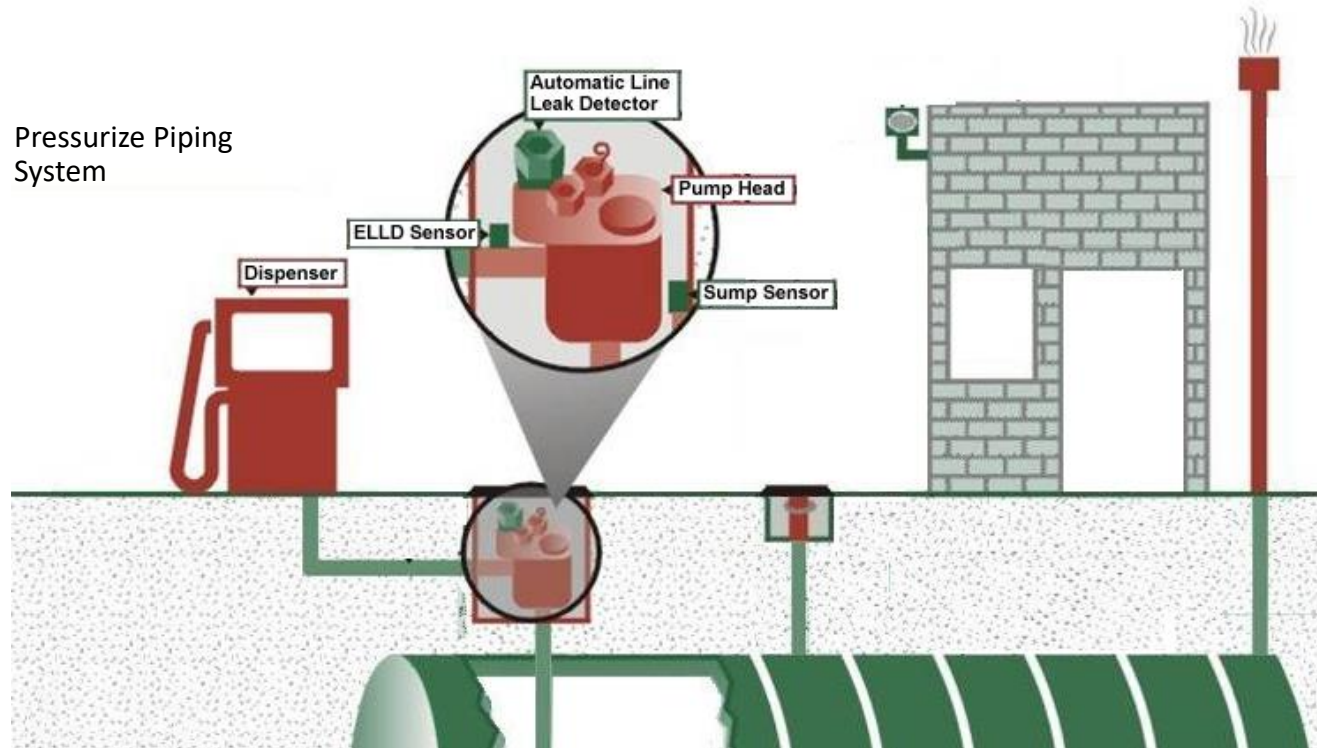


There are two types of systems used to pump fuel through UST product lines: Suction pumping systems and pressurized pumping systems. In a suction pumping system, the pump is located inside the dispenser cabinet, and the fuel is drawn from the tank by suction. In a pressurized piping system, the pumping mechanism is located inside the UST near the bottom of the tank. The pump moves the fuel through the piping under a pressure of approximately 30 pounds per square inch.



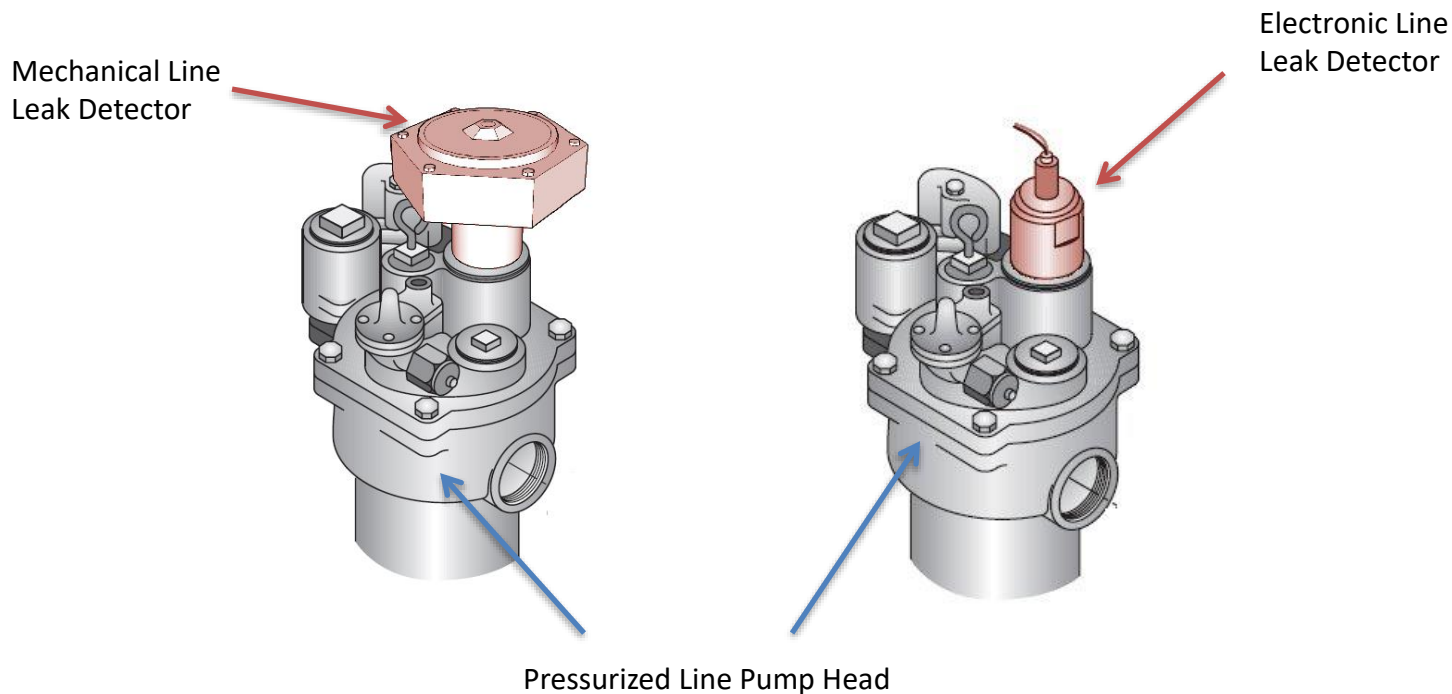
Pressurized Piping Systems

Because the pumps are located inside the tank and operate under positive pressure, even large leaks in the piping do not affect the operation of the fuel dispensing system, and without leak detection would go unnoticed. North Dakota UST rules require two types of release detection on pressurized piping:

- A mechanism or method to detect a “large” leak at a rate of 3 gallons per hour; ***and***
- A mechanism or method to detect a “small” leak at a rate of 0.2 gallon per hour monthly OR 0.1 gallon per hour yearly.

Detecting Large Leaks

To find a “large” leak in pressurized piping, the pumping system must have equipment that can continuously monitor for leaks or include a device called an automatic line leak detector (ALLD). There are two types of ALLDs: **mechanical** and **electronic**.

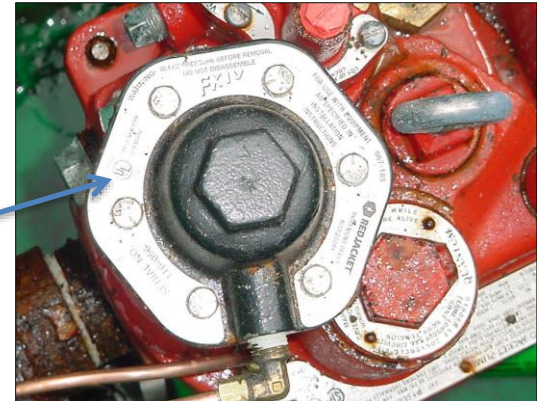


Detecting Large Leaks

Mechanical ALLDs - With a mechanical line leak detector, a leak will be indicated by a reduction in the flow of fuel (normal flow is 7 to 10 gallons per minute.) The mechanical line leak detector is threaded into the pump head and has no wiring connections. They usually have a round or hexagonal top and should have a stamped brand name like Red Jacket, EBW, Vaporless, FE Petro or Veeder-Root.



A Red Jacket mechanical line leak detector capable of detecting a leak of 3 gallons per hour



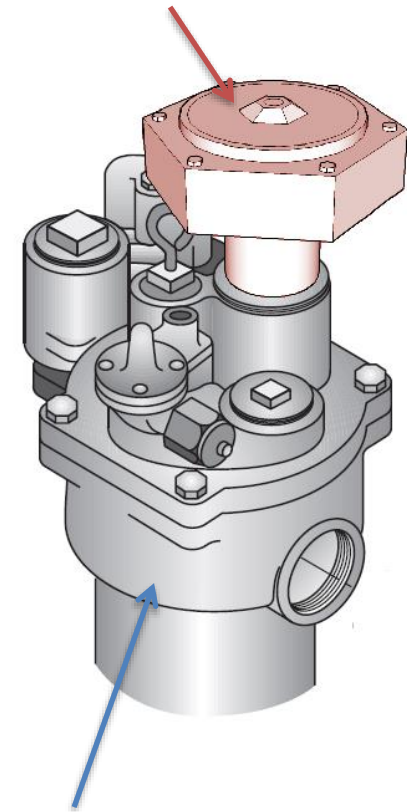
Detecting Large Leaks

Mechanical Line Leak Detectors - *If the UST facility has mechanical line leak detectors, the operator must respond immediately to customer complaints of slow fuel flow which could indicate a leak!!!*

Things other than leaks can cause slow flow (for example plugged filters, defective pump motors). The facility operator should call a service technician to determine the cause. Cold temperatures may also cause a mechanical line leak detector to go into slow flow. If the slow flow only affects one customer, it is likely because of temperature effects. If the slow flow persists however, a service technician should be called.

Mechanical line leak detectors wear out and typically need to be replaced every few years. The North Dakota UST Rules require line leak detectors to be tested annually for operation by a qualified technician.

Mechanical Line
Leak Detector

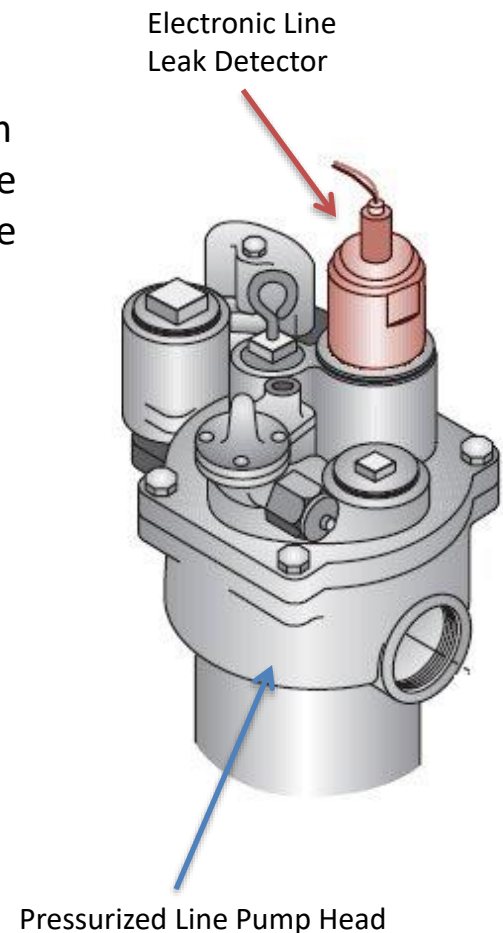


Pressurized Line Pump Head

Detecting Small Leaks

Electronic Line Leak Detectors - With an electronic line leak detectors, the leak detector will shut down the pump when a small leak is detected. This is a much more reliable indicator of a problem than the *slow flow* of a mechanical line leak detector. Electronic line leak detectors use a special sensor that monitors the pressure inside the piping system between customer transactions, when the pressure should be stable. A loss of pressure in the piping may indicate a leak. Electronic line leak detectors are usually connected to an alarm at an automatic tank gauge. An electronic line leak detectors may also have the ability to detect leaks smaller than .2 gallons per hour.

Both mechanical and electronic line leak detectors must have a functionality test performed annually by a qualified service technician.



Detecting Small Leaks

Electronic line leak detectors - Like the mechanical line leak detectors, the electronic line leak detector is also threaded into the pump head. It is either wireless or hard-wired to the pump electrical system. Common brand names are Red-Jacket, Incon and Veeder-Root.



Red Jacket ELLD



InCon ELLD



Veeder-Root ELLD

Detecting Small Leaks

Because of the significant environmental hazard posed by pressurized pumping systems, the North Dakota UST Rules also require pressurize piping to find small leaks, leaks of .2 gallons per hour or less, in addition to the requirements of finding leaks greater than 3 gallons per hour.

There are several options for finding “small” leaks in a pressurized piping system:

- Monthly monitoring with an electronic line leak detector at the rate of 0.2 gallons per hour;
- Annual line tightness test performed by a qualified technician or with an electronic line leak detectors at the rate of 0.1 gallon per hour (EPA approved to perform test at 0.1 gph);
- Monthly Statistical Inventory Reconciliation (SIR); or
- Continuous monitoring using sump sensors with double-walled or secondary containment piping.
- Monthly visual inspection of piping sumps with double-walled or secondary containment.

Detecting Small Leaks

Monthly Monitoring With An Electronic Line Leak Detector

Electronic line leak detector tests may be used to meet the monthly leak detection requirements for your piping. In order to meet the leak detection requirements, a .2 gallon per hour test must be performed every month. *A copy of the printout or log showing the results of the test must be kept at the facility for 12 months.*

You must also conduct annual tests that demonstrates proper functioning of each line leak detector by a qualified service technician. Documentation must be kept by the operator for 12 months.

Detecting Small Leaks

Monthly Monitoring With An Electronic Line Leak Detector

These are examples of printouts from an automatic tank gauging system. The printout on the left is an example of a line leak test using an electronic line leak detector. The printout on the right shows how much product is in the tanks. If you use electronic equipment to monitor for leaks, you must know how to use the equipment.

A line leak test report that was printed from a tank monitoring system.

```
MMM DD, YYYY  HH:MM XM
PRESSURE LINE LEAK TEST
RESULTS
Q 1:UNLEADED REG LINE
3.0 GAL/HR RESULTS:

LAST TEST:
MMM DD,YYYY HH:MM XM PASS

NUMBER OF TESTS PASSED
PREV 24 HOURS : 123
SINCE MIDNIGHT : 81

0.20 GAL/HR RESULTS:

MMM DD,YYYY HH:MM XM PASS
MMM DD,YYYY HH:MM XM PASS

0.10 GAL/HR RESULTS:

MMM DD,YYYY HH:MM XM PASS
MMM DD,YYYY HH:MM XM PASS
```

A report printed by the same system showing how much fuel is in each tank. **This is not a printout of a line leak test.**

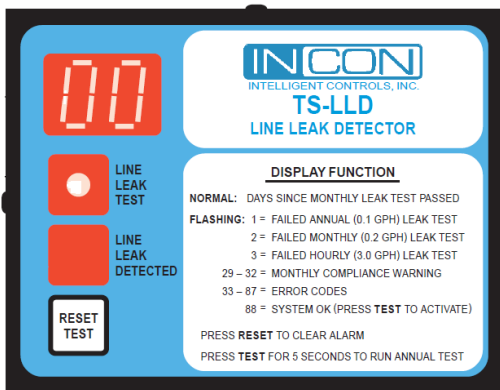
```
MMM DD, YYYY HH:MM XM
INVENTORY REPORT
T 1:UNLEADED GASOLINE
VOLUME = 8518 GALS
ULLAGE = 1482 GALS
90% ULLAGE= 482 GALS
TC VOLUME = 8492 GALS
HEIGHT =76.26 INCHES
WATER VOL = 0 GALS
WATER = 0.00 INCHES
TEMP = 64.6 DEG F

T 2: SUPER UNLEADED
VOLUME = 7545 GALS
ULLAGE = 2455 GALS
90% ULLAGE= 1455 GALS
TC VOLUME = 7569 GALS
HEIGHT =67.76 INCHES
WATER VOL = 0 GALS
WATER = 0.00 INCHES
```

Detecting Small Leaks

Monthly Monitoring With An Electronic Line Leak Detector

Some electronic line leak detection systems do not print test results, such as the InCon TS-LLD. If you have one of these systems, you will still need to record the test results every month. In a logbook or form provided by the North Dakota Department of Health, enter the tank and line number, the date, and the status of the leak test. The form "[30-Day Electronic Line Leak Detector Record](#)" is available at the NDDEQ Underground Storage Tank Program website to record the monthly tests.



InCon line leak detector display

Monthly Electronic Line Leak Detector Record

Product Line Premium ELLD Make/Model InCon TS-LLD

Month	OK (✓)	Leak Detector Tripped (✓)	Reason Leak Detector Tripped
January	✓ "00"		
February	✓		
March	✓		
April		✓	Equipment malfunction - fixed 4.12.10
May			
June			
July			

Sample electronic line leak detector log

Detecting Small Leaks

Annual Line Tightness Test

Annual line tightness testing may be used in combination with mechanical line leak detectors to meet the release detection requirements for your piping. These tests are performed by a qualified technician or with an electronic LLD that can detect leaks at the rate of 0.1 gallon per hour and is performed at least once every 12 months.

You must keep records of tightness testing results at your facility until the next test is conducted. If you use a permanently installed electronic line leak detection system to do your line tightness test, you will need to have the system serviced on an annual basis.

Detecting Small Leaks

Statistical Inventory Reconciliation (SIR)

Statistical Inventory Reconciliation (SIR) is a mathematical process that analyzes daily inventory data to assess whether a leak exists in the tank or piping. SIR is conducted by a vendor whose process has been approved by the U.S. Environmental Protection Agency.

The SIR provider uses a computer program to look more closely at inventory data to statistically determine if the tank or piping has a leak. The company then provides the facility with a report indicating whether the inventory records passed or failed.

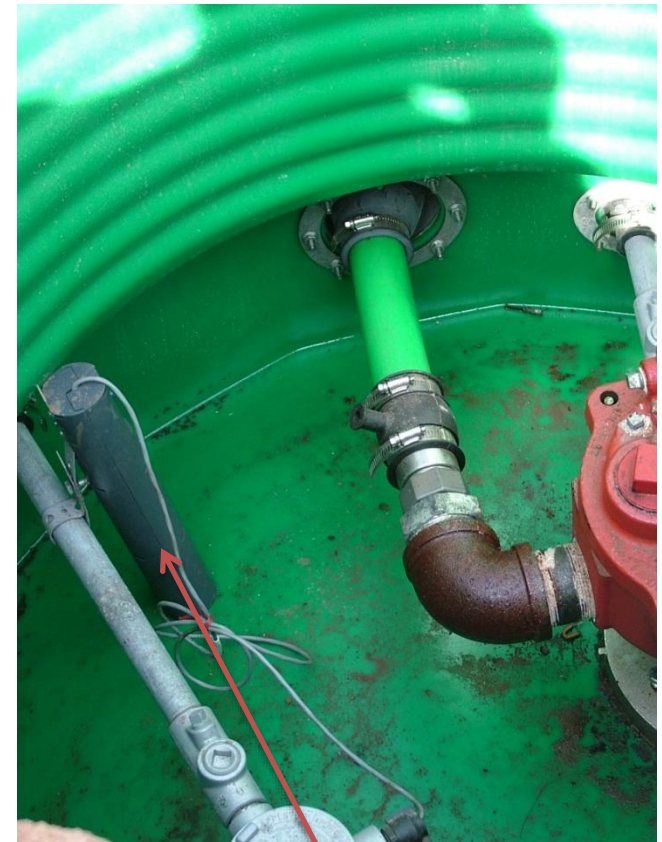
SIR can detect leaks in piping less than .2 gallons per hour. It requires that the operator of a facility to gauge the tank daily and record the results. After enough data is collected, the information is sent to the SIR vendor for analysis. Contact your SIR vendor for specific details on procedures for recording the results.

If you use SIR as the form of leak detection for your piping, you will also be required to take the module on SIR to complete the North Dakota owner/operator training.

Detecting Small Leaks

Continuous Monitoring Using Sump Sensors

Continuous monitoring can be used to meet the release detection requirements for your piping and can be used in place of a line leak detector. The piping must be secondarily contained (double-walled) and slope down towards the sump. The monitoring must be done continuously, which requires the use of a sensor that can report back to a console. Most sensors are float sensors that detect liquids. The sensor must be placed at the lowest point in the containment area. This is so the sensor will quickly be able to detect when liquids have entered the containment area. When the sensor detects a leak, it must be able to either shutdown the turbine, trigger an alarm you can see or hear, or alert a responsible person by other means such as an autodialer.



Sensor

Continuous Monitoring Using Sump Sensors

If you use sump sensors as the form of leak detection on your piping, you need to record the status of the sump sensors every month. In a logbook or form provided by the North Dakota Department of Health, enter the sump number, the month, the year, the status of the sensor, the date recorded and your initials. The form "[30-Day Piping Interstitial Monitoring Record](#)" is available at the NDDEQ Underground Storage Tank Program website to record your results.

Sample sump inspection log.
For more information about sumps, see the training module on sumps.



30 DAY MONITORING OF PIPING SUMPS

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WASTE MANAGEMENT – UNDERGROUND STORAGE TANK PROGRAM

SFN 62204 (07-2022)

Telephone: 701-328-5166

Email: ndust@nd.gov

Fax: 701-328-5200

Website: <https://deq.nd.gov/wm>

Clear Form

Facility Name	Facility Location Address	ND UST Facility ID
---------------	---------------------------	--------------------

Fill in the date, if the sump has a sensor and the results of the 30-day leak check. If you are visually checking the sumps, write the results of the check (i.e., dry or if fuel or water is found). If a sump sensor is present in the sump, write that the sump alarm was checked and print a copy of the sensor status on your ATG console. See back side for additional instructions.

Date of Inspection		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Piping Sump ID (Ex. Premium, diesel #1, etc.)	Sump Sensor I/N												

Example Document

Monthly Visual Inspection of Piping Sumps

If the sumps in your double-walled piping system do not contain electronic alarms or if the alarms are not functional, you can meet the leak detection requirements for piping by visually checking all piping sumps once a month. This includes dispenser sumps. After the sumps have been visually checked, you must document that they have been checked. Documentation must include the sump's ID, the date, the condition of the sump (is water or fuel visible), and the inspector's initials. You may record the information in a logbook or use a form "[30-Day Monitoring of Piping Sumps](#)" that is available on the internet at the NDDEQ Underground Storage Tank Operator Training Program. This documentation must then be kept on site for at least 12 months. *For pressurized piping systems, visual monitoring of piping sumps must be used in conjunction with line leak detectors in order to meet the leak detection requirements.*



Opening a sump for visual inspection

Visual Inspection of Piping Sump Log



30 DAY MONITORING OF PIPING SUMPS

NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
 DIVISION OF WASTE MANAGEMENT – UNDERGROUND STORAGE TANK PROGRAM

SFN 62204 (07-2022)

Telephone: 701-328-5166

Email: ndust@nd.gov

Fax: 701-328-5200

Website: <https://deq.nd.gov/wm>

Clear Form

Facility Name	Facility Location Address	ND UST Facility ID
---------------	---------------------------	--------------------

Fill in the date, if the sump has a sensor and the results of the 30-day leak check. If you are visually checking the sumps, write the results of the check (i.e., dry or if fuel or water is found). If a sump sensor is present in the sump, write that the sump alarm was checked and print a copy of the sensor status on your ATG console. See back side for additional instructions.

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Date of Inspection													
Piping Sump ID (Ex. Premium, diesel #1, etc.)	Sump Sensor (Y/N)												

Example Document