Section 4.8: Leak Detection for Piping

There are pressurized, suction, and gravity piping delivery systems that could be used with USTs. Piping could be either single or double walled. There are line leak detection requirements for underground pressurized and suction piping. The leak detection requirements are different depending on the type of piping delivery system. **For the purposes of leak detection requirements, do not consider fill pipes.**

Depending on the type of piping in use at your facility, sumps may house some of the leak detection equipment. Information on sumps and associated requirements is provided in section 4.8.5.

If you have underground piping that contains a hazardous substance listed on the CERCLA list of hazardous substances, you must meet one of the following for each of these piping runs:

1. You must have secondarily contained piping with interstitial monitoring. This is necessary for both pressurized and suction piping,

   OR

2. You must have a waiver from DEC.

To determine requirements and BMPs for leak detection of your piping, do the following:

1. Identify the type(s) of piping you have at your facility. Check the appropriate boxes in the table below.

   Different piping runs at your facility may use different types of fuel delivery systems. Make sure to select the appropriate type of fuel delivery system for each piping run at your facility.

   Note: If <u>all</u> piping associated with an UST system is aboveground, then that piping has no requirements for leak detection.

2. For each type of piping you check in the table below, go to the appropriate section and read and fill out the appropriate sections of the checklist(s) for piping release detection.

What type(s) of piping do you have at your facility?					Go to these sections for information
UST Number:	**1**	**2**	**3**	**4**	
Pressurized					Section 4.8.1
Suction					Section 4.8.2
Gravity					Section 4.8.3
Alternate Methods					Section 4.8.4

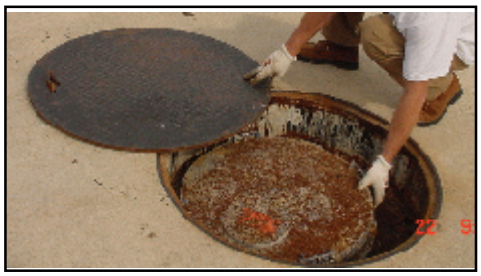
If you do not know the type(s) of piping you have, take the following steps to figure out what is at your facility:

- Read the descriptions below of the different types of fuel delivery systems for piping.
- Look through your old records and permit to see if they match any of the names in the descriptions.
- Contact the contractor who installed your piping system.
- Contact your service contractor/environmental consultant for assistance.

Pressurized fuel delivery pushes fuel from the tank to the dispenser through piping by using a submersible turbine pump (STP) located inside the tank. Usually there is an STP head in a sump above the tank. These sumps are often covered with a lid.

Sample STP Head in a Sump on Top of a Tank

Sample STP Head in a Sump on Top of a Tank



Sample Lid and Sump Cover

Example of a Suction Pump Inside a Dispenser

Suction fuel delivery pulls fuel from the tank to the dispenser through the piping by using a suction pump located at the dispenser. You should be able to tell if you have suction piping by looking for a suction pump (you may see pulleys and belts) inside the dispenser. Also, there will not be a pump in a sump above the tank.

Gravity feed fuel delivery has no pump and relies on the downward slope of the piping to transport fuel to or from the tank. Generally, gravity piping connects a sink or drain inside a building to a tank outside the building. The product (most commonly used oil) is dumped into the sink or drain and flows into the tank by gravity.

4.8.1 Pressurized Piping

Information

Pressurized piping can be either single or double walled. There are some general requirements that apply to all types of pressurized piping, as well as additional requirements that depend on whether your piping is single or double walled.

4.8.1.1 Requirements for All Pressurized Piping

Information

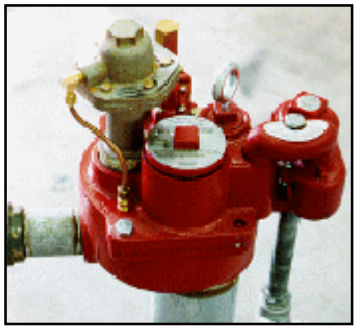
Automatic line leak detectors (LLDs) are devices installed in the piping run and are designed to detect a catastrophic release from pressurized piping. They are located on the STP head in the sump above your tank. LLDs are required because if they detect a major breach in the piping, they will restrict flow to only 3 gallons per hour, which will prevent a major release. But because they will not detect small piping leaks, an additional method of release detection is also required.

Each pressurized piping run must have an automatic LLD installed. You must meet specific requirements for your LLDs.

Sample LLD

There are two types of LLDs:

- Mechanical LLDs are mechanically operated pressure valves that test for piping leaks each time the pump is turned on.
- Electronic LLDs have an electronic detection element that connects to an electronic control panel (such as an ATG system) and continuously monitors for piping releases.



Sample STP Head with LLD

Note that an electronic LLD also may be capable of conducting a line tightness test. Check with the UST service technician to see if this option applies to you.

When a leak is detected, automatic LLDs must restrict fuel flow to a rate no greater than three gallons per hour.

You must test each LLD at least once every year. The test must be performed according to the manufacturer's requirements and procedures by trained, qualified personnel.

- You must keep records of these annual tests for 3 years.
- If an LLD fails a functionality test, have a trained person repair or replace the LLD and re-test the LLD.

You must maintain all records of maintenance or repair to your LLD for a period of 3 years.

The end of all pressurized piping (where the pipe enters the bottom of the dispenser) must be equipped with an emergency shut-off valve (i.e., a shear valve, also called a crash valve) designed to close automatically in the event of impact or fire exposure. The shear valve must be mounted directly beneath the dispenser and the bottom portion of the shear valve (below the shear line) must be solidly mounted to the dispensing island.

✓ Frequently test your automatic LLDs according to the manufacturer's instructions to make sure they are working properly.

✓ Make sure that your LLD is designed to operate with the type of fuel your UST system stores. For example, some LLDs are designed to work with gasoline, while others are intended to work with diesel.

✓ Test the shear valve annually.

4.8.1.2 Requirements for Single-Walled Pressurized Piping

A line tightness test must be used to meet leak detection requirements for your pressurized single-walled piping. Line tightness testing may be performed by either a trained tester or by using a permanently installed electronic system. Line tightness testing must be able to detect a release of 0.1 gallons per hour at a line pressure of one and a half times the operating pressure of the system. For example, if the pipe typically operates at 30 PSI, the line test must be capable of detecting a leak of 0.1 gallon per hour at 45 PSI.

For pressurized piping, a line tightness test is required every year. You must keep results of tightness testing for 3 years.

If you use a permanently installed electronic system, it must be inspected, calibrated, and tested on a yearly basis. You must keep records of these annual tests.

Line tightness tests must be conducted by a trained tester.

- Make sure that the method of tightness testing is approved by the DEC.
- Keep the results of all tightness tests for 3 years.

✓ If you use a permanently installed electronic system, periodically have a trained contractor, such as the vendor who installed the system, service that system according to the manufacturer's instructions.

4.8.1.3 Requirements for Double-Walled Pressurized Piping

Each double-walled pressurized piping run must have **interstitial monitoring.** You must be monitoring the interstitial space continuously with an electronic monitor, or manually once per week, for releases. Whether electronic continuous monitoring is present or manual monitoring is performed, weekly documentation of this monitoring must be kept for at least a year.

The requirements for interstitial monitoring of double-walled tanks also apply to piping. Consult section 4.7.2.2 for more information on these requirements. **In addition,** extra requirements apply to sensors and sumps. See section 4.8.5 for more information on sumps.

All sumps must be physically checked once each week, or be equipped with sensors for continuous monitoring. Sensors are typically located in the piping collection sump areas for interstitial monitoring. These sumps must be liquid-tight and free of leaks (e.g., no holes, cracks, or spaces between the sump wall and any piping or conduit entering the pipe) for piping interstitial monitoring to operate correctly. They also must be free of water, debris, and product.

Sensors must be positioned at the lowest point on the perimeter of the bottom of the sump. They must be upright and functioning properly.

The secondary piping test boot must be disconnected.

All other entries (boots) must be sealed to prevent infiltration of water and release of product.

Piping must slope to the sump containing the monitoring probe.

4.8.2 Suction Piping

Suction piping can be either single- or double-walled. Systems with suction piping may be exempt from some leak detection requirements if the piping run meets the characteristics described in section 4.8.2.1. If suction piping is not exempt, leak detection requirements depend on whether the piping is single- or double-walled (described in sections 4.8.2.2 and 4.8.3.3, respectively).

4.8.2.1 Exempt Suction Piping

Suction piping that has only one check valve, located immediately beneath the dispenser, and is sloped uphill from the tank to the dispenser at a gradient of at least 1/8-inch per foot is exempt from leak detection requirements. Most suction piping qualifies as exempt suction piping, but in some instances topographic features prevent the installation of suction piping with the proper gradient.

Vertical check valves must be installed only at the dispenser end of each exempt suction piping run, immediately below the dispenser. The presence of the check valve must be verifiable.

4.8.2.2 Single-Walled Suction Piping

If your system meets the design criteria for an exempt suction system described in section 4.8.2.1 above, you do not need to conduct a line tightness test. Few systems that do not meet the exemption criteria are still in service. Contact the DEC UST Program to determine whether your system meets the design criteria. If it does not, you must conduct a piping tightness test at least once every 3 years.

If it is required, line tightness testing must be performed by a trained tester. Line tightness testing must be able to detect a release of 0.1 gallons per hour, at a line pressure of one and a half times the operating pressure of the system. The term “operating pressure” for a suction system may seem confusing, but the U.S. EPA has stated that for suction systems, “operating pressure” means the amount of vacuum the suction pump applies. So, if a suction system typically operates at a negative pressure (suction) of 4 PSI, the line test must be capable of detecting a leak rate of 0.1 gallons per hour at a positive pressure of 6 PSI.

If you have the tightness tests performed by a trained tester, you must:

- Make sure that the tester is qualified and that the method of tightness testing is approved by the DEC.
- Keep the results of all tightness tests for 3 years.

4.8.2.3 Double-Walled Suction Piping

If your double-walled suction piping system meets the criteria for exemption listed in section 4.8.2.1 above, you are not required to monitor the interstitial space of your piping system. If your system does not meet the criteria for exemption, each double-walled suction piping run must have **interstitial monitoring.** You must monitor the interstitial space manually once per week, or continuously with an electronic monitor, for releases. Whether electronic continuous monitoring is present or manual monitoring is performed, weekly documentation of this monitoring must be kept for at least a year.

The requirements for interstitial monitoring of double-walled tanks also apply to piping. Consult section 4.7.2.2 for more information on these requirements. **In addition,** extra requirements may apply to sensors and sumps. See section 4.8.5 for more information on sumps.

All sumps must be either checked manually at least once each week, or be equipped with sensors for continuous monitoring. Sensors are typically located in the piping collection sump areas for interstitial monitoring. These sumps must be liquid tight and free of leaks (e.g., no holes, cracks, or spaces between the sump wall and any piping or conduit entering the pipe) for interstitial monitoring of piping to operate correctly. They also must be free of water, debris, and product.

Sensors must be positioned at the lowest point on the perimeter of the bottom of the sump. They must be upright and functioning properly.

The secondary piping test boot must be disconnected.

All other entries (boots) must be sealed to prevent infiltration of water and release of product.

Piping must slope to the sump containing the monitoring probe.

4.8.3 Gravity Piping

Gravity piping must be secondarily contained (e.g. double-walled piping). You must monitor the interstitial space electronically or manually at least once per week.

4.8.4 Alternate Methods

If you use an alternate method not described in this chapter to monitor your piping for leaks, it **must** be approved by DEC. It must be capable of detecting leaks consistently. There are very few alternate systems in operation in Vermont. Contact the DEC's UST Program for specific guidance.

4.8.5 Sumps

A sump is a contained subsurface area designed to provide access to equipment located below ground and to prevent liquids from releasing into the environment. Sumps are required for all facilities installed after September 1, 1987, except for intrinsically safe suction systems. If you do not have sumps installed, contact the DEC.

Contained sumps have sides and a bottom, are designed to be liquid tight, and usually have a special cover designed to keep out water.

Types of Sumps Associated with UST Systems

The types of sumps likely to be associated with your UST system are:

Turbine Sumps – Turbine sumps are designed to provide access to the turbine area above the tank. The turbine area houses the STP head, piping, LLDs, interstitial monitoring devices, wiring, and other equipment. You will find turbine sumps directly above your USTs. Turbine sump lids generally range from 3 to 4 feet in diameter and can be round, oval, square, or rectangular in shape.

Dispenser Sumps – Dispenser sumps are designed to provide containment for, and access to, piping, flex connectors, shear valves, and other equipment located beneath the dispenser. Dispenser sumps are found directly under your dispensers.

Transition/Intermediate Sumps – Transition/intermediate sumps are less common than other sumps, but can be found along the piping runs that connect the tanks to the dispensers, and are designed to provide access to the piping. Transition sumps are used to transition from above-ground piping to below-ground piping or, in some cases, to transition between different types of piping. Intermediate sumps are located at key points in the piping system (e.g., low spots, branches, tees). Transition/intermediate sump lids generally range from 3 to 4 feet in diameter and can be round, oval, square, or rectangular in shape.

You can obtain more information on sumps from U.S. EPA's "Inspecting and maintaining sumps and spill buckets," document number EPA 501-R-05-001, May 2005, available online at http://www.epa.gov/OUST/pubs/sumpmanl.htm.

4.8.5.1 Sump Maintenance

Maintaining your sumps and spill buckets will involve gaining access to them, inspecting them on a regular basis, assessing whether any problems exist, and ensuring any problems are addressed. For serious problems (e.g., obvious leaks occurring on the piping and equipment, cracked spill buckets or sidewalls, cracked or missing seal around the lid), it's best to contact your UST contractor or the manufacturer of your UST equipment to have the problem fixed.

If you conduct manual monitoring, you must record results in a monitoring log.

If your facility does not have sensors installed on its sumps, you must conduct manual monitoring every week. Inspect all dispenser lines, fittings, and couplings, and inspect the sump beneath the dispenser for any signs of leakage.

When you inspect your sumps, you should answer the following questions about their condition:

- **Is the secondary containment sump free of water, debris, and product?** Debris, liquid, and product can damage equipment, reduce capacity (if contained), and interfere with your equipment's ability to operate correctly. For example, water in your sump will reduce capacity and may cause metal equipment in your sump to corrode. Fuel in your sump will also reduce capacity and may damage some plastic sumps and other components not designed for long term contact with petroleum. Similarly, used dispenser filters may contain small amounts of petroleum, so they should not be left inside your sump. You should carefully remove and properly dispose of any debris, liquid, or ice in your sumps.
- **Do the sumps appear to be free from leaks (e.g., no obvious holes, cracks, spaces between the sump wall and any piping or conduit entering the pipe)?** Examine your contained sumps for signs of damage (e.g., cracks or holes). Check to ensure no cracks are present around the areas where components, such as wiring conduit and piping, enter your sumps. Cracks and holes mean your sump will no longer contain product or prevent releases to the environment.
- **Are all entries (boots) sealed to prevent infiltration of water and release of product?** A test boot is found on secondarily-contained piping and is a flexible sleeve usually made of rubber with a valve located either at the entry to the sump or on the piping in the sump. It is used to test the space between the inner and outer piping walls for tightness. Check to ensure the test boots are in good condition, not cracked or torn, and positioned correctly in the sump.
- **Is the secondary piping test boot disconnected?** For turbine sumps and transition and intermediate sumps, check to ensure the test boots are pulled back from the secondary piping so any fuel in the secondary piping can flow to the sump. You should be able to see a gap between the primary and secondary piping which allows any fuel present in the secondary piping to flow into the sump. For dispenser sumps, depending on the configuration of your system, the test boot may or may not need to be pulled away. Test boots would typically be pulled away in sumps that are located in low spots to allow leaks inside the piping to flow into the sumps. However, check with your contractor for the appropriate configurations.