TCEQ REGULATORY GUIDANCE
Program Support and Environmental Assistance Division
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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 of laws and regulations for PSTs and can be used to minimize 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 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 underground and does not apply 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 can not only 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 associated underground piping are referred to as a "UST system." TCEQ rules apply to the UST system starting from the underground components 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?

Inventory control is an ongoing accounting system like 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)

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. (Note: you must gauge the product to the closest 1/8 inch.)
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 the 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[1] 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 removing water from the tank is critical before it interferes with dispensing operations. In addition, a sudden influx of water into the tank should be reported to TCEQ as a suspected release.

If your system has tanks that share a common inventory of fuel, those tanks are considered "manifolded." For example, two 1,000-gallon tanks that are connected (via a siphon line) are considered manifolded tanks. For inventory control, 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 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, Doing Inventory Control Right[2], and our easy to use excel worksheets:

- Blended Fuel Inventory Control Worksheet[3]
- Non-Blended Fuel Inventory Control Worksheet[4]

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. Any facility (retail and non-retail) utilizing automatic tank gauging (ATG) or statistical inventory reconciliation (SIR) for their 30-day tank release detection must also conduct 30-day inventory control. The only exceptions to this are emergency generator tanks and used oil tanks, which may use ATG without inventory control for release detection.

Keep in mind, all retail facilities where fuel products are sold to the public are required to perform inventory control regardless of the chosen release detection method.

1. www.tceq.texas.gov/downloads/assistance/publications/rg-475h-suspected-and-confirmed-releases-from-psts
2. www.epa.gov/ust/doing-inventory-control-right-underground-storage-tanks
3. www.tceq.texas.gov/downloads/assistance/industry/pst/blended-30-day.xlsx
4. www.tceq.texas.gov/downloads/assistance/industry/pst/non-blended-30-day.xlsx

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 removed 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 TCEQ of a suspected release.

  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. It must be reported to 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 vapor 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. If your system was installed on or after January 1, 2009, then interstitial monitoring must be your primary release detection method.

- ***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 products (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 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.

- ***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 specific standards based on the capacity of your tank.

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.
- That 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 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 three types of piping: pressurized, suction, and gravity flow piping.

Pressurized Piping

Each pressurized product line (from the USTs to the fuel dispenser) must have an automatic line leak detector (ALLD) designed to detect and prevent a large or catastrophic leak in the line. ALLD equipment must be tested annually for proper operation by simulating a leak. The recommended code of practice that may be used for this test 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. 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
- 30-day electronic leak monitoring through an ATG system

Suction and Gravity Flow Piping

Suction piping requires no leak detection if it meets all 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 can verify that these requirements have been met, e.g., via plans provided by the installer, a Texas-licensed professional engineer, or signed documentation by a licensed UST contractor.

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

- 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
- 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 meet EPA standards and have a third-party certification verifying that it does. Each certification must list the conditions of use and limitations of the equipment. While the equipment is in use ensure that it is operated according to the certification. Maintain copies of these certifications, installation and maintenance records for the UST system for the life of the system.

We include the following example log sheets at the end of this document which you may use to compile your records:

- 30-Day Release Detection Walkthrough Inspection Log Sheet
- Interstitial Sensor Monitoring Log Sheet
- Groundwater or Vapor Well Inspection Log Sheets
- Secondary Containment Monitoring Log Sheet
- Manual Tank Gauging Weekly and Monthly Log Sheets
- 30-Day Tank Gauging Log Sheet
- Annual Release Detection Testing and Inspection Log Sheet

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 and Confirmed Releases from Petroleum Storage Tanks (RG-475h)[5].

Where do I find more information?

Find complete requirements in 30 TAC[6] for:

- Release detection equipment testing and walkthrough inspections (30 TAC 334.48)
- Release detection general requirements (30 TAC 334.50)
- Tanks in the Edwards Aquifer (30 TAC Chapter 213)
- Tanks over other aquifers (30 TAC Chapter 214)

Other online resources include:

- Forms for PST Facilities[7]
- Guidance for tank owners and operators[8] developed by our Small Business and Local Government Assistance (SBLGA) program
- TCEQ's Compliance Notebook for Underground Storage Tanks[9]
- Investigating and Reporting Releases from Petroleum Storage Tanks[10] (RG-411)
- TCEQ's publication search[11]
- EPA's Underground Storage Tanks (USTs) webpage[12] – please note that EPA requirements may be used as a guideline but differ from Texas requirements

Contact the Edwards Aquifer Protection Program[13] for more information.

For confidential environmental compliance assistance for small businesses and local governments, contact SBLGA at 800-447-2827 or online at www.TexasEnviroHelp.org.

5. www.tceq.texas.gov/downloads/assistance/publications/rg-475h-suspected-and-confirmed-releases-from-psts
6. www.tceq.texas.gov/goto/view-30tac
7. www.tceq.texas.gov/remediation/pst_rp/downloads.html
8. www.tceq.texas.gov/assistance/industry/pst
9. www.tceq.texas.gov/downloads/assistance/publications/rg-543.pdf
10. www.tceq.texas.gov/downloads/remediation/pst/responsible-party/investigating-and-reporting-releases-from-psts-rg-411.pdf
11. www.tceq.texas.gov/publications
12. www.epa.gov/ust
13. www.tceq.texas.gov/permitting/eapp

30-Day Release Detection Walkthrough Inspection: Log Sheet

Records Current?	Equipment Operational?	Name of Inspector	Description of Issues and Corrective Actions Taken (if any)	Date

Interstitial Sensor Monitoring: Log Sheet

Sensor Location

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

Sensor Status Log

Date	S1	S2	S3	S4	S5	S6	S7	S8	Inspector Initials	Comments

Groundwater or Vapor Well Inspection: Log Sheet

Groundwater Depth

From Ground Surface:	
To Tank Bottom:	

All depths measured in feet.

Vapor Reading Instrument and Depth Information

Depth from Ground Surface to Tank Bottom:	
Instrument Name and Type:	
Date of Last Instrument Calibration:	

Groundwater or Vapor Monitoring Well Inspections

Date	Well 1	Well 2	Well 3	Well 4	Well 5	Well 6	Free Product in Well?	Comments	Inspector Initials
							☐ Yes ☐ No		
							☐ Yes ☐ No		
							☐ Yes ☐ No		
							☐ Yes ☐ No		
							☐ Yes ☐ No		
							☐ Yes ☐ No		
							☐ Yes ☐ No		
							☐ Yes ☐ No		
							☐ Yes ☐ No		
							☐ Yes ☐ No		

Secondary Containment Monitoring: Log Sheet

Monitoring Method

Select Your Monitoring Method:	☐ Electronic Sensors ☐ Observation Wells

Vapor Monitoring Well Inspections

Date	Sensor/ Well 1	Sensor/ Well 2	Sensor/ Well 3	Sensor/ Well 4	Sensor/ Well 5	Sensor/ Well 6	Comments	Inspector Initials

Manual Tank Gauging: Weekly Log Sheet

Start of Test Record

Data to Record	Tank ID:	Tank ID:	Tank ID:	Tank ID:
Test Start (Date and Time)				
First Stick Reading (inches)				
Second Stick Reading (inches)				
Average of Initial Readings (inches)				
Initial Gallons (Convert from inches)				

End of Test Record (tank IDs continue from above)

Data to Record				
Test End (Date and Time)				
First Stick Reading (inches)				
Second Stick Reading (inches)				
Average of Final Readings (inches)				
Final Gallons (Convert from inches)				

Test Results (tank IDs continue from above)

Data to Record				
Change in Tank Volume (gal. + or -)				
Tester Initials				
Tank Passes Test?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Manual Tank Gauging: Monthly Average Log Sheet

Month and Year:

Data to Record	***Tank ID:***	***Tank ID:***	***Tank ID:***	***Tank ID:***
Week 1 Volume Change				
Week 2 Volume Change				
Week 3 Volume Change				
Week 4 Volume Change				
Monthly Average (+ or -)				
Tank Passes Test?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Month and Year:

Data to Record	***Tank ID:***	***Tank ID:***	***Tank ID:***	***Tank ID:***
Week 1 Volume Change				
Week 2 Volume Change				
Week 3 Volume Change				
Week 4 Volume Change				
Monthly Average (+ or -)				
Tank Passes Test?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Month and Year:

Data to Record	***Tank ID:***	***Tank ID:***	***Tank ID:***	***Tank ID:***
Week 1 Volume Change				
Week 2 Volume Change				
Week 3 Volume Change				
Week 4 Volume Change				
Monthly Average (+ or -)				
Tank Passes Test?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

30-Day Tank Gauging: Log Sheet

Start of Test Record

Data to Record	***Tank ID:***	***Tank ID:***	***Tank ID:***	***Tank ID:***
Test Start (Date and Time)				
First Stick Reading (inches)				
Second Stick Reading (inches)				
Average of Initial Readings (inches)				
Initial Gallons (Convert from inches)				

End of Test Record (tank IDs continue from above)

Data to Record				
Test End (Date and Time)				
First Stick Reading (inches)				
Second Stick Reading (inches)				
Average of Final Readings (inches)				
Final Gallons (Convert from inches)				

Test Results (tank IDs continue from above)

Data to Record				
Change in Tank Volume (gallons + or -)				
Tester Initials				
Tank Passes Test?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Annual Release Detection Testing and Inspection: Log Sheet

Test Date:		**Tester Name:**		**Tester Signature:**	

Equipment Test and Inspection Summary

Equipment[14]	**Tested and Inspected?**	**Needs Action?**	**Corrective Actions Taken (if any are needed)**
Automatic tank gauge and other controllers: test the alarm and battery backup and verify the system configuration.			
Probes and sensors: test alarm operability and communication with controller, check for residual buildup and confirm floats move freely, shaft is not damaged, and cables are free of kinks and breaks.			
Automatic line leak detector: confirm it can detect piping system releases[15] by simulating a leak.			
Vacuum pumps and pressure gauges: confirm they communicate with the sensors and controller.			
Hand-held electronic release detection equipment: confirm it operates properly.			
Groundwater and vapor monitoring equipment: make sure it operates properly.			
Handheld release detection equipment: (e.g., groundwater bailers) make sure it is operable and serviceable.			

14. Include any other release detection equipment in the blank rows of this table.
15. It must be able to detect releases of 3 gallons per hour at 10 pounds per square inch within 1 hour.