Underground Storage Tanks

The Basics

A resource for UST System Owners and Operators in Iowa

Iowa Department of Natural Resources
Underground Storage Tanks Section

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Disclaimer

This publication is advisory only and does not give specific legal advice. It is intended to assist owners and operators with underground storage tank-related issues. Compliance with applicable statutes is the responsibility of each individual facility's owner and operator. Every attempt has been made to verify the accuracy of the information contained herein. However, it carries no warranty, expressed or implied, as to its accuracy, and the information presented is subject to change at any time without notice. Mention of any firm, product, service, or process in this publication is for educational purposes only and does not constitute a recommendation or endorsement, nor does it attempt to reflect negatively on others which are not mentioned.

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Chapter 1 Introduction

Owning and operating an underground storage tank (UST) system in the State of Iowa is a sophisticated operation. As you know, there are numerous and stringent regulations regarding the installation, maintenance and operation of your UST system. Over time, these regulations have grown in number and complexity. Understanding these requirements is critical to maintaining compliance. The UST Section of the DNR is committed to providing you with the tools necessary to do just that--own and operate an underground storage tank system in compliance with the rules and regulations enforced by the Iowa DNR.

It was with you in mind that USTs – The Basics was written. As we see it, we are your partner in regulatory compliance. While it is the role of the DNR to enforce the rules and regulations, it is also our responsibility to inform and assist tank owners and operators with their compliance issues. This becomes especially important as we implement operator training. The more operators know about their UST system the better off we all will be in terms of loss prevention, compliance with regulations, groundwater protection and public safety.

As we see it, we are your partner in regulatory compliance. While it is the role of the DNR to enforce the rules and regulations, it is also our responsibility to inform and assist tank owners and operators with their compliance issues.

It is our hope that this manual provides critical information in a format that is easier to understand than that found in typical regulatory documents. We hope you find this information useful. Of course, not every subject could be covered in this manual. If you have additional questions or require clarification regarding any compliance issues please do not hesitate to contact your compliance inspector directly, the field office in the region where your site is located or the central office (see next page for field office locations and phone numbers).

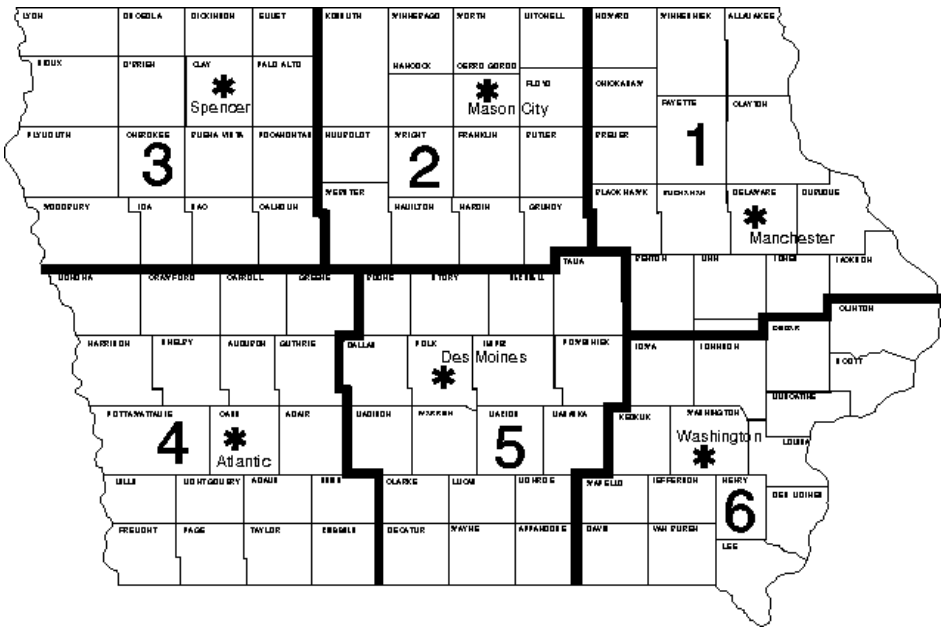
The Field Services and Compliance Bureau consists of six field offices throughout the state. They are local representatives of the Environmental Services Division, and a primary task for them is helping people to understand environmental programs and requirements, such as the UST Section requirements.

The field offices conduct audits of third party compliance inspections among other duties for other program areas. Field office staff who work with the UST program are well-trained and knowledgeable about UST technical requirements and in preventing releases from UST systems. They respond to and investigate spills, releases and complaints; they conduct follow up investigations, handle enforcement and in general serve as an UST Section's liaison in the field with UST owners and operators.

Field Office Contacts

Field Office 1	Manchester, IA 52057 909 W Main St, Ste 4 563.927.2640
Field Office 2	Mason City, IA 50401 2300—15th St SW 641.424.4073
Field Office 3	Spencer, IA 51301 1900 N Grand Ave E17 712.262.4177
Field Office 4	Atlantic, IA 50022 1401 Sunnyside Lane 712.243.1934
Field Office 5	Des Moines, IA 50309 401 SW 7th, Ste 1 515.725.0268
Field Office 6	Washington, IA 52353 1004 W Madison 319.653.2135

Iowa Department of Natural Resources
Environmental Services Division Field Office Map



Contact Information
It is our desire to assist you in your compliance effort. If you have questions that are not addressed in this manual or would like additional information regarding underground storage tank systems, please contact us directly at:

Iowa DNR
Underground Storage Tank Section
Wallace State Office Bldg.
502 East 9th Street
Des Moines, IA 50319-0034

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The term "system" not only refers to the tank itself, but also to the connected piping and associated equipment (monitoring system, etc.).

UST Section Website:

www.iowadnr.gov/land/ust/index.html

Authority
The Iowa DNR, UST Section (Environmental Services Division, Land Quality Bureau) regulates underground storage tank systems in Iowa under Chapter 567—135 of the Iowa Administrative Code: *Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks*. The UST Section implements and enforces the underground storage tank rules set forth in Chapter 567--135 of the Iowa Administrative Code. These regulations were adopted from the federal regulations (40 CFR Part 280). Iowa Stat-

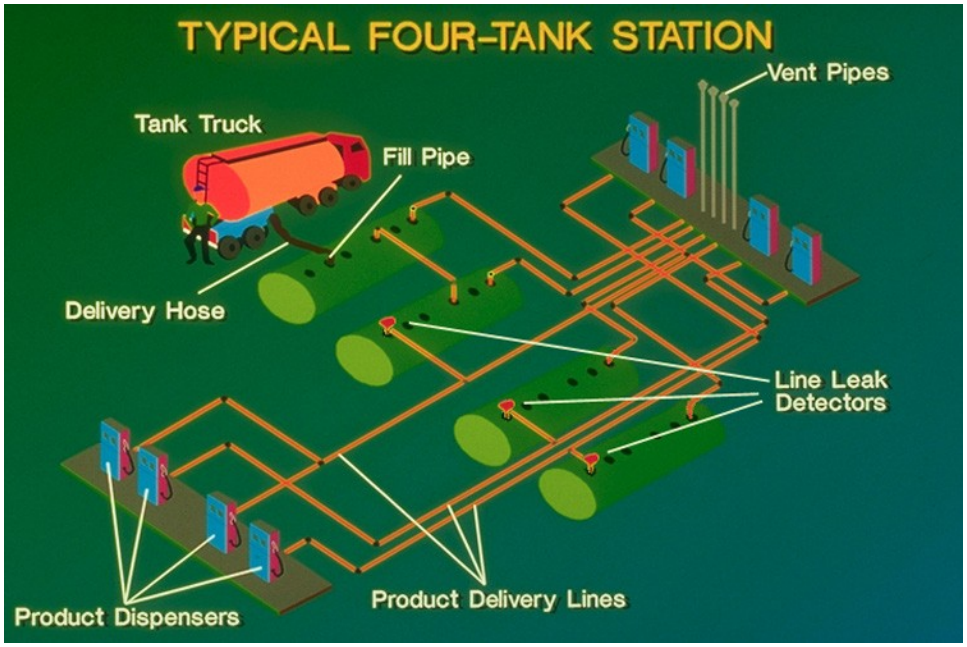
ute 455B.474 gives the state's Environmental Protection Commission authority to create rules for the UST program and gives the DNR oversight of the program. The UST Section further revises Chapter 135 to incorporate changes in technical, material, operational, and safety and health standards.

Tank Overview

Before we discuss UST compliance, we must first have an understanding of what a UST is and what it is not.

Simply put, a UST system is used to store petroleum or hazardous substances underground. The term "system" not only refers to the tank itself, but also to the connected piping and associated equipment (monitoring system, etc.). Dispensers are located above ground but we consider them as part of the overall UST system. While these systems are commonly associated with gas stations and convenience stores, there are many other applications for UST systems. Examples include emergency generator systems, waste oil tanks, and chemical and hazardous substance storage tank systems.

An existing UST installed prior to August 8, 2007, are only required to have primary, or single-walled, containment.



According to Chapter 567—135 of the Iowa Administrative Code, an underground storage tank is defined as:

> *…any one or combination of tanks, including pipes connected thereto, that is used for the storage of hazardous substances and the volume of which (including piping) is 10 percent or more beneath the surface of the ground.*

Although they may meet the above definition, the following systems are exempt from UST regulations:

- Tanks with a capacity of 1,100 gallons or less located on a farm and used for the storage of motor vehicle fuel for the primary purpose of agricultural use and installed before July 1, 1987. (Registration is required)
- Residential tanks of 1,100 gallons or less located at a residence and used for dwelling purposes. (Registration is required)
- Tanks 110 gallons or fewer
- Tanks used for storing heating oil for use on the premises where the tanks are buried
- Oil/water separators, flow-through process tanks, pipeline facilities, oil field gathering lines, surface impoundments, pits, ponds or lagoons, storm-water or waste-water collection systems
- UST systems removed from service and emptied by January 1, 1974
- UST systems removed from the ground by July 1, 1985

Now that we have established the definition of an underground storage tank, we can begin our discussion of the construction and monitoring requirements for these systems. There is, however, one fundamental distinction that drives many of these construction and monitoring requirements. The difference between a "new" and "existing" underground storage tank is the determining factor.

By definition, an existing UST is one installed prior to August 8, 2007. These tanks are only required to have primary, or single-walled, containment. Tanks installed on or after August 8, 2007, are required to have secondary containment. Secondary containment provides a means for capturing spills of the stored petroleum or hazardous substance in the event of a primary containment failure. These double-walled systems dramatically changed how UST systems were constructed and also revolutionized leak detection monitoring methods. This will be discussed in greater detail in Chapter 3.

It should be noted that existing systems requiring replacement of some or all of the primary piping may be required to upgrade to double-walled components as part of the construction.

Chapter 2 Notification and Tank Management Tags

All regulated underground storage tanks must be issued permanent tank management tags. Tanks 1100 gallons or fewer receive a permanent silver tag. Tanks larger than 1100 gallons are issued a purple permanent tag to identify the tank until it is permanently closed and an annual tag for the period of April 1 through March 31 of the following year. Initial tank tags are issued upon completion of tank installation.

In order to be issued permanent and annual tags to operate, a facility must be in compliance with the laws and regulations specified in Chapter 567—135 IAC. This includes payment of the tank management and registration fees, having an approved method of financial responsibility (pollution liability and accidental release insurance that is current), submittal of the registration form, installation inspection checklist, tightness test results and manufacturer's installation checklist.

Purple permanent tags must remain attached to the tank until it is permanently closed.

For new tank installations, the following documents are required to be submitted to the UST Section (the tank owner/operator should maintain a copy of all submitted documents):

- **Notification of Installation**
  - Notification is required 30 days before the installation by the owner or installer for pre-approval of construction
- **Registration Form**
  - Installer's certification of completion of the installation.
  - Identifies the owner/operator/authorized agent.
  - Provides a description and construction details of the underground storage tank system
  - Submitted by owner within 30 days after the tanks are placed in the ground, tested, and covered
  - Tank management fees are submitted with registration form
  - NESHAP (Air Quality) requirements
- **Installation Inspection Checklist**
  - Inspector's certification of installation process
  - Submitted by the installation inspector within 14 days after the final inspection
- **UST System Tightness Test Results**
  - Confirms UST system is tight with no damage incurred during shipping or installation
  - Submitted together with the registration form
- **Certification of Financial Responsibility**
  - Documentation to demonstrate compliance with state and federal financial responsibility requirements applicable to

underground storage tanks containing petroleum submitted together with registration form
- Must be current and written for current UST system owner

Permanent and Annual Tank Management Tags
Each regulated underground storage tank is issued a permanent tag that identifies that tank in the UST database, and remains attached to the fill port for the life of the tank. An annual tag also is issued each year (unless the tank is less than or equal to 1100 gallons capacity). Tank tags are extremely important in identifying fill ports and confirming that a site was in compliance when the annual tag was issued.

Transport drivers may not transfer product to tanks that are not identified with either a permanent or annual tag. If permanent and current annual tags are not present on a fill port, deliveries may not take place to that tank. Tank tags also identify a fill port from a monitoring well, otherwise, there could be a lot more deliveries to monitoring wells than have already occurred.

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Annual tank management tags are issued for the period of April 1 through March 31 of each year. Initial tank management tags are issued upon completion of installation requirements. Tank management fees are $65.00 per tank or compartment and $10 for registration. These fees are received by the DNR, which keeps only 23% of the tank management fee. The balance goes to the UST Fund

Permanent tag

2010-2011 annual tag

Chapter 3 Monitoring UST Systems

All underground storage tanks must be monitored at least monthly in order to alert the tank operator to the presence of a leak in the system. The type of monitoring is dependent on the type of system installed. Double-walled tanks and piping may be monitored differently than single-walled components. In this section, we will describe the different monitoring methods approved for your system.

New Tanks

Monitoring

All new UST systems installed after August 8, 2007 must have secondary containment. This means a primary and secondary wall (double wall) in tanks and piping, sumps at the tank top, transition sumps for piping and under dispenser containment (UDC). Secondary containment is a preventative measure to provide extra security in case a break occurs in the primary wall.

All new UST systems installed after August 8, 2007 must have secondary containment.

New double wall UST systems require monitoring of the "interstitial" or "annular" space, in other words, the space between the primary and secondary walls. For double-walled tanks, monitoring typically consists of a non-visual method. Non-visual methods rely upon an electronic monitoring system to detect leaks in the underground tank system. As with single-walled tanks, visual monitoring is an option, however, it is not practical for most applications.

Non-visual tank monitoring consists of a sensor installed at the lowest part of the tank between the primary and secondary tank walls. Any liquid escaping from the primary tank will be detected by the sensor and cause the monitor to alarm. Similarly, if the integrity of the outer wall is compromised, any liquid entering from outside of the system will be detected.

Secondarily-contained, or double-walled piping also requires either continuous or visual monitoring. Gravity is used to help with this method. All underground storage tank piping is oriented so that it slopes back to a monitored sump, or low point.

A leak in any portion of the primary piping will flow

down through the secondary piping to the monitored sump. In a continuously monitored system, the liquid will be detected by a sensor and cause the monitor to alarm, thereby alerting the operator of the leak. In the visual method, the sump must be opened and visually checked at least once per month.

For tanks installed on or after August 8, 2007, the primary and secondary containment structures must be continuously or manually monitored. By far, the most accurate and reliable method for monitoring the interstitial space is continuous electronic monitoring.

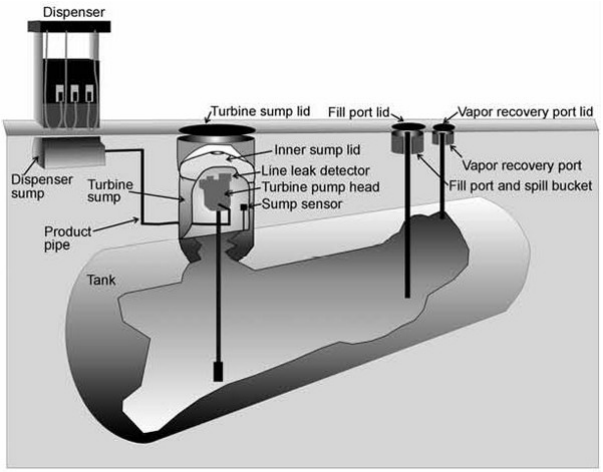
Monitoring Equipment and Programming

Sensors used to monitor pressurized piping are only required to notify the operator by an audible and/or visual alarm. Most monitoring systems can be programmed to shut off product flow when a leak is detected. This is known as "positive shut-down."

For tanks installed on or after August 8, 2007, the primary and secondary containment structures must be continuously or manually monitored.

The sensor must be positioned in the tank-top sump to detect a piping leak as early as possible. In order to do this, the sensor must be located at the low point in the sump closest to the piping penetration. The cut away shows a correctly positioned sensor.

Under Dispenser Containment (UDC)



The under-dispenser containment, or UDC, is a sump located under each dispenser. It is also considered to be part of the secondary containment. This is because the secondary piping terminates shortly after entering the UDC, leaving the primary piping exposed to travel up into the dispenser. The under dispenser containment is designed to contain leakage from the primary piping that may occur within the UDC/dispenser area.

A monitoring device must be installed in the UDC to detect the presence of a leak or the sump must be inspected monthly for a leak. There are several types of sensors that are approved for UDC monitoring. The two common types are electronic and mechanical. Although they may function differently, both will stop flow of product at the dispenser when a leak is detected.

Monitoring the UDC

Electronic under-dispenser sensors that communicate with the monitoring system typically shut down the turbine and trigger an audible

and/or visual alarm. Some electronic sensors, also known as "stand-alone" sensors, operate by shutting down the power to the affected dispenser, thereby stopping product flow.

Mechanical sensors function by using a float mechanism. As the liquid level in the UDC increases, a float rises. This float assembly "trips" the shear valve thereby stopping product flow. The idea is the customer then notifies the operator.

Visual inspection of the UDC requires opening up the dispenser to check the UDC at least once a month.

Existing Tanks

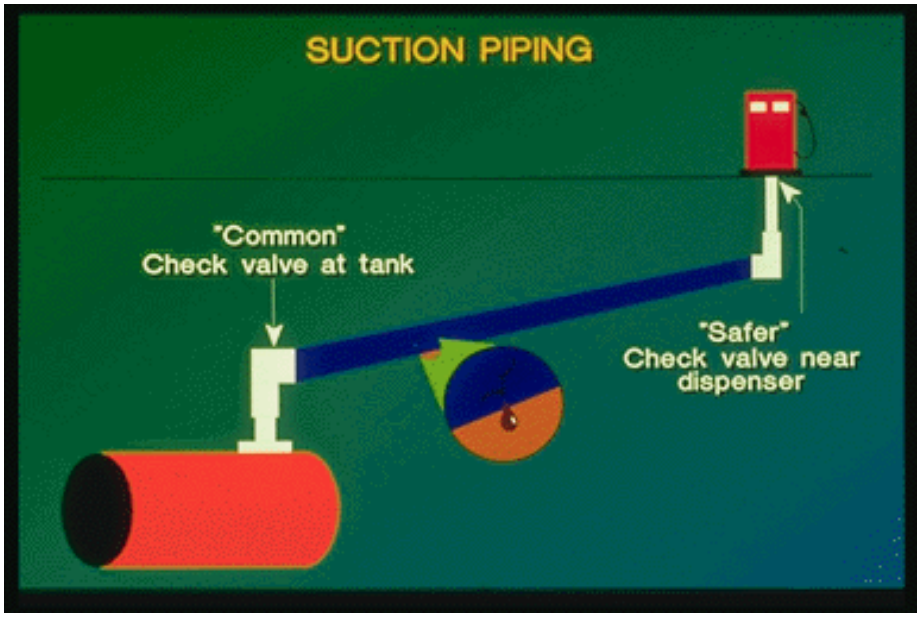
Pressurized and Suction Delivery Systems

Roughly 70 percent of the petroleum marketing facilities in Iowa feature a pressurized delivery system, which pushes product from the tank to the dispenser. The remaining 30 percent use either European or American suction delivery systems, both of which pull the product out of the tank instead of pushing it, and operate at atmospheric pressure.

European suction systems are the safest delivery systems (for the public and environment), and are referred to as "Safer Suction" systems.

Suction Delivery Systems

European suction systems are the safest systems (for the public and environment), and are referred to as "safer suction" systems. If a hole or break develops in a safer suction system, the prime or suction is broken in the piping and the product in the line flows back to the tank. All suction piping is installed to slope back to the tank. Safer



suction systems do not require monthly leak detection monitoring because the possibility of a release to the environment is minimized.

American suction systems, called "suction" or "unsafe suction" feature a check valve at the tank top which prevents the product from draining back into the tank. If a leak develops in suction piping, the product above the hole or break in the piping wall will leak.

Pressurized Delivery Systems

The advantage of pressurized delivery systems is fast, high-volume delivery over any distance. Suction systems are slower delivery systems, and are commonly used at small petroleum marketing facilities and fleet fueling sites with a smaller area to cover.

A pressurized delivery system pushes product through the automatic line leak detector and into the piping at 25 to 30 psi during full flow.

A pressurized delivery system has a 1.5 to 5 hp submersible turbine pump (STP), which connects to the tank top riser. Product is pushed from the STP motor in the bottom of the tank to the top of the tank and into the turbine manifold where an automatic line leak detector is attached. The product is then pushed through the ALLD and then into the piping at 25 to 30 pounds per square inch (psi) during full flow.

Requirements for Piping Leak Detection for Pressurized Product Lines

In order to conduct continuous monitoring of pressurized lines, the lines must be equipped with an automatic line leak detector (ALLD) that is capable of detecting leaks of 3 gallons per hour at 10 pounds per square inch line pressure within 1 hour. When such a leak is detected, the ALLD must respond by doing one of the following:

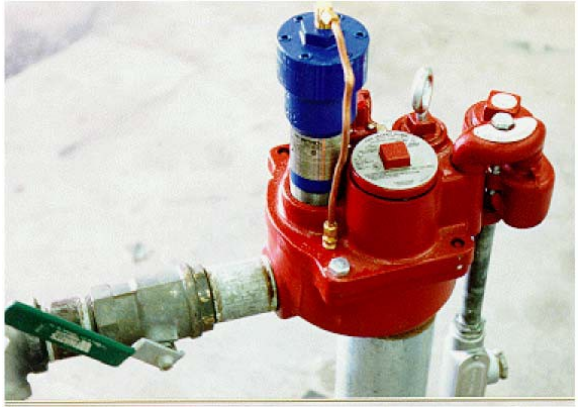
- trigger an alarm (audible and/or visual),
- restrict (slow) product flow, or
- shut off product flow IAC 567—135.5(5)"a."

The ALLD can be either mechanical or electronic. All ALLDs are designed to indicate a leak in the piping between the leak detector and the dispenser.

Mechanical Line Leak Detector (MLLD) Operation

When the dispenser is activated and the STP is turned on, a controlled amount of product flows from the pump through the MLLD (1.5 to 3 gallons per minute). The MLLD is now in leak sensing position. Pressure in the MLLD builds rapidly to 8 to 10 psi. If there is a loss of 3 GPH or larger, the line pressure will not build beyond this point and the MLLD will remain in the leak sensing position.

If someone tries to dispense product when the MLLD is in the leak sensing position the line pressure will drop and the MLLD will restrict



the flow to 1.5 to 3 GPM to the dispenser. It takes about two seconds for the MLLD to run in leak sensing position.

If there is a leak smaller than 3 GPH, it will take longer than 2 seconds for the MLLD to open completely and allow full flow. The MLLD will continue to push product out the hole or break in the piping as long as the leak is smaller than 3 GPH, which can add up to a large loss of product.

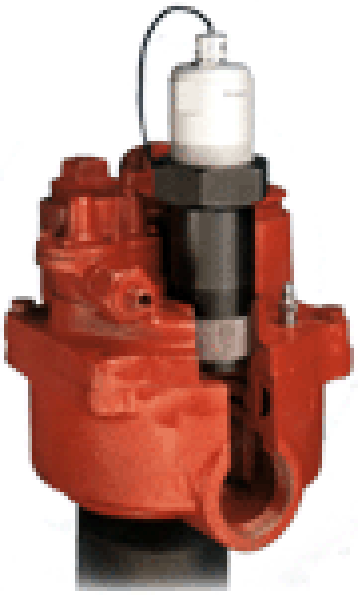
When the MLLD restricts flow, this is the signal to the operator that there is a leak in the system. The customer recognizes that what used to take two minutes now takes more than 10 minutes and reports the "slow flow" problem to the operator. The operator's proper response is to shut down the line until the problem can be investigated further.

You can see the problem that could develop with single-walled piping systems. If a break occurs in the single-walled line, the MLLD will go into slow flow, and unless the problem is reported and the pump shut down, product will continue to be forced out through the break into the backfill. All Single-walled-piping with pressurized delivery should have an electronic line leak detector with positive shutdown capability. All pressurized product lines must have either a MLLD or an ELLD.

If a break occurs in the single-walled line, the MLLD will go into slow flow, and unless the problem is reported and the pump shut down, product will continue to be forced out through the break into the backfill.

Electronic Line Leak Detection

The most effective option for pressurized delivery systems is to install an ELLD that is capable of positive shutdown. ELLDs represent a significant technological advancement over MLLDs and are usually integrated into automatic tank gauging systems (ATGs), which allow operators to control the entire leak detection monitoring system from a single location.



ELLDs are installed at the turbine head and wired to the control panel of the ATG system or its own control box. They feature a sensor or transducer that can find leaks as small as 0.1 GPH instead of the 3 GPH of the MLLDs. The ELLD monitors changes in pressure in the product line after the customer finishes dispensing. When the STP shuts off, the ELLD tests for pressure decay or loss of product. If

the test fails, the ELLD will shut down the STP or signal a release to the operator.

Tank Leak Detection

Automatic Tank Gauging Systems (ATG)

ATG systems consist of a tank probe mechanism installed in the tank that records information such as product level and temperature. One control panel inside the facility can operate probes in several tanks. The control panel essentially is a computer processor that communicates with the probes in each tank as well as any sensors connected to it. The computer processor collects, interprets and analyzes the information from the probes.

The ATG system is a remarkable piece of leak detection technology. It can provide accurate and reliable measurements of product volume and temperature and look for leaks as low as 0.1 gph.

Information from the processor is communicated to the operator via on-site or remote printer, audible/visual alarms or display monitor. Most newer model ATGs are capable of measuring the following:

- Gross volume—volume of product in the tank based on the product depth and the tank's depth to volume conversion factor
- Product temperature—the average temperature of the product in the tank
- Net volume—temperature-compensated volume of product calculated at 60º Fahrenheit),
- Water volume—the depth of water in the tank in inches
- Product depth—depth of the product in the tank in inches
- Ullage—the capacity of the tank minus the gross volume of product or the empty space above the product level
- Net delivered product volume—automatic calculation of delivery volume based on before and after product level and temperature measurements. This volume is temperature compensated to 60ºF of product delivered
- Leak test result—the results of the most recent as well as past leak tests. The result of a leak test may be a pass, fail, inconclusive or test aborted, etc.

ATGs can be programmed to send audible/visible alarms when various problems exist. Most models include the following alarms:

- High product level—this is usually an overfill, when product exceeds a high level set point, either 90 or 95% of the tank's capacity an audible and visual alarm engages. If product transfer procedures were done correctly, this alarm would not engage because product would be ordered based on the formula: tank capacity in gallons X 90% minus product currently in tank = maximum amount calculation. The alarm engages to notify the transport driver that an overfill is about to occur if the product transfer is not stopped
- Low product level alarm—this alarm engages when the product level is below a low-level set point. It is used to notify the operator that inventory is low and a delivery is needed
- High water alarm—ATGs are required to be able to detect and measure the presence of water in the tank. Water ingress could indicate a leak in the tank. Water ingress should always be investigated, but it could be from condensation or ingress through tank top access. Tank top access should always be tight and sealed
- Theft alarm: if product level drops significantly when the facility is not operating this alarm will engage. It may signal a theft or a catastrophic release
- Leak test alarm—engages when a leak test indicates a leak or when the system has not been able to perform a leak test during a pre-specified time

Find your ATG system on the National Work Group on Leak Detector Evaluations (NWGLDE): **www.nwglde.org** to ensure you are testing within the range for which the ATG system was evaluated.

ATG systems (control panels) can also monitor the following components:

- External sensors—liquid detecting sensors can be connected to the ATG system to monitor interstitial spaces, sumps, vapor and groundwater monitoring wells and under dispenser containment

- Line leak detectors—ATG systems can provide leak detection for the pressurized product line as well as the tank. When connected to an electronic line leak detector, the ATG system can print line leak tests, trigger an alarm and/or shut down the submersible turbine pump when a leak is detected.

- Communications—ATG consoles can be equipped with modems for remote communication capabilities, ports for communication with point-of-sale (POS) to integrate sales and inventory data, and automatic dialers to alert off-site personnel of conditions at a facility.

ATG systems are capable of testing only the portion of the tank that contains product. Therefore, if a tank is routinely filled to 80 percent of its capacity, it should be tested near that level at least once per month. It defeats the purpose of leak detection to run the tests only on partially filled tanks. It is also easier to detect a release in a tank that is 80 percent full than a tank that is 50 percent full because of the greater head pressure. An ATG system cannot be as accurate finding a 0.2-gallon per-hour leak in the tank when it is 50 percent full compared to 80 percent full.

When using SIR, compare the calculated leak rate with the threshold. If the calculated leak rate exceeds the reportable loss threshold, a "Fail" should be declared and further investigation required.

Find your ATG system on the list of Leak Detection Evaluations for UST Systems to ensure you are testing within the range for which it was evaluated.

The list is published by the EPA and is based on reviews of the National Work Group on Leak Detection Evaluations (NWGLDE), and can found at this website: **http://www.nwglde.org**.

To summarize ATG system monitoring requirements:

- Monthly 0.2 gallon per hour test
- Monthly tank test results must be printed out by the monitoring systems and be available for review

Statistical Inventory Reconciliation (SIR)

SIR is commonly used as a supplemental method of leak detection if not as a stand-alone method. SIR analyzes inventory, delivery, and dispensing data collected over a month's time to determine whether or not a tank system is leaking. SIR must be capable of detecting at least a 0.2-gallon-per-hour leak rate to be used as an acceptable monitoring method. A two-week turnaround on SIR reports is required. Data is collected each day of operation, either by gauging stick or ATG system and submitted monthly 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 may be leaking. The SIR vendor provides you with a monthly test report of the analysis. Make sure your SIR vendor can provide the test report within 2 weeks.

There are three possible bottom-line responses for any SIR test results: ***Pass, Fail or Inconclusive.*** When you review your SIR reports, look at the calculated leak rate, the minimum detectable leak rate and the leak threshold to make sure they equate with the result of Pass. In the past, we have found tanks that have been declared passing by the vendor when, in fact, the calculated leak rate exceeded the threshold.

The leak threshold is a value set by the leak detection system manufacturer in order to meet the probability of detection (95%) and probability of false alarm (5%). Sometimes the threshold is raised in order to reduce the instances of false alarms. Compare the calculated leak rate with the threshold. If the calculated leak rate (0.735 in the example below) exceeds the reportable loss threshold (0.13 in the example below), a "Fail" should be declared and further investigation required.

See the EPA booklet, *Doing Inventory Right*, to better understand how to stick your tanks, and do the math and recordkeeping when using inventory control.

Sample SIR Monthly Report

Tank ID	Product	System Status	Measured Leak Rate	Threshold	MDL
001	Premium Unleaded	PASS	0.037	0.09	0.18
002[1]	Regular Unleaded	FAIL!	0.735	0.13	0.26
003[2]	Diesel	INCONCLUSIVE!	0.120	0.17	0.34

(All rates are gallons per hour)

[1]Tank number 002 has unexplained loss of product. You must notify your local underground storage tank agency of the failed test within 24 hours and take appropriate steps to confirm or refute.

[2]Tank number 003 could not be analyzed to the necessary performance levels. The tank has failed to meet federal leak detection requirements for the period in question. Improved tank sticking methods may help. See report detail for more information.

As with ATG systems, if you observe a "Fail" on SIR reports, determine if it is a false alarm or if it indicates a loss of product or influx of groundwater. "Inconclusive" usually means the data provided to the SIR vendor are poor quality or inadequate, and the vendor is not able to make a determination. "Inconclusive" means the owner operator has failed to perform leak detection on the UST in question for that month. Find out what the problem is and reconcile it. If it is not rec-

onciled within the month, it is a violation. Two consecutive "Inconclusive" indicates a "Fail" and must be reported.

Inventory Control with Tank Tightness Testing
Inventory control (with tank tightness testing) is a temporary monitoring method that can be used for 10 years after tank installation. Tanks must be tightness tested every 5 years. Inventory control does not meet piping release detection requirements.

Inventory control must be capable of detecting a release of 1.0 percent of throughput plus 130 gallons. Inputs and withdrawals and the amount remaining in the UST must be recorded each day. The measuring stick must be calibrated to 1/8th-inch. The owner/operator must also measure any water on the bottom of the UST to the nearest 1/8th-inch at least once a month and record it.

See the EPA booklet, *Doing Inventory Control Right*, for proper inventory control record keeping. Many owners and operators will conduct inventory control as a secondary method of leak detection. Inventory control is not the best, most-accurate method of leak detection, but it is the least expensive. Any time one measures the volume of product in the tank, the volume of product sold, the volume of product delivered and then reconciles it monthly, there are bound to be errors in the calculations. Overall, however, inventory control can reveal problems if one is conscientious about recording the daily information.

Manual Tank Gauging (MTG) may be used as the sole method of leak detection for life on USTs of 1,000-gallon capacity or less. Product level measurements must be collected at the beginning and end of a 36- to 58-hour period depending on the size of the tank. No product may be added or removed from the UST during manual tank gauging.

The measuring stick must be calibrated to 1/8th-inch. The owner/operator averages two stick readings at the beginning and end of the 36- to 58-hour period.

For tanks between 1,001 to 2,000 gallons, an owner/operator may use manual tank gauging and a tank tightness test conducted at least every 5 years until 10 years after installation or upgrade.

For tanks over 2,000 gallons, an owner/operator may not use manual tank gauging. MTG is a short-term test in a static (closed) tank. It differs from Inventory Control, which requires daily recording of volume in an active tank, and keeping track of additions and withdrawals. In MTG, tests are conducted by gauging the volume with a gauging stick once a week and lasts at least 36 hours.

Four measurements must be taken: two at the beginning of the weekly test, and two at the end. The tank volume must not be dis-

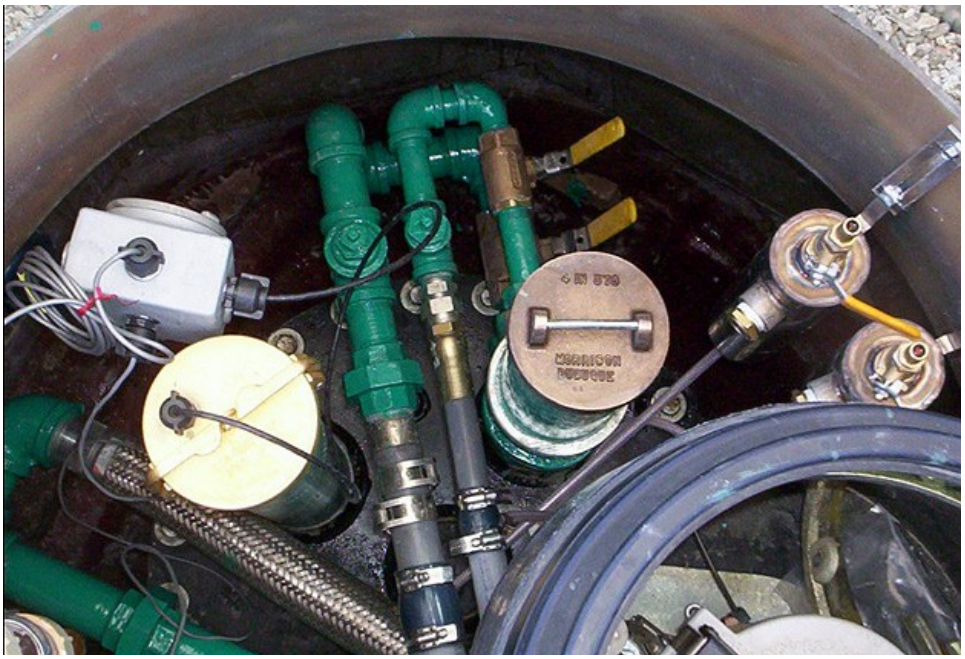
turbed during the test period. A calibration chart specific to the tank is used to convert product level measurement into product volume. The average of the final two measurements is subtracted from the average of the first two to obtain the change in product volume over time.

The calculated product volume change is compared to weekly and monthly standards. If the volume change exceeds these standards, the tank may be leaking. If you need assistance in conducting MTG, refer to the EPA publication *Manual Tank Gauging For Small Underground Storage Tanks.* The manual is downloadable from the EPA's website: **http://www.epa.gov/swerust1/pubs/index.htm**.

MTG works best with heavier fluids such as waste oil and diesel because the measurements are easy to read on the gauging stick and these fuel types are not sensitive to temperature changes.

A leak is suspected if the variation between the beginning and ending measurement is greater than the weekly or monthly standard (see manual referenced above). Remember, if the groundwater level is

Unless you have had a vapor monitoring system installed by a company that is licensed & specializes in vapor monitoring, your leak detection system is probably not adequate.



higher than the product level in a leaking tank, it may create pressure on the outside of the tank that can hide a release.

Groundwater /Vapor Monitoring – Much of what is said about groundwater monitoring can be said for vapor monitoring (e.g., well construction, spacing, radius of detection, porous backfill, etc.) Groundwater monitoring may be performed when groundwater is no greater than 20 feet below ground surface. The well screen must be

set above the seasonable high-water table to be capable of detecting free-floating product.

Groundwater monitoring must be capable of detecting at least 1/8th-inch of product on the water table. Wells must be sufficient in number to detect a release from any portion of the tank, and the backfill must be porous to allow product to migrate to the wells. This requires the owner or operator to maintain on site a monthly monitoring record (just as with vapor monitoring). The owner should also have available boring logs of the groundwater monitoring wells to ensure the site conditions and location of the monitoring devices comply with 135.5(4)"f". Make sure groundwater monitoring wells are clearly marked with covers secured.

Vapor Monitoring – To conduct vapor monitoring correctly is complex and demanding; and in the end, its effectiveness is very much in doubt. Unless you have had a vapor monitoring system installed by a company that is licensed and specializes in vapor monitoring, your system is probably not adequate.

Vapor monitoring wells must be located and sufficient in number to detect a release from any portion of the tank system within 30 days. The product stored must be sufficiently volatile to be detected. Gasoline is easier to detect than diesel due to its high vapor pressure. Temperature must also be considered. Iowa winters are not conducive to vapor monitoring unless done by professionals. The colder the temperature, the less volatile a substance becomes, thereby decreasing the chance of detecting a release.

Obviously, monitoring wells must extend below the frost line if they are to have a chance of detecting a release. Moreover, the static water level must be at least two feet below the lowest component being monitored, as saturated conditions inhibit vapor diffusion/movement, and can 'mask' a release from being detected.

Monitoring devices may include portable instruments such as Flame Ionization Detector (FID), Ionization Detector (PID), Combustible Gas Instrument (CGI) and Colorimetric or detector tubes. Calibration must be performed at each facility before each testing event. Ask for the document *Vapor Monitoring Guidance* from the Central Office for further information regarding monitoring devices and VWM as an RDM.

Additional Monitoring Methods

Additional monitoring is achieved through the use of an approved Vacuum, Pressure, or Hydro-Static system. VPH is the acronym that refers to the methods of continuous monitoring of the space between

the primary and secondary containment structures. These modes are as follows:

- Vacuum – Interstitial space is placed under continuous vacuum and monitored for loss of vacuum pressure
- Pressure – Interstitial space is placed under continuous pressure and monitored for loss of pressure
- Hydrostatic – Interstitial space is filled with brine solution and monitored for loss or gain in solution volume

Chapter 4 Testing: UST System and Reporting Requirements

As we have discussed, the components installed in your UST system are quite sophisticated. Complex design and engineering solutions have provided us with containment systems that afford redundant levels of protection. As advanced as these systems are, they must be periodically tested to ensure that they function properly.

Monitor Equipment Testing

All monitoring equipment described in the preceding section must be tested on an annual basis unless specified otherwise by the manufacturer. Sumps and UDCs must be tested every two years. The annual or biennial testing is designed to demonstrate that the equipment is functioning according to the manufacturer's specifications. This includes testing the operational capabilities of all electronic and mechanical sensors, automatic tank gauges, overfill prevention equipment, line leak detectors, and the monitoring system control panel. The annual function tests allow for the identification of components which require replacement, repair, and/or calibration.

You want eyes on your equipment—that is why we have Iowa licensed petroleum service providers. The public trusts that this equipment works.

The common elements of a function test:

- Sumps and UDCs opened and inspected to ensure they are liquid tight. Tested with either vacuum or hydrostatically every two years
- Sensors tested
- Line leak detectors tested
- Audible and visual alarms tested

The testing must be completed by an Iowa licensed installer or tester.

Testing and Reporting Requirements

Be aware that the UST owner is responsible for ensuring that these tests are performed either annually or biennially (sumps, interstitial spaces, and UDCs). Additionally, owners are liable for contamination caused by their systems. With this in mind, it is imperative that a Iowa Licensed Contractor is hired to conduct this and all other UST testing and certifications. While a technician may perform these functions, it is ultimately the responsibility of the tank owner and operator to ensure the following:

- All equipment is tested at required intervals. As discussed, monitoring systems must be tested annually
- Testing is performed according to manufacturer's specifications
- Failed test results must be reported to the UST Section immediately
- Copies of the test results should be maintained on-site or readily available

All Iowa licensed petroleum contractors should be familiar with these requirements. Please discuss these requirements with the contractor that you have chosen to ensure that the elements of the testing event meet the minimum requirements. Failure to meet these standards may necessitate a retest.

Secondary Containment Testing

In an effort to further reduce the possibility of groundwater contamination from underground storage tank systems, the requirement for secondary containment testing was added to the regulations n [567—135.3(9)]. These regulations were adopted as part of the Energy Policy Act of 2005, which also included inspections, delivery prohibition and operator training.

The integrity of the secondary containment components is required to be tested upon startup and every two years thereafter.

The integrity of the secondary containment components is required to be tested upon startup and every two years thereafter. The testing is conducted to demonstrate that the system remains as "tight" as it was at installation. The secondary containment system should be tested according to manufacturer's specifications.

This testing protocol typically contains the following elements:

Tank Annular Testing
- Typically 1 hour at 10" HG or 5 psi

Piping Annular
- Typically 1 hour at 5 psi

Tank-Top Sumps and UDCs
- hydrostatic or vacuum tests

What you will see:
- Station may have restricted access while testing is conducted
- Sumps opened and water added or special lid fitted over sump and vacuum applied
- UDCs opened and water added
- Water removed, either left on site or taken by tester
- Water left on site after testing may be hazardous. It is the responsibility of the owner/operator to make this waste determination and manage it properly
- Spill Bucket Testing (below)
- Spill buckets are tested hydrostatically as with UDCs. The owner is responsible for managing the waste water properly.
- Notify the UST Section if any components fail
- Testing is performed according to manufacturer's specifications

For systems that contain both single-walled and double-walled components, only the double-walled components must be tested.

Tanks installed on or after August 8, 2007, that have hydrostatic monitoring of the interstitial space, (i.e., a brine solution filling the interstitial space that provides continuous monitoring of the tank secondary containment), do not need to conduct secondary containment testing.

Secondary containment components of these systems that are not continuously monitored (piping, sumps, UDC's, etc.) are still subject to secondary containment testing.

Spill Bucket Testing

Spill buckets are designed to temporarily store product that may be released during the fuel delivery process. Spill buckets are similar to sumps and UDCs as they contain spills from overfills. They are as critical as any other containment because spills, unfortunately, commonly occur.

A spill bucket is the only protection between the hose of the transport vehicle and the backfill. If a spill bucket is cracked, perforated or damaged, product contained in the spill bucket after a spill could be

A spill bucket is the only protection between the hose of the transport vehicle and the backfill.

Spill buckets were not designed to last the lifetime of the tank. The normal operating life of a spill bucket is around 7 years. Test them annually to ensure they remain liquid tight.

released to the backfill. Spills can occur when a delivery driver disconnects the fuel hose from the fill pipe. These buckets should be tested every two years to ensure they are watertight. Owners may conduct their own testing of the spill buckets.

For spill buckets that are installed in a tank-top sump, a simple visual or "lake" test, can be performed. During this test, the bucket is filled with water and allowed to rest for a 30-minute test period. The water level is measured/marked at the beginning and end of the test. Any observable drop in the water level constitutes a failed test.

Line Testing

In some instances a pipeline precision or integrity test or "line test," may be required. A line test is typically conducted by placing the piping under pressure. The test method must be capable of detecting a release equivalent to 0.1 gph at 150% of the line's normal operating pressure.

A line test is required:

- Annually – But, if the system has monitored secondary containment, it is not required
- Every three years for American suction systems

Enhanced Leak Detection (ELD)

Enhanced Leak Detection (ELD) is an advanced leak detection method that is capable of identifying vapor and liquid leaks in underground storage tank systems that conventional testing and leak detection equipment cannot identify. This testing method also allows for targeted repairs of service station systems by pinpointing the location of individual leak sites. As a result, ELD has the potential to drastically reduce environmental contamination, as well as to limit costly cleanup and site remediation for station owners.

Today's federal and state regulations use testing standards that are over 40 years old. The conventional leak detection methods used today are limited in detection sensitivity and cannot guarantee to detect leaks below a 0.1 gallon per hour (gph) leak rate. The standard of 0.1 gph leak rate is extremely high for a regulatory threshold. A leak of 0.1 gph is the equivalent of over 800 gallons of liquid fuel being released into the ground and water table every year. If the leak is a large subsurface vapor leak, the environmental impact could be just as severe.

ELD has been certified with a leak rate of 0.005 gph with a probability of detection (PD) of 97.6% (cf. NWGLDE evaluation, October 17, 2008). ELD is capable of finding smaller leaks that over time can become big problems.

Vapors as well as liquids leaking from a UST system can contribute to increases in subsurface contaminant levels. While subsurface vapor leaks do not change or condense into a liquid, they will contaminate groundwater and increase BTEX values at LUST sites just as liquid leaks do. BTEX can dissolve into the water faster as a vapor than as a liquid. It does not matter to the groundwater if it is in contact with liquid fuel or saturated fuel vapors of the same mass, both mediums contaminate groundwater and require corrective action.

Where conventional tightness testing might find a leak in a UST system, they may not be able to pinpoint the location of the leak, which ELD is capable of doing. Further, an additional test is required to ensure the system is tight after the repairs are made, which means another trip and increased costs. Companies offering this ELD service typically do not leave a site until the repairs are made and a 0.005 gph passing test is achieved. Repairs are made as other components of the UST system are being tested, and the mobile lab provides immediate results.

These small, subsurface, continuous long-term releases actually deliver a greater impact to the environment, gallon for gallon, than do fuel spills. Undetected long-term leaks are more difficult to repair, and more expensive to clean up, as compared to a single spill event.

ELD Test Method & Procedure:

The ELD method uses chemical markers to detect leaks. These chemical markers or tracers each have a unique signature which is not a constituent of the fuel. To determine the leak status of a component such as an underground storage tank system a unique tracer is added directly to the fuel. Permanent soil vapor sampling ports are installed along the piping trench and around the tank perimeter. If a leak is present in the system, the fuel will carry the tracer into the environment where the tracer will migrate to the nearest sampling port. Individual samples are collected at each sampling port, labeled and sent to a laboratory for analysis. The laboratory evaluates the samples using sensitive analytical equipment. If there are multiple tanks on the site, each tank is inoculated with a different formulation of the chemical marker. Because each marker or tracer has a different analytical signature, the tanks that are leaking can be easily identified.

In addition, ELD can identify leaks in double wall containment tanks and lines. To determine if the inner containment is leaking, a chemical marker is added to the fuel. Samples are collected from the interstice and examined for the chemical marker. If the chemical marker is present, the primary containment is leaking. Additional testing is completed to pinpoint the exact location. To test the outer containment, a different tracer or chemical marker is added to the interstice and after a migration period soil vapor samples are extracted and analyzed for the presence of the chemical marker.

Where leaks have been detected with ELD

- Spill buckets
- Tank top access
- Product piping (European suction, American suction and pressurized); often present upon start up, and may be due to manufacturer's defects and installer handling
- Piping fittings

Double-wall systems have as many problems as single wall. Leaks are found among flex or rolled piping as well as fiberglass.

Iowa has approximately 2,800 active and temporarily closed UST facilities. Four hundred seventeen of those UST sites are also LUST sites. There are a approximately 1,300 Leaking Underground Storage Tank LUST sites currently undergoing investigation or cleanup. Furthermore, 35 to 45 new LUST sites are added to this count each year. At this rate, in seven (7) years, 10% of Iowa fueling facilities will enter the LUST program. A significant portion of the contamination on these new LUST sites can be attributed to the gap in the testing requirements between the current leak rate of 876 gallons per year (0.2 gph) and a more acceptable leak rate of 30 to 50 gallons per year (0.005 gph).

ELD Applications

New Construction Testing: ELD, when used as a quality assurance program at the time of new construction of a fuel station, ensures each component is manufactured, shipped, and installed "tight." Experience shows that ELD testing of new installations detect an average of five additional leaks beyond those leaks detected through traditional testing methods.

Annual Testing: ELD technology is also used for annual testing to make sure the fueling system and all components are tested tight. The testing includes the initial evaluation, screening of exposed components, and installation of monitoring ports. Once installed monitoring can be completed at intervals to guarantee a tight system for years to come.

Existing LUST Sites: ELD technology should be used at sites where there is contamination that was not the result of a fuel spill. After the liquid and vapor leaks are identified and stopped, monitoring ensures future releases are timely addressed, and reduce the need for, and expense of, continuous remediation systems.

Chapter 5 Releases: Suspected or Confirmed

Owner Requirements

As an owner or operator of a UST, you must be prepared to respond to a release before one occurs. Proper preparation and due diligence can help prevent releases, but accidents do happen. The following release preparedness/response steps should be taken to minimize damage to the public, environment, and business:

- Make sure employees know the location of the Emergency Shut -off (ESO) switch.
- Keep spill response equipment and supplies on site
- Maintain personal protective equipment (PPE) on site and ensure employees know how to properly use it
- Have phone numbers, emergency contacts readily accessible

Due to the constant possibility of a spill, it is important to maintain emergency materials at your site.

Major Release:

- Activate the Emergency Shut-off (ESO) switch
- Call 911
- Call DNR Emergency Response (515.281.8694)
- Secure the affected area / evacuate customers
- Wear proper personal protective equipment (PPE)
- Minimize the release: cover storm drains and use absorbent, as necessary

Minor Release:

- Stop/minimize release
- Cover (bag) nozzle, if necessary
- Wear proper PPE
- Contain the release and clean up, when possible, with absorbent material

Another key to being prepared is having the right equipment for the job. Due to the constant possibility of a spill, it is important to maintain emergency materials at your site. This will maximize containment of spills and overfills until emergency response personnel can respond to the incident. We suggest that the following supplies and equipment be maintained on site at all times:

- Containment devices, such as containment booms, dikes, and pillows

- Absorbent material, such as kitty litter, sand, and sawdust. (Be sure you properly dispose of used absorbent materials.)
- Fire extinguishers (multi-class—A-B-C—extinguishers)
- 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, or other warning signs
- Personal protective gear such as gloves, suits and boots

Suspected and Confirmed Releases and Reporting Requirements

Iowa law requires owners and operators of UST systems to report a confirmed or suspected release of "regulated substances," which includes petroleum, to the DNR within 24 hours or within 6 hours if a hazardous condition exists [567 Iowa Administrative Code (IAC)—135.6 & Iowa Code section 455B.386]. Always report your suspected or confirmed release to your insurance company to preserve coverage.

Shut down the product line if you suspect a release from the product piping (slow flow, failed test results, positive shutoff, alarm, etc.).

Suspected Release

Even though there is no obvious visual or olfactory evidence of a release—such as stained soils or a strong hydrocarbon odor—the presence of other indicators may suggest a release has occurred from the UST system. Below are examples of conditions qualifying as a "suspected release":

- Vapor or product is detected in vapor monitoring or groundwater monitoring wells used for leak detection.
- Inventory control discrepancies indicate that a release may have occurred (a gain or loss of product greater than 130 gallons + 1% of throughput).
- Alarms from automatic tank gauging (ATG) systems, interstitial monitors, sump sensors, automatic line leak detector, etc., indicate that a release may have occurred.
- Statistical inventory reconciliation (SIR) results indicate either a *Fail* or two consecutive *Inconclusive.*
- Unexplained loss of product.
- Unexplained presence of water in the tank or sump.
- Product dispensing equipment does not dispense product or dispenses product at a greatly reduced rate.
- Internal tank (periodic) inspection results reveal perforations, corrosion holes, weld failures, or other similar defects.

Suspected Release Investigation

Owners and operators must immediately investigate and confirm suspected releases. Make sure the monitoring device that declared a release is not defective and giving false indications of a release. If it

is defective, get it recalibrated, repaired or replaced immediately and make sure subsequent monitoring shows no release. Your petroleum equipment service company is able to help you diagnose whether there is a problem with your monitoring equipment and whether the suspected release can be confirmed.

If the monitoring equipment is found to be operating properly, the suspected release or confirmed release must be reported to the DNR by phone or fax within 24 hours. Make sure to contact Emergency Response if the release creates a hazardous condition (see *What is a Hazardous Condition Requiring Reporting within 6 Hours?* below). You should also contact your UST insurance company to inform them you have a suspected or confirmed release.

- Shut down the product line if you suspect a release from the product piping (slow flow, failed test results, positive shutoff, alarm, etc.).
- Shut down the submersible pump and empty the tank if a sudden loss of product occurs from the tank or if test results indicate a "Fail."
- If there is a suspected release that cannot be explained due to defective monitoring equipment or the source of the release is unknown or uncertain, regulations require you to test your UST system to confirm if a leak has occurred. You must proceed with system tightness testing, which can detect a release at least as small as 0.1 gph in the tanks and/or product lines.
- If the precision test results are "Fail," a site investigation may be necessary. The DNR will issue a letter requiring a site check. You must repair or replace defective equipment if the test indicates a leak has occurred in the system. Submit documentation of the repair or replacement to the DNR (e.g., invoice, 148 form, and installation checklist if necessary).

Shut down the submersible pump and empty the tank if a sudden loss of product occurs from the tank or if test results indicate a 'Fail."

Confirmed Release and Reporting Requirements

A release can be confirmed when based on visual and olfactory observations it is evident that petroleum or other regulated substances have breached the UST system or come in contact with the surface material (concrete/asphalt), backfill material, soil, groundwater or surface water or the system monitoring has confirmed a leak in the UST system that cannot be observed.

The owner or operator must report the release to the DNR within 24 hours or six hours if a hazardous condition exists (see *What is a Hazardous Condition Requiring Reporting within 6 Hours?* below). Environmental evidence of a confirmed release includes:

- Soil or groundwater sample analytical results for any petroleum constituent exceed the DNR's action levels [567—135.14].

- There is a spill or overfill from the UST system.
- There is an affected receptor (e.g., petroleum discovered in a utility trench, which can be attributed to the UST facility or the UST facility cannot be ruled out as a source).
- Drinking water supplies are contaminated, which can be attributed to the UST facility or the UST facility cannot be ruled out as a source.
- Vapors are observed in buildings or structures which can be attributed to the UST facility or the UST facility cannot be ruled out as a source.
- Free product is observed in the environment or in monitoring well used for release detection or LUST monitoring.
- Stained soil is observed.
- A sheen is observed on surface water

Be mindful that you are investigating for the presence of flammable or combustible liquids. Avoid contact with the substance, and keep any ignition sources out of the area.

Exceptions
An aboveground release of petroleum from an UST facility does not need to be reported to DNR if it is less than 25 gallons, does not reach soil, groundwater or surface water, and is cleaned up within 24 hours and the facility retains records of the incident.

An overfill caused by a transporter filling an UST does not need to be reported to DNR if the spill is contained in the spill bucket of the UST and does not reach the backfill. A spill (e.g., a customer who overfills the vehicle's gas tank) of less than 25 gallons does not need to be reported if it is cleaned up within 24 hours and does not reach soil, groundwater or surface water. If a spill less than 25 gallons cannot be cleaned up within 24 hours, it must be reported.

Confirmed Release Investigation
After reporting the confirmed release, take immediate action to prevent the spread of the release and danger to the public (e.g., fire, vapor and explosion hazards).

- If the public is in danger from a spill or overfill, immediately contact DNR's Emergency Response and the local enforcement authority.
- Shut down the pump for the suspected tank or product line.
- Investigate for free product in sumps and in under dispenser containment (UDC). Be mindful that you are investigating for the presence of flammable or combustible liquids. Avoid contact with the substance, and keep any ignition sources out of the area.

If the source of the release is the tank, contact your petroleum equipment service provider to have the tank emptied and to further investigate the problem. Upon receipt of the Release Report Form, the DNR will complete a Preliminary Leaking Underground Storage Tank (LUST) Report, the information will be entered into the database, and the

owner/operator will receive a letter in the mail requiring a Risk Based Corrective Action (RBCA) assessment.

What is a Hazardous Condition Requiring Reporting within 6 Hours?

A hazardous condition is defined in 567 IAC—131.1 and means any situation where a suspected or actual release of a hazardous substance, such as petroleum, places the health and safety of the public or the environment in danger.

Examples of a hazardous condition are:

- product floating on the groundwater in the tank pit or in a monitoring well
- a sheen of product on a lake, in a stream or a river
- product discovered in a sump, a monitoring well, or in the UDC
- product spilled onto the ground
- vapors or product present in a building, sewer or utility line

In any of these situations, imminent or potential danger exists to the public or the environment and must be reported immediately.

An example of a hazardous condition is product floating on the groundwater in the tank pit or in a monitoring well; a sheen of product on a lake, in a stream or a river; product discovered in a sump, a monitoring well, or in the UDC; product spilled onto the ground; vapors or product present in a building, sewer or utility line.

An overfill that occurs during product delivery *and which is not contained by the spill bucket* must be reported immediately by the transporter (See 567 IAC—135.6(4) and 567 IAC—131.1). A release of a hazardous substance must be reported within 6 hours. Ultimately, the owner and operator of the tank system must ensure the release is reported.

Releases of petroleum from non-regulated sources such as heating oil tanks, aboveground storage tanks, and farm and residen-

tial tanks must also be reported to DNR within 6 hours if a hazardous condition exists. To report a release, contact Emergency Response, the field office in the region where the release occurred, and the UST Section at the DNR central office.

- Emergency Response: (24 hour phone) 515.281.8694 or fax 515.725.0218
- DNR Field Offices: (**http://www.iowadnr.gov/fo/fomap.html**)

Field Office	Phone	Fax
1-Manchester	563.927.2640	563.927.2075
2-Mason City	641.424.4073	641.424.9342
3-Spencer	712.262.4177	712.262.2901
4-Atlantic	712.243.1934	712.243.6251
5-Des Moines	515.725.0268	515.725.0218
6-Washington	319.653.2135	319.653.2856

When a release is reported in a timely manner and the release investigation is begun quickly, further spread of the contamination can be prevented.

- UST Central Office: (work hours phone) 515.281.8941 or fax 515.281.8895. Use the Release Report Form to fax within 24 hours or 6 hours. Release reporting forms can be found at: **www.iowadnr.gov/land/ust/ustrelease.html**

It's Good Business to Report: Don't Make a Release More Expensive or Complicated

Reporting suspected and confirmed releases promptly as required and as soon as it is known not only protects the public and the environment, but can save the owner/operator money and lower cleanup costs. When a release is reported in a timely manner and the release investigation is begun quickly, further spread of the contamination can be prevented. With any hazardous substance release, safety is the primary concern. While it is important to make every effort to stop the release and perform the actions discussed earlier, do not delay notification of the fire department.

Report suspected and confirmed releases to your insurance company. Your insurance for pollution liability requires you to report a release to them as soon as possible. Report the release to preserve your coverage.

Chapter 6 The Designated Operator

What is Operator Training?
On October 14, 2009 new operator training requirements for owners of underground storage tank systems in Iowa took effect. The operator training rules can be found in 567-135.4(6), Iowa Administrative Code (IAC), which may be viewed on the UST Section's webpage at **http://www.iowadnr.gov/land/ust/adminrulesindex.html**

The operator training rules are the last part of the Federal Energy Policy Act of 2005 for the DNR to implement. The UST Section previously implemented the Energy Policy Act's inspections, delivery prohibition, and secondary containment provisions in 2007. The purpose of the rules is to improve operations and maintenance at UST system facilities and ultimately improve compliance and groundwater protection.

The purpose of operator training is to improve operations and maintenance at UST system facilities.

Operator training requires owners and/or their designated employees to undergo training to become UST designated operators (DO). The type of training an operator receives depends on the operator class and duties they intend to fulfill at their facilities. There are three different classes of operators:

Class A Operator – has overall responsibility for the facilities assigned to them, is knowledgeable of statutory & regulatory requirements, and maintains appropriate records. This class of operator is usually an owner or an environmental manager for a company with multiple facilities.

Class B Operator – implements the day-to-day aspects of UST operations, maintenance and record keeping according to regulatory requirements. This class of operator has direct management at 1 or more facilities and monitors the status of UST system leak detection.

Class C Operator – is an on-site employee whose primary responsibility is emergency response. The Class C Operator will be trained by either the Class A or B Operator of the facility. Owners can train and designate as many employees as they want for this class for a particular facility. This class of operator is typically a sales clerk behind the counter at the convenience store and must be trained in how to respond to spills, overfills, alarms and other emergencies related to their specific UST systems.

After December 31, 2011, a UST facility must have trained and designated A, B and C operators before it can operate.

Owners have the option of hiring third party contractors to designate as Class B Operators as long as the contractors have successfully completed the training required. Owners may designate either themselves or their employees for multiple operator classes. For instance, if an owner of a single facility has only one employee, the owner may

The Designated Class A Operator has primary responsibility for the broader aspects of the UST requirements and standards necessary to operate and maintain the UST system.

designate him or herself as both the Class A & B Operator of the facility. The owner would then train the employee as a Class C Operator for the facility. During normal operating hours, a staffed facility must always have at least one trained Class C designated operator on site. Class A and B Operators must be trained and designated for unstaffed sites such as cardtrols, non-marketing and emergency generator sites.

Deadlines for Operator Training

Designated operators must be trained for each facility by December 31, 2011. This deadline provides two years for owners and operators to be trained.

By April 14, 2010, Class C Operators must be provided with written basic operating instructions, emergency contact names and phone numbers and basic procedures specific to the facility e.g., what to do in case of an alarm, spill, overfill or emergency condition. These instructions must be readily available at all times to the Class C Operator. This is a simple and effective requirement to address emergency conditions that should have immediate and positive results.

Operator training will be provided by third party companies, not by the State. Some companies may want to provide in-house training. Internet-based training is also acceptable training format for all classes of operators.

All training programs must be preapproved by the Iowa DNR, UST Section. Any company wishing to become an approved trainer must follow the requirements in 135.4(8). A fact sheet for operator training providers is available on the UST Section website. The UST Section is currently accepting applications for operator training providers.

The Designated Class B UST Operator is the person primarily responsible for maintaining the UST system.

A list of approved trainers will be posted on the UST Section's website as they become available. If you do not have access to the internet, the UST Section can send a list of UST operator training providers.

How often is this training required?

Class A and B Operators are required to be trained only one time, but refresher training is encouraged. The Class B Operator should provide refresher training to Class C Operators every 12 months to ensure they understand spill and emergency response procedures.

When a facility is found to be out of compliance, the DNR may require the owner to re-train the designated UST system Class A, B or C Operator under a plan approved by the DNR. The training must occur within 60 days from the DNR notice for Class A & B Operators and 15 days for Class C Operators.

What is required of a trained operator?
Once an operator has been trained to fulfill the duties for his or her assigned class they will have particular requirements to meet. These requirements can be found in 135.4(6) for each class of operator.

Owners shall ensure that at least one trained operator, whether Class A, B, or C, is on site whenever a staffed business is open and fuel is being dispensed. Unstaffed or keytrol facilities do not have to have a trained operator present at all times as long as they have a trained and designated Class A & B Operators.

The Class C Operator is generally the first line of response to events indicating emergency conditions.

What if an operator transfers to another store or was trained in another state?
Class A & B Operators may transfer to other UST facilities in Iowa provided the Class A or B Operator is properly designated. The DNR may waive the training course for operators upon a showing of successful completion of a training course and exam approved by another state.

Documentation of Training
The owner/operator shall maintain a list of employees trained by the designated operator or third party trainer. The list must be maintained on-site and include the following:

- Name of each operator and the operator's class(es)
- Copies of the certificates of training
- Name of company providing training and name of trainer
- Date of training
- Class A and B contact information

Recommended Monthly Inspections
The Designated Class B UST Operator is the person primarily responsible for maintaining the UST system. Class B operators should, at minimum, conduct a monthly inspection at the facility. PEI provides an excellent resource for conducting UST system inspections: Recommended Practices for the Inspection and Maintenance of UST Systems (PEI/RP900-08). PEI's Inspection Checklist is found at **http://www.pei.org/Default.aspx?TabId=107**.

The operator training rules can be found in 567-135.4 (6), Iowa Administrative Code (IAC), which may be viewed on the UST Section's webpage at **http://www.iowadnr.gov/land/ust/adminrulesindex.html**

The inspection should include the following activities:

Review of the monitoring system alarm history or log

- If there were any monitoring system alarms, review maintenance and repair documentation to verify that the condition(s) responsible for the alarms have been handled appropriately. This documentation should be attached to the monthly report.
- If there is no record of a response to the alarm, inspect the monitoring equipment in that sump to ensure that it is placed in a location that will detect a leak at the earliest

opportunity.

- Inspection of all spill buckets to make sure they are clean and dry. The spill buckets should be maintained so they are free of water, fuel, and/ or debris.
- Inspection of all UDCs to make sure they are clean and dry. The sumps and UDCs should be maintained so they are free of water, fuel, and/or debris. Verify that the monitoring devices are placed in such a manner as to detect a leak at the earliest possible time.

Confirmation of the test dates for all required equipment testing. Schedule testing when required:

- Monitoring system: annual
- Spill bucket testing: annual
- Secondary containment testing: every two years
- Line test: annual, if required
- Confirmation that all employee training is current
- Alerting the owner of any conditions requiring follow-up activity

The Class B Operator should provide refresher training to Class C operators every 12 months. The training should include the following elements:

- Best management practices, which are effective and practical methods the employee can use to prevent or reduce the possibility of a release from the underground storage tank system
- Components of the monitoring system and monitoring plan for which they are responsible
- Responsibility with regard to releases and the spill response plan
- Contact information in the event of releases or other emergencies

Chapter 7 Preparing for Inspections

The Iowa DNR third party compliance inspection program began in 2007. Third party compliance inspections must be completed every two years — specifically, each inspection must be conducted within 24 months, but no sooner than six months of the last inspection. The owner/operator is responsible for contracting with an Iowa licensed inspector to complete the inspection. Upon completion of the inspection, a compliance report will be provided to the owner/operator. The report may be left on site at the conclusion of the inspection. Alternatively, the report can be mailed to the owner/operator.

Compliance inspections give us a snapshot of the condition of your UST system regarding UST regulations. Compliance inspections are the best way for us to protect groundwater and public safety, and identify problems before they develop into more serious issues. A list of Iowa licensed compliance inspectors is posted on our website: **http://www.iowadnr.gov/land/ust/ustinspectindex.html.**

Compliance inspections are the best way for us to protect groundwater and public safety, and identify problems before they develop into more serious issues.

What does the inspection address? The inspection typically includes the following:

- Verification of tank and product line monitor function
- Document/record review
- Physical inspection of the UST system equipment

What is required of the owner/operator? At a minimum the following documents must be maintained on site or readily available for the inspector to review. Compliance inspectors are told to ask for these records in advance to be better prepared for the inspection:

- Leak detection requirements for each tank:
  - If you have an **automatic tank gauging system (ATG),** submit one passing test printout for each month for the past 12 months. Make sure the test you save for the month is shortly after a delivery or when the product level is at its highest for the month. The product level will show up on either your leak test or inventory report. Use the test with the highest level of product.
  - If you use **SIR**, submit the last 12 months of individual monthly tests. You may also submit the annual report; but unless you submit each month's report along with it, the SIR is invalid.
  - If you use **interstitial monitoring or secondary containment**, you are monitoring the space between the primary and secondary walls of your tanks and/or piping. Submit the last 12 months of recorded visual inspections (log of monthly entries) or the last 12 months of reports from your automated system.

- If you use **vapor or groundwater monitoring**, submit results of the last 12 months of monitoring. Make sure you identify the monitoring device used: automatic or manual.
- If you use the combination method of **daily inventory control and tank tightness testing**, you are recording inventory daily and reconciling monthly plus you have a precision test completed on your tank every 5 years. In order to use this method, your tanks cannot be older than 10 years. After 10 years, you cannot continue with this combination method of leak detection monitoring and must switch to one of the other approved methods
- You are encouraged to continue to use daily inventory control and monthly reconciliation as a secondary method of leak detection. It is an effective way of keeping track of product throughput.
- If you are using this method, submit your records for each month for the last 12 months and results of the last precision (0.1 gph) tank test (unless your tank is not yet 5 years old).
- The correct third party certification for your ATG system should be available on site, and should have been provided by your ATG system installer. If not, go to the National Work Group on Leak Detection Evaluations (NWGLDE) to print a copy of your equipment's evaluation: (**http://nwglde.org/**).

- Leak detection requirements for **pressurized piping**.
  - If you are using an electronic line leak detector (ELLD), submit one passing line leak detection printout for each month. Also, submit the last annual function test of your electronic line leak detector (if required by the manufacturer). You do not need to conduct an annual line tightness test if you are using a monthly monitoring method such as this. You must also submit a function test of your ELLD if required by the ELLD's manufacturer.
  - If you are using a **mechanical line leak detector (MLLD)**, submit the last **annual function test** of the line leak detector (a test that assures the MLLD still meets requirements and your most recent **line tightness test** (0.1 gph).
  - If you are using **interstitial monitoring**: submit log of visual inspections for each month or monthly reports from your automated system.
  - If you are using **vapor or groundwater monitoring**: submit monthly monitoring results for last 12 months.

- Leak detection requirements for **suction piping.**
  - **Suction piping** requires a tightness test (0.1 gph) of the product line every three years. Submit the most recent line

tightness test within the last three years. A tightness test is not required for a safe suction system.

- Cathodic protection records for steel tanks and piping. (Fiberglass or composite tanks do not need cathodic protection.)
  - If you have steel tanks, submit the last two cathodic protection test results. The same goes for steel piping. Cathodic protection testing is required every three years.
  - If you have an impressed current system (rectifier), submit the 60-day log of your inspection of the rectifier. The DNR recommends you inspect your rectifier every 30 days for proper operation.
  - If your tank was lined, submit the most recent internal inspection results. Lining inspections are required 10 years after tanks were lined and every 5 years thereafter. Internal periodic inspections are waived if cathodic protection was added within a year of the lining or if an internal integrity assessment of the tank was completed before adding cathodic protection to your tank.

- Submit records of any repairs to your UST system since the last inspection, e.g., repairs to your cathodic protection system, tanks or lines. Also, submit a copy of the registration form if new equipment or installations have taken place.

- Make sure your insurance certificate is current. The certificate is renewed annually. Include a copy of the certificate along with the other records above.

- If you are using a form of financial responsibility other than insurance, submit documentation and certification of financial responsibility.

- If your UST site is temporarily closed, submit a copy of the temporary closure form.

- Make sure your annual tags and permanent tags (purple) are attached to the fill ports of your tanks. **Permanent tags (purple) must remain on the fill ports for the life of the tanks.** Annual tags are not issued for temporarily closed tanks.

- A copy of the registration form

- Secondary Containment Test reports

- Designated Operator training records (after December 31, 2011)

- Log for E85 non-compatible dispensers (daily)
- Previous inspection report
- Copies of any spill reports

Please do not submit originals of the above records--copies only. Keep the original records on site, and send the compliance inspector copies of the originals. Also keep in mind DNR field personnel occasionally may be conducting follow-up inspections and will need access to your records as well; this is another reason for not sending your original copies. Please arrange the records (leak detection) in chronological order. No more than one test per month is required. Any results of "Fail" for leak tests should have been reported to the DNR, but include those with the copies of the records submitted to the compliance inspector.

Common UST Violations

At the Iowa DNR, it is our desire to assist you in meeting all requirements for operating your UST system. To help illustrate common problems that UST owners face, we have reviewed our records to determine the "7" most common UST violations cited by our compliance inspectors. It is our hope that awareness of these violations will help you achieve compliance. The following are the most commonly cited UST violations:

- **Liquid in UDCs, STP sumps, pipe sumps**. All containment sumps and spill buckets must be free of liquid and debris. If not, the volume of the containment is compromised. Secondary containment sumps are not intended to store petroleum contaminated liquids for any length of time. Penetration seals, where the piping enters the sump must be liquid tight to prevent high groundwater from entering the sump and product. Damaged seals and test boots were a common occurrence. Make sure these are in good condition. ***Sumps must be liquid tight with no cracks or perforations in the walls***

- **Spill buckets**. Spill buckets are a critical, but often the weak link in the UST system's leak prevention. Spill buckets have a comparatively short lifespan. After about seven years of operation in Iowa, they are usually in need of repair or replacement. Think of all the abuse they take from thousands of tight fill connections, to freeze and thaw and snowplows driving over the top of them. After a few year's time the flange at the tank riser and spill bucket can loosen, the spill bucket itself can deteriorate, cracks can form and spills commonly occur into the backfill. Spill buckets must be free of liquids and debris. Keep them dry and clean.

- **Tank release detection**. The biggest problem here is invalid leak detection—not testing the tank at the level it is routinely filled. Make sure the ATG system is set to test as soon as possible after a fill. Also, become familiar with the level of product necessary for your leak detection equipment to operate properly (NWGLDE's leak detection evaluations). Many operators test daily so they are certain to have at least one passing test per month at a level that is approved for the equipment and a level that is near the level it is routinely filled. Always try to test as much volume as possible in the tank.

- **Overfill prevention.** All three options for overfill prevention—auto shutoff, alarm and ball float — have their own set of problems. Overfill alarms don't do any good inside the store, ball floats may not be used on suction systems, and auto shutoffs must not be tampered with by delivery drivers. If you don't have a drop tube, and your tank is filled with a tight fill connection, you must install one.

- **Tank/piping leak detection and corrosion/repair/maintenance records not submitted, incomplete or unavailable**. Make it easier on yourself, keep these records organized. You need one passing leak test per month; put it in a compliance notebook or keep it organized so you can produce it when requested. The same goes for records for repairs, maintenance, annual tightness testing, secondary containment testing, and corrosion protection.

- **Maintenance and testing records are not available in sufficient detail**

- **Monitor system has not been certified annually**

Inspections can be a positive tool and a way that you can verify that all of your hard work to minimize potential risks to human health and the environment is working.

Although the violations related to failed testing are virtually unavoidable, you can see that some of these violations can be easily prevented.

Non-Compliance

As an Agency, we hope to work closely with you to ensure that you are compliant with all current rules and regulations. One way we are able to do this is through inspections. Inspections can be a positive tool and a way that you can verify that all of your hard work to minimize potential risks to human health and the environment is working. At the completion of an inspection, a report will be issued to you by your inspector. The report includes the inspector contact information, site information, observations, violations, and steps to correct the violations. While it is our goal to obtain compliance from each business through education and inspection oversight, there are times when en-

forcement actions are necessary to achieve compliance through the correction of violations.

Notice of Violation (NOV)
Serious violations that are observed during an inspection may result in a Notice of Violation (NOV) being sent to the owner/operator. A NOV may also be sent if outstanding violations are not corrected in an acceptable timeframe. The owner is given 60 days to resolve the violation. The purpose of the NOV is to make the owner/operator aware that DNR has serious concerns about the facility compliance. Continued noncompliance may result in an increase of enforcement activity, which can include civil and/or criminal penalties.

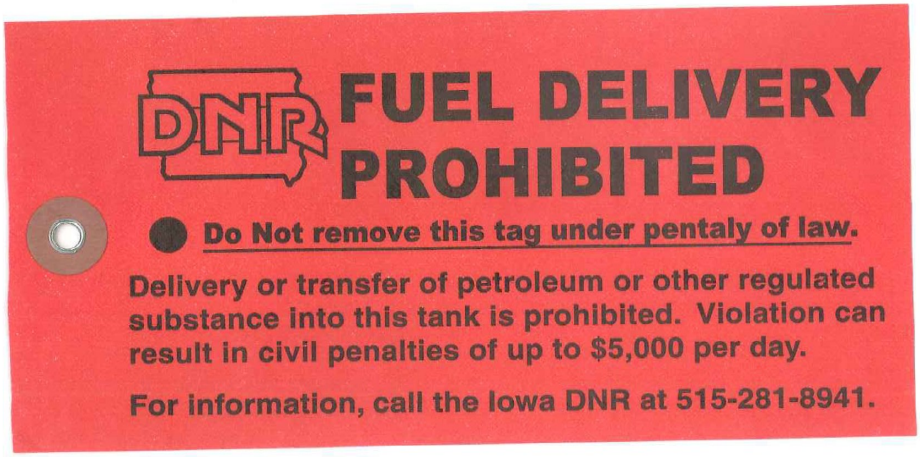
Red Tag Authority
If a significant violation is discovered and it poses an imminent threat to human health or safety or the environment, DNR is authorized to affix a red tag to the fill pipe of the noncompliant underground storage tank system. This will prevent new product deliveries to the site.

If a significant violation is discovered at an UST facility, the DNR is authorized to affix a red tag to prevent further deliveries until the violation is resolved.

Before affixing a red tag, DNR will notify the owner/operator and inform them of the significant violation and why the red tag was issued.

Violations that may initiate Red Tag authority or delivery prohibition include:

- failure to conduct leak detection
- expired or lapsed UST pollution liability insurance
- failure to conduct a compliance inspection
- failure to conduct function tests and/or line tightness tests
- failure to install spill protection and/or overfill prevention, corrosion protection
- failure to monitor leak detection or corrosion protection
- failure to undertake release abatement, investigation and confirmation in response to a confirmed or suspected releases



It is the responsibility of the owner to correct the violation and notify DNR. We will inspect the facility within 5 business days of the correction of the violation to ensure the violation(s) have been resolved. Once the violation has been verified corrected, the DNR will remove the red tag and allow the facility to receive fuel deliveries.

Administrative Orders and Expedited Enforcement Order

The goal of an Expedited Enforcement Order is to return a facility to compliance in a timely manner, eliminate the economic benefit of noncompliance and create a deterrence against future noncompliance.

The first step in this process is usually a Show Cause letter, which details the specific facility violations. This may be followed by a meeting between facility representatives and DNR staff to discuss and agree upon a compliance schedule and penalties.

If no agreement is reached during the meeting, the DNR will issue an Administrative Order. The Administrative Order specifies the compliance activities, timelines, and penalties that must be met. Unlike the Show Cause procedure and meeting, the compliance conditions and penalties are set solely by the DNR. The business may opt to contest the Administrative Order, in which case the business representatives must appear before an administrative law judge to defend their position.

Chapter 8 UST System Installation, Repairs and Upgrades

Before a tank system can be installed, modified, or removed, notification has to be sent to the DNR. Notifications are reviewed by the UST Section staff. The purpose of the process is to verify that the components being installed meet regulatory codes and standards and will prevent releases of petroleum and hazardous substances.

The following UST activities require notification:

- Installation (Notification of Installation)
  - Submitted 30 days before the installation
- Installation (Registration Form #148)
  - Submitted within 30 days after the newly installed UST system is covered and tested
- Notification of Change of Ownership
  - Submitted before assuming responsibility for UST operations along with copy of financial responsibility documenting transfer of benefits/coverage

Contractor Requirements

As with UST testing, it is important that owners carefully select an Iowa licensed petroleum service contractor to perform system modifications and installations. The selected contractor must:

- Have the appropriate contractor's license for the scope of work: UST Installer /Installation inspector/tester/NACE or STI license (for cathodic protection work)
- Have current training by the equipment manufacturer

UST Activities and Requirements

Component	UST System Installation, Repair and Upgrade Requirements	Notification	148 Form	Inspection Checklist	No. of Inspections
Tanks	Installation	✓	✓	✓	3
	Removal	✓		✓	
	Inspection/repair of tank lining		✓		
	Cathodic protection repair/replacement		✓		
Sumps	Installation or replacement		✓	✓	1
	Modification or repair			✓	1
	Installation of penetration boot			✓	1
	Installation of test boot				1
	Tightening of band clamp				
	Repair/replacement of top hats or sump lids				
Piping	Installation or replacement	✓	✓	✓	2
	Removal	✓			
	Modification or repair		✓	✓	2
	Installation of penetration boot		✓	✓	1
	Installation of test boot				
	Tightening of band clamps				
	Replacement of flex hoses with secondary cont.				
	Replacement of flex hoses without secondary cont.		✓	✓	1
	Replacement of STP with secondary cont.				
	Replacement of STP without secondary cont.		✓	✓	1
	Cathodic protection repair/replacement		✓		
Under Dispenser Containment (UDC)	Installation or replacement		✓	✓	1
	Modification or repair		✓	✓	1
	Installation of penetration boot			✓	1
	Installation of test boot				
	Repair/replacement of float chain mechanism				
	Installation/replacement of dispenser				
Monitoring	New monitoring system				1
	New ATG system where one had not existed before		✓	✓	
	New software that affects monitoring				
	New software that requires cold start				
	Minor software upgrade or reprogramming				
	Sensor replacement—same model				
	Sensor replacement—different model		✓	✓	1
	Leak detector replacement—same model				
	Leak detector replacement—different model		✓	✓	1
	Installation of overfill or high-level alarm		✓	✓	
	Installation of ATG probe—same type				
	Installation of ATG probe—different type		✓	✓	1
	Repair/replacement of spill buckets in fill sump				
	Repair/replacement of direct bury spill buckets		✓	✓	1

Chapter 9 Tank Closure

Temporary Closure
Owners and/or operators of UST systems must submit notification for temporary closure. If you decide temporary closure is appropriate for your tanks, the following requirements must be met:

- The underground storage tank may be filled with a noncorrosive, nonhazardous liquid if there are concerns about hydraulic pressure exerted on the tank.
- Except for required venting, all fill and access locations and piping must be sealed using locking caps or concrete plugs.
- Power service must be disconnected from all pumps associated with the use of the underground storage tank, unless the power services some other equipment which is not being closed.
- Compliance inspections must be completed to ensure temporary closure requirements continue to be met.
- Pollution liability insurance must be maintained. **If insurance cannot be maintained on the USTs, a site check is required of the UST facility before the owner's eligibility to file a claim expires.**

At the end of the temporary closure period, which is 12 months, the UST must be returned to service, permanently closed or an extension of temporary closure filed. All compliance and testing requirements will be enforced prior to completion of temporary closure.

UST removals are hazardous undertakings involving flammable and combustible liquids, excavations and confined spaces. Worker and public safety is vital. Out-of-service UST systems can also cause harm to the environment and must be properly closed.

Permanent Closure
UST removals are hazardous undertakings involving flammable and combustible liquids, excavations and confined spaces. Worker and public safety is vital. Out-of-service UST systems can also cause harm to the environment and must be properly closed. For these reasons, closure activity must be conducted by an Iowa Licensed Remover and a closure assessment must be conducted or supervised by a Certified Groundwater Professional according to 567—134.28 IAC. The UST system owner is responsible for contacting the qualified individuals to complete UST closure.

The Iowa Licensed Remover must notify the DNR UST Section at least 30 days before removal, fill-in-place or change-in-service by completing the Notification of Closure form. An Iowa licensed remover must be on site for all regulated UST system closures. All closure documents are found on DNR's webpage. Iowa licensed removers receive a copy of the Underground Storage Tank Closure Guidance when they complete their initial training. If you need an extra copy download it the following webpage:
http://www.iowadnr.gov/land/ust/ustremovers.html

After receiving the completed Notification of Closure form, the UST Section will send out a letter to the owner and remover acknowledging the closure date. Removers must notify the DNR Field Office in the region where the closure is taking place at least one working day prior to closure. Follow the closure procedures in the guidance document. Make sure you notify the local fire department for permitting and other requirements before implementing any closure activity.

The owner must demonstrate to the satisfaction of the DNR that no release has occurred. This is based on soil and groundwater sample analysis.

A closure assessment must be conducted or supervised by a Certified Groundwater Professional (CGP) [567—134.28(2). Closure assessment procedures are found in the guidance document. Workers must not enter a tank pit excavation to obtain samples unless the proper shoring or sloping is in place. Evidence of contamination must be reported within 24 hours or 6 hours if a hazardous condition exists.

The Iowa Licensed Remover is responsible for submitting the UST closure report form within 45 days of closure.

Abandonment In-Place
The last option for decommissioning is abandonment in-place. This is relatively rare and allowed when the removal of the tank may cause damage to existing structures. Please contact your Iowa licensed remover for questions regarding tank or piping abandonment. When considering abandonment in-place, keep in mind that when the property is sold, you will still have a buried UST or a solid waste underground. Property is easier to sell when the UST system is removed and everything documented.

Sampling & Reporting
Part of the requirements for closure of a UST is that the owner must demonstrate to the satisfaction of the DNR that no release has occurred. This is based on soil and groundwater sample analyses.

This analysis must be performed during or immediately after closure activities. If you have questions regarding this process, please contact the DNR.

Following sampling, a tank closure report must be submitted to DNR.

Chapter 10 Recordkeeping Requirements

Underground storage tank systems are inspected every two years to ensure they are operating within the technical requirements of Chapter 567--135 IAC. A thorough inspection of a facility requires the availability of records, such as monitoring results, cathodic protection test results and any UST equipment repairs.

Records may be kept at an off-site location and provided to the department upon request [567--135.4(5)]. The department allows a minimum of two working days to submit records if they are not immediately available.

The following records must be available to the department [135.4(5)] and the compliance inspector.

Notification Records to be submitted to the department:

- Installation Notification form [135.3(3)"h"]
- Registration (148) form [135.3(3)"a"]
- Temporary Closure form (if applicable)
- Notification of Permanent Closure or Change in Service form
- Change of Ownership
- Financial Responsibility Documentation (Chapter 136)

Required Release Reporting
The following are required to be reported to the department:

- All releases including suspected and confirmed releases [135.6 (1)]
- Spills/Overfills (135.6(4))

Following the reporting of a release, corrective actions planned or taken including:

- Initial abatement measures [135.7(3)]
- Initial site characterization [135.9]
- Free product removal [135.7(5)]
- Investigation of soil and groundwater, cleanup and corrective action plan [135.8 to 135.12]

Release Detection Records, Equipment and Testing

- Results of all monthly release detection monitoring and any maintenance checks performed
- Performance claims pertaining to any release detection system used. These records must be maintained for five years from the date of installation (recommend keeping for the life of the equipment).
- Calibration, maintenance and repair of any release detection system used on site. These records must be maintained for at least one year after the service work is completed (recommend keeping for the life of the equipment).
- Function tests of automatic line leak detectors

- Tightness test results conducted as part of a facility's leak detection requirements, including:
  - Annual line tightness testing for pressurized systems must be conducted if monthly monitoring of the line is not conducted. The tightness test must meet a minimum 0.1 gallon per hour leak rate. *Maintain records at least until the next test*.
  - Line tightness test every three years for suction systems if monthly monitoring of the line is not conducted. Maintain records at least until the next test.
  - Tank tightness test every five years when inventory control or manual tank gauging is used. Maintain records at least until the next test.

Corrosion Protection Record Keeping [135.3(1)]

For steel UST systems, the owner/operator shall maintain records, including:

- Operation of the UST system corrosion protection equipment, including:
  - Results of cathodic protection tests conducted at installation of the system, and within six months of installation, and at least every three years thereafter by an Iowa licensed tester [135.4(2) "b" (1)]. Maintain results of last two inspections.
  - With UST systems that have an impressed current cathodic protection system, the rectifier must be inspected every 60 days to ensure it is operating properly [135.4(2) "c"-"d"]. *Maintain results of the last three inspections.*
  - If an UST is lined for corrosion protection, records must be available documenting when the UST was lined and the results of any internal inspections required 10 years after the lining and every 5 years thereafter. Maintain records for the life of the tank.

Record Keeping General Repairs [135.4(4)]

Records for the following repairs must be maintained for the remaining operating life of the system [135.4(4) "f"]:

- All repairs shall be conducted in accordance with a nationally recognized standard and/or in accordance with the equipment manufacturer's specifications [135.4(4)].
- Repaired tanks and piping must be tightness tested within 30 days following the repair. Records documenting the repair and tightness test by a certified UST contractor shall be available for inspection [135.4(4) "d"].
- Cathodic protection systems must be tested within 6 months following a repair of the system [135.4(4) "e"].

Appendix A

Glossary

Automatic Tank Gauge (ATG) – An electronic device that measures liquid level and calculates liquid volume in an underground storage tank. By monitoring the liquid level, the ATG can conduct leak tests of the underground storage tank.

Ball-Float Valve (BFV) – An overfill prevention device that operates by restricting the vent opening in an underground storage tank, thus limiting the flow of fuel into the tank. It is used in conjunction with an external alarm that alerts the operator when the tank is at 90% capacity.

Cathodic Protection – A method of protecting underground metal structures, typically single-walled steel tanks, from corrosion. Two basic types of cathodic protection include:

> **Galvanic cathodic protection** – A system designed to protect the metal of the UST system by directing the corrosion to a metal anode, commonly called a "sacrificial anode".
>
> **Impressed-current cathodic protection** – A system that uses a power source, or rectifier, and buried anodes to create an electric current that protects buried metal from corrosion.

Containment Sump / Tank-Top Sump – A tank-top containment device used to protect system components. These sumps are typically used to house the turbine head and piping, as well as the fill tube riser and automatic tank gauge (ATG). They are usually easily located because they are protected by manhole or manway covers. This device is also used to secondarily contain leaks with the UST piping.

Continuous Interstitial Monitoring – An approved method for double-walled tank leak detection. The space between the primary and secondary containment is continuously monitored for the presence of leakage.

Fuel Dispenser – A device that measures and transfers liquid fuel from a UST system into a motor vehicle.

Designated Operator – One or more individuals designated by the owner to have responsibility for conducting monthly visual inspections and training facility employees at an underground storage tank facility.

Drop Tube Shut-off Valve / Flapper Valve – A mechanism installed in a drop tube designed to prevent the overfill of an underground storage tank. The valve is designed to shut off product delivery when the tank is nearly full.

Emergency Shut-off Switch (ESO) – An outside master pump shut-off switch that should be visible from all pumps. It is typically required by state fire code.

Existing Tank – A UST installed prior to January 1, 1984. An existing tank is also a UST installed before January 1, 1987 and which is located on a farm, has a capacity greater than 1,100 gallons, and stores motor vehicle fuel used mainly for agricultural purposes and not for resale.

Fail Safe – A monitoring system that will shut down the turbine pump in the event of a power outage, or when the monitoring system fails or is disconnected.

Fill Cap – A round, removable device that latches to the fill adaptor and is used to seal the fill-pipe opening when a delivery is not in progress.

Fill (or Drop) Tube – A tube that extends from the surface to the bottom of the tank. It creates a passage between the fuel delivery hose and the tank, allowing for introduction of fuel into the UST. It often is protected by the fill sump and is equipped with a spill bucket. A flapper valve (shut-off valve) may be an integrated part of the fill tube.

Flapper Valve – A mechanism installed in a fill tube to prevent the overfill of an underground storage tank. The valve is designed to stop flow of product at 95% tank capacity and meets state overfill prevention requirements.

Impact/Shear/Emergency Shut-off Valve – A spring-loaded device that is installed on the product piping directly under the dispenser. It is designed to automatically stop flow of product in the event of dispenser impact or fire.

Interstitial Space / Annular Space – The gap between the inner and outer walls of a double-walled tank or double-walled piping.

Leak Detection / Release Detection – Any procedure or equipment that can be used to determine whether an underground storage system is unexpectedly releasing product to the outside of the primary containment. Leak detection methods include inventory control, tank and line testing, and interstitial monitoring.

Line-Leak Detector – A device used to detect a loss of pressure in the primary piping, possibly indicating a piping leak. Can be electronic or mechanical.

Manhole/Manway – A surface opening allowing access to below-grade equipment or tank systems. It is typically protected with a manhole cover.

Material Safety Data Sheet (MSDS) – A standard form providing data regarding a particular substance or chemical. It includes information of safety procedures for substance handling, physical data, hazardous properties, first aid, storage, spill handling, and is most typically provided by substance supplier.

Monitoring Well – A slotted pipe, typically made of PVC plastic, which is positioned vertically in the ground. It is used to obtain groundwater samples in order to assess the extent of groundwater contamination.

New Tank – A UST which is not an existing tank.

Overfill Alarm – An outdoor audible and visual warning device that alerts a fuel-delivery operator that a storage tank is nearly full and the delivery must be stopped.

Penetration Fitting – A fitting designed to provide a liquid-tight seal around piping or conduit that passes through the wall of a containment sump.

Personal Protective Equipment (PPE) – Equipment designed to protect workers from workplace injuries or illness as a result of contact with chemical, physical, electrical, mechanical, or other workplace hazards (i.e., safety shoes, hard hats, safety glasses, coveralls, gloves, high-visibility vests, hearing protection and respirators).

Positive Shut-down – an alarm condition that stops the flow of product at the product pump(s).

Pressurized Piping System – A fuel delivery system that uses a submersible pump located near the bottom of a storage tank to push fuel to the dispensing device(s).

Primary Piping – The piping used to convey the fuel from the tank to the dispenser. For sites with single-walled piping, this is the only piping. For systems with double walled piping, this is the inner piping that comes in contact with the fuel.

Safe / "European" Suction — A suction pumping system that contains one check valve located immediately below the pump. Fuel in the line drains back to the tank when not in use.

Secondary Piping – Piping that envelopes the primary piping from the sump to the dispenser. It is designed to prevent leakage from the primary piping from entering the environment.

Sensor – An electronic device used to detect the presence of liquid in the tank annular, turbine sump, fill sump, or under dispenser containment. Sensors used to monitor brine-filled tank annulars can detect liquid loss or gain.

Spill Bucket – A liquid tight container located at the top of the fill pipe of an underground storage tank. It is designed to capture small spills that might occur during delivery. It must be corrosion protected, have a minimum capacity of 5 gallons, and allow for drainage into the tank.

Stage I Vapor Recovery – A system of piping and hoses designed to transfer gasoline vapors from an underground storage tank to a delivery truck as product is transferred from the truck to the tank.

Stage II Vapor Recovery – A system of piping, hoses, and nozzles designed to transfer gasoline vapors from a vehicle fuel tank to an underground storage tank as fuel is transferred from the underground storage tank to the vehicle.

Submersible Turbine Pump (STP) – A pump that rapidly delivers fuel to the dispenser(s). It is installed for systems that have pressurized piping.

Tank Gauge Stick – A long wooden stick with 1/8-inch markings clearly visible along its length. Tank gauge sticks are manually inserted in the fill pipe of an underground tank to measure the depth of product or water present in the tank.

Test Boot – A flexible device used to seal the space between the primary and secondary piping. It is used during the secondary containment testing (SB-989 testing) to maintain conditions required by the test procedure.

Under-Dispenser Containment (UDC) – The UDC is a containment sump located immediately below the dispenser. The primary function of the UDC is to capture any leakage that may occur within the dispenser. The UDC is continuously monitored for the presence of liquid by a mechanical or electronic device.