



Release Detection and Inventory Control for Underground Storage Tanks

A guide for owners and operators of USTs

This is module g of the PST Super Guide, a comprehensive guide to issues relating to petroleum storage tanks (PSTs). This super guide provides an overview to laws and regulations for PSTs and it can be used as an aid in minimizing potential risks. The guide does not replace those laws and regulations, which take precedence over any information in this publication.

Module g explains how to detect releases, account for inventory, and detect water in underground storage tanks (USTs).

- You, the owner or operator of a PST, are responsible for ensuring compliance with all applicable laws and regulations.
- If your UST system is located in Kinney, Uvalde, Medina, Bexar, Comal, Hays, Travis, or Williamson County, additional requirements related to protecting the Edwards or the Trinity Aquifer may apply (Title 30, Texas Administrative Code [30 TAC], Chapters 213 and 214).
- In addition to the laws and TCEQ rules, local governments, and other state and federal agencies may have rules that apply.

What is release detection?

Release detection is a way to determine if your UST system is leaking below ground and is not applicable to dispensers or aboveground equipment. It allows you to ensure that the tanks and piping are not releasing a petroleum substance into the soil or groundwater. All UST systems are required to have an approved release detection method to monitor at a frequency of at least every 30 days. “Leak detection” and “release detection” have the same meaning.

Why is it required?

Release detection is necessary to prevent or minimize releases of regulated substances (gasoline, diesel, used oil, etc.) into the environment. It involves periodic monitoring of your tanks and piping for leaks, which not only can contaminate soil and groundwater, but also incur a cost to you in lost product and remediation expenses in the event of a release. Effective detection allows for a quick response to signs of a release. Early action on your part protects the environment, while also protecting you from the high costs of cleaning up leaks and responding to liability claims. Often, when releases from

UST systems occur, the petroleum substance can affect soil or groundwater over an area much larger than the property on which the tanks are located, affecting other parties, and increasing the cost of cleanup.

Remember that release detection applies to both tanks and product piping. Together, the tanks and piping are referred to as a “UST system.” TCEQ rules apply to the UST system from underground up to the point where piping exits the ground, leading to the dispenser. Leak detection only affects that part of the UST system that is installed below ground, not dispensers or aboveground equipment.

Many methods are available for monitoring your tanks and piping for leaks, and they may be used in multiple combinations to achieve compliance. Some methods cover tanks only, some cover piping only, and some cover both tank and piping. It is important that you look at release detection not just as something required, but also as a tool that will help you make sure a regulated substance is not leaking from your UST system.

What is inventory control?

Regardless of your chosen release detection method, all retail facilities (where fuel products are sold to the public) are required to perform inventory control. Inventory control is an ongoing accounting system similar to balancing a checkbook. It compares what is in the tank to what should be in the tank by reconciling the inputs and outputs of product with the volume remaining in the UST.

Each day the tank is used, record the following information in your inventory control ledger or worksheet:

- records of product deliveries
- amounts dispensed
- measured volume of product remaining in the tank (inventory)

Electronic Inventory Control Worksheets for blended and non-blended systems are available at <www.tceq.texas.gov/assistance/industry/pst> or you can use your own paper ledger.

Determine fuel inventory by measuring the product level in the tank in one of two ways:

1. Use a measuring stick (sticking the tank) and then convert that level into a volume using a calibration chart specific to the tank size.
2. Use an automatic tank gauge capable of measuring the fuel level.

At the end of each 30-day monitoring period, compare the book inventory (what your recordkeeping indicates you *should* have based on amount of product dispensed) against the measured inventory to determine the total overage or shortage of product. Next, compare the overage or shortage to the “leak check” value calculated by a mathematical formula in the worksheet. The leak check value is described as the sum of 1 percent of the total substance flow-through for the month plus 130 gallons. To calculate the “leak check value” on your own ledger, multiply the total gallons of product dispensed by 0.01, then add 130 to that number. Write that answer as the “leak check” value on your ledger. If the overage or shortage exceeds the “leak check” value for two consecutive 30-day periods for the same tank, you must report a suspected release. (See *Suspected and Confirmed Releases from Petroleum Storage*

Tanks, TCEQ publication RG-475h, for more information about reporting suspected releases.)

Check all tanks for water at least once every 30 days. This required 30-day water check is used to quantify the water in the tank. A small amount may be expected, but it is critical to remove water from the tank before it interferes with dispensing operations. In addition, a sudden influx of water into the tank should be reported to the TCEQ as a suspected release.

If your system has tanks that share a common inventory of fuel, those tanks are considered to be “manifolded.” For example, two 1,000-gallon tanks that are connected (via a siphon line) are considered manifolded tanks. For the purpose of inventory control, you should consider all manifolded tanks as a single system.

Blended-fuel systems are those with no separate tank for a midgrade product. For example, a station sells three grades of gasoline, but only has two tanks. Fuel from each tank is blended to create the midgrade fuel. To complete proper inventory control, the blended fuel product must be accounted for in both of the tanks’ inventory-control records. *Doing proper inventory control on manifolded tanks and blended-fuel systems can be very complicated. For assistance, please call the SBLGA hotline at 800-447-2827.*

For more details and sample inventory control forms, see the U.S. Environmental Protection Agency’s publication no. 510-B-93-004, *Doing Inventory Control Right* available at <www.epa.gov/ust/doing-inventory-control-right-underground-storage-tanks>.

Is inventory control an acceptable method of 30-day release detection?

Inventory control is only effective for finding larger leaks and is not considered a stand-alone method of release detection; it must be used in combination with a 30-day method that can detect small leaks.

What are my options for detecting releases from tanks?

Monitor each tank for leaks at least once every 30 days. When properly employed, the following are acceptable methods of 30-day release detection:

- ***Automatic tank gauging (ATG) and inventory control*** use monitors permanently installed in the tank and linked electronically to a nearby control device to report product level and temperature. Often called the “tank monitor,” the control device is usually mounted on a wall inside a building and has a keypad with a message screen and a printing device. During a test period, the gauging system automatically calculates the changes in product volume that can indicate a leaking tank. The test will often fail or give an inconclusive result if the product level in the tank is too low or if product is added to or removed from the tank while the test is being run. Test periods require several hours of quiet time, when nothing is put into or taken from the tank. Users of the ATG system must perform a complete test on each tank at least once every 30 days and keep all leak test results. A failing test result may require that you notify the TCEQ of a suspected release. For more information on reporting suspected releases, refer to the module *Suspected Releases from Petroleum Storage Tanks* (RG-475h).

In addition to the ATG leak test, inventory control for each tank must be maintained as outlined in the previous section. Some ATG systems can perform inventory control and store the results in memory or print a copy.

- **Statistical inventory reconciliation (SIR) and inventory control** uses a computer program to determine whether a tank system is leaking by conducting a statistical analysis of inventory, delivery, and dispensing data collected over time. You send the data to an SIR vendor, who performs an analysis to determine if there is a loss trend in the UST system.

By the 15th calendar day following the last day of the 30-day monitoring period, the SIR vendor supplies a report that indicates whether the UST system is passing or failing.

If the analysis indicates a failure (or an inconclusive result that cannot be immediately corrected), the situation is considered a suspected release and must be reported to the TCEQ within 24 hours from the time the operator receives the results. **Important: even a single SIR failure requires notification and investigation of a suspected release, even if inventory control indicates there is no leak in the tanks.** In Texas, SIR is considered a 30-day monitoring method of release detection that covers tanks and lines.

- **Interstitial monitoring** is used in double-walled UST systems. Monitoring sensor equipment is designed to detect if product vapors or liquid is present in the interstitial space between the inner (primary) and outer (secondary) walls of the system. The sensor must monitor the interstitial space between the walls, and the sensor status must be documented at least once every 30 days. Document the status by printing your liquid sensor report from the manufacturer, if available, or by manually logging the status by hand.
- **Groundwater monitoring** uses monitoring wells that are installed at strategic locations in the ground near the tank system. Groundwater is monitored for the presence of liquid product (gasoline, diesel, used oil) floating on its surface. To discover if leaked product has reached groundwater, these wells are checked periodically (at least once every 30-days) by hand, or continuously with permanently installed equipment (electronic sensors). This method is only valid at sites where groundwater is within 20 feet of the surface year-round and the subsurface soil or backfill material (or both) consists of gravels, coarse to medium sands, or other similarly permeable materials. The person who installs the wells should state in writing that a release from any part of the UST system will be detected within 30-days of its occurrence.
- **Vapor monitoring** is the sensing and measurement of product vapor in the soil around the tank system to determine whether a leak is present. This method requires installation of carefully placed monitoring wells in the ground near the tank system. Vapor monitoring can be periodic (at least once every 30 days) using manual devices or continuous using permanently installed equipment (electronic sensors). All subsurface soils and backfill material must be sufficiently porous (e.g., gravel, sand) to allow vapors to diffuse rapidly through the subsurface. For this method of release detection to be acceptable, any preexisting background contamination in the subsurface soils must not interfere with the ability of the vapor-monitoring equipment to detect a new release. The person who installs the wells should state in writing that a release

from any part of the UST system will be detected within 30 days of its occurrence.

Note: For both groundwater monitoring and vapor monitoring, you are required to ensure subsurface conditions that enable the monitoring systems to detect a release from any portion of the system that contains product.

- **Secondary containment barriers** are impermeable barriers (i.e., liners, vaults) placed between the UST system and the environment. Leaked product from the UST system is directed toward monitoring points, such as observation wells located between the tank system and the secondary containment barrier. To determine if a leak has occurred, the wells should be checked periodically (at least once every 30 days) by hand or continuously with permanently installed equipment (electronic sensors).
- **Manual tank gauging** is only acceptable for tanks with a capacity of 1,000 gallons or less. It requires a quiet period each week where nothing is added to or removed from the tank. The length of the quiet period depends on the diameter of the tank. For that reason, very few owners or operators use this method of release detection. If you would like more information about this method, contact the SBLGA hotline at 800-447-2827.
- **30-day tank gauging** is only acceptable for emergency-generator tanks. It requires a quiet period, during which nothing is added to or removed from the tank. The product level is measured at the beginning and end of the quiet period. The difference between measurements should be within certain standards based on the capacity of your tank. At the end of module g, there is a 30-day tank gauging tracking sheet. If you would like more information on this method, contact the SBLGA hotline at 800-447-2827.

What other inspections are required?

Every 30 days, you must conduct and document a walkthrough inspection to ensure your release detection equipment is functioning correctly with no unusual operating conditions. For example, you must check for:

- Erratic behavior of product dispensing equipment;
- Sudden loss of product from the UST system;
- Unexplained presence of water in the tank; and
- Ensure release detection records are reviewed and current.

You must also annually inspect any hand-held equipment you use to conduct release detection on your system. For example, if you use a measuring stick to gauge your product level or use a groundwater bailer to monitor groundwater for releases, you must verify that the measurements are clear, and that the bailer is functioning properly. Keep records documenting the dates and results of these inspections.

What are my options for detecting releases from product piping?

There are two types of piping: pressurized and suction.

Pressurized Piping

Each pressurized product line (from the USTs to the fuel dispenser) is required to have an automatic line-leak detector (ALLD) designed to detect and prevent a large or catastrophic leak (of at least 3 gallons per hour) in the line. Mechanical ALLDs are required to be performance tested annually. If you have an electronic ALLD (also referred to as an ELLD) that can self-test and either print out or store the test results, documentation of the self-test at least once a year satisfies your ALLD-testing requirements. Contact your UST contractor for more information about ALLD testing.

In addition to an ALLD, pressurized piping requires one of the following release-detection methods:

- an annual piping-tightness test,
- 30-day vapor monitoring,
- 30-day groundwater monitoring,
- 30-day interstitial monitoring,
- 30-day monitoring with a secondary containment barrier,
- 30-day SIR and inventory control, or
- 30-day electronic leak monitoring through an ATG system.

Suction Piping

Suction piping requires no leak detection if it meets all of the following design requirements:

- The below-grade piping operates at less than atmospheric pressure;
- The below-grade piping is sloped so that the contents of the pipe drain back into the tank when suction is released;
- Only one check valve is included for each suction line and it is located directly below, and as close as possible to, the suction pump; and
- You are able to verify that these requirements have been met, e.g., via plans provided by the installer, a consultant, or signed documentation by a registered UST contractor.

Suction piping that does not meet the design requirements listed above must use one of the following approved methods to meet the release-detection requirements for piping:

- a piping-tightness test once every three years,
- 30-day vapor monitoring,
- 30-day groundwater monitoring,
- 30-day interstitial monitoring,
- 30-day monitoring with a secondary containment barrier, or
- 30-day SIR and inventory control.

What release detection records do I need to keep?

All testing and monitoring results, including the results of any annual function test of mechanical ALLDs, must be kept for at least five years.

All equipment used for release detection must have a third-party certification, which verifies that the equipment meets EPA standards. Each certification must list the conditions of use and limitations of the equipment. You must maintain copies of these certifications while the equipment is in use. You must ensure that the equipment is operated in accordance with the third-party certification. *Installation and maintenance records for the UST system must be maintained for the life of the system and should not be discarded after five years.*

The following supplemental record-keeping forms are included at the end of module g:

- 30-day Record of Vapor-Well Monitoring
- 30-day Record of Groundwater-Well Monitoring
- 30-day Record of Interstitial-Sensor Monitoring
- 30-day Record of Secondary Containment Well Monitoring
- Weekly Record of Manual Tank Gauging (Tanks <1,000 gallons)
- Record of 30-day Tank Gauging

What if there is a release?

If any of the release detection methods discussed in module g indicate that a leak has occurred, you are required to report it to TCEQ within 24 hours as a suspected release at 512-239-2200 or 800-832-8224.

For more information on what to do in the case of suspected releases, refer to the module *Suspected Releases from Petroleum Storage Tanks* (RG-475h).

Where do I find more information?

The complete requirements for release detection may be found at 30 TAC 334.50, available online at

[http://texreg.sos.state.tx.us/public/readtac\\$ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=30&pt=1&ch=334&rl=50](http://texreg.sos.state.tx.us/public/readtac$ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=30&pt=1&ch=334&rl=50).

Resources for PST facilities are available on our website at

<https://www.tceq.texas.gov/agency/data/lookup-data/pst-datasets-records.html> >.

Requirements for UST systems in the Edwards Aquifer are in 30 TAC 213 available online at

[http://texreg.sos.state.tx.us/public/readtac\\$ext.ViewTAC?tac_view=4&ti=30&pt=1&ch=213](http://texreg.sos.state.tx.us/public/readtac$ext.ViewTAC?tac_view=4&ti=30&pt=1&ch=213).

Requirements for UST systems over other aquifers are in 30 TAC 214 available at

[http://texreg.sos.state.tx.us/public/readtac\\$ext.ViewTAC?tac_view=4&ti=30&pt=1&ch=214&rl=Y](http://texreg.sos.state.tx.us/public/readtac$ext.ViewTAC?tac_view=4&ti=30&pt=1&ch=214&rl=Y).

The Small Business and Local Government Assistance Program has information designed to assist UST system owners and operators online at www.tceq.texas.gov/assistance/industry/pst/.

Download TCEQ publications online at www.tceq.texas.gov/goto/publications.

EPA's Underground Storage Tanks (USTs) webpage (please note that EPA requirements may be used as a guideline but differ from Texas requirements) at www.epa.gov/ust.

EPA's Doing Inventory Control Right (publication no. 510-B-93-004) provides details and sample inventory control forms at www.epa.gov/ust/doing-inventory-control-right-underground-storage-tanks.

Suspected Releases from Petroleum Storage Tanks (TCEQ Publication RG-475h), available online at www.tceq.texas.gov/goto/rg-475.

For confidential environmental compliance assistance for small businesses and local governments, contact Small Business and Local Government Assistance via its hotline at 800-447-2827 or online at www.TexasEnviroHelp.org.

30-Day Record of Vapor-Well Monitoring

If you have questions on how to complete this form or about the Petroleum Storage Tank (PST) program, please contact the Small Business and Local Government Assistance hotline at 1-800-447-2827, or online at <www.TexasEnviroHelp.org>.

Facility Information

Facility Name:	Facility ID No.:
Street Address:	City, State, Zip:

Instructions

- Vapor wells must be monitored at least once every 30 days for potential product releases.
- Monitoring and observation wells must be properly secured to prevent any unauthorized substances being deposited in the well.
- If there is a suspected release, notify the TCEQ within 24 hours and refer to *Suspected and Confirmed Releases from Petroleum Storage Tanks* (TCEQ publication RG-475h).
- Keep this form on file for at least 5 years.

Vapor Reading Instrument & Tank Information

Instrument Name and Type:	
Date Last Calibrated:	Depth from Ground Surface to Tank Bottom (in feet):

Vapor Monitoring Well Record

Date Inspected	Vapor Reading (in PPM)						Free Product in Well (Y/N)	Inspector Initials	Comments
	Well #1	Well #2	Well #3	Well #4	Well #5	Well #6			



30-Day Record of Groundwater-Well Monitoring

If you have questions on how to complete this form or about the Petroleum Storage Tank (PST) program, please contact the Small Business and Local Government Assistance hotline at 1-800-447-2827, or online at. <www.TexasEnviroHelp.org>.

Facility Information

Facility Name:	Facility ID No.:
Street Address:	City, State, Zip:

Instructions

- Groundwater wells must be monitored at least once every 30 days for potential product releases.
- Monitoring wells must be properly secured to prevent any unauthorized substances being deposited in the well.
- Automatic monitoring devices must be capable of detecting at least 1/8 inch of free product on top of the groundwater.
- Manual monitoring methods must be capable of detecting a visible sheen or other accumulation of regulated substances.
- If there is a suspected release, notify the TCEQ within 24 hours and refer to *Suspected Releases from Petroleum Storage Tanks* (TCEQ publication RG-475h).
- Keep this form on file for at least five years.

Groundwater

Depth from Ground Surface (in feet):	Depth to Tank Bottom (in feet):
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Groundwater- Monitoring Well

Date Inspected	Depth to Top of the Groundwater (in feet)						Free Product in Well (Y/N)	Inspector Initials	Comments
	Well #1	Well #2	Well #3	Well #4	Well #5	Well #6			



30-Day Record of Interstitial-Sensor Monitoring

If you have questions on how to complete this form or about the Petroleum Storage Tank (PST) program, please contact the Small Business and Local Government Assistance hotline at 1-800-447-2827, or online at <www.TexasEnviroHelp.org>.

Facility Information

Facility Name:	Facility ID No.:
Street Address:	City, State, Zip:

Instructions

- Interstitial sensors must be monitored at least once every 30 days for potential product releases.
- If there is a suspected release, notify the TCEQ within 24 hours and refer to *Suspected and Confirmed Releases from Petroleum Storage Tanks* (TCEQ publication RG-475h).
- Keep this form on file for at least five years.

Sensor Location (tank or dispenser [T/D])

Sensor #1	Sensor #2	Sensor #3	Sensor #4	Sensor #5	Sensor #6	Sensor #5	Sensor #6	Sensor #7	Sensor #8

Sensor -Status Record

Date Inspected	Sensor Status								Inspector Initials	Comments
	Sensor #1	Sensor #2	Sensor #3	Sensor #4	Sensor #5	Sensor #6	Sensor #7	Sensor #8		



30-Day Record of Secondary Containment Well Monitoring

If you have questions on how to complete this form or about the Petroleum Storage Tank (PST) program, please contact the Small Business and Local Government Assistance hotline at 1-800-447-2827, or online at www.TexasEnviroHelp.org.

Facility Information

Facility Name:	Facility ID No.:
Street Address:	City, State, Zip:

Instructions

- Observation wells must be monitored at least once every 30 days for potential product releases.
- *Note:* if your system uses observation wells or electronic sensors to determine if there is free product in the secondary containment, record any free product detected.
- Observation wells must be properly secured to prevent any unauthorized substances being deposited in the well.
- If there is a suspected release, notify the TCEQ within 24 hours and refer to *Suspected and Confirmed Releases from Petroleum Storage Tanks* (TCEQ publication RG-475h).
- Keep this form on file for at least five years.

Monitoring Method

Secondary-Containment Release-Detection Method (circle one):	
Observation Wells	Electronic Sensors

Observation Well or Sensor-Status Record

Date Inspected	Sensor-Status or Well Observation (Free product detected? (Y/N))						Inspector Initials	Comments
	Sensor/Well #1	Sensor/Well #2	Sensor/Well #3	Sensor/Well #4	Sensor/Well #5	Sensor/Well #6		



Weekly Record of Manual Tank Gauging (Tanks <1,000 gallons)

If you have questions on how to complete this form or about the Petroleum Storage Tank (PST) program, please contact the Small Business and Local Government Assistance hotline at 1-800-447-2827 or online at www.TexasEnviroHelp.org.

Facility Information

Facility Name:	Facility ID No.:
Street Address:	City, State, Zip:

Instructions

- Manual Tank Gauging must be performed weekly.
- In the table to the side, circle your tank size, duration, and standard.
- If the weekly total or average of the four weekly test results exceeds the standard in the table, your tank may be leaking.
- If there is a suspected release, notify TCEQ within 24 hours and refer to *Suspected and Confirmed Releases from Petroleum Storage Tanks* (TCEQ publication RG-475h).
- If you don't have sufficient quiet time, you must choose a different method of release detection.
- Release detection is a good business practice. Lost product, penalties and fines, and cleanup costs can add up to a significant amount of money.

Tank Size	Minimum Duration of the Test	Weekly Standard (1 test)	Monthly Standard (4-test average)
Up to 550 Gallons	36 hours	10 gallons	5 gallons
551-1000 gallons (when tank diameter is 64")	44 hours	9 gallons	4 gallons
551-1000 gallons (when tank diameter is 48")	58 hours	12 gallons	6 gallons

Gauge Record

Start Test (date and time)					
First Initial Stick Reading					
Second Initial Stick Reading					
Average Initial Reading					
Initial Gallons (convert inches to gallons) [a]					
End Test (date and time)					To calculate monthly average, divide sum of 4 weekly readings by 4 and enter results here ▼
First End Stick Reading					
Second End Stick Reading					
Average End Reading					
End Gallons (convert inches to gallons) [b]					
Change In Tank Volume (gallons + or -) [a-b]					
Initials					
Tank Passes Test? Y/N					



Record of Release Detection Annual Testing

If you have questions on how to complete this form or about the petroleum storage tank (PST) program, please contact the Small Business and Local Government Assistance Hotline at 1-800-447-2827 or visit our Web site at <www.TexasEnviroHelp.org>.

Facility Information

Facility Name:	Facility ID #:
Street Address:	City, State, ZIP:

Instructions

- Your release detection equipment must be tested annually for proper operation.
- The code of practice that may be used is Petroleum Equipment Institute (PEI) Publication RP1200, "Recommended Practices for the Testing and Verification of Spill, Overfill, Leak Detection and Secondary Containment Equipment at UST Facilities."
- If an item listed in the *Components Tested* column is not applicable to your facility, record "N/A" for that item.
- List any additional release detection equipment in the *Other Components Tested* column.
- Have the Release Detection Tester record the test date in the space above the table, complete the testing, and fill out the table below.
- In the last column, have the Release Detection Tester record the actions taken to fix any issues identified during the test.
- Have the Release Detection Tester sign and date the bottom of this form. Keep the form on file for at least 5 years.

Date(s) of annual release detection operation test: _____

<i>Component Tested</i>	<i>Name of Tester</i>	<i>Meets Criteria? (Y/N)</i>	<i>Needs Action? (Y/N)</i>	<i>Action Taken to Correct Issue</i>
Automatic tank gauge and other controllers: test alarm; verify system configuration; test battery backup.				
Probes and sensors: inspect for residual buildup; ensure floats move freely; ensure shaft is not damaged; ensure cables are free of kinks and breaks; test alarm operability and communication with controller.				
Automatic line leak detector: test to ensure device can detect any release from the piping system of 3 gallons per hour at 10 pounds per square inch within one hour by simulating a leak.				
Vacuum pumps and pressure gauges: ensure proper communication with sensors and controller.				
Hand-held electronic sampling equipment associated with groundwater or vapor monitoring: ensure proper operation.				
<i>Other Components Tested:</i>	<i>Name of Tester</i>	<i>Meets Criteria? (Y/N)</i>	<i>Needs Action? (Y/N)</i>	<i>Action Taken to Correct Issue</i>

Release Detection Tester Signature

Date

