# Automatic Tank Gauging (ATG)

An automatic tank gauge (ATG) is an electronic device, whose basic function is to monitor the fuel level in the tank over a period of time to see if the tank is leaking. It can also tell the facility operator what is going on inside the tank (example: fuel level, volume and temperature, water level and volume, high and low fuel level warnings).

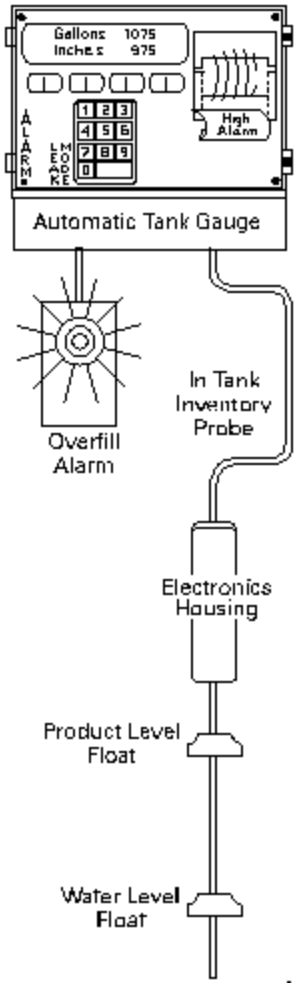
Other features can be added to the ATG so that it can perform useful functions such as monitoring the interstitial spaces in tanks and piping, monitoring pressurized piping, or communicating remotely.

## *Components of an Automatic Tank Gauging System*

An ATG uses probes located in each tank or compartment to measure fuel and water levels. Each probe consists of a long rod with floats or sensors. The position of the floats tells the ATG console how much fuel and water are present in the tank. The probe rod also has thermistors to measure the fuel temperature.

A console is typically located inside the facility building, and can include a display, a keypad, a printer, status lights, and a beeper that signals alarm conditions. An ATG system may also be connected directly to a computer.

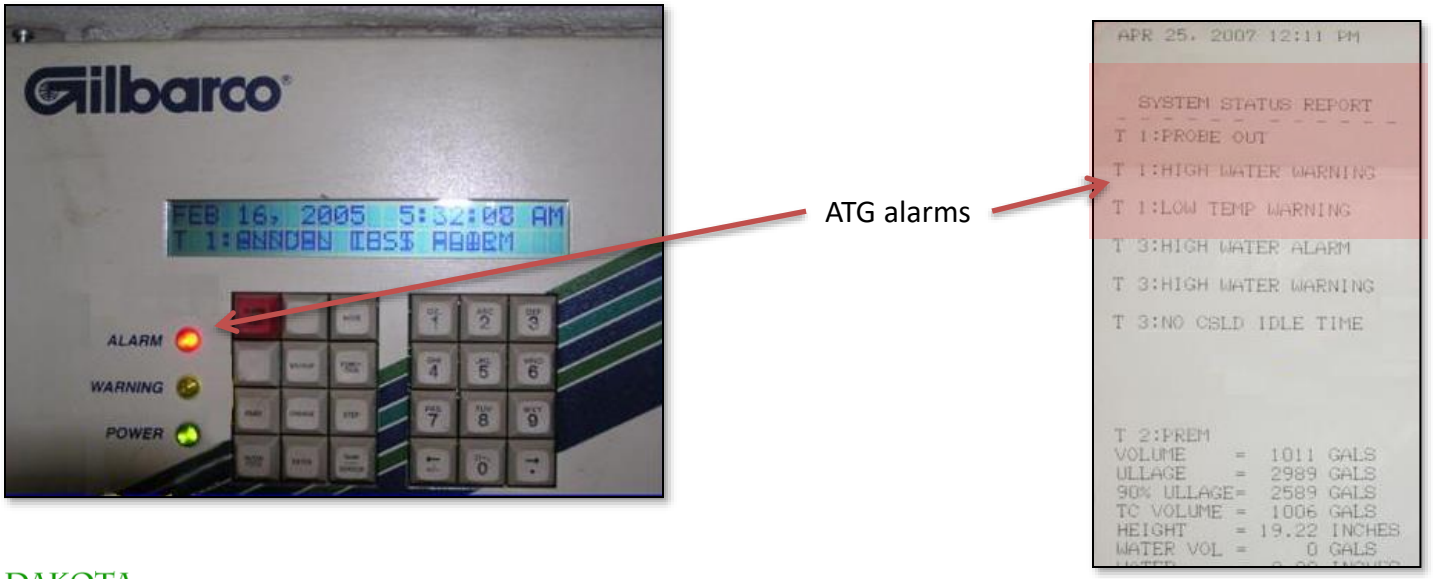

A Veeder-Root ATG console



**The single biggest problem associated with using ATG for monthly release detection is OPERATORS IGNORING ALARMS!!!**

Alarms are annoying for a reason - the ATG is trying to alert the operator. Not all alarms are due to leaks, but ignoring any alarm defeats the purpose of having an ATG. Large leaks have gone undetected when operators either ignored an alarm or turned the ATG off to get rid of the annoying "beeping" sound.

*Respond immediately to any audible alarms or blinking red or yellow lights!*



## *Monthly Automatic Tank Gauging Leak Tests*

When an ATG is used as the monthly leak detection method, the tank must PASS a test that can detect a 0.2 gallon per hour (gph) leak at least once every 30 days. A 0.2 gph leak rate is equivalent to about two cans of soda every hour. Detecting a fuel level change that amounts to two cans of soda leaking from an 8,000- or 10,000-gallon tank requires a very accurate measurement of fuel levels and temperatures.

Petroleum, especially gasoline, expands and contracts substantially with temperature, so the fuel temperature must be monitored by the ATG system very closely to get an accurate test. The temperature of fuel being delivered is most often different from the temperature of the fuel in the UST. Therefore, after a delivery, the fuel temperature inside a tank changes fairly rapidly. An ATG will not get a good test result for approximately 6 to 12 hours after a delivery until the fuel temperature has had time to stabilize.

## *Monthly Automatic Tank Gauging Leak Tests*

There are two types of ATG tank tests: **periodic** and **continuous**.

- **Periodic Test.** The tank must be shut down for several hours, during which time there should be no dispensing or delivery of fuel. Most periodic tests are done overnight. If the volume change is too great, the test fails. If product is dispensed in the middle of the test, the test either fails or is invalid. *The periodic test approach is not workable when a tank facility is open 24 hours a day.*

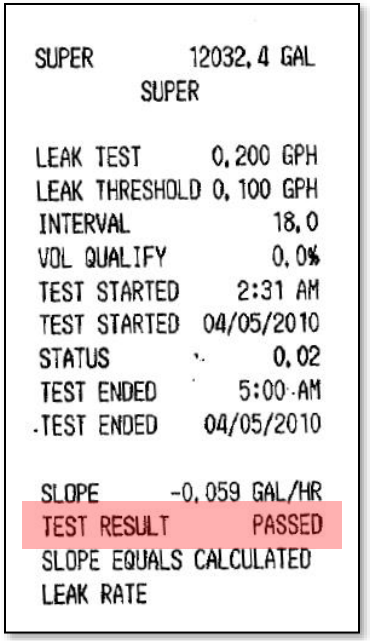
- **Continuous Test.** The ATG monitors the fuel level for periods of at least 15 to 20 minutes between customers, when a tank is idle. The ATG gathers and stores product-level data in its memory during these quiet intervals. If fuel dispensing starts, the data gathering is interrupted. The ATG then waits for another quiet period to gather more data. It keeps doing this until there is sufficient data to conclude that the tank is either tight or leaking.

**ATG Tank Test Procedure - How to read an ATG test report:**

The ATG test report typically provides the basic information about product volume and temperature in the tank at the beginning and end of the test. It also prints out the results of the test, usually “pass” or “fail”. Occasionally the ATG may print out a result that is “inconclusive” or “invalid” when conditions are not right for conducting a test over the testing period.

**ATG Tank Test Procedure - How to read an ATG test report:**

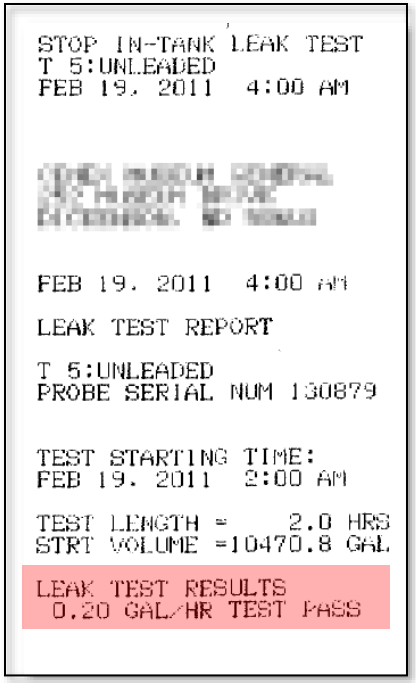
If the result is **pass,** file the printout with the facility leak detection records and retain on site for a minimum of twelve (12) months. You only need to keep one passing test per tank each month.



SUPER 12032.4 GAL
SUPER

LEAK TEST 0.200 GPH
LEAK THRESHOLD 0.100 GPH
INTERVAL 18.0
VOL QUALIFY 0.0%
TEST STARTED 2:31 AM
TEST STARTED 04/05/2010
STATUS 0.02
TEST ENDED 5:00 AM
TEST ENDED 04/05/2010

SLOPE -0.059 GAL/HR
TEST RESULT PASSED
SLOPE EQUALS CALCULATED
LEAK RATE



STOP IN-TANK LEAK TEST
T 5:UNLEADED
FEB 19, 2011 4:00 AM

[redacted]

FEB 19, 2011 4:00 AM

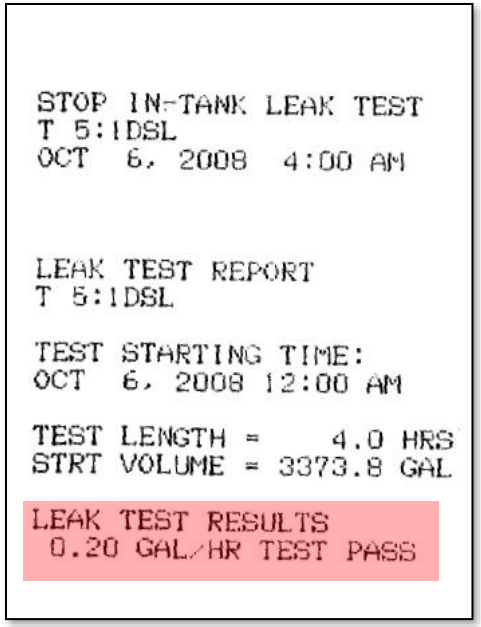
LEAK TEST REPORT

T 5:UNLEADED
PROBE SERIAL NUM 130879

TEST STARTING TIME:
FEB 19, 2011 2:00 AM

TEST LENGTH = 2.0 HRS
STRT VOLUME =10470.8 GAL

LEAK TEST RESULTS
0.20 GAL/HR TEST PASS



STOP IN-TANK LEAK TEST
T 5:1DSL
OCT 6, 2008 4:00 AM

LEAK TEST REPORT
T 5:1DSL

TEST STARTING TIME:
OCT 6, 2008 12:00 AM

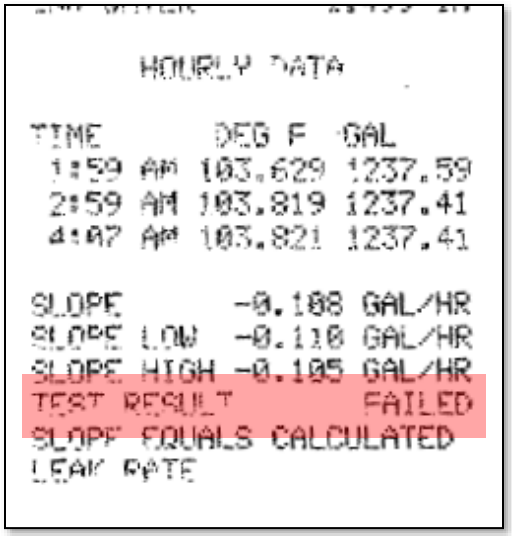
TEST LENGTH = 4.0 HRS
STRT VOLUME = 3373.8 GAL

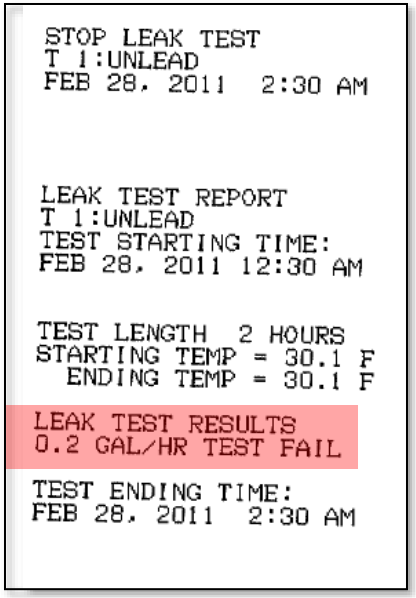
LEAK TEST RESULTS
0.20 GAL/HR TEST PASS

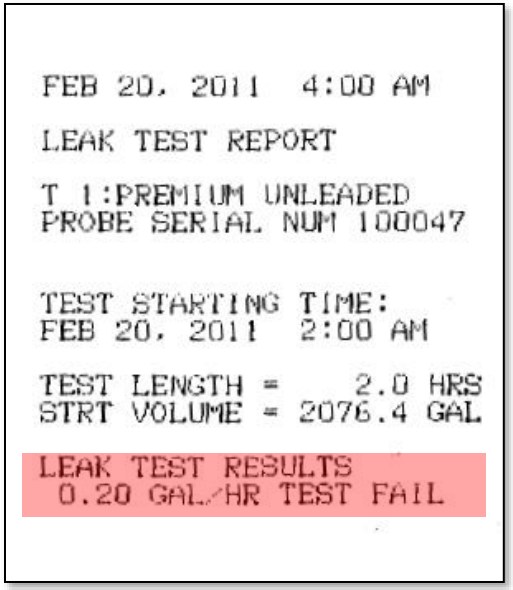
Examples of ATG printouts showing a passed test.

**ATG Tank Test Procedure - How to read an ATG test report:**

If the result is **fail,** there is evidence of a possible leak. The facility operator must investigate to determine if there is a leak. Report confirmed releases to the North Dakota Department of Environmental Quality at 701-328-5166.



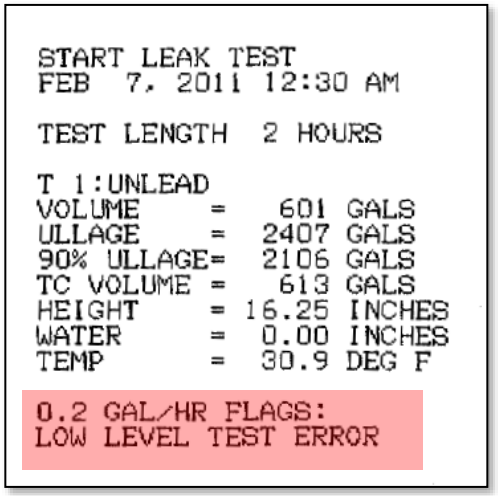

Examples of ATG printouts showing a failed test.

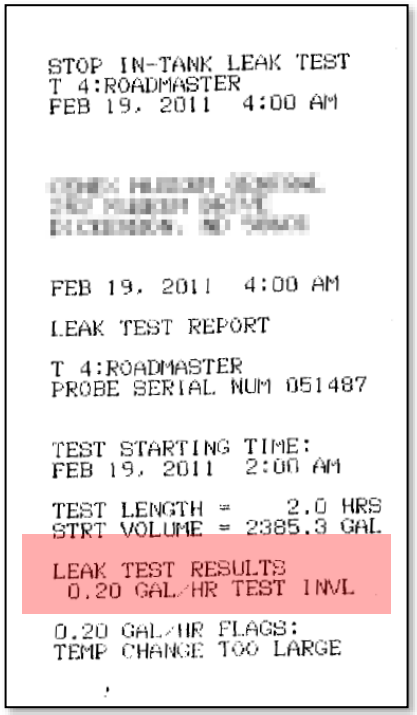
**ATG Tank Test Procedure - How to read an ATG test report:**

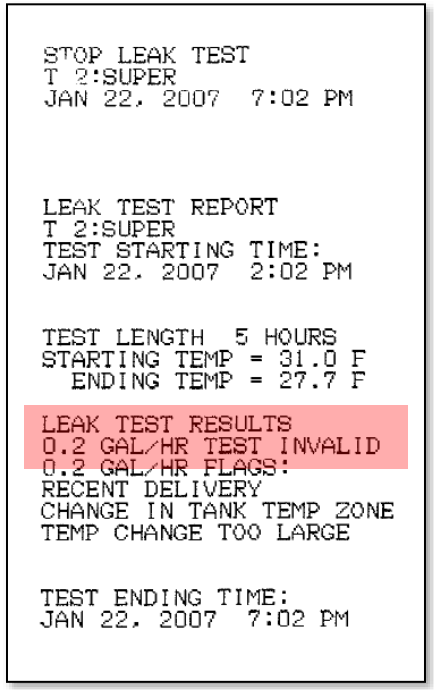
If the result is **inconclusive** or **invalid,** the operator must run another test. If the ATG continues to record inconclusive test results, a service technician should be called to investigate and correct the problem.

A "low level test error" indicates that there is not enough product in the tank to test for tightness.

Examples of ATG printouts showing an invalid test.



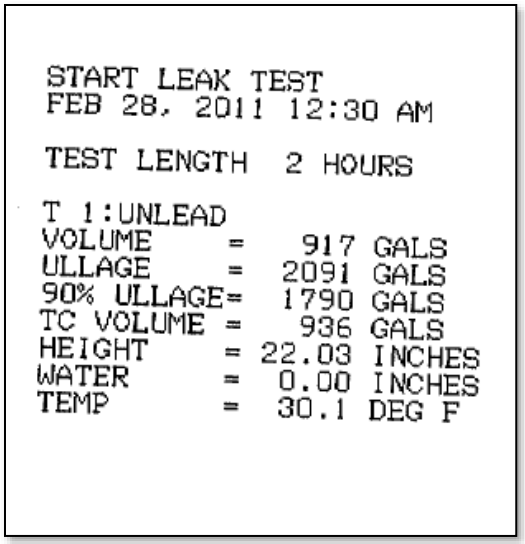



**ATG Tank Test Procedure - How to read an ATG test report:**

If the ATG printout does not show a **Pass**, **Fail**, or **Invalid**, the printout is not printing a test result. Please look carefully at the printout to see what it is printing.

Examples of ATG printouts showing product information "Inventory Report."



```
START LEAK TEST
FEB 28, 2011 12:30 AM

TEST LENGTH  2 HOURS

T 1:UNLEAD
VOLUME      =    917 GALS
ULLAGE      =   2091 GALS
90% ULLAGE=   1790 GALS
TC VOLUME   =    936 GALS
HEIGHT      = 22.03 INCHES
WATER       =   0.00 INCHES
TEMP        =   30.1 DEG F
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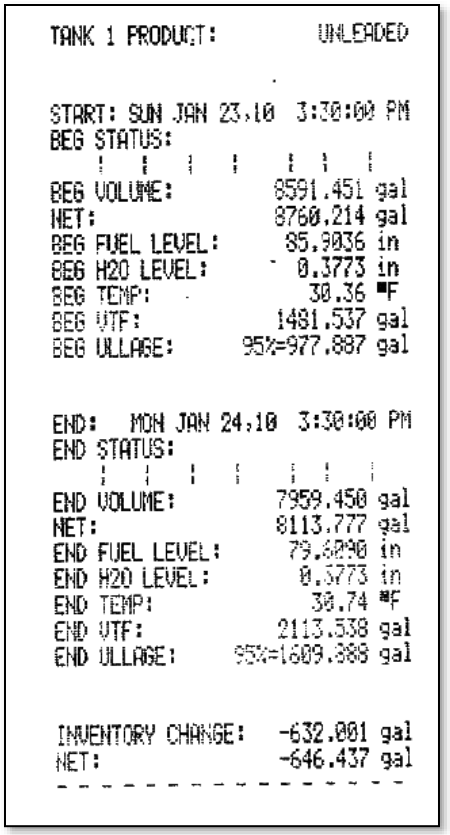

```
TANK 1 PRODUCT:          UNLEADED


START: SUN JAN 23,10  3:30:00 PM
BEG STATUS:
    !   !   !   !    !   !   !
BEG VOLUME:          8591.451 gal
NET:                 8760.214 gal
BEG FUEL LEVEL:        85.9036 in
BEG H2O LEVEL:          0.3773 in
BEG TEMP:              30.36 ºF
BEG VTF:             1481.537 gal
BEG ULLAGE:      95%=977.887 gal


END:   MON JAN 24,10  3:30:00 PM
END STATUS:
    !   !   !   !    !   !   !
END VOLUME:          7959.450 gal
NET:                 8113.777 gal
END FUEL LEVEL:        79.6090 in
END H2O LEVEL:          0.3773 in
END TEMP:              30.74 ºF
END VTF:             2113.538 gal
END ULLAGE:      95%=1609.388 gal


INVENTORY CHANGE:    -632.001 gal
NET:                 -646.437 gal
- - - - - - - - - - - - - - - -
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## *Automatic Tank Gauging Limitations*

Be aware of the following ATG tank-test limitations:

- There must be a minimum amount of fuel in the tank for the ATG to get accurate data. The amount of fuel needed varies by system so you will need to consult the operations manual to determine your ATG requirements.

- The "periodic" type of ATG test is not valid for manifolded tanks. Tanks are manifolded when there is more than one tank with the same fuel in it, and the tanks are connected so that the fuel levels in the tanks are always equal. ATGs that perform periodic tests are NOT able to conduct valid tests on manifolded tanks unless a special valve is installed that isolates the tanks for the duration of the test. ATGs that perform continuous tests ARE capable of testing this type of tank system. If you have a manifolded tanks, ensure that your ATG is designed for manifolded tanks.

- There is a limit to how large a tank or a set of manifolded tanks an ATG can test.

- For continuous tests, there is a limit on how much fuel can be pumped over a period of a month and still have enough quiet time to perform a test.

- All ATGs must wait for approximately 6 to 12 hours after a delivery before conducting a leak test.

## *Other Useful Automatic Tank Gauging Functions*

Besides leak detection, other key information that an ATG can provide includes:

- **Ullage Volume versus 90% Ullage.** Ullage is the amount of empty space left in the tank. For example, an 8,000-gallon tank with 5,000 gallons of fuel has an ullage volume of 3,000 gallons. Ninety percent ullage is the ullage minus 10% of the tank capacity. The 90% ullage volume is the amount of fuel that should fit in the tank without triggering the overfill prevention device. *The 90% ullage number can be used to determine the amount of fuel to order.*

- **Gross versus Net Volume.** Gasoline changes volume quite dramatically with temperature. For example, 10,000 gallons of gasoline will change in volume by 7 gallons with a temperature change of 1°F. The gross volume is the actual volume of fuel at whatever temperature it happens to be. The net volume is the amount of fuel that WOULD be in the tank IF the temperature of the fuel were 60° F. *The gross volume is the number to use for inventory control purposes.*

## *Other Useful Automatic Tank Gauging Functions*

Besides leak detection, other key information that an ATG can provide includes:

- **Delivery Reports.** When a delivery occurs, the ATG automatically notes when the fuel level in a tank starts to rise and when it stops rising. The ATG then calculates the difference in volume and prints a report that gives the volume of fuel delivered. The ATG delivery volume may not match the delivery invoice because any fuel dispensed while the delivery was in progress will not be included in the ATG delivery report.

- **Water Levels.** With traditional gasoline, the ATG reports the amount of water (in both inches and gallons) present in the bottom of the tank. *However, water level measurements from the ATG may not be accurate in ethanol fuels (even E10).* Unless the ATG probe has been certified by the manufacturer for use with ethanol-blended fuels, the operator should use a gauge stick and water-finding paste formulated for alcohol fuels to monitor for the presence of water when storing any ethanol-blended gasoline.

## *Getting To Know The ATG*

If a facility has an ATG, it is essential the operator know what it does or does not do, what it is communicating, and what to do when an alarm - **any alarm** - sounds. There are many brands and models of ATGs; all have the ability to perform essentially the same functions. The operator should insist that the ATG installer or service technician train them and provide clear instruction on the proper operation and maintenance of the ATG. The owner or operator should contact the equipment manufacturer or UST installer if they have questions about operating the ATG.

For additional information on ATGs, refer to the EPA booklet "Getting The Most Out Of Your Automatic Tank Gauging System" available on the internet at the NDDEQ Underground Storage Tank Program website.

**What are the regulatory requirements for automatic tank gauging?**

- No later than April 1, 2021, all release detection equipment needs to be tested and inspected every year.
    - For automatic tank gauging systems, at a minimum, test the alarm, battery back-up, and verify the system configuration. For probes and sensors, you must inspect for residual build-up, ensure floats move freely, ensure the shaft is not damaged, ensure cables are free of kinks and breaks, and test alarm operability and communication with controller. Keep records of these tests for at least three years.
    - Typically these annual system tests are performed by your tank service contractor.
- Make sure employees who run, monitor, or maintain the automatic tank gauging system know exactly what they have to do and to whom to report problems.
- Keep results of your 30-day automatic tank gauging test results for at least one year. Your monitoring equipment provides printouts that can be used as records.