verify that the system is operating. Keep results of your last three inspections to prove that the impressed current system is operating properly.

Only tanks proven to be structurally sound can have cathodic protection added to them.

Using cathodic protection requires periodic tests and inspections, as well as consistent recordkeeping (see page 14 for industry codes).

*Only tanks proven
to be structurally
sound can be lined.*

2. **Add interior lining to the tank.** The interior of a tank can be lined with a thick layer of noncorrodible material (see page 14 for industry codes). Tanks using only an interior lining for corrosion protection must pass an internal reinspection in 10 years and every 5 years after that to make sure that the lining is sound. Keep records of the inspection results.
3. **Combine cathodic protection and interior lining.** You can add both cathodic protection and interior lining. The advantages for you of this combined method are simple: your USTs receive more cathodic protection; and you are not required to have the interior lining periodically inspected (which saves you the cost of these inspections). You will still need to have the cathodic protection system periodically tested and inspected and to keep records (as explained on page 9).

And what about piping?

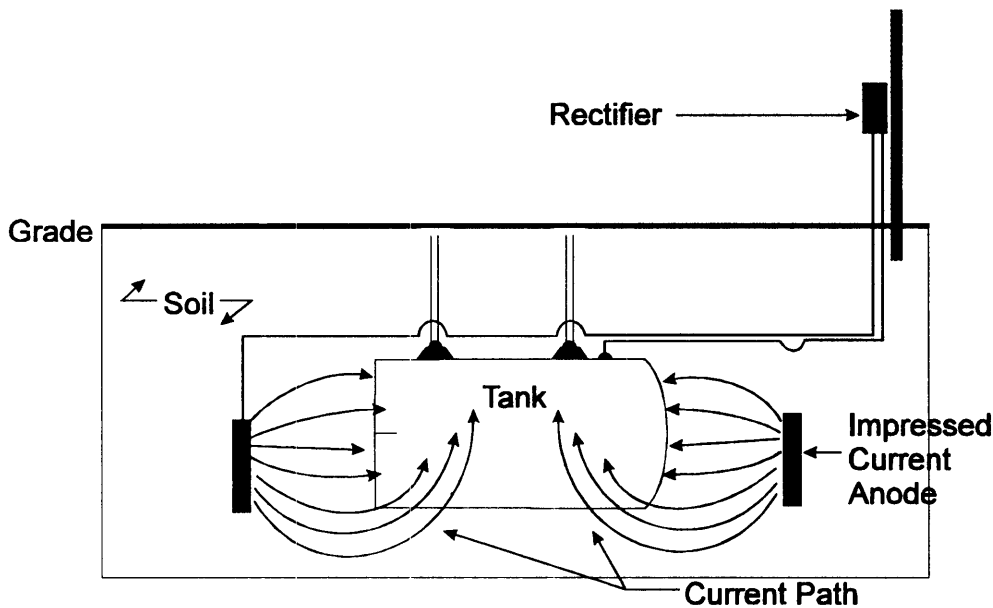
Existing steel piping must have cathodic protection. Note that cathodic protection needs to be tested and inspected periodically and records kept as described on page 9.

Piping entirely made of (or enclosed in) noncorrodible material, such as fiberglass, does not need cathodic protection.

What Are Cathodic Protection Methods?

IMPRESSED CURRENT SYSTEM

An impressed current system uses a rectifier to convert alternating current to direct current (see illustration below). This current is sent through an insulated wire to the "anodes," which are special metal bars buried in the soil near the UST. The current then flows through the soil to the UST system, and returns to the rectifier through an insulated wire attached to the UST. The UST system is protected because the current going to the UST system overcomes the corrosion-causing current normally flowing away from it.



SACRIFICIAL ANODE SYSTEM

Another type of cathodic protection (not illustrated here) is called a sacrificial anode or galvanic system. Although sacrificial anode systems work with new USTs, corrosion protection experts generally agree that ***sacrificial anodes do not work effectively or economically with most existing steel USTs***. Only a qualified cathodic protection expert can determine what kind of cathodic protection will work at your UST site.

For more information on corrosion and how USTs can be protected from it, contact NACE International (formerly the National Association of Corrosion Engineers) or other professionals in this field (see page 14).

What If You Close Or Replace The UST?

If you do not upgrade your existing UST, then you must properly close it. After closing the UST, you may replace it by installing a new UST. Basically, federal rules require the following when closing or replacing an UST:

- Notify your regulatory authority at least 30 days before you take an UST out of service for closure or replacement. (The regulatory authority may want to monitor the actions you take.)
- Determine if releases from your UST have contaminated the surrounding environment. You can use the results of monthly vapor or groundwater monitoring to show that your site is not contaminated. Otherwise you will need to do a site assessment. *Check to see if your state requires additional closure assessment measures.* If you find contamination, you will have to take corrective action (see page 15 for ordering EPA's booklet on taking corrective action).
- Have the tank emptied of liquids, dangerous vapor levels, and accumulated sludge. These potentially very hazardous actions need to be carried out by trained personnel who carefully follow standard safety practices. After the tank has been properly emptied, you can have it removed. If you want to leave the UST in the ground, you must fill it with a harmless and chemically inactive solid. *However, you should check to see if your state requires removal of the UST.*

WARNING: People are killed or injured every year while closing or removing tanks. Use safe removal practices (see page 14 for a safe closure standard). Only qualified contractors should close or remove USTs.

What About Hazardous Substance USTs?

Several hundred substances are designated as "hazardous" in Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, better known as CERCLA. The UST regulations apply to tanks that store the same hazardous substances identified by CERCLA, except for those listed as hazardous wastes. Information on CERCLA hazardous substances is available through EPA's RCRA/Superfund Hotline at 800 424-9346.

If your hazardous substance UST was installed before December 22, 1988, you have until December 22, 1998 to add spill, overfill, and corrosion protection (see pages 4-11). Otherwise, you must properly close the UST (see page 12). By this same date, hazardous substance USTs must also have leak detection systems that include **secondary containment and interstitial monitoring**. The leak detection system must be able to detect a leak in the interstitial space within 30 days of occurrence. (Some regulatory authorities may allow you to apply for permission to use another leak detection method.)

Secondary containment is created by placing a barrier inside or outside the tank and piping so that any leaks are contained within the space between the barrier and the tank and piping. **This containment space is called the "interstitial space" and must be monitored for leaks.** Methods that create an interstitial space for existing systems are currently limited in number and not available everywhere.

For more information on hazardous substance USTs, see "Musts for USTs" (ordering information on page 15).

PARTIAL LIST OF
HAZARDOUS SUBSTANCES

HAZARDOUS SUBSTANCE	CASRN*
Acenaphthene	83329
Acenaphthylene	208968
Acetaldehyde	75070
Acetaldehyde, chloro-	107200
Acetaldehyde, trichloro-	75876

Chromic sulfate	10101538
Chromium	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
Keponc	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 silicofluoride	16871719
Zinc sulfate	7733020
Zirconium nitrate	13746899
Zirconium sulfate	14644612
Zirconium tetrachloride	10026116

* Chemical Abstracts Service Registry Number

NOTE: You may find the "Quick Compliance Checklist" on page 16 to be helpful.

ORGANIZATIONS TO CONTACT FOR TANK INFORMATION

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

ASTM (American Society for Testing and
Materials)
1916 Race Street
Philadelphia, PA 19103
215 299-5585

Fiberglass Petroleum Tank and
Pipe Institute
9801 Westheimer, Suite 606
Houston, TX 77042-3951
713 465-3310

NACE International (formerly the National
Association of Corrosion Engineers)
Box 218340
Houston, TX 77218-8340
713 492-0535

National Fire Protection Association
1 Batterymarch Park
Box 9109
Quincy, MA 02269-9101
617 770-3000

NLPA (National Leak Prevention
Association)
Box 1643
Boise, ID 83701
208 389-2074

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

STI (Steel Tank Institute)
570 Oakwood Road
Lake Zurich, IL 60047
708 438-8265

INDUSTRY CODES AND STANDARDS

Assessing Tank Integrity and Interior Lining of Tank

API Recommended Practice 1631 (1992),
"Interior Lining of Underground Storage
Tanks"

NLPA Standard 631 (1991), "Entry,
Cleaning, Interior Inspection, Repair, and
Lining of Underground Storage Tanks"

[An ASTM consensus code may be
published to standardize alternatives to
internal inspections that assess tank
integrity.]

Cathodic Protection

API Recommended Practice 1632 (1987),
"Cathodic Protection of Underground
Petroleum Storage Tanks and Piping
Systems"

NACE RP-0169-92 (1992), "Recommended
Practice: Control of Corrosion on External
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"

STI R892-91 (1991), "Recommended
Practice for Corrosion Protection of
Underground Piping Networks Associated
with Liquid Storage and Dispensing
Systems"

Closing USTs

API Recommended Practice 1604 (1987),
"Removal and Disposal of Used
Underground Petroleum Storage Tanks"

General

API Recommended Practice 1615 (1987), "Installation of Underground Petroleum Storage Systems"

PEI RP100-94 (1994), "Recommended Practice for Installation of Underground Liquid Storage Systems"

EPA PUBLICATIONS

Leak Detection Requirements

"Straight Talk On Tanks: A Summary of Leak Detection Methods for Petroleum Underground Storage Tanks." To order this free publication, call EPA's toll-free RCRA/Superfund Hotline at 800 424-9346 and ask for EPA 530/UST-90/012.

Installing New USTs and General Information

"Musts for USTs: A Summary of the Regulations for Underground Storage Tank Systems." Order from Superintendent of Documents, Box 371954, Pittsburgh, PA 15250-7954; order #055-000-00294-1 (\$2.50 a copy).

Taking Corrective Action

"Oh No! Petroleum Leaks and Spills: What Do You Do?" To order this free publication, call EPA's toll-free RCRA/Superfund Hotline at 800 424-9346 and ask for EPA 530/UST-88/004.

Tank Filling

"Keeping It Clean: Making Safe and Spill-Free Motor Fuel Deliveries." For ordering information call EPA's toll-free RCRA/Superfund Hotline at 800 424-9346 (video costs about \$60).

Closure

"Tank Closure Without Tears" and "What Do We Have Here?" Videos and companion booklets available (\$20 to \$45) from New England Interstate Water Pollution Control Commission, ATTN: VIDEOS, 2 Fort Road, South Portland, ME 04106.

Quick Compliance Checklist

You should be in compliance with the "upgrade" requirements if you can check off the major items below for each of your *existing* UST systems by December 1998:

- ☐ **Spill protection** provided by a catchment basin
- ☐ **Overfill protection** provided by an automatic shutoff device, overfill alarm, or ball float valve
- ☐ **Corrosion protection for the tank** provided by one of the following:
 - ☐ Steel tank has corrosion-resistant coating AND cathodic protection
 - ☐ Tank made of noncorrodible material (such as fiberglass)
 - ☐ Steel tank clad with (or enclosed in) noncorrodible material
 - ☐ Uncoated steel tank has cathodic protection system
 - ☐ Uncoated steel tank has interior lined with noncorrodible material
 - ☐ Uncoated steel tank has cathodic protection AND interior lined with noncorrodible material steel tank
- ☐ **Corrosion protection for piping** provided by one of the following:
 - ☐ Uncoated steel piping has cathodic protection
 - ☐ Steel piping has a corrosion-resistant coating AND cathodic protection
 - ☐ Piping made of (or enclosed in) noncorrodible material
- ☐ If you have decided not to upgrade your *existing* UST system with the items above, you have properly closed the UST system. If you subsequently install a new UST system, the new installation meets all the regulatory requirements for installations after December 22, 1988.



United States
Environmental Protection
Agency
5403W
Washington, DC 20460

Official Business
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