ADEQ

Underground Storage Tank Operator Training

Study Guide

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Contents

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Section 1 - The What, Why and Who of UST Operator Training

What is UST Operator Training?

Underground storage tank (UST) operator training is a program developed to ensure UST operators have the basic knowledge necessary to properly operate and maintain UST systems in Arkansas. The U.S. Environmental Protection Agency (EPA), in consultation with states, has developed guidelines that specify training requirements for three classes of UST system operators: Class A; Class B; and Class C. The general description for each class of operator is as follows:

Class A Operator

Person having primary responsibility for on-site operation and maintenance of UST system.

Class B Operator

Person having daily on-site responsibility for the operation and maintenance of UST system.

Class C Operator

Daily, on-site employees having primary responsibility for addressing emergencies presented by a spill or release from an UST system.

UST Operator Training is designed to ensure that UST operators operate their tank systems in a manner that is compliant with state and federal requirements, and that will prevent product releases that could endanger human health and/or the environment.

Why UST Operator Training?

- **To Improve UST Compliance**
- **To Meet Requirements Set Forth by the Energy Policy Act of 2005 and by Arkansas law and regulation**
- **To Reduce the Potential for Environmental Harm from UST Releases**

Who Needs To Be Trained?

Each underground storage tank facility must have a Class A, Class B, and Class C operator designated for that facility. Separate individuals may be designated for each class of operator, or an individual may be designated to more than one of the operator classes. An individual who is designated to more than one operator class must be trained in each operator class for which he or she is designated. Class A or Class B operators will be responsible for making sure their Class C operators are properly trained.

The major differences in class designations are outlined below.

Class A – **The Class A operator has primary responsibility to operate and maintain the underground storage tank (UST) system**. Those responsibilities include managing resources and personnel such as establishing work assignments to achieve and maintain compliance with regulatory requirements. In general, the Class A focuses on the broader aspects of the statutory and regulatory requirements and standards necessary to operate and maintain a UST system.

At a minimum, Class A operators must be ADEQ-certified in the following areas:

1. A general knowledge of applicable federal and state UST system requirements for operation, maintenance, and recordkeeping including, but not limited to --

   (a) Release prevention

   (b) Release detection

   (c) Emergency response

   (d) Product compatibility

2. Financial responsibility requirements

3. Notification requirements

4. Release and suspected release reporting requirements

5. Temporary and permanent closure requirements

6. Operator training requirements

Class B – **A Class B operator implements applicable UST regulatory requirements and standards in the field**. The Class B implements day-to-day aspects of operating, maintaining and recordkeeping for USTs at one or more facilities.

At a minimum, a Class B operator must be ADEQ-certified in the following areas:

1. An in-depth knowledge of UST system requirements for day-to-day operation, maintenance, and recordkeeping including, but not limited to --

   (a) Release prevention

   (b) Release detection

   (c) Components of UST systems

   (d) Materials of UST system components

   (e) Emergency response

   (f) Product compatibility

(g) Reporting requirements
(h) Class C operator training requirements

Class B operators will generally have a more in-depth understanding of operation and maintenance aspects of the UST system in comparison to a Class A operator.

Class C – **A Class C is an employee and is, generally, the first line of response to events indicating emergency conditions**. This individual is responsible for responding to alarms or other indications of emergencies caused by spills or releases from UST systems. The Class C operator notifies the Class B or A operator and appropriate emergency responders when necessary.

A Class C operator typically:

- Controls or monitors the dispensing or sale of regulated substances, or
- Is responsible for initial response to alarms or releases

Class C operators, at a minimum, must be trained to:

- Take action in response to emergency situations posing an immediate danger to the public or to the environment (e.g., spills or releases from a UST system)
- Take action in response to alarms caused by spills or releases from a UST system

Section 2- How To Use This Study Guide

Who Should Read This Study Guide?

This study guide is for persons seeking certification as an Arkansas Class A or Class B operator of underground storage tank (UST) systems.

As an operator of USTs, you are responsible for making sure your tanks do not leak. In order to be a **certified** UST operator, you must pass an exam given by ADEQ. This study guide is provided to help you understand your responsibilities as an operator and to help you prepare for the Arkansas UST Operator exam.

Key Terms Used In This Study Guide

An **UST** is an **underground storage tank and underground piping connected to the tank** that has at least 10 percent of its combined volume underground. The federal and state regulations apply only to USTs storing petroleum or certain hazardous substances.

O&M stands for **operation and maintenance procedures** that must be followed to keep USTs from causing leaks and creating costly cleanups.

What Can This Study Guide Help You Do?

- Identify and understand the operation and maintenance (O&M) procedures you need to follow routinely to make sure your USTs don't have leaks that endanger human health, damage the environment or result in costly cleanups.
- Maintain required records of your tank system's O&M.
- Correctly respond to and report releases or suspected releases, spills or other unusual operating conditions associated with USTs.

What is an "UST"?

An UST is any tank, including the underground piping connected to it, with at least 10% of its volume underground and which stores a regulated substance (petroleum or certain hazardous chemicals.)

Some kinds of tanks that are **not** covered by federal and state UST regulations are:

- Farm and residential tanks of 1,100 gallons or less in size.
- Tanks storing heating oil used on the premises where stored.
- Septic tanks.
- USTs storing hazardous wastes.
- Any UST holding 110 gallons or less.
- Emergency spill or overfill tanks.

Is Your UST A "New" Tank Or An "Existing" Tank?

UST systems installed **after** December 1988 are considered **"new"** tanks. As such, these USTs have to meet all the federal standards for spill/overfill prevention, corrosion protection, and release detection at the time of installation.

"Existing" UST systems are those installed **before** December 1988. These tank systems were required to be upgraded with spill/overfill prevention and corrosion protection by the compliance deadline of December 22, 1998, or be closed.

Your UST System Is New Or Upgraded — Is That Enough?

Being new or upgraded is not enough. New and upgraded USTs are a complex collection of mechanical and electronic devices that can fail under certain conditions. These failures can be prevented or quickly detected by following routine O&M procedures. Having a new or upgraded UST system is a good start, but the system must be properly operated and continuously maintained to ensure that leaks are avoided or quickly detected.

What Should You Do With Each Section Of This Study Guide?

Read through each section carefully and use the checklists to help you establish clear O&M procedures.

By identifying and understanding the O&M tasks you need to perform routinely, you will ensure timely repair or replacement of components when problems are identified. Read through each section carefully and use the checklists to help you establish clear O&M procedures.

How Can You Effectively Use The Checklists Provided?

This guide includes several checklists.
You can easily copy any of the checklists
(as appropriate to your facility) from this manual, reproduce them, and fill them out to help comply with various recordkeeping requirements.

You can also select the specific mix of checklists that matches your particular UST facility. Once you have your select group of checklists together, make several copies that you can fill out periodically over time.

In this way you can keep track of your O&M activities and know that you've done what is necessary to keep your UST site safe, clean, and in compliance, avoiding any threats to the environment or nearby people as a result of costly and dangerous UST releases.

Use This Guide Often — Effective O&M Requires Constant Vigilance.

Section 3 - Identifying The Equipment At Your UST Facility

Determine what UST equipment you have at your facility by completing the checklist below. Note that each part of the checklist below refers you to the appropriate section of this guide for relevant information. After you have identified your equipment, proceed to the following sections to identify the O&M actions necessary for your specific UST system.

General Facility Information (optional)				
Facility Name				
Facility ID #				
Spill and Overfill Protection (See Section 4 for more information)				
Check for each tank:	**Tank #1**	**Tank #2**	**Tank #3**	**Tank #4**
Spill Catchment Basin/ Spill Bucket				
Check at least one overfill device for each tank:				
Automatic Shutoff Device				
Overfill Alarm				
Ball Float Valve				
Corrosion Protection (See Section 5 for more information)				
A. Corrosion Protection for Tanks				
Check at least one for each tank:	**Tank #1**	**Tank #2**	**Tank #3**	**Tank #4**
Coated and Cathodically Protected Steel				
Noncorrodible Material (such as Fiberglass Reinforced Plastic)				
Steel Jacketed or Clad with Noncorrodible Material				
Cathodically Protected Noncoated Steel*				
Internally Lined Tank*				
Cathodically Protected Noncoated Steel and Internally Lined Tank*				
Other Method Used to Achieve Corrosion Protection (please specify):				
*** These options may be used only for tanks installed before December 22, 1988.**				
B. Corrosion Protection for Piping				
Check at least one for each:	**Tank #1**	**Tank #2**	**Tank #3**	**Tank #4**
Coated and Cathodically Protected Steel				
Noncorrodible Material (such as Fiberglass Reinforced Plastic or Flexible Plastic)				
Cathodically Protected Noncoated Metal*				
Other Method Used to Achieve Corrosion Protection (please specify):				
*** This option may be used only for piping installed before December 22, 1988.**				

General Facility Information (optional)

Facility Name

Facility ID #

Release Detection (See Section 6 for information on release detection)

A. Release Detection for Tanks

Check at least one for each tank:	Tank #1	Tank #2	Tank #3	Tank #4
Automatic Tank Gauging System				
Interstitial Monitoring (with secondary containment)				
Groundwater Monitoring				
Vapor Monitoring				
Inventory Control and Tank Tightness Testing (TTT)*				
Manual Tank Gauging Only **				
Manual Tank Gauging and Tank Tightness Testing (TTT)***				
Other Release Detection Method, such as SIR (please specify)				

* Allowed only for 10 years after upgrading or installing tank with corrosion protection. TTT required every 5 years.
** Allowed only for tanks of 1,000 gallon capacity or less.
*** Allowed only for tanks of 2,000 gallon capacity or less and only for 10 years after upgrading or installing tank with corrosion protection. TTT required every 5 years.

B. Release Detection for Pressurized Piping

Check at least one from A & B for each tank's piping:		Tank #1	Tank #2	Tank #3	Tank #4
A (Automatic Line Leak Detectors)	Automatic Flow Restrictor				
	Automatic Shutoff Device				
	Continuous Alarm				
B	Annual Line Tightness Test				
	Monthly Monitoring*				

* Monthly Monitoring for piping includes Interstitial Monitoring, Vapor Monitoring, Groundwater Monitoring, and other accepted methods (such as SIR and Electronic Line Leak Detectors)

C. Release Detection for Suction Piping

Check at least one for each tank's piping:	Tank #1	Tank #2	Tank #3	Tank #4
Line Tightness Testing Every Three Years				
Monthly Monitoring*				
No Release Detection Required For Safe Suction **				

* Monthly Monitoring for piping includes Interstitial Monitoring, Vapor Monitoring, Groundwater Monitoring, and SIR
** No release detection required only if it can be verified that you have a safe suction piping system with the following characteristics:

1) Only one check valve per line located directly below the dispenser;
2) Piping sloping back to the tank; and
3) System must operate under atmospheric pressure.

Any Problems Filling Out These Checklists?

If you have trouble filling out the checklist above or any other checklist in this guide, remember these sources of assistance you can contact:

- Your UST contractor, the vendor of your equipment, and the manufacturer of your UST equipment should be ready to help you. Look through your records for contact information. You may also want to use some of the industry contacts and other contact information provided in Section 11.

- ADEQ's Regulated Storage Tanks Division will be able to help you identify equipment or sources of information about your UST equipment. You should make yourself aware of all components of your UST system. State and Federal contact information is available in Section 11.

Section 4 — Spill And Overfill Protection

The purpose of spill and overfill protection equipment is to eliminate the potential for a release during fuel deliveries. The equipment must be in working order and used properly to provide adequate protection from spills and overfills.

Even the best spill and overfill protection equipment can become faulty over time if not properly operated and maintained.

Only one gallon of fuel leaking each week from a poorly maintained spill bucket can result in up to 195 tons of contaminated soil in a year.

Improper maintenance of the spill bucket at the UST site pictured below contributed to significant contamination of soil and groundwater.

What's The Difference?

Spill Protection:
A spill bucket is installed at the fill pipe to contain the drips and spills of fuel that can occur when the delivery hose is uncoupled from the fill pipe after delivery.

Overfill Protection:
Equipment is installed on the UST that is designed to stop product flow, reduce product flow, or alert the delivery person during delivery **before** the tank becomes full and begins releasing petroleum into the environment.

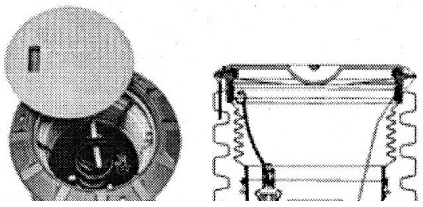
The following pages in this section focus on how you can routinely make sure your spill and overfill equipment is operating effectively.

What Are The Basics Of Spill Protection?

Your USTs must have catchment basins — also called spill buckets — installed at the fill pipe to contain spills that may occur as a result of fuel deliveries.

- The spill bucket is designed to temporarily contain product spills that might occur during fuel delivery. To contain a spill, the spill bucket must be liquid tight.
- **The spill bucket is not designed to contain fuel for long periods of time.** After each delivery, empty and dispose of contents properly.
- Spill buckets need to be large enough to contain any fuel that may spill when the delivery hose is uncoupled from the fill pipe. Spill buckets typically range in size from 5 gallons to 25 gallons.
- If you use a checklist for correct filling practices (see page 18), spills should be eliminated or reduced to very small volumes that your spill bucket can easily handle.

If your UST ***never*** receives deliveries of more than 25 gallons at a time, the UST does not need to meet the spill protection requirements. Many used oil tanks fall into this category. Even though these USTs are not required to have spill protection, you should consider using spill protection as part of good UST system management.



Examples Of Spill Buckets

How Do You Maintain Your Spill Bucket?

The checklist below provides information on properly maintaining your spill bucket.

✓ Spill Bucket O&M Checklist

- ❑ **Keep your spill bucket empty of liquids.**
  Some spill buckets are equipped with a valve that allows you to drain accumulated fuel into your UST. Others may be equipped with a manual pump so fuel can be put into your UST by pumping it through the fill pipe. However, keep in mind that when you pump out or drain your spill bucket into your UST, any water and debris may also enter the UST. If a basin is not equipped with drain valve or pump, then any accumulated fuel or water must be removed manually and disposed of properly.
- ❑ **Periodically check your spill bucket to remove any debris.**
  Debris could include soil, stones, or trash.
- ❑ **Periodically check to see if your spill bucket is still liquid tight.**
  Have a qualified UST contractor inspect your spill bucket for signs of wear, cracks, or holes. Based on this inspection, the contractor may suggest a test to determine if the spill bucket is tight or needs repair or replacement.

What Are The Basics Of Overfill Protection?

Your USTs must have overfill protection installed to help prevent the overfilling of tanks.

Three types of overfill protection devices are commonly used:

- Automatic shutoff devices
- Overfill alarms
- Ball float valves

Each of these forms of overfill protection is discussed in detail on the following pages.

If your UST ***never*** receives deliveries of more than 25 gallons at a time, the UST does not need to meet the overfill protection requirements. Many used oil tanks fall into this category. Even though these USTs are not required to have overfill protection, you should consider using overfill protection as part of good UST system management.

How Can You Help The Delivery Person Avoid Overfills?

To protect your business, you must make every effort to help the delivery person avoid overfilling your UST.

Use A Checklist On Correct Filling Practices

If correct filling practices are used, you will not exceed the UST's capacity — see page 18 for a checklist on correct filling procedures. Overfills are caused when the delivery person makes a mistake, such as ignoring an overfill alarm.

Use Signs, Alert Your Delivery Person

The delivery person should know what type of overfill device is present on each tank at your facility and what action will occur if the overfill device is triggered — such as a visual and/or audible alarm or that the product flow into the tank will stop or slow significantly.

Educate and alert your delivery person by placing a clear sign near your fill pipes, in plain view of the delivery person. An example of such a sign follows on the next page.

Delivery Person — Avoid Overfills

- An **overfill alarm** is used for overfill protection at this facility.
- Do not tamper with this alarm in any attempt to defeat its purpose.
- When the tank is 90% full, the overfill alarm whistles and a red light flashes.
- **If you hear the alarm whistle or see the red light flashing,**

Stop The Delivery Immediately!

Make Sure You Order The Right Amount Of Product

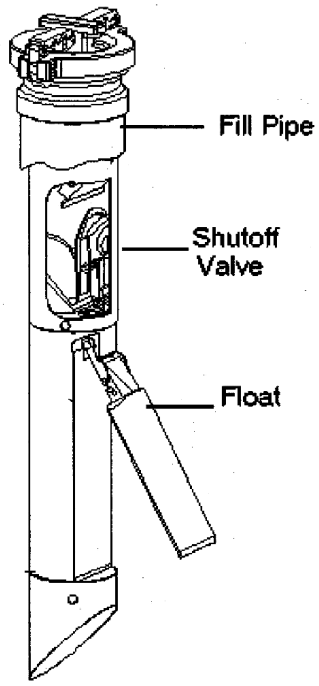
Also, you need to **make sure you've ordered the right amount of product for delivery**. Order only the quantity of fuel that will fit into 90% of the tank. For example, if you have a 10,000 gallon tank with 2,000 gallons already in the tank, you would order at the most a 7,000 gallon delivery (90% of 10,000 is 9,000 gallons; subtracting the 2,000 gallons already in the tank leaves a maximum delivery of 7,000 gallons). Use the checklist formula on page 18. Do your homework right and you reduce the chance of overfills.

What Should You Do To Operate And Maintain Your Automatic Shutoff Device?

The automatic shutoff device is a mechanical device installed in line with the drop tube within the fill pipe riser. It slows down and then stops the delivery when the product has reached a certain level in the tank. It should be positioned so that the float arm is not obstructed and can move through its full range of motion.

When installed and maintained properly, the shutoff valve will shut off the flow of fuel to the UST at 95% of the tank's capacity or before the fittings at the top of the tank are exposed to fuel.

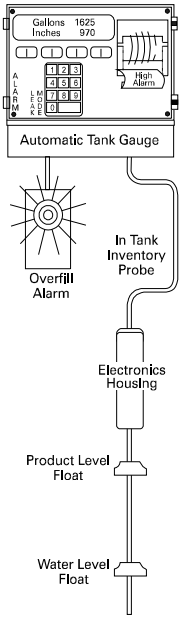
You should not use an automatic shutoff device for overfill protection if your UST receives pressurized deliveries.



✓ Basic O&M Checklist For Automatic Shutoff Devices

- ❑ A qualified UST contractor periodically checks to make sure that the automatic shutoff device is functioning properly and that the device will shut off fuel flowing into the tank at 95% of the tank capacity or before the fittings at the top of the tank are exposed to fuel:
  - Make sure the float operates properly.
  - Make sure there are no obstructions in the fill pipe that would keep the floating mechanism from working.
- ❑ You have posted signs that the delivery person can easily see and that alert the delivery person to the overfill warning devices and alarms in use at your facility.

What Should You Do To Operate And Maintain Your Electronic Overfill Alarm?



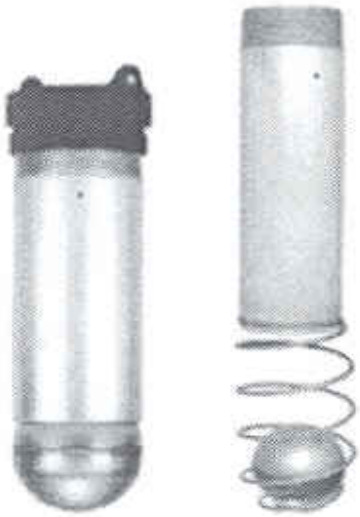
This type of overfill device activates an audible and/or visual warning to delivery personnel when the tank is either 90% full or is within one minute of being overfilled. **The alarm *must* be located so it can be seen or heard (or both) from the UST delivery location.** Once the electronic overfill alarm sounds, the delivery person has approximately one minute to stop the flow of fuel to the tank.

Electronic overfill alarm devices have no mechanism to shut off or restrict flow. Therefore, the fuel remaining in the delivery hose after the delivery has been stopped will flow into the tank as long as the tank is not yet full.

✓ Basic O&M Checklist For Overfill Alarms

- ❑ A qualified UST contractor periodically checks your electronic overfill alarm to make sure that it is functioning properly and that the alarm activates when the fuel reaches 90% of the tank capacity or is within one minute of being overfilled:
  - Ensure that the alarm can be heard and/or seen from where the tank is fueled.
  - Make sure that the electronic device and probe are operating properly.
- ❑ You have posted signs that the delivery person can easily see and that alert the delivery person to the overfill warning devices and alarms in use at your facility.

What Should You Do To Operate And Maintain Your Ball Float Valve?



The ball float valve — also called a float vent valve — is installed at the vent pipe in the tank and restricts vapor flow in an UST as the tank gets close to being full. The ball float valve should be set at a depth which will restrict vapor flow out of the vent line during delivery at 90% of the UST's capacity or 30 minutes prior to overfilling.

As the tank fills, the ball in the valve rises, restricting the flow of vapors out of the UST during delivery. The flow rate of the delivery will decrease noticeably and should alert the delivery person to stop the delivery.

For ball float valves to work properly, the top of the tank must be airtight so that vapors cannot escape from the tank. Everything from fittings to drain mechanisms on spill buckets must be tight and be able to hold the pressure created when the ball float valve engages.

You should not use a ball float valve for overfill protection if any of the following apply:

- **Your UST receives pressurized deliveries.**
- **Your UST system has suction piping.**
- **Your UST system has single point (coaxial) stage 1 vapor recovery.**

✓ Basic O&M Checklist For Ball Float Valves

- ❑ A qualified UST contractor periodically checks to make sure that the ball float valve is functioning properly and that it will restrict fuel flowing into the tank at 90% of the tank capacity or 30 minutes prior to overfilling:
  - Ensure that the air hole is not plugged.
  - Make sure the ball cage is still intact.
  - Ensure the ball still moves freely in the cage.
  - Make sure the ball still seals tightly on the pipe.
- ❑ You have posted signs that the delivery person can easily see and that alert the delivery person to the overfill warning devices and alarms in use at your facility.

✓ Spill And Overfill O&M Checklist	
Spill Bucket	❑ **Keep your spill bucket empty of liquids.** Some spill buckets are equipped with a drainage valve which allows you to drain accumulated fuel into your UST. Others can be equipped with a manual pump so fuel can be put into your UST by pumping it through the fill pipe. However, keep in mind that when you pump out or drain your spill bucket into your UST, any water and debris may also enter the UST. If a spill bucket is not equipped with a drain valve or pump, then any accumulated fuel or water must be removed manually and disposed of properly. ❑ **Periodically check your spill bucket to remove any debris.** Debris could include soil, stones, or trash. ❑ **Periodically check to see if your spill bucket is still liquid tight.** Have a qualified UST contractor inspect your spill bucket for signs of wear, cracks, or holes. Based on this inspection, the contractor may suggest a test to determine if the spill bucket is tight or needs repair or replacement.
Automatic Shutoff Devices	❑ A qualified UST contractor periodically checks to make sure that the automatic shutoff device is functioning properly and that the device will shut off fuel flowing into the tank at 95% of the tank capacity or before the fittings at the top of the tank are exposed to fuel: • Make sure the float operates properly. • Make sure that there are no obstructions in the fill pipe that would keep the floating mechanism from working. ❑ You have posted signs that the delivery person can easily see and that alert the delivery person to the overfill warning devices and alarms in use at your facility.
Overfill Alarms	❑ A qualified UST contractor periodically checks your electronic overfill alarm to make sure that it is functioning properly and that the alarm activates when the fuel reaches 90% of the tank capacity or is within one minute of being overfilled: • Ensure that the alarm can be heard and/or seen from where the tank is fueled. • Make sure that the electronic device and probe are operating properly. ❑ You have posted signs that the delivery person can easily see and that alert the delivery person to the overfill warning devices and alarms in use at your facility.
Ball Float Valves	❑ A qualified UST contractor periodically checks to make sure that the ball float valve is functioning properly and that it will restrict fuel flowing into the tank at 90% of the tank capacity or 30 minutes prior to overfilling: • Ensure that the air hole is not plugged. • Make sure the ball cage is still intact. • Ensure the ball still moves freely in the cage. • Make sure the ball still seals tightly on the pipe. ❑ You have posted signs that the delivery person can easily see and that alert the delivery person to the overfill warning devices and alarms in use at your facility.

What Are Your Responsibilities For Correct Filling Practices?

As an owner or operator you are responsible for ensuring that releases due to spilling or overfilling do not occur during fuel delivery.

As part of this responsibility, you must:

- Ensure the amount of product to be delivered will fit into the available empty space in the tank; and

- Ensure the transfer operation is monitored constantly to prevent overfilling and spilling.

One way help ensure the above requirements are met is to follow the checklist on the next page. The checklist describes activities to perform before, during, and after a fuel delivery.

✓ Correct Filling Checklist

What To Do Before Your USTs Are Filled	❑ Post clear signs that alert delivery persons to the overfill devices and alarms in use at your facility. ❑ Make and record accurate readings for product and water in the tank before fuel delivery. ❑ Order only the quantity of fuel that will fit into 90% of the tank. **Remember, the formula for determining the maximum amount of gasoline to order is:** (Tank capacity in gallons X 90%) — Product currently in tank = Maximum amount of fuel to order **Example:** (10,000 gal X 0.9) — 2,000 gal = 7,000 gal maximum amount to order ❑ Ensure fuel delivery personnel know the type of overfill device present at the tank and what actions to perform if it activates. For example, use sample sign on page 12 of this section. ❑ Review and understand the spill response procedures. ❑ Verify that your spill bucket is empty, clean, and will contain spills.
What To Do While Your USTs Are Being Filled	❑ Keep fill ports locked until the fuel delivery person requests access. ❑ Have an accurate tank capacity chart available for the fuel delivery person. ❑ The fuel delivery person makes all hook-ups. The person responsible for monitoring the delivery should remain attentive and observe the entire fuel delivery, be prepared to stop the flow of fuel from the truck to the UST at any time, and respond to any unusual condition, leak, or spill which may occur during delivery. ❑ Have response supplies readily available for use in case a spill or overfill occurs (see Section 7). ❑ Provide safety barriers around the fueling zone. ❑ Make sure there is adequate lighting around the fueling zone.
What To Do After Your USTs Are Filled	❑ Following complete delivery, the fuel delivery person is responsible for disconnecting all hook-ups. ❑ Return spill response kit and safety barriers to proper storage locations. ❑ Make and record accurate readings for product and water in the tank after fuel delivery. ❑ Verify the amount of fuel received. ❑ Make sure fill ports are properly secured. ❑ Ensure the spill bucket is free of product and clean up any small spills.

Section 5 — Corrosion Protection

Corrosion of metal is essentially the gradual process by which the metal tries to return to its original state (ore). When unprotected steel USTs, piping or other subsurface metal components are exposed to an electrolyte (usually moisture in the soil or backfill), the UST system begins to corrode or give up pieces of itself as the existing electric current in the surroundings passes through and exits the metal. As this happens, the hard metal begins to turn into soft ore, holes form and leaks begin.

To prevent leaks, all parts of your UST system that are underground and routinely contain product need to be protected from corrosion. The UST system includes the tank, piping, and ancillary equipment, such as flexible connectors, fittings, and pumps.

One way to protect UST components from corrosion is to **make them with nonmetallic, noncorrodible materials**, such as USTs made of (or clad or jacketed with) fiberglass reinforced plastic (FRP) or other noncorrodible materials — as illustrated by the FRP tank above. Noncorrodible USTs like these do not require O&M for corrosion protection.

UST components made from metal, however, that routinely contain product and are in direct contact with the ground need corrosion protection provided by cathodic protection or (in some cases) lining the interior of the tank, as described below. These options require O&M.

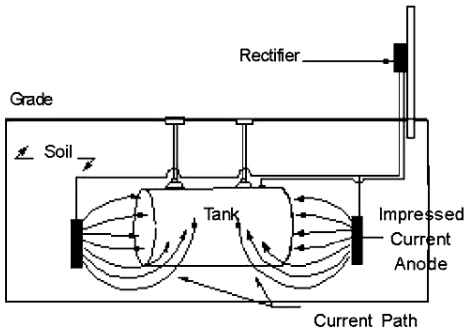
Note: Metal tanks or piping installed after December 22, 1988, must have a dielectric coating (a coating that does not conduct electricity) in addition to the cathodic protection described below.

Cathodic Protection Using Sacrificial Anode Systems

Sacrificial anodes are buried and attached to UST components for corrosion protection — as illustrated on the right by an anode attached to a tank. Anodes are pieces of metal that are more electrically active than steel, and thus they corrode faster than the steel to which they are attached. Zinc and magnesium are two of the most commonly used materials for sacrificial anodes.

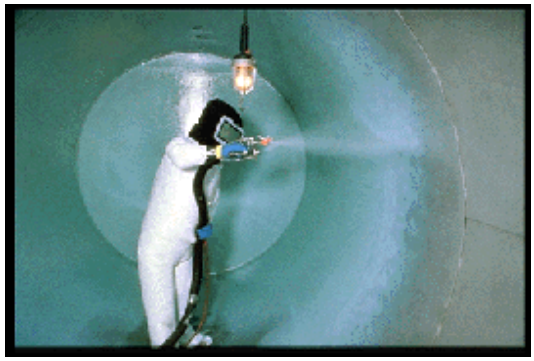
Cathodic Protection Using Impressed Current Systems

An impressed current system — as shown on the right — uses a rectifier to provide direct current through anodes to the tank or piping to achieve corrosion protection. The steel is protected because the current going to the steel overcomes the corrosion-causing current flowing away from it. **The cathodic protection rectifier must always be on and operating to protect your UST system from corrosion.**



Corrosion Protection Using Internal Lining Of The Tank

This corrosion protection upgrade option applied only to "existing" tanks installed before December 22, 1988. These older tanks could be internally lined by licensed professionals to meet the corrosion protection upgrade requirements and deadline of December 22, 1998. Shown on the right is a professional following industry codes to safely and effectively line a tank's interior.



It may help you to see your corrosion protection options displayed in the following table.

Corrosion Protection Choices	
Option	**Description**
Noncorrodible Material	The tank or piping is constructed of noncorrodible material.
Steel Tank Clad Or Jacketed With A Noncorrodible Material	Examples of cladding or jacket material include fiberglass and urethane. Does not apply to piping.
Coated And Cathodically Protected Steel Tanks Or Piping	Steel tank and piping is well-coated with a dielectric material and cathodically protected.
Cathodically Protected Noncoated Steel Tanks Or Piping	*This option is only for steel tanks and piping installed before December 22, 1988.* Cathodic protection is usually provided by an impressed current system.
Internal Lining Of Tanks	*This option is only for steel tanks installed before December 22, 1988.* A lining is applied to the inside of the tank. Does not apply to piping.
Combination Of Cathodically Protected Steel And Internal Lining Of Tanks	*This option is only for steel tanks installed before December 22, 1988.* Cathodic protection is usually provided by an impressed current system. Does not apply to piping.
Other Methods Used To Achieve Corrosion Protection	If you have tanks or piping that do not meet any of the descriptions above, check with the Arkansas Department of Environmental Quality to see if your UST system meets the requirements for corrosion protection. You also will need to ask about the operation, maintenance, and recordkeeping requirements applicable to this type of UST system.

Note: In addition to tanks and piping, all other metal components in direct contact with the ground that routinely hold product — such as flexible connectors, swing joints, fittings, and pumps — must also be cathodically protected.

Use the O&M checklist on the next page
Following the checklist, look for recordkeeping forms and discussions of special corrosion protection situations.

✓ Basic O&M Checklist For Corrosion Protection	
Sacrificial Anode Cathodic Protection Systems	**You need to have a periodic test conducted by a qualified corrosion tester to make sure your cathodic protection system is adequately protecting your UST system. This test needs to be conducted:** ❑ Within 6 months of installation. ❑ At least every 3 years after the previous test. ❑ Within 6 months after any repairs to your UST system. • Make sure the professional tester is qualified to perform the test and follows a standard code of practice to determine that test criteria are adequate. • If any test indicates your tanks are not adequately protected, you need to have a corrosion expert examine and fix your system. • Testing more frequently can catch problems before they become big problems. ❑ **You need to keep the results of at least the last two tests on file.** See page 23 for a cathodic protection test record keeping form.
Impressed Current Cathodic Protection Systems	**You need to have a periodic test conducted by a qualified corrosion tester to make sure your cathodic protection system is adequately protecting your UST system. This test needs to be conducted:** ❑ Within 6 months of installation. ❑ At least every 3 years after the previous test. ❑ Within 6 months after any repairs to your UST system. • Make sure the professional tester is qualified to perform the test and follows a standard code of practice to determine that test criteria are adequate. • If any test indicates your tanks are not adequately protected, you need to have a corrosion expert examine and fix your system. • Testing more frequently can catch problems before they become big problems. ❑ **You need to keep the results of at least the last two tests on file.** See page 23 for a cathodic protection test record keeping form. ❑ **You need to inspect your rectifier at least every 60 days to make sure that it is operating within normal limits.** • This inspection involves reading and recording the voltage and amperage readouts on the rectifier. You or your employees can perform this periodic inspection. • Make sure your cathodic protection professional provides you with the rectifier's acceptable operating levels so you can compare the readings you take with an acceptable operating level. If your readings are not within acceptable levels, you must contact a cathodic protection professional to address the problem. ❑ **You need to keep records of at least the last 3 rectifier readings.** See page 25 for a 60-Day Inspection Results record keeping form. ❑ **You should have a trained professional periodically service your impressed current system.** ❑ **Never turn off your rectifier!**
Internally Lined Tanks	❑ Within 10 years after lining and at least every 5 years thereafter, the lined tank must be inspected by a trained professional and found to be structurally sound with the lining still performing according to original design specifications. Make sure the professional performing the inspection follows a standard code of practice. ❑ **Keep records of the inspection (as specified in industry standards for lining inspections).**

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Record For Periodic Testing Of Cathodic Protection Systems

(for use by a qualified cathodic protection tester)

Test Date:____/____/____ Facility Name/ID:_____

Note: Provide site sketch as directed on the back of this page.

Cathodic Protection (CP) Tester Information:

Name: _____ Phone Number:_____

Address: _____

Testing must be conducted by a qualified CP tester. Indicate your qualifications as a CP tester:

Identify which of the following testing situations applies:

- ❑ Test required within 6 months of installation of CP system (installation date was __/__/__)
- ❑ Test required at least every 3 years after installation test noted above
- ❑ Test required within 6 months of any repair activity – note repair activity and date below:

Indicate which industry standard you used to determine that the cathodic protection test criteria are adequate: _____

Cathodic Protection Test Method Used (check one)	
	100 mV Cathodic Polarization Test
	-850 mV Test (Circle 1 or 2 below) 1) Polarized Potential (instant off) 2) Potential with CP Applied, IR Drop Considered **Note: All readings taken must meet the -850 mV criteria to pass**
	Other Accepted Method (please describe):

Is the cathodic protection system working properly? Yes No (circle one)

If answer is no, go to the directions at the bottom on the next page.

My signature below affirms that I have sufficient education and experience to be a cathodic protection tester; I am competent to perform the tests indicated above; and that the results on this form are a complete and truthful record of all testing at this location on the date shown.

CP Tester Signature**:** _____ Date:_____

Keep This Paper On File For At Least Six Years

Site Sketch: Provide a rough sketch of the tanks and piping, the location of each CP test, and each voltage value obtained (use space below or attach separate drawing). Voltage readings through concrete or asphalt do not provide accurate readings and are not acceptable. Perform sufficient testing to evaluate the entire UST system.

If CP system fails test, you must have a corrosion expert fix the system.

If the answer was no, indicating that your CP system is not working, you must have a ***corrosion expert*** investigate and fix the problem. A corrosion expert has additional training, skills, and certification beyond the corrosion tester who filled out the bulk of this form. A corrosion expert must be:

- Accredited/certified by NACE International (The Corrosion Society) as a corrosion specialist or cathodic protection specialist, or
- Be a registered professional engineer with certification or licensing in corrosion control.

As long as you have the UST, be sure you keep a record that clearly documents what the corrosion expert did to fix your CP system.

Keep This Paper On File For At Least Six Years

60-Day Inspection Results For Impressed Current Cathodic Protection Systems

Facility Name:_____

Amp Range Recommended:_____

Voltage Range Recommended:_____

Date	Your Name	Voltage Reading	Amp Reading	Is Your System Running Properly? (Yes/No)

- **If the rectifier voltage and/or amperage output(s) are outside the recommended operating levels, contact a cathodic protection expert to address the problem.**
- **Never turn off your rectifier.**
- **Keep this record for at least 6 months after the date of the last reading.**

Some Special Corrosion Protection Situations

What If You Have An STI-P3 Tank With A PP4 Test Station?

If you have a PP4 test station installed with an STI-P3 tank, you may perform the periodic testing of your cathodic protection system by using the meter provided to you with the PP4 test station.

- Don't forget to record the result of the reading and keep at least the last two results.

- If your test readings do not pass, you must take action to correct the problem. Call your installer and ask that the corrosion expert who designed the system examine it and correct the problem.

What If You Combine Internal Lining And Cathodic Protection?

If you chose the combination of internal lining and cathodic protection for meeting corrosion protection requirements on your UST, you may not have to meet the periodic inspection requirement for the lined tank. However, you must always meet the requirements for checking and testing your cathodic protection system as described in the basic O&M checklist for corrosion protection on page 21. The 10-year and subsequent 5-year inspections of the lined tank are not required if the integrity of the tank was ensured when cathodic protection was added. You should be able to show an inspector documentation of the passed integrity assessment.

Example 1:
If you have cathodic protection and internal lining applied to your tank at the same time, periodic inspections of the lined tank **are not** required because an integrity assessment of the tank is required prior to adding the cathodic protection and internal lining.

Example 2:
If you had cathodic protection added to a tank in 1997 that was internally lined in 1994 and the contractor did not perform an integrity assessment of the tank at the time cathodic protection was added (or you cannot show an inspector documentation of the passed integrity assessment), then periodic inspections of the lined tank **are** required because you cannot prove that the tank was structurally sound and free of corrosion holes when the cathodic protection was added. The lined tank needs to be periodically inspected because the lining may be the only barrier between your gasoline and the surrounding environment.

What If You Have A Double-Walled Steel UST With Interstitial Monitoring And Cathodic Protection?

If you have a cathodically protected double-walled steel tank and you use interstitial monitoring capable of detecting a breach in both the inner and outer wall or ingress of product and water as your method of leak detection, then you should monitor your cathodic protection system within six months of installation and following any activity that could affect the CP system.

If you are using impressed current cathodic protection, you still need to perform the 60-day checks of your rectifier to make sure it is operating within normal limits.

- Testing the cathodic protection system frequently may help catch problems quicker.

- If your test readings do not pass, you must take action to correct the problem. Call your installer and ask that the corrosion expert who designed the system examine it and correct the problem.

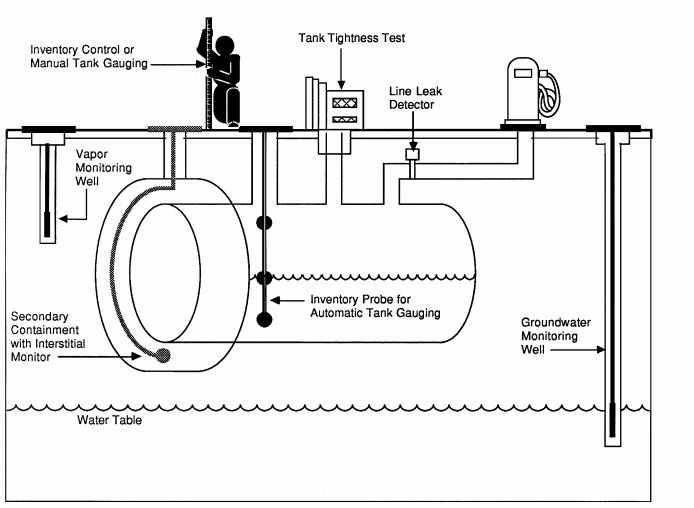
- Don't forget to keep at least the last two results of your cathodic protection testing.

Do All UST Sites Need Corrosion Protection?

A corrosion expert may be able to determine the soil at an UST site is not conducive to corrosion and will not cause the tank or piping to have a release during its operating life. If so, you must keep a record of that corrosion expert's analysis for the life of the tank or piping to demonstrate why your UST has no corrosion protection.

Section 6 — Release Detection

What Is Release Detection?



Release detection means determining whether a release of a regulated substance has occurred from the UST system into the environment or into the interstitial space between the UST system and its secondary barrier or secondary containment around it.

You must be able to determine at least every 30 days whether or not your tank and piping are leaking by using approved release detection methods.

Your release detection method must be able to detect a release from any portion of the tank and connected underground piping that routinely contains product.

Release detection must be installed, calibrated, operated, and maintained according to the manufacturer's instructions.

Do You Know If Your Release Detection Method Is Certified To Work At Your UST Site?

Release detection must meet specific performance requirements. You should have documentation from the manufacturer, vendor, or installer of your release detection equipment showing certification that it can meet performance requirements.

Some vendors or manufacturers supply their own certification, but more often an impartial "third party" is paid to test the release detection equipment and certify that performance requirements are met. An independent workgroup of release detection experts periodically evaluates all third-party certifications, thus providing a free and reliable list of evaluations of third-party certifications for various release detection equipment. Frequently updated, this list is available on the Internet at **http://www.nwglde.org/**. (The publication's title is ***List Of Leak Detection Evaluations For Underground Storage Tank Systems.***) If you can't find the certification anywhere, contact ADEQ (see Section 11 for contact information).

By checking the certification, you may discover the method you use has not been approved for use with the type of tank or piping you have or the type of product being stored. For example, you may learn from the certification that your method won't work with manifolded tanks, certain products, high throughput, or with certain tank sizes.

That's why you need to make sure your release detection method has clear certification that it will work effectively at your site with its specific characteristics.

How Can You Make Sure Your Release Detection Method Is Working At Your UST Site?

If you don't understand your O&M responsibilities and don't know what O&M tasks you must routinely perform, you may allow your UST site to become contaminated — then you will face cleanup costs and associated problems.

To avoid these problems, use the checklists on the following pages that describe each type of leak detection method, discuss actions necessary for proper O&M, and note the records you should keep.

Locate the methods of release detection you are using at your facility, review these pages, and periodically complete the checklist. You might want to copy a page first and periodically fill out copies later.

If you have questions about your release detection system, review your owner's manual or call the vendor of your system. ADEQ will be able to provide assistance as well.

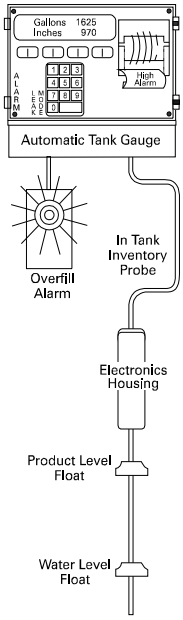
You will find leak detection recordkeeping forms in the following pages of this section. Keeping these records increases the likelihood that you are conducting good O&M and providing effective release detection at your UST site.

If you ever suspect or confirm a leak, contact ADEQ within 24 hours!

<u>Never</u> ignore leak detection alarms or failed leak detection tests. Treat them as potential leaks!

Automatic Tank Gauging Systems

Will you be in compliance?



When installed and operated according to the manufacturer's specifications, automatic tank gauging (ATG) systems meet the federal leak detection requirements for ***tanks*** and/or piping (depending upon your piping system). A test performed each month fulfills the requirements for the life of the tank. (For additional requirements for piping, see the section on leak detection for piping starting on page 59.)

How does the leak detection method work?

- The product level and temperature in a tank are measured continuously and automatically analyzed and recorded by a computer.
- In the inventory mode, the ATG system replaces the use of the gauge stick to measure product level and perform inventory control. This mode records the activities of an in-service tank, including deliveries.
- In the test mode, the tank is taken out of service and the product level and temperature are measured for at least one hour. Some systems, known as continuous ATGs, do not require the tank to be taken out of service to perform a test. This is because these systems can gather and analyze data during many short periods when no product is being added to or taken from the tank.
- Some ATG systems can meet the requirements for monthly monitoring for piping or a line tightness test if equipped with an electronic line leak detection interface with the ATG system. It must be capable of detecting a 3 gallon per hour leak rate.
- Some methods combine aspects of automatic tank gauges with statistical inventory reconciliation.

Continuous In-Tank Leak Detection Systems

Continuous In-Tank Leak Detection System (CITLDS) is a volumetric leak detection method that does not require an extended shutdown period in order to conduct a leak test. The system gathers pieces of data from all designated input devices during tank “quiet” time and then performs the leak test calculations when enough data have been recorded. The term continuous, in this situation, implies that data are collected on a regular basis and when available. Most CITLDS methods employ the use of an Automatic Tank Gauge (ATG) to gather product level and some use additional information from input devices such as dispenser totalizers and point-of-sale records.

CITLDS are well suited to facilities that are continuously open for business 24 hours a day, seven days a week, as long as the volume of product sold from the storage system does not exceed the throughput limit of the CITLDS method. There must be sufficient data collected in order to perform the leak test calculations. For example, if there is not enough “quiet time”, then not enough data will have been collected to complete a test. If enough suitable data have not been collected during the month to perform a leak test, the tank system must be shut down and a “static” test must be performed.

What are the regulatory requirements?

- The ATG system must be able to detect a leak of 0.2 gallons per hour with certain probabilities of detection and of false alarm if used as your monthly monitoring method.

- Some ATG systems can also detect a leak of 0.1 gallons per hour with the required probabilities. This type of system must be used if the ATG is being used in lieu of tank tightness testing.

Will it work at your site?

- ATG systems have been used primarily on small to large capacity tanks containing gasoline or diesel. Some ATG systems have been evaluated for use on very large tank capacities of up to 75,000 gallons. If considering using an ATG system for products other than gasoline or diesel, discuss its applicability with the manufacturer's representative. Check the method's evaluation to confirm that it will meet regulatory requirements and your needs.

- Water around a tank may hide a leak by temporarily preventing the product from leaving the tank. To detect a leak in this situation, the ATG should be capable of detecting water in the bottom of a tank.

Anything else you should consider?

- The ATG probe is permanently installed through an opening (not the fill pipe) on the top of the tank.

- With the exception of some continuous ATG systems evaluated to perform on manifolded tanks, each tank at a site must be equipped with a separate probe. Check the method's evaluation to determine if the ATG system can be used with manifolded tanks.

- The ATG probe is connected to a console that displays ongoing product level information and the results of the monthly test. Printers can be connected to the console to record this information.

- ATG systems are often equipped with alarms for high and low product level, high water level, and theft.

- ATG systems can be linked with computers at other locations, from which the system can be programmed or read.

- For ATG systems that are not of the continuous type, no product should be delivered to the tank or withdrawn from it for at least the time specified by the manufacturer's specifications.

- An ATG system can be programmed to perform a test more often than once per month (a recommended practice).

- Some ATG systems may be evaluated to test at relatively low capacities (in accordance to manufacturer's recommended practice). Although the product level at such capacities may be valid for the test equipment, it may not appropriately test all portions of the tank that routinely contain product. The ATG system test needs to be run to test the tank at the capacity to which it is routinely filled.

Automatic Tank Gauging (ATG) Systems (for tanks only)	
Description Of Release Detection	**An automatic tank gauging (ATG) system consists of a probe permanently installed in a tank and wired to a monitor to provide information on product level and temperature. ATG systems automatically calculate the changes in product volume that can indicate a leaking tank.**
Have Certification For Your Release Detection Method	❑ **Make sure your ATG system is certified for the types of tanks and stored contents on which the ATG system is used.** Most manufacturers have their leak detection devices tested and certified by a third party to verify that their equipment meets specific performance requirements set by regulatory agencies. If you don't have certified performance claims, have the manufacturer provide them to you.
Perform These O&M Actions	❑ **Use your ATG system to test for leaks at least every 30 days.** Most systems are already programmed by the installer to run a leak test periodically. If your system is not programmed to automatically conduct the leak test, refer to your ATG system manual to identify which buttons to push to conduct the leak test. Testing more often than monthly can catch leaks sooner and reduce cleanup costs and problems. ❑ **Make sure that the amount of product in your tank is sufficient to run the ATG leak test.** The tank must contain a minimum amount of product to perform a valid leak detection test. One source for determining that minimum amount is the certification for your leak detection equipment (as discussed above). ❑ **Frequently test your ATG system according to the manufacturer's instructions to make sure it is working properly.** Don't assume that your release detection system is working and never needs checking. Read your owner's manual, run the appropriate tests, and see if your ATG system is set up and working properly. Most ATG systems have a test or self-diagnosis mode that can easily and routinely run these checks. ❑ **If your ATG ever fails a test or indicates a release, see Section 7 of this booklet for information on what to do next.** ❑ **Periodically have a qualified UST contractor, such as the vendor who installed your ATG, service all the ATG system components according to the manufacturer's service instructions.** Tank probes and other components can wear out and must be checked periodically. Many vendors recommend or require this maintenance activity at least annually. ❑ **Check your ATG system owner's manual often to answer questions and to make sure you know the ATG system's operation and maintenance procedures.** Call the ATG manufacturer or vendor for a copy of the owner's manual if you don't have one. ❑ **Make sure employees who run, monitor, or maintain the release detection system know exactly what they have to do and to whom to report problems.** Develop and maintain regular training programs for all employees.
Keep These O&M Records	❑ **Keep results of your ATG system tests for at least 1 year.** Your monitoring equipment may provide printouts that can be used as records. Unless you are recording actual release detection results at least every 30 days and maintaining records for at least 1 year, you are not doing leak detection right. ❑ **Keep all records of calibration, maintenance, and repair of your release detection equipment for at least 1 year.** ❑ **Keep all performance claims supplied by the installer, vendor, or manufacturer for at least 5 years.** These records include the certification of your leak detection equipment described above.

Secondary Containment With Interstitial Monitoring

What is Secondary Containment with Interstitial Monitoring?

Secondary containment with interstitial monitoring as an UST release detection method for regulated storage tanks/piping involves a barrier outside the primary tank/piping with a release detection device between the inner and outer barriers. The space between the barriers is called the interstitial space (or interstice).

How does the leak detection method work?

Secondary containment:

- Secondary containment provides a barrier between the tank/piping and the environment. The barrier holds the release between the tank/piping and the barrier so that the leak is detected. The barrier is shaped so that a release will be directed towards the interstitial monitor.

- Barriers include:

    - Double-walled or jacketed tanks, in which the outer wall partially or completely surrounds the primary tank/piping
    - Internally fitted liners (i.e., bladders)
    - Leak-proof excavation liners that partially or completely surround the tank/piping

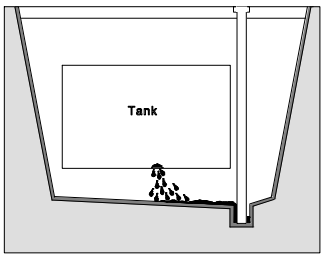
- Clay and other earthen materials cannot be used as barriers.

Interstitial monitors

- Monitors are used to check the area between the tank/piping and the barrier for releases and alert the operator if a release is suspected.

- Some monitors indicate the physical presence of the released product, either liquid or gaseous. Other monitors check for a change in conditions that indicates a hole in the tank or piping (such as a loss of vacuum or pressure) or a change in the level of monitoring liquid (such as brine or glycol solution) between the walls of a double-walled tank/piping.

- Monitors can be as simple as a dipstick used in the tank to measure at the lowest point of the containment to see if liquid product has pooled there. Monitors can also be sophisticated automated systems that continuously check for releases.



Will you be in compliance?

When installed and operated according to the manufacturer's specifications, secondary containment with interstitial monitoring meets the federal leak detection requirements for USTs. Operation of the monitoring device at least once each month fulfills the requirements for the life of the tank. Secondary containment with interstitial monitoring can also be used to detect leaks from piping (see the section on leak detection for piping starting on page 59).

Beginning July 1, 2007, each new UST system installed within 1,000 ft. of any existing community water system or any existing potable drinking water well must meet the following requirements:

- Each new UST and piping connected to any new UST must be secondarily contained and interstitially monitored for releases.
- Any UST piping that is to be replaced must be secondarily contained and interstitially monitored for releases. To “replace” means to remove and put back more than five feet (5’) of piping associated with a single UST. This applies only to the piping that is replaced, not to all the piping that comprises the system.
- The under-dispenser spill containment must be liquid tight on its sides, bottom, and at any penetrations, compatible with the substance conveyed by the piping, and allow for visual inspection and access to its components and/or be monitored.

The secondary containment system should be designed, constructed and installed to:

- Prevent a product release to the environment
- Contain regulated substances released until detected and removed
- Be checked for evidence of a release at least every 30 days

An excavation liner must:

< Direct a leak towards the monitoring point

< Be compatible with the product stored in the tank

< Not interfere with operation of the UST's cathodic protection system (if present)

< Not be disabled by moisture; (i.e., groundwater, soil moisture or rainfall will not render the testing or sampling method used inoperative so that a release could go undetected for more than 30 days.)

< Have clearly marked and secured monitoring wells

A bladder must be compatible with the product stored and must be equipped with an automatic monitoring device.

Will it work at your site?

- **In areas with high groundwater or a lot of rainfall, it may be necessary to select a secondary containment system that completely surrounds the tank to prevent moisture from interfering with the monitor.**

Anything else you should consider?

- This method works effectively only if the barrier and the interstitial monitor are installed correctly. Therefore, trained and experienced installers are necessary.

- An ADEQ-licensed UST contractor must be used for any UST system work.

Secondary Containment With Interstitial Monitoring (for tanks & piping)	
Description Of Release Detection	**Secondary containment is a barrier between the portion of an UST system that contains product and the outside environment. Examples of secondary containment include double walled tanks or piping, excavation liners, and a bladder inside an UST. The area between the inner and outer barriers — called the interstitial space — is monitored manually or automatically for evidence of a leak.**
Have Certification For Your Release Detection Method	❑ **Make sure your interstitial monitoring equipment and any probes are certified for the types of tanks, piping, and stored contents on which the release detection system is used.** Most manufacturers have their leak detection devices tested and certified by a third party to verify that their equipment meets specific performance requirements set by regulatory agencies. If you don't have certified performance claims, have the manufacturer provide them to you.
Perform These O&M Actions	❑ **Use your release detection system to test for leaks at least every 30 days.** Testing more often than monthly can catch leaks sooner and reduce cleanup costs and problems. ❑ **Frequently test your release detection system according to the manufacturer's instructions to make sure it is working properly.** Don't assume that your release detection system is working and never needs checking. Read your owner's manual, run the appropriate tests, and see if your system is set up and working properly. Some interstitial monitoring systems have a test or self-diagnosis mode that can easily and routinely run these checks. ❑ **If your interstitial monitoring ever fails a test or indicates a release, see Section 7 of this booklet for information on what to do next.** ❑ **Periodically have a qualified UST contractor, such as the vendor who installed your release detection system, service all the system components according to the manufacturer's service instructions.** Tank probes and other components can wear out and must be checked periodically. Many vendors recommend or require this maintenance activity at least annually. ❑ **Keep interstitial monitoring access ports clearly marked and secured.** ❑ **Check your interstitial monitoring system owner's manual often to answer questions and to make sure you know the system's O&M procedures.** Call the system's vendor or manufacturer for a copy of the owner's manual if you don't have one. ❑ **Make sure employees who run, monitor, or maintain the release detection system know exactly what they have to do and to whom to report problems.** Develop and maintain regular training programs for all employees.
Keep These O&M Records	❑ **Keep results of your release detection system tests for at least 1 year.** Your monitoring equipment may provide printouts that can be used as records. Unless you are recording actual release detection results at least every 30 days and maintaining records for at least 1 year, you are not doing leak detection right. ❑ **Keep all records of calibration, maintenance, and repair of your release detection equipment for at least 1 year.** ❑ **Keep all performance claims supplied by the installer, vendor, or manufacturer for at least 5 years.** These records include the certification of your leak detection equipment described above.

Statistical Inventory Reconciliation

What is SIR?

SIR is a method of release detection where computer software is used to conduct a statistical analysis of inventory, delivery, and dispensing data every 30 days. A measuring stick or an ATG is commonly used to gather the inventory data. Depending on the vendor, you may either need to send your data to the vendor and receive a report or enter the data into a computer program that provides you with the results. The results may be a pass, inconclusive or a fail.

Will you be in compliance?

SIR, when performed according to the vendor's specifications, meets federal leak detection requirements for USTs as follows. SIR with a 0.2 gallon per hour leak detection capability meets the federal requirements for monthly monitoring for the life of the tank and piping. SIR with a 0.1 gallon per hour leak detection capability meets the federal requirements as an equivalent to tank tightness testing. SIR can, if it has the capability of detecting even smaller leaks, meet the federal requirements for line tightness testing as well. (For additional requirements for piping, see the section on leak detection for piping starting on page 59.)

How does the leak detection method work?

- SIR analyzes inventory, delivery, and dispensing data collected over a period of time to determine whether or not a tank system is leaking.
- Each operating day, the product level is measured using a gauge stick or other tank level monitor. You also keep complete records of all withdrawals from the UST and all deliveries to the UST. After data has been collected for the period of time required by the SIR vendor, you provide the data to the SIR vendor.
- The SIR vendor uses sophisticated computer software to conduct a statistical analysis of the data to determine whether or not your UST system may be leaking. The SIR vendor provides you with a test report of the analysis. Also, you can purchase SIR software which performs this same analysis and provides a test report from your own computer.
- Some methods combine aspects of automatic tank gauges with statistical inventory reconciliation. In these methods, sometimes called hybrid methods, a gauge provides liquid level and temperature data to a computer running SIR software, which performs the analysis to detect leaks.

What are the regulatory requirements?

- To be allowable as monthly monitoring, a SIR method must be able to detect a leak at least as small as 0.2 gallons per hour and meet the federal regulatory requirements regarding probabilities of detection and of false alarm. Data must be submitted at least monthly.
- To be allowable as an equivalent to tank tightness testing, a SIR method must be able to detect a leak at least as small as 0.1 gallons per hour and meet the federal regulatory requirements regarding probabilities of detection and of false alarm.

- The individual SIR method must have been evaluated with a test procedure to certify that it can detect leaks at the required level and with the appropriate probabilities of detection and of false alarm.

- The method's evaluation must reflect the way the method is used in the field. If a SIR method is not performed by the SIR vendor, then the method's evaluation must be done without the involvement of the SIR vendor. Examples of this situation are SIR methods licensed to owners and hybrid ATG /SIR methods.

- If the test report is inconclusive, you must investigate to determine why the report recorded was inconclusive. If the inconclusive result is not resolved through investigation, you must report it to ADEQ as a suspected release and take the steps necessary to find out whether or not your tank is leaking.

- An inconclusive result means you effectively have no release detection for the month.

- You must keep on file both the test reports and the documentation that the SIR method used is certified as valid for your UST system.

Will it work at your site?

- Some SIR methods have been evaluated for use on tanks from very small to very large in capacity. If you are considering using a SIR method, check the method's evaluation to confirm that it will meet regulatory requirements and your specific UST system needs.

- A SIR method's ability to detect leaks declines as throughput increases. If you are considering using a SIR method for high throughput UST systems, check the method's evaluation to confirm that it will meet regulatory requirements and your needs.

- Water around a tank may hide a hole in the tank or distort the data to be analyzed by temporarily preventing a leak. To detect a leak in this situation, you should check for water at least once a month.

Anything else you should consider?

- Data, including product level measurements, dispensing data, and delivery data, should all be carefully collected according to the SIR vendor's specifications. Poor data collection produces inconclusive results and noncompliance.

- The SIR vendor will generally provide forms for recording data, a calibrated chart converting liquid level to volume, and detailed instructions on conducting measurements.

- SIR should not be confused with other release detection methods that also rely on periodic reconciliation of inventory, withdrawal, and delivery data. Unlike manual tank gauging or inventory control, SIR uses a sophisticated statistical analysis of data to detect releases.

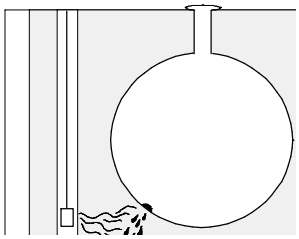
Statistical Inventory Reconciliation (SIR) (for tanks & piping)	
Description Of Release Detection	**SIR is typically a method in which a trained professional uses sophisticated computer software to conduct a statistical analysis of inventory, delivery, and dispensing data. You must supply the professional with data every month. There are also computer programs that enable an owner/operator to perform SIR. In either case, the result of the analysis may be pass, inconclusive, or fail.**
Have Certification For Your Release Detection Method	❑ **Make sure your SIR vendor's methodology is certified for the types of tanks, piping, and product on which you use SIR.** Most vendors have their leak detection methodology tested and certified by a third party to verify that their equipment meets specific performance requirements set by regulatory agencies. If you don't have certified performance claims, have the vendor provide them to you**.**
Perform These O&M Actions	❑ **Supply daily inventory data to your SIR vendor (as required) at least every 30 days.** The vendor will provide you with your leak detection results after the statistical analysis is completed. Otherwise, use your computer software at least every 30 days to test your tank for leaks. ❑ **See Section 7 of this manual if your UST system fails a leak test.** ❑ **If you receive an inconclusive result, you must work with your SIR vendor to correct the problem and document the results of the investigation.** An inconclusive result means that you have not performed leak detection for that month. If you cannot resolve the problem, treat the inconclusive result as a suspected release and refer to Section 7. ❑ **If you use an ATG system to gather data for the SIR vendor or your software, periodically have a qualified UST contractor, such as the vendor who installed your ATG, service all the ATG system components according to the manufacturer's service instructions.** Tank probes and other components can wear out and must be checked periodically. Many vendors recommend or require this maintenance activity at least annually. Do this according to manufacturer's instructions. See the checklist for ATG systems on page 33. ❑ **If you stick your tank to gather data for the SIR vendor or your software, make sure your stick can measure to one-eighth of an inch and can measure the level of product over the full range of the tank's height.** You should check your measuring stick periodically to make sure you can read the markings and numbers and that the bottom of the stick is not worn. ❑ **Make sure employees who run, monitor, or maintain the release detection system know exactly what they have to do and to whom to report problems.** Develop and maintain regular training programs for all employees.
Keep These O&M Records	❑ **Keep results of your SIR tests for at least 1 year.** Unless you are keeping records of the 30-day release detection results and maintaining those records for at least 1 year, you are not doing leak detection right. ❑ **Keep all vendor performance claims for at least 5 years.** This includes the certification of the SIR method discussed above. ❑ **If you use an ATG system, keep all records of calibration, maintenance, and repair of your release detection equipment for at least 1 year.** ❑ **Keep the records of investigations conducted as a result of any monthly monitoring conclusion of inconclusive or fail for at least 1 year.** This may include the results of a tightness test performed during the investigation or a re-evaluation based on corrected delivery or dispenser data.

Vapor Monitoring

What is Vapor Monitoring?

Vapor monitoring senses or measures fumes from leaked product in the soil around the tank to determine if the tank is leaking. It requires the installation of monitoring wells/sampling points within the tank backfill and/or along pipe runs.

Will you be in compliance?



When installed and operated properly, vapor monitoring meets the federal leak detection requirements for USTs. Vapor monitoring denotes sampling for petroleum hydrocarbons (e.g., gasoline) that are sufficiently volatile to be picked up in the monitoring well/sampling point. However, the federal regulations also recognize sampling for tracer compounds introduced in the UST system. Operation of a vapor monitoring system at least once each month fulfills the requirements for the life of the tank. Vapor monitoring can also be installed to detect leaks from piping (see the section on leak detection for piping starting on page 59).

How does the leak detection method work?

- Tracer compound analysis is used to sample for the presence of a tracer compound outside the UST system that was introduced in the tank or underground piping.
- Fully automated vapor monitoring systems have permanently installed equipment to continuously or periodically gather and analyze vapor samples and respond to a release with a visual or audible alarm.
- Tracer compound analysis requires the installation of monitoring wells/sampling points strategically placed in the tank backfill or along pipe runs to intercept special chemicals that, in the event of a leak, are picked up in the sampling points.
- Manually operated vapor monitoring systems range from equipment that immediately analyzes a gathered vapor sample to devices that gather a sample that must be sent to a laboratory for analysis. Manual systems must be used at least once a month to monitor a site. Tracer compound analysis may be performed on a monthly or less frequent basis by qualified technicians.
- All vapor monitoring devices should be periodically calibrated to ensure that they are properly responding.
- Before installation of a vapor monitoring system for release detection, a site assessment is necessary to determine the soil type, groundwater depth and flow direction, and the general geology of the site. This can only be done by a trained professional.
- The number of wells and their placement is very important. Only an experienced, ADEQ-licensed UST contractor can properly design, construct and install an effective monitoring well system. Vapor monitoring requires the installation of monitoring wells within the tank backfill. Determining the adequate number and placement of wells should be done in accordance with ADEQ's Guidelines for Vapor Monitoring. (See Section 11.)

What are the regulatory requirements?

- The UST backfill must be sand, gravel or another material that will allow the petroleum vapors or tracer compound to easily move to the monitor.
- The backfill should be clean enough that previous contamination does not interfere with the detection of a current leak.
- The substance stored in the UST must vaporize easily so that the vapor monitor can detect a release. Some vapor monitoring systems do not work well with diesel fuel.
- High groundwater, excessive rain, or other sources of moisture must not interfere with the operation of vapor monitoring for more than 30 consecutive days.
- Monitoring wells must be secured and clearly marked.
- If a monthly vapor reading is significantly greater than a previous month's reading, you must report it to ADEQ as a suspected release and investigate. (See Section 7.)

Will it work at your site?

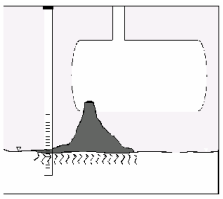
- Before installing a vapor monitoring system, a site assessment must be done to determine whether vapor monitoring is appropriate at the site. A site assessment usually includes at least a determination of the groundwater level, background contamination, stored product type, and soil type. This assessment can only be done by a trained professional.

Vapor Monitoring (for tanks & piping)	
Description Of Release Detection	**Vapor monitoring measures product vapors in the soil at the UST site to check for a leak. A site assessment must determine the number and placement of monitoring wells that make sure a release is detected. NOTE: vapor monitors will not work well with substances that do not easily vaporize (such as diesel fuel).**
Have Certification For Your Release Detection Method	❑ **Make sure your vapor monitoring equipment is certified for the types of stored contents on which the release detection system is used.** Most manufacturers have their leak detection devices tested and certified by a third party to verify that their equipment meets specific performance requirements set by regulatory agencies. If you don't have certified performance claims, have the manufacturer provide them to you.
Perform These O&M Actions	❑ **Use your release detection system to test for leaks at least every 30 days.** Testing more often than monthly can catch leaks sooner and reduce cleanup costs and problems. **Be sure you check all of your vapor monitoring wells.** ❑ **See Section 7 of this manual if your UST system fails a leak test.** ❑ **Frequently test your release detection system according to the manufacturer's instructions to make sure it is working properly.** Don't assume that your release detection system is working and never needs checking. Some electronic vapor monitoring systems have a test or self-diagnosis mode. If you have components (such as monitoring equipment, probes or sensors) for your vapor monitoring system, read your manual and test your equipment to see if it is working properly. ❑ **Periodically have a qualified UST contractor, such as the vendor who installed your release detection system, service all the system components according to the manufacturer's service instructions.** Probes and other components can wear out and must be checked periodically. Many vendors recommend or require this maintenance activity at least annually. ❑ **Keep your vapor monitoring wells clearly marked and secured.** ❑ **Check your vapor monitoring system owner's manual often to answer questions and to make sure you know the system's operation and maintenance procedures.** Call the system's vendor or manufacturer for a copy of the owner's manual if you don't have one. ❑ **Make sure employees who run, monitor, or maintain the release detection system know exactly what they have to do and to whom to report problems.** Develop and maintain regular training programs for all employees.
Keep These O&M Records	❑ **Keep results of your release detection system tests for at least 1 year.** Your monitoring equipment may provide printouts that can be used as records. Unless you are recording actual release detection results at least every 30 days and maintaining records for at least 1 year, you are not doing leak detection right. ❑ **Keep all records of calibration, maintenance, and repair of your release detection equipment for at least 1 year.** ❑ **Keep all performance claims supplied by the installer, vendor, or manufacturer for at least 5 years.** These records include the certification of your leak detection equipment described above.

Groundwater Monitoring

What is Groundwater Monitoring?

The application of groundwater monitoring as an UST release detection method involves the use of one or more permanent observation wells that are placed close to the tank and are checked periodically for the presence of free product on the water table surface.



Will you be in compliance?

When installed and operated properly, a groundwater monitoring system meets the federal leak detection requirements for USTs. Operation of a groundwater monitoring system at least once each month fulfills the requirements for the life of a tank. Groundwater monitoring can also be used to detect leaks in piping (see the section on leak detection for piping starting on page 61).

How does the leak detection method work?

- Groundwater monitoring involves the use of permanent monitoring wells placed close to the UST. The wells are checked at least monthly for the presence of product that has leaked from the UST and is floating on the groundwater surface.
- The two main components of a groundwater monitoring system are the monitoring well (typically, a well of 2-4 inches in diameter) and the monitoring device.
- Detection devices may be permanently installed in the well for automatic, continuous measurements for leaked product.

Note: Groundwater monitoring cannot be used at sites where groundwater is more than 20 feet below the surface.

- Detection devices are also available in manual form. Manual devices range from a bailer (used to collect a liquid sample for visual inspection) to a device that can be inserted into the well to electronically indicate the presence of leaked product. Manual devices must be used at least once a month.
- Before installation, a site assessment is necessary to determine the soil type, groundwater depth and flow direction, and the general geology of the site. This assessment can only be done by a trained professional.
- The number of wells and their placement is very important. Only an experienced contractor can properly design and construct an effective monitoring well system. Groundwater monitoring requires the installation of monitoring wells within the tank backfill. Determining the adequate number and placement of wells should be done in accordance with ADEQ Guidelines for Vapor Monitoring. (See section 11.)

What are the regulatory requirements?

- Groundwater monitoring can only be used if the stored substance does not easily mix with water and floats on top of water.

- If groundwater monitoring is to be the sole method of leak detection, the groundwater must not be more than 20 feet below the surface, and the soil between the well and the UST must be sand, gravel or other coarse materials.

- Product detection devices must be able to detect one-eighth inch or less of leaked product on top of the groundwater.

- Monitoring wells must be designed to detect releases (slotted properly, etc.) within the tank pit or piping trench, and be sealed to keep them from becoming contaminated from outside sources. The wells must also be clearly marked and secured.

- Wells should be placed in the UST backfill so that they can detect a leak as quickly as possible.

- If one-eighth inch or more of product is detected on the water's surface, it must be reported to ADEQ as a suspected release and investigated to confirm or deny. (See Section 7.)

Will it work at your site?

- In general, groundwater monitoring works best at UST sites where:

  < Monitoring wells are installed in the tank backfill; and

  < There are no previous releases of product that would falsely indicate a current release.

- A professionally conducted site assessment is critical for determining these site-specific conditions.

Groundwater Monitoring (for tanks & piping)	
Description Of Release Detection	**Groundwater monitoring looks for the presence of liquid product floating on the groundwater at the UST site. A site assessment must determine the number and placement of monitoring wells that make sure a release is detected. NOTE: this method cannot be used at sites where groundwater is more than 20 feet below the surface.**
Have Certification For Your Release Detection Method	❑ **Make sure any automated groundwater monitoring equipment is certified for the types of stored contents on which the release detection system is used.** Most manufacturers have their leak detection devices tested and certified by a third party to verify that their equipment meets specific performance requirements set by regulatory agencies. If you don't have certified performance claims, have the manufacturer provide them to you. (Manual devices such as bailers are not generally certified.)
Perform These O&M Actions	❑ **Use your release detection system to test for leaks at least every 30 days.** Testing more often than monthly can catch leaks sooner and reduce cleanup costs and problems. **Be sure you check all of your groundwater monitoring wells.** ❑ **See Section 7 of this manual if your UST system fails a leak test.** ❑ **Frequently test your automated release detection system according to the manufacturer's instructions to make sure it is working properly.** Don't assume that your release detection system is working and never needs checking. Some electronic groundwater monitoring systems have a test or self-diagnosis mode. If you have components (such as monitoring equipment, probes or sensors) for your groundwater monitoring system, read your manual and test your equipment to see if it is working properly. Manual devices should be periodically checked to make sure they are working properly. ❑ **Periodically have a qualified UST contractor, such as the vendor who installed your release detection system, service all the system components according to the manufacturer's service instructions.** Probes and other components can wear out and must be checked periodically. Many vendors recommend or require this maintenance activity at least annually. ❑ **Keep your groundwater monitoring wells clearly marked and secured.** ❑ **Check your groundwater monitoring system owner's manual often to answer questions and to make sure you know the system's operation and maintenance procedures.** Call the system's vendor or manufacturer for a copy of the owner's manual if you don't have one. ❑ **Make sure employees who run, monitor, or maintain the release detection system know exactly what they have to do and to whom to report problems.** Develop and maintain regular training programs for all employees.
Keep These O&M Records	❑ **Keep results of your release detection system tests for at least 1 year.** Your monitoring equipment may provide printouts that can be used as records. Unless you are recording actual release detection results at least every 30 days and maintaining records for at least 1 year, you are not doing leak detection right. ❑ **Keep all records of calibration, maintenance, and repair of your release detection equipment for at least 1 year.** ❑ **Keep all performance claims supplied by the installer, vendor, or manufacturer for at least 5 years.** These records include the certification of your leak detection equipment described above.

Inventory Control and Tank Tightness Testing

What is Inventory Control and Tank Tightness Testing?

This method **combines** periodic tank tightness testing with monthly inventory control. Inventory control involves taking measurements of tank contents and recording amount pumped each operating day, as well as reconciling all this data at least once a month. This combined method must also include tightness tests, which are sophisticated tests performed by trained professionals. ***This combined method can be used only temporarily*** (usually for 10 years or less);

These two leak detection methods must be used together because neither method alone meets the federal requirements for leak detection for tanks. Tightness testing is also an option for underground piping, as described in the section on leak detection for piping starting on page 59.
Because they must be used together, both tank tightness testing and inventory control are discussed in this section.

Will you be in compliance?

When performed properly, periodic tank tightness testing combined with monthly inventory control can ***temporarily*** meet the federal leak detection requirements for ***tanks*** (this method does not detect piping leaks). See page 49 for time restrictions.

Tank Tightness Testing

How does the leak detection method work?

Tightness tests include a wide variety of methods. These methods can be divided into two categories: volumetric and nonvolumetric. Tightness test methods are also referred to as precision tank tests.

- Volumetric test methods generally involve measuring very precisely (in milliliters or thousandths of an inch) the change in product level in a tank over time. Additional characteristics of this category of tank tightness testing include:

  - Changes in product temperature also must be measured very precisely (thousandths of a degree) at the same time as level measurements, because temperature changes cause volume changes that interfere with finding a leak.

  - The product in the tank is required to be at a certain level before testing. This often requires adding product from another tank on-site or purchasing additional product.

  - A net decrease in product volume (subtracting out volume changes caused by temperature) over the time of the test indicates a leak.

  - A few of these methods measure properties of product that are independent of temperature, such as mass and so do not need to measure product temperature.

- Nonvolumetric methods use acoustics or vacuum or pressure decay to determine the presence of a hole in the tank.

  - Various nonvolumetric methods are used to test either the wetted portion of the tank (that part containing product) or the ullage (unfilled portion of the tank that does not contain product) of the UST.

- < Nonvolumetric testing involving acoustics interprets an ultrasonic signal.

- < Tracer chemicals can also be circulated through the UST system and tested in strategically placed sampling ports.

- < Nonvolumetric testing involving acoustics interprets an ultrasonic signal.

- < Tracer chemicals can also be circulated through the UST system and tested in strategically placed sampling ports.

- For both volumetric and nonvolumetric (except tracer compounds) test methods, the following generally apply:

  - < The testing equipment is temporarily installed in the tank, usually through the fill pipe.

  - < The tank must be taken out of service for the test.

  - < Some tightness test methods require all of the measurements and calculations be made by hand by the tester. Other tightness test methods are highly automated. After the tester sets up the equipment, a computer controls the measurements and analysis.

- Some automatic tank gauging systems are capable of meeting the regulatory requirements for tank tightness testing and may be considered an equivalent method. Check with ADEQ.

What are the regulatory requirements?

- The tightness test method must be able to detect a leak at least as small as 0.1 gallon per hour with certain probabilities of detection and of false alarm. To meet leak detection requirements, tank tightness testing must be combined with either inventory control or manual tank gauging.

- UST systems must have the combined method using tank tightness testing every 5 years for no more than10 years following corrosion protection, spill, and overfill upgrade of tanks (no later than December 1998) or installation of new tanks. For some USTs which had corrosion protection before the entire UST system met upgrade standards, the combined method using tank tightness testing every 5 years may be valid for less than 10 years.

- Ten years after upgrade or installation of a new UST system, you must have a monitoring method that can be performed at least once per month.

Anything else you should consider?

- For most methods, the test is performed by a testing company. You just observe the test.
- Depending on the method, tank tightness testing can be used on tanks of varying capacity containing gasoline and diesel. Many test methods have limitations on the capacity of the tank or the amount of ullage (unwetted portion of the tank not filled with product) that should not be exceeded. Methods that use tracer chemical analysis do not have limitations on tank capacity. If you are considering using tightness testing for products other than gasoline or diesel, discuss the method's applicability with the manufacturer's representative. Check the method's evaluation to confirm that it will meet regulatory requirements and your specific UST system needs.
- Manifolded tanks generally should be disconnected and tested separately.
- Procedure and personnel, not equipment, are usually the most important factors in a successful tightness test. Therefore, well-trained and experienced testers are very important. Some states and local authorities have tester certification programs.

Time restrictions on the use of this combined method...

The combined method using tank tightness testing every 5 years is valid only after the entire UST system has met spill, overfill, and corrosion protection standards. Following entire UST system upgrade, this combined method may be used for 10 years after the date the tank was installed or upgraded with corrosion protection. Note that the end date is based on the compliance status of the ***tank only***, not the entire UST system. As a result, some USTs may not be able to use this combined method for as long as 10 years. At the end of the valid time period, you must use one of the monthly monitoring leak detection choices described in this booklet.

Check with ADEQ for guidance.

The combined method can be used only temporarily. Be sure you know how long you can use the combined method to meet federal, state, or local requirements.

Inventory Control And Tank Tightness Testing (for tanks only)	
Description Of Release Detection	**This temporary method combines monthly inventory control with periodic tank tightness testing. Inventory control involves taking measurements of tank contents and recording the amount of product pumped each operating day, measuring and recording tank deliveries, and reconciling all this data at least once a month. This combined method also includes tightness testing, a sophisticated test performed by trained professionals.** ***NOTE: This combination method can only be used temporarily for up to 10 years after installing a new UST or for up to 10 years after your tank meets the corrosion protection requirements.***
Have Certification For Your Release Detection Method	❑ **Make sure your tank tightness testing method is certified for the types of tanks and stored contents on which the tightness test is used.** Most tightness test methods are certified by a third party to verify that they meet specific performance requirements set by regulatory agencies. If you don't have certified performance claims, have the tightness tester provide them to you.
Perform These O&M Actions	❑ **Take inventory readings and record the numbers at least each day that product is added to or taken out of the tank.** You may want to use the Daily Inventory Worksheet provided for you on the next page. ❑ **Reconcile the fuel deliveries with delivery receipts by taking inventory readings before and after each delivery.** Record these readings on a Daily Inventory Worksheet (see next page). ❑ **Reconcile all your data at least every 30 days.** Use a Monthly Inventory Record (see page 52 for an example). ❑ **Have a tank tightness test conducted at least every 5 years. This testing needs to be conducted by a professional trained in performing tank tightness testing and licensed by ADEQ.** ❑ **See Section 7 of this manual if your tank fails a tightness test or if fails two consecutive months of inventory control.** ❑ **Ensure that your measuring stick can measure to the nearest one-eighth inch and can measure the level of product over the full range of the tank's height.** You should check your measuring stick periodically to make sure that you can read the markings and numbers and that the bottom of the stick is not worn. ❑ **Ensure that your product dispenser is calibrated according to local standards or to an accuracy of 6 cubic inches for every 5 gallons of product withdrawn.** ❑ **Measure the water in your tank to the nearest one-eighth inch at least once a month and record the results on the reconciliation sheet.** You can use a paste that changes color when it comes into contact with water. ❑ **Make sure employees who run, monitor, or maintain the release detection system know exactly what they have to do and to whom to report problems.** Develop and maintain regular training programs for all employees.
Keep These O&M Records	❑ **Keep results of your release detection system tests for at least 1 year.** Your monitoring equipment may provide printouts that can be used as records. Unless you are recording actual release detection results at least every 30 days and maintaining records for at least 1 year, you are not doing leak detection right. ❑ **Keep the results of your most recent tightness test.** ❑ **Keep all certification and performance claims for tank tightness test performed at your UST site for at least 5 years.**

Daily Inventory Worksheet

Facility Name: _____

Your Name: _____

Date: _____

Tank Identification					
Type Of Fuel					
Tank Size In Gallons					
End Stick Inches					
Amount Pumped	↓	↓	↓	↓	↓
Totalizer Reading					
Totalizer Reading					
Totalizer Reading					
Totalizer Reading					
Totalizer Reading					
Totalizer Reading					
Totalizer Reading					
Totalizer Reading					
Today's Sum Of Totalizers					
Previous Day's Sum Of Totalizers					
Amount Pumped Today					
Delivery Record	↓	↓	↓	↓	↓
Inches of Fuel Before Delivery					
Gallons of Fuel Before Delivery (from tank chart)					
Inches of Fuel After Delivery					
Gallons of Fuel After Delivery (from tank chart)					
Gallons Delivered (Stick) [Gallons After ! Gallons Before]					
Gross Gallons Delivered (Receipt)					

Monthly Inventory Record

Month/Year :_____/_____ Tank Identification & Type Of Fuel:_____

Facility Name:_____

Date Of Water Check: _____ Level Of Water (Inches):_____

Date	Start Stick Inventory (Gallons)		Gallons Delivered		Gallons Pumped		Book Inventory (Gallons)	End Stick Inventory (Inches)	End Stick Inventory (Gallons)	Daily Over (+) Or Short (–) [End – Book]	Initials
1	(+)		(-)		(=)						
2	(+)		(-)		(=)						
3	(+)		(-)		(=)						
4	(+)		(-)		(=)						
5	(+)		(-)		(=)						
6	(+)		(-)		(=)						
7	(+)		(-)		(=)						
8	(+)		(-)		(=)						
9	(+)		(-)		(=)						
7	(+)		(-)		(=)						
8	(+)		(-)		(=)						
9	(+)		(-)		(=)						
10	(+)		(-)		(=)						
11	(+)		(-)		(=)						
12	(+)		(-)		(=)						
13	(+)		(-)		(=)						
14	(+)		(-)		(=)						
15	(+)		(-)		(=)						
16	(+)		(-)		(=)						
17	(+)		(-)		(=)						
18	(+)		(-)		(=)						
19	(+)		(-)		(=)						
20	(+)		(-)		(=)						
21	(+)		(-)		(=)						
22	(+)		(-)		(=)						
23	(+)		(-)		(=)						
24	(+)		(-)		(=)						
25	(+)		(-)		(=)						
26	(+)		(-)		(=)						
27	(+)		(-)		(=)						
28	(+)		(-)		(=)						
29	(+)		(-)		(=)						
30	(+)		(-)		(=)						
31	(+)		(-)		(=)						

Total Gallons Pumped > _____ **Total Gallons Over Or Short >** _____

Leak Check:
Drop the last two digits from the **Total Gallons Pumped** number and enter here: _____ + 130 =

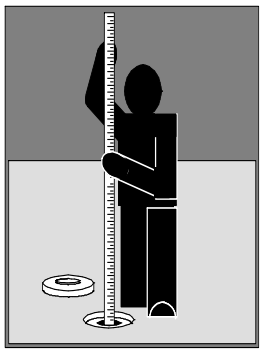
Compare these numbers

_____ gallons

Is the total gallons over or short **larger** than leak check result? **Yes** **No** (circle one)

If your answer is "Yes" for 2 months in a row, **notify the regulatory agency** as soon as possible. (Keep this piece of paper on file for at least 1 year)

Manual Tank Gauging



What is Manual Tank Gauging

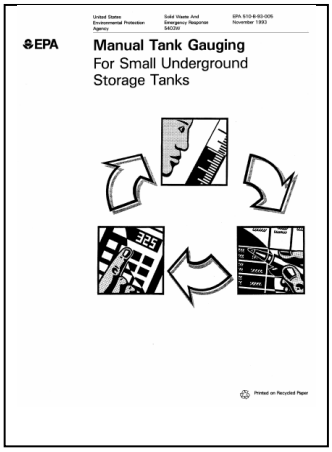
Manual tank gauging can be used only for tanks 2,000 gallons or less capacity. Tanks 1,000 gallons or less can use this method alone. Tanks from 1,001-2,000 gallons can temporarily use manual tank gauging only when it is combined with tank tightness testing. Manual tank gauging cannot be used on tanks over 2,000 gallons.

Will you be in compliance?

When performed according to recommended practices, manual tank gauging meets the federal leak detection requirements for USTs with a capacity of 1,000 gallons or less for the life of the tank. Manual tank gauging detects leaks only from ***tanks*** (this method does not detect piping leaks). For requirements for piping, see the section on leak detection for piping starting on page 59.

How does the leak detection method work?

EPA has a booklet, *Manual Tank Gauging*, that fully explains how to do manual tank gauging correctly. The booklet also contains standard recordkeeping forms. You can order this free booklet by calling EPA's publication distributor at (800) 490-9198 or downloading it from the EPA Web site at www.epa.gov/oust.



- Four measurements of the tank's contents must be taken weekly, two at the beginning and two at the end of **at least a 36-hour period** during which nothing is added to or removed from the tank. See the table on the next page.
- **The average of the two consecutive ending measurements are subtracted from the average of the two beginning measurements to indicate the change in product volume.**
- Every week, the calculated change in tank volume is compared to the standards shown in the table on the next page. If the calculated change exceeds the weekly standard, the UST may be leaking. Also, monthly averages of the four weekly test results must be compared to the monthly standard in the same way. See the table on the next page.

What are the regulatory requirements?

- Liquid level measurements must be taken with a gauge stick that is marked to measure the liquid to the nearest one-eighth of an inch.
- Manual tank gauging may be used as the sole method of leak detection for tanks with a capacity of 1,000 gallons or less for the life of the tank. Tanks between 551 and 1,000 gallons have testing standards based on their diameter or their additional use of tightness testing (see table). These tanks may temporarily use a combination of manual tank gauging and periodic tank tightness. (See next bullet on following page.)

Table of Test Standards for Manual Tank Gauging

Tank Size	Minimum Duration Of Test	Weekly Standard (1 test)	Monthly Standard (4-test average)
up to 550 gallons	36 hours	10 gallons	5 gallons
551-1,000 gallons (when tank diameter is 64")	44 hours	9 gallons	4 gallons
551-1,000 gallons (when tank diameter is 48")	58 hours	12 gallons	6 gallons
551-1,000 gallons (also requires periodic tank tightness testing)	36 hours	13 gallons	7 gallons
1,001-2,000 gallons (also requires periodic tank tightness testing)	36 hours	26 gallons	13 gallons

- For tanks with a capacity of 1,001-2,000 gallons, manual tank gauging must be combined with periodic tightness testing. This combined method will meet the federal requirements only ***temporarily***. See page 49 for an explanation of **time** restrictions that also applies to the combination of manual tank gauging and tank tightness testing. You must eventually have another monitoring method that can be performed at least once a month.

- Tanks greater than 2,000 gallons in capacity may not use this method of leak detection to meet these regulatory requirements.

Common Equipment used in Manual Tank Gauging

Gauge Stick or Other Gauges

The gauge stick used to measure the depth of liquid in an underground tank must be marked or notched to the1/8th inch, starting with zero at the bottom end. Check your stick to be sure the end has not been worn or cut off and that the stick is not warped. The stick should be made of non-sparking material, such as wood, and varnished to minimize the creeping of fuel above the actual fuel level in the tank. Instead of using a gauge stick, you may use a mechanical or electronic tank level monitor. Whatever measuring device you use must be capable of measuring the level of product over the full range of the tank's height to the nearest 1/8 inch.

Forms

A sample “MANUAL TANK GAUGING RECORD” form has been provided for you in this manual on page 57. (Make copies as needed,)

Tank Chart

A tank chart is a table that converts the number of inches of liquid in the tank into the number of gallons. You need a tank chart that exactly matches your storage tank (tank manufacturers usually provide charts for their tanks). If you have more than one tank, you will need a chart for each tank unless the tanks are identical. The tank chart must show conversion to gallons for each 1/8th inch stick reading. If your tank chart does not convert each 1/8th inch reading into gallons, contact the tank manufacturer, or, if you have a steel tank, the Steel Tank Institute (see Section 11) to get an appropriate chart.

You always need to convert inches into gallons in order to fill out the form correctly and to do the necessary math. To convert inches into gallons, find your stick's reading to the nearest 1/8th inch on the tank chart, then simply read across to the gallons column to find the number of gallons.

Anything else you should consider?

- You can perform manual tank gauging yourself. Correct gauging, recording, and math are the most important factors for successful tank gauging. The accuracy of tank gauging can be greatly increased by spreading product-finding paste on the gauge stick before taking measurements.

Manual Tank Gauging (for tanks 1,000 gallons or less only)	
Description Of Release Detection	**<u>This method may be used only for tanks of 1,000 gallons or less capacity</u> meeting certain requirements. These requirements (tank size, tank dimension, and test time) are found in the manual tank gauging record on the next page. Manual tank gauging involves taking your tank out of service for the testing period (at least 36 hours) each week, during which time the contents of the tank are measured twice at the beginning and twice at the end of the test period. The measurements are then compared to weekly and monthly standards to determine if the tank is tight.**
Have Certification For Your Release Detection Method	**None required.**
Perform These O&M Actions	❑ **Once a week, record two inventory readings at the beginning of the test, allow the tank to sit undisturbed for the time specified in the Manual Tank Gauging Record on the next page, and record two inventory readings at the end of the test (use any form comparable to the one on the following page).** ❑ **Reconcile the numbers weekly and record them on a Manual Tank Gauging Record (see the next page).** ❑ **See Section 7 of this manual if your tank fails the weekly standard.** ❑ **At the end of 4 weeks, reconcile your records for the monthly standard and record the result on a Manual Tank Gauging Record (see the next page).** ❑ **See Section 7 of this manual if your tank fails the monthly standard.** ❑ **Ensure that your measuring stick can measure to the nearest one-eighth inch and can measure the level of product over the full range of the tank's height.** You should check your measuring stick periodically to make sure that you can read the markings and numbers and that the bottom of the stick is not worn. ❑ **Make sure employees who run, monitor, or maintain the release detection system know exactly what they have to do and to whom to report problems.** Develop and maintain regular training programs for all employees.
Keep These O&M Records	❑ **Keep your manual tank gauging records for at least 1 year.** Unless you are recording actual release detection results weekly and at least every 30 days and maintaining records for at least 1 year, you are not doing leak detection right.

Manual Tank Gauging Record

Circle your tank size, test duration, and weekly/monthly standards in the window below

Tank Size	Minimum Duration of Test	Weekly Standard (1 test)	Monthly Standard (4 test average)
Up to 550 gallons			
551-1,000 gallons (when tank diameter is 64")			
551-1,000 gallons (when tank is 48")			
551-1,000 gallons (also requires periodic tank tightness testing)			
1,001- 2,000 gallons (also requires periodic tank tightness testing)			

Compare your weekly readings and the monthly average of the 4 weekly readings with the standards shown in the table on the left.

If the calculated change exceeds the weekly standard, the UST may be leaking. Also, the monthly average of the 4 weekly test results must be compared to the monthly standard in the same way.

If either the weekly or the monthly standards have been exceeded, the UST may be leaking. Call ADEQ within 24 to report the suspected release and get further instructions.

Start Test (month, day, and time)	First Initial Stick Reading	Second Initial Stick Reading	Average Initial Reading	Initial Gallons (convert inches to gallons) [a]	End Test (month, day, and time)	First End Stick Reading	Second End Stick Reading	Average End Reading	End Gallons (convert inches to gallons) [b]	Change in Tank Volume In Gallons + or (-) [a-b]	Tank Passes Test (circleYes or No)
Date: Time: AM/PM					Date: Time: AM/PM						Y N
Date: Time: AM/PM					Date: Time: AM/PM						Y N
Date: Time: AM/PM					Date: Time: AM/PM						Y N
Date: Time: AM/PM					Date: Time: AM/PM						Y N
							To see how close you are to the monthly Standard, divide the sum of the 4 weekly Readings by 4 and enter the results here >				Y N

Keep This Piece Of Paper On File For At Least 1 Year

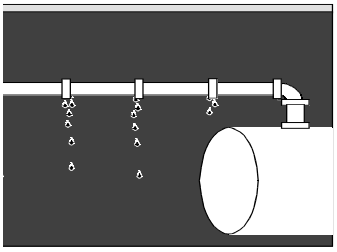
Manual Tank Gauging And Tank Tightness Testing (for tanks 2,000 gallons or less only)	
Description Of Release Detection	**This temporary method combines manual tank gauging with periodic tank tightness testing. <u>It may be used only for tanks of 2,000 gallons or less capacity.</u> Manual tank gauging involves taking your tank out of service for the testing period (at least 36 hours) each week, during which the contents of the tank are measured twice at the beginning and twice at the end of the test period. The measurements are then compared to weekly and monthly standards to determine if the tank is tight. This combined method also includes tightness testing, a sophisticated test performed by trained professionals.** ***NOTE: This combination method can only be used temporarily for up to ten years after installing a new UST or for up to 10 years after your tank meets the corrosion protection requirements.***
Have Certification For Your Release Detection Method	❑ **Make sure your tank tightness testing is certified for the types of tanks and stored contents on which the tightness test is used.** Most tightness test methods are certified by a third party to verify that they meet specific performance requirements set by regulatory agencies. If you don't have certified performance claims, have the tightness tester provide them to you.
Perform These O&M Actions	❑ **Once a week, record two inventory readings at the beginning of the test, allow the tank to sit undisturbed for the time specified in the Manual Tank Gauging Record, and record two inventory readings at the end of the test (use any form comparable to the one on page 57).** ❑ **Reconcile the numbers weekly and record them on a Manual Tank Gauging Record (see page 57).** ❑ **See Section 7 of this guide if your tank fails the weekly standard.** ❑ **At the end of 4 weeks, reconcile your records for the monthly standard and record the result on a Manual Tank Gauging Record (see page 57).** ❑ **See Section 7 of this guide if your tank fails the monthly standard.** ❑ **Conduct a tank tightness test at least every 5 years.** This testing needs to be conducted by a professional trained in performing tank tightness testing. ❑ **See Section 7 of this manual if your tank fails the tightness test.** ❑ **Ensure that your measuring stick can measure to the nearest one-eighth inch and can measure the level of product over the full range of the tank's height.** You should check your measuring stick periodically to make sure that you can read the markings and numbers and that the bottom of the stick is not worn. ❑ **Make sure employees who run, monitor, or maintain the release detection system know exactly what they have to do and to whom to report problems.** Develop and maintain regular training programs for all employees.
Keep These O&M Records	❑ **Keep your manual tank gauging records for at least 1 year.** Unless you are recording actual release detection results at least weekly and every 30 days and maintaining records for at least 1 year, you are not doing leak detection right. ❑ **Keep the results of your most recent tightness test.** ❑ **Keep all certification and performance claims for tank tightness test performed at your UST site for at least 5 years.**

Leak Detection For Underground Piping

Will you be in compliance?

When installed and operated according to the manufacturer's specifications, the leak detection methods discussed here meet the federal regulatory requirements for the life of underground piping systems. Your UST may have ***suction*** or ***pressurized*** piping, both of which are discussed below.

What are the regulatory requirements for **suction** *piping?*



- No leak detection is required if the suction piping has (1) enough slope so that the product in the pipe can drain back into the tank when suction is released and (2) has only one check valve, which is as close as possible beneath the pump in the dispensing unit. If a suction line is to be considered exempt based on these design elements, there must be some way to check that the line was actually installed according to these plans.

- If a suction line does not meet all of the design criteria noted above, one of the following leak detection methods must be used:

  - A line tightness test at least every 3 years; or
  - Monthly interstitial monitoring; or
  - Monthly vapor monitoring (including tracer compound analysis); or
  - Monthly groundwater monitoring; or
  - Monthly statistical inventory reconciliation; or
  - Other monthly monitoring that meets performance standards.

The line tightness test must be able to detect a leak at least as small as 0.1 gallon per hour at 1.5 times normal operating pressure with certain probabilities of detection and of false alarm.

Interstitial monitoring, vapor monitoring (including tracer compound analysis), groundwater monitoring, and statistical inventory reconciliation have the same regulatory requirements for piping as they do for tanks. See the earlier sections of this booklet on those methods.

What are the regulatory requirements for **pressurized** *piping?*

Each pressurized piping run must have one leak detection method from each set below:

An automatic line leak detector:

- Automatic flow restrictor; or
- Automatic flow shutoff; or
- Continuous alarm system.

And one other method:

- < Annual line tightness test; or
- < Monthly interstitial monitoring; or
- < Monthly vapor monitoring (including tracer compound analysis); or
- < Monthly groundwater monitoring; or
- < Monthly statistical inventory reconciliation; or
- < Other monthly monitoring that meets performance standards.

- The automatic line leak detector (LLD) must be designed to detect a leak at least as small as 3 gallons per hour at a line pressure of 10 pounds per square inch within 1 hour by shutting off the product flow, restricting the product flow, or triggering an audible or visual alarm.

- The line tightness test must be able to detect a leak at least as small as 0.1 gallon per hour when the line pressure is 1.5 times its normal operating pressure. The test must be conducted each year. If the test is performed at pressures lower than 1.5 times operating pressure, the leak rate to be detected must be correspondingly lower.

- Automatic LLDs and line tightness tests must also be able to meet the federal regulatory requirements regarding probabilities of detection and false alarm.

- Interstitial monitoring, vapor monitoring (including tracer compound analysis), groundwater monitoring, and statistical inventory reconciliation have the same regulatory requirements for piping as they do for tanks. See the earlier sections of this booklet on those methods.

How do the leak detection methods work?

Automatic line leak detectors (LLDs)

- Flow restrictors and flow shutoffs can monitor the pressure within the line in a variety of ways: whether the pressure decreases over time; how long it takes for a line to reach operating pressure; and combinations of increases and decreases in pressure.

- If a suspected leak is detected, a flow restrictor keeps the product flow through the line well below the usual flow rate. If a suspected leak is detected, a *flow shutoff* completely cuts off product flow in the line or shuts down the pump.

- A continuous alarm system constantly monitors line conditions and immediately triggers an audible or visual alarm if a leak is suspected. Automated internal, vapor, or interstitial line monitoring systems can also be set up to operate continuously and sound an alarm, flash a signal on the console, or even ring a telephone in a manager's office when a leak is suspected.

- Both automatic flow restrictors and flow shutoffs are permanently installed directly into the pipe or the pump housing.

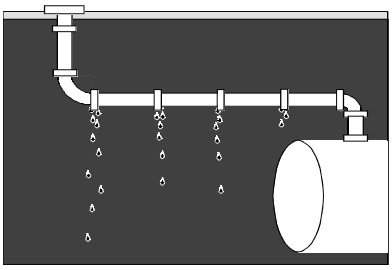
- Vapor, interstitial, or other monitoring systems can be installed to shut off flow, restrict flow, or trigger an alarm whenever a leak is detected. If it meets the applicable standards, such a setup meets the monthly monitoring requirement as well as the LLD requirement.

Line tightness testing

- The line is taken out of service and pressurized, usually above the normal operating pressure. A drop in pressure over time, usually an hour or more, suggests a possible leak.

- Suction lines are not pressurized very much during a tightness test (about 7 to 15 pounds per square inch).
- Most line tightness tests are performed by a testing company. You just observe the test.
- Some tank tightness test methods can be performed to include a tightness test of the connected piping.
- For most line tightness tests, no permanent equipment is installed.
- In the event of trapped vapor pockets, it may not be possible to conduct a valid line tightness test. There is no way to tell definitely before the test begins if this will be a problem, but long complicated piping runs with many risers and dead ends are more likely to have vapor pockets.
- Some permanently installed electronic systems (which often include ATG systems) can meet the requirements of monthly monitoring or a line tightness test.

Secondary containment with interstitial monitoring



- A barrier is placed between the piping and the environment. Double-walled piping or a leak-proof liner in the piping trench can be used.
- A monitor is placed between the piping and the barrier to sense a leak if it occurs. Monitors range from a simple stick that can be put in a sump to see if a liquid is present, to continuous automated systems that monitor for the presence of liquid product or vapors.
- Proper installation of secondary containment is the most important and the most difficult aspect of this leak detection method. Trained, experienced ADEQ-licensed installers are necessary.
- See the section on secondary containment for additional information. Secondary containment for piping is similar to that for tanks.

Vapor (including tracer compound analysis) or groundwater monitoring

- Vapor monitoring detects product that leaks into the soil and evaporates.
- Tracer compound analysis uses a tracer chemical to determine if there is a hole in the line.
- Groundwater monitoring checks for leaked product floating on the groundwater near the piping.
- A site assessment must be used to determine monitoring well placement and spacing.
- UST systems using vapor (including tracer compound analysis) or groundwater monitoring for the tanks are well suited to use the same monitoring method for the piping.
- See the earlier sections on vapor (including tracer compound analysis) and groundwater monitoring. Use of these methods with piping is similar to that for tanks.

Note: Systems with Pressurized Piping <u>Must</u> Have An Automatic Line Leak Detector.

Automatic Line Leak Detection (for pressurized piping only)	
Description Of Release Detection	**Automatic line leak detectors (LLDs) are designed to detect a catastrophic release from pressurized piping. Automatic LLDs must be designed to detect a leak at least as small as 3 gallons per hour at a line pressure of 10 psi within 1 hour. When a leak is detected, automatic LLDs must shut off the product flow, restrict the product flow, or trigger an audible or visual alarm. NOTE: Mechanical automatic LLDs need to be installed and operated as close as possible to the tank (LLDs are designed to detect a leak, restrict flow, etc. only between the detector and the dispenser).**
Have Certification For Your Release Detection Method	❑ **Make sure your release detection equipment is certified for the types of piping and stored contents on which the release detection system is used.** Most manufacturers have their leak detection devices tested and certified by a third party to verify that their equipment meets specific performance requirements set by regulatory agencies. If you don't have certified performance claims, have the manufacturer provide them to you.
Perform These O&M Actions	❑ **Frequently test your automatic LLDs according to the manufacturer's instructions to make sure it is working properly.** Don't assume that your release detection system is working and never needs checking. Some monitoring systems have a test or self-diagnosis mode. ❑ **Periodically have a qualified UST contractor, such as the vendor who installed your release detection system, service all the system components according to the manufacturers' service instructions.** Components can wear out and must be checked periodically. Many vendors recommend or require this maintenance activity at least annually. ❑ **See Section 7 of this manual if your LLD detects a leak.** ❑ **Make sure employees who run, monitor, or maintain the release detection system know exactly what they have to do and to whom to report problems.** Develop and maintain regular training programs for all employees.
Keep These O&M Records	❑ **For at least a year, keep the annual test that demonstrates that the LLD is functioning properly.** ❑ **If used for monthly monitoring, keep results of your release detection system tests for at least 1 year.** Your monitoring equipment system may provide printouts that can be used as records. Unless you are recording actual release detection results at least every 30 days and maintaining records for at least 1 year, you are not doing leak detection right. ❑ **Keep all records of calibration, maintenance, and repair of your release detection equipment for at least 1 year.** ❑ **Keep all performance claims supplied by the installer, vendor, or manufacturer for at least 5 years.** These records include the certification of your leak detection equipment described above.

Line Tightness Testing (for piping only)	
Description Of Release Detection	**This method uses a periodic line tightness test to determine if your piping is leaking. Tightness testing can be performed by either a trained professional or by using a permanently installed electronic system (sometimes connected to an automatic tank gauging system).**
Have Certification For Your Release Detection Method	❑ **Make sure your line tightness testing or permanently installed electronic system is certified for the types of piping and stored contents on which the release detection system is used.** Most tightness test methods and release detection equipment have been tested and certified by a third party to verify that the equipment or services meet specific performance requirements set by regulatory agencies. If you don't have certified performance claims, have the tightness tester or equipment manufacturer provide them to you.
Perform These O&M Actions	❑ **If line tightness testing is used for pressurized piping, the test must be conducted at least annually.** ❑ **If line tightness testing is used for suction piping, the test must be conducted at least every three years.** Safe suction piping as described on page 59 may not need release detection testing. ❑ **This tightness testing must be conducted by a professional trained in performing line tightness testing or by using a permanently installed electronic system.** ❑ **See Section 7 of this manual if your piping fails the tightness test or if the electronic system indicates a leak.** ❑ **Periodically have a qualified UST contractor, such as the vendor who installed your release detection system, service all the system components according to the manufacturers' service instructions.** Components can wear out and must be checked periodically. Many vendors recommend or require this maintenance activity at least annually. ❑ **Make sure employees who run, monitor, or maintain the release detection system know exactly what they have to do and to whom to report problems.** Develop and maintain regular training programs for all employees.
Keep These O&M Records	❑ **Keep results of your release detection system tests for at least 1 year.** Your monitoring equipment may provide printouts that can be used as records. Unless you are recording actual release detection results at least every 30 days and maintaining records for at least 1 year, you are not doing leak detection right. ❑ **If you use a permanently installed electronic system, keep all records of calibration, maintenance, and repair of your equipment for at least 1 year.** ❑ **Keep all performance claims supplied by the installer, vendor, or manufacturer for at least 5 years.** These records include the certification of your leak detection equipment described above.

30-Day Release Detection Monitoring Record

(May be used for monitoring wells, interstitial monitoring, and automatic tank gauging)

Release Detection Method:_____

Facility Name:_____

Date	Your Name	UST System (Tank & Piping) (Enter N for No Release Detected or Y for a Suspected Or Confirmed Release)			
		UST #	UST #	UST #	UST #

Keep This Piece Of Paper And Any Associated Printouts On File For At Least 1 Year From The Date Of The Last Entry

Section 7 — Suspected Or Confirmed Releases

You need to be fully prepared to respond to releases **before** they may occur. You need to know what to do when release detection methods indicate a suspected or confirmed release. Be ready to take the following steps, as appropriate.

Stop The Release

- Take immediate action to prevent the release of more product.
- Turn off the power to the dispenser and bag the nozzle.
- Make sure you know where your emergency shutoff switch is located.
- Empty the tank, if necessary, without further contaminating the site. You may need the assistance of your supplier or distributor.

Contain The Release

Contain, absorb, and clean up any surface spills or overfills. You should keep enough absorbent material at your facility to contain a spill or overfill of petroleum products until emergency response personnel can respond to the incident. The suggested supplies include, but are not limited to, the following:

- Containment devices, such as containment booms, dikes, and pillows.
- Absorbent material, such as kitty litter, chopped corn cob, sand, and sawdust. (Be sure you properly dispose of used absorbent materials.)
- Mats or other material capable of keeping spill or overfill out of nearby storm drains.
- Spark-free flash light.
- Spark-free shovel.
- Buckets.
- Reels of caution tape, traffic cones, and warning signs.
- Personal protective gear.

Also, identify any fire, explosion, or vapor hazards and take action to neutralize these hazards.

Call For Help

Contact your local fire or emergency response authority. Make sure you have these crucial telephone numbers prominently posted where you and your employees can easily see them. See the next page for a form you can copy and post.

Report To Authorities

If you observe any of the following, contact your state's underground storage tank regulatory authority to report a suspected or confirmed release as soon as possible (within 24 hours):

- Any spill or overfill of petroleum that exceeds 25 gallons or that causes a sheen on nearby surface water. (Spills and overfills under 25 gallons that are contained and immediately cleaned up do not have to be reported. If they can't be quickly cleaned up, they must be reported to ADEQ.)

- Any released regulated substances at the UST site or in the surrounding area — such as the presence of liquid petroleum; soil contamination; surface water or groundwater contamination; or petroleum vapors in sewer, basement, or utility lines.

- Any unusual operating conditions you observe — such as erratic behavior of the dispenser, a sudden loss of product, or an unexplained presence of water in the tank. However, you are not required to report if:

    - The system equipment is found to be defective, but not leaking, and is immediately repaired or replaced.

- Results from your release detection system indicate a suspected release. However, you are not required to report if:

    - The monitoring device is found to be defective and is immediately repaired, recalibrated, or replaced and further monitoring does not confirm the initial suspected release, or

    - In the case of inventory control, a second month of data does not confirm the initial result.

The next page contains a blank list for names and phone numbers of important contacts. Fill out this information for your facility so that you will know who to call in case of an emergency. Remove this page from the manual, copy it, fill it out, and post it in a prominent place at your facility.

Copy the next page and update it often. Make sure everyone at your UST facility is familiar with this list of contacts.

Release Response
Important Contact Information

	Contact Name	Phone #
ADEQ:		
Local ADEM:		
Fire Department:		
Ambulance:		
Police Department:		
Repair Contractor:		
Other Contacts:		

✓ Release Response Checklist

- ❑ **Stop the release:** Take immediate action to prevent the release of more product. Turn off the power to the dispenser and bag the nozzle. Make sure you know where your emergency shutoff switch is located. Empty the tank, if necessary, without further contaminating the site.
- ❑ **Contain the release:** Contain, absorb, and clean up any surface releases. Identify any fire, explosion, or vapor hazards and take action to neutralize these hazards.
- ❑ **Call for help and to report suspected or confirmed releases:** Contact your local fire or emergency response authority. Contact ADEQ within 24 hours.

Section 8 - Frequent Walk-Through Inspections

You should conduct basic walk-through inspections of your facility **at least monthly** to make sure your essential equipment is working properly and you have release response supplies on hand.

These inspections would not be as thorough as following the O&M checklists presented earlier in this booklet, but they can provide a quick overview you can do more often than the longer checklists. You might think of this level of inspection as similar to automobile dashboard indicators that provide us with status warnings like low battery.

When you perform your walk-through inspection you should quickly check at least the following:

- **Spill Buckets:** Are spill buckets clean, empty, and in good condition?
- **Overfill Alarm (if you have one):** Is your overfill alarm working and easily seen or heard?
- **Release Detection System:** Is your release detection equipment working properly? For example, did you run a quick self-test of the ATG to verify it's working properly? Or did you check your manual dip stick to make sure it's not warped or worn?
- **Impressed Current Cathodic Protection System (if you have one):** Is your cathodic protection system turned on? Are you checking your rectifier at least every 60 days?
- **Fill And Monitoring Ports:** Are covers and caps tightly sealed and locked?
- **Spill And Overfill Response Supplies:** Do you have the appropriate supplies for cleaning up a spill or overfill?

In addition, good UST site management should also include the following quick visual checks:

- **Dispenser Hoses, Nozzles, And Breakaways:** Are they in good condition and working properly?
- **Dispenser And Dispenser Sumps:** Any signs of leaking? Are the sumps clean and empty?
- **Piping Sumps:** Any signs of leaking? Are the sumps clean and empty?

If you find any problems during the inspection, you or your UST contractor needs to take action quickly to resolve these problems and avoid serious releases.

A frequent walk-through checklist is provided for your use on the next page.

✓ Frequent Walk-Through Inspection Checklist						
Date Of Inspection						
Release Detection System: Inspect for proper operation.						
Spill Buckets: Ensure spill buckets are clean and empty.						
Overfill Alarm: Inspect for proper operation. Can a delivery person hear or see the alarm when it alarms?						
Impressed Current System: Inspect for proper operation.						
Fill And Monitoring Ports: Inspect all fill/monitoring ports and other access points to make sure that the covers and caps are tightly sealed and locked.						
Spill And Overfill Response Supplies: Inventory and inspect the emergency spill response supplies. If the supplies are low, restock the supplies. Inspect supplies for deterioration and improper functioning.						
Dispenser Hoses, Nozzles, And Breakaways: Inspect for loose fittings, deterioration, obvious signs of leakage, and improper functioning.						
Dispenser And Dispenser Sumps: Open each dispenser and inspect all visible piping, fittings, and couplings for any signs of leakage. If any water or product is present, remove it and dispose of it properly. Remove any debris from the sump.						
Piping Sumps: Inspect all visible piping, fittings, and couplings for any signs of leakage. If any water or product is present, remove it and dispose of it properly. Remove any debris from the sump.						

Your initials in each box below the date of the inspection indicate the device/system was inspected and OK on that date.

Section 9 - Financial Responsibility

Financial Responsibility

State and federal regulations require that owners of regulated storage tanks maintain financial responsibility for their tanks. This ensures that an owner is able to pay for the cleanup of damage caused to the environment and third-party claims that may result from a leaking UST system. The amount of coverage required varies by the type of tank owner or operator and the number of tanks owned or operated.

There are two general types of coverage required: per occurrence and annual aggregate.

- **Per occurrence** means the amount of money that must be available to pay the costs for each occurrence of a leaking UST. The amount of per occurrence coverage required depends on the type of facility and, in some cases, on the amount of throughput at the facility.

- **Annual aggregate** means the total amount of FR available to cover all obligations that might occur in one year. The amount of annual aggregate coverage required depends on the number of tanks that are owned or operated.

The amount of coverage required is provided in the table below.

Required Coverage Of Financial Responsibility		
Group Of UST Owners And Operators	**Per Occurrence Amount**	**Aggregate Amount**
Group 1: Petroleum producers, refiners, or marketers	**$1 million**	**$1 million** (for 100 or fewer tanks) **or** **$ 2 million** (for more than 100 tanks)
Group 2: Non-marketers (Non-marketing facilities do not sell or transfer petroleum to the public or any other facility that would sell the petroleum. Additionally, non-marketing facilities do not produce or refine petroleum. An example of a non-marketer is a bus terminal.)	**$500,000** (if throughput is 10,000 gallons monthly or less) **or** **$1 million** (if throughput is more than 10,000 gallons monthly)	

Tank owners can use one or more of several mechanisms available to meet financial responsibility (FR) obligations:

- **Financial Test Of Self-Insurance** - A firm with a tangible net worth of at least $10 million may demonstrate FR by passing one of the two financial tests listed in the federal regulations.
- **Corporate Guarantee** - You may secure a corporate guarantee from another eligible firm. The provider of the guarantee has to pass one of the financial tests listed in the federal regulations.
- **Insurance Coverage** - You may buy insurance from an insurer or a risk retention group.

- **Surety Bond** - You may obtain a surety bond, which is a guarantee by a surety company that it will satisfy FR obligations if the person who obtained the surety bond does not.
- **Letter Of Credit** - You may obtain a letter of credit, which obligates the issuer to provide funding for corrective action and third-party compensation.
- **Trust Fund** - You may set up a fully-funded trust fund administered by a third party to pay for corrective action costs and third-party claims.
- **State Financial Assurance Funds** - You may be covered by a state fund that provides all or a portion of FR to the degree it pays for cleanup and third-party compensation costs.

You may use one or a combination of the mechanisms listed above to meet your FR obligations. Combinations may be used to cover:

- **Different sets of tanks** - For example, tanks in one state may be covered by a state fund, while tanks in another state may be covered by insurance.
- **Different scopes of coverage** - For example, an owner may use a state fund to cover corrective action obligations and a letter of credit to cover third-party liability obligations.
- **Different dollar amounts of coverage** - For example, an owner may have a letter of credit for the first $7,500 (the deductible amount) of coverage and state fund coverage for the rest.

One FR mechanism owners in the State of Arkansas have available is the **Arkansas Petroleum Storage Tank Trust Fund.** Although the state trust fund is not insurance, it may be used to meet part of the tank owner's financial responsibility obligation. Like insurance, there is a "deductible" amount or a non-reimbursable amount which the tank owner must pay before he/she can receive any trust fund reimbursement. Eligibility for the state trust fund is not automatic or a guaranteed entitlement once a tank is registered and fees paid. Participation in the fund is voluntary, and owners must meet certain eligibility requirements at the time of discovery of the occurrence.

State Trust Fund Requirements

In order to obtain reimbursement from the state trust fund for the costs of investigation and corrective action resulting from the accidental release of petroleum from a regulated storage tank, an owner must be compliant with the following criteria at the time of discovery of the release:

- Tanks must be registered with ADEQ
- Tank fees must be paid as required by ADEQ
- Financial responsibility for the deductible amount of $7,500 must be maintained
- Release must be reported to ADEQ in a timely manner (within 24 hours of discovery)
- Cooperate fully with ADEQ in corrective action to address the release.

The owner must expend $7,500 in reasonable, allowable and necessary corrective action costs for the occurrence before any reimbursement may be made from the state trust fund.

State Trust Fund Coverage Limits

For eligible owners of petroleum storage tank systems, the trust fund will reimburse:

- Up to $1.5 million per occurrence for corrective action costs
- Up to $1 million for third-party damages.

FR for Local Governments

If you are a local government, there are four additional methods that you can use to comply with the FR requirements:

- **Bond Rating Test** - A local government may demonstrate (or guarantee) FR by passing a bond rating test.
- **Financial Test** - A local government may demonstrate (or guarantee) FR by passing a financial test.
- **Guarantee** - A local government may obtain a guarantee from another local government or the state.
- **Dedicated Fund** - A local government may demonstrate (or guarantee) FR by establishing a fund.

Section 10 - Out-of-Service UST Systems and Closure

Temporary closure.

(a) When an UST system is temporarily closed, owners and operators must continue operation and maintenance of corrosion protection , as well as release detection in the manner explained earlier in this manual. If a release is suspected or confirmed, it must be handled in the same manner that it would be if the UST were in operation. However, release detection is not required as long as the UST system is empty. The UST system is considered empty when all materials have been removed using commonly employed practices so that no more than 2.5 centimeters (one inch) of residue, or 0.3 percent by weight of the total capacity of the UST system, remain in the system.

(b) When an UST system is temporarily closed for 3 months or more, owners and operators must also comply with the following requirements:

(1) Leave vent lines open and functioning; and

(2) Cap and secure all other lines, pumps, manways, and ancillary equipment.

(c) When an UST system is temporarily closed for more than 12 months, owners and operators have three options:

(1) You must permanently close your UST if it doesn't meet the applicable requirements for new or upgraded USTs (except for spill and overfill requirements).

(2) You can ask ADEQ for an extension beyond 12 months, if you provide an assesment that determines whether contamination is present at your site.

(3) Your UST can remain temporarily closed without needing an extension granted by ADEQ if the UST meets the applicable requirements for new or upgraded USTs (except spill and overfill requirements) and the requirements noted above for temporary closure.

Closing Permanently

If you decide to close your UST permanently, follow these requirements for **permanent closure:**

- Notify ADEQ at least 30 days before you plan to close your UST.

- Either remove the UST from the ground or close it in place. In both cases, the tank must be emptied and cleaned by removing all liquids, dangerous vapors, and accumulated sludge. These potentially very hazardous actions must be carried out by ADEQ-licensed contractors and individuals who follow standard safety practices. If you leave the UST in the ground, you must have it filled with a harmless chemically inactive solid, like sand.

- Conduct a site assessment to determine if a release from the UST system has occurred. If there is contamination, you may have to take corrective action. For at least 3 years, keep a record of the actions you take to determine if contamination is present at the site (or you can mail this record to ADEQ's RST division).

Note: The following cleaning and closure procedures may be used to comply with this section:

(A) American Petroleum Institute Recommended Practice 1604, "Removal and Disposal of Used Underground Petroleum Storage Tanks";

(B) American Petroleum Institute Publication 2015, "Cleaning Petroleum Storage Tanks";

(C) The National Institute for Occupational Safety and Health "Criteria for a Recommended Standard...Working in Confined Space" may be used as guidance for conducting safe closure procedures at some hazardous substance tanks.

(D) ADEQ Guidelines for the Permanent Closure of Petroleum Underground Storage Tank Systems.

Assessing the site at closure or change-in-service.

In contrast to closure of a UST system, a "change-in-service" is the continued use of an UST system to store a non-regulated substance rather than a regulated substance.

Before permanent closure or a change-in-service is completed, owners and operators must measure for the presence of a release where contamination is most likely to be present at the UST site. In selecting sample types, sample locations, and measurement methods, owners and operators must consider the method of closure, the nature of the stored substance, the type of backfill, the depth to groundwater, and other factors appropriate for identifying the presence of a release. The requirements of this section are satisfied if vapor monitoring or groundwater monitoring is being used and is operating in accordance within the necessary requirements at the time of closure, and indicates no release has occurred.

If contaminated soils, contaminated groundwater, or free product as a liquid or vapor is discovered by the methods mentioned above or by any other manner, owners and operators must begin corrective action.

Applicability to previously closed UST systems.

When directed by ADEQ, the owner and operator of an UST system permanently closed before December 22, 1988, must assess the excavation zone and close the UST system in accordance with the applicable requirements if releases from the UST may, in the judgment of ADEQ, pose a current or potential threat to human health and the environment.

Closure records.

Owners and operators must maintain records that are capable of demonstrating compliance with closure requirements. The results of the excavation zone assessment must be maintained for at least 3 years after completion of permanent closure or change-in-service in one of the following ways:

(a) By the owners and operators who took the UST system out of service;

(b) By the current owners and operators of the UST system site; or

(c) By mailing these records to ADEQ if they cannot be maintained at the closed facility.

Section 11 - For More Information

This section identifies UST program contacts and other resources to help answer your questions and provide you with information about good UST management.

Internet Resources

Government Links

ADEQ's Home Page: http://www.adeq.state.ar.us
U.S. Environmental Protection Agency's Office of Underground Storage Tanks Home Page: http://www.epa.gov/oust. To go directly to the compliance assistance section of the Home page go to: http://www.epa.gov/swerust1/cmplastc/index.htm
Tanks Subcommittee of the Association of State and Territorial Solid Waste Management Officials (ASTSWMO): http://www.astswmo.org/programs_tanks.htm
New England Interstate Water Pollution Control Commission (NEIWPCC): http://www.neiwpcc.org

Professional And Trade Association Contact Information.

American Petroleum Institute (API): http://www.api.org
American Society of Testing and Materials (ASTM): http://www.astm.org
Fiberglass Tank and Pipe Institute (FTPI): http://www.fiberglasstankandpipe.com
NACE International - The Corrosion Society: http://www.nace.org
National Fire Protection Association (NFPA) : http://www.nfpa.org
Petroleum Equipment Institute (PEI): http://www.pei.org
Steel Tank Institute (STI): http://www.steeltank.com
Underwriters Laboratories (UL): http://www.ul.com

Free Informative Publications Available

Many UST-related publications are available for free from the U.S. Environmental Protection Agency (EPA). You can access these publications in the following ways.

Go to EPA's web site at http://www.epa.gov/oust/pubs/index.htm to order, read, or download documents online.
Write and ask for **free** publications by addressing your request to EPA's publication distributor: National Service Center for Environmental Publications (NSCEP), Box 42419, Cincinnati, OH 45242.
For **free** copies, call EPA's publication distributor's **toll-free** number at (800) 490-9198. Or go to http://www.epa.gov/nscep/ordering.htm for additional ordering methods.

[END OF STUDY GUIDE]