# Leak Detection: Statistical Inventory Reconciliation (SIR)

Statistical Inventory Reconciliation (SIR) is an approved monthly monitoring method for underground storage tanks (USTs) and piping. The tank owner/operator provides to the SIR vendor daily inventory, delivery and dispensing data. The vendor's computer software statistically analyzes the data provided to determine whether the tank or piping system is leaking. The vendor provides to the tank owner a monthly report of that analysis. Using SIR does not relieve tank owners/operators of the requirement to equip all pressurized lines with operational automatic line leak detectors, and to test the leak detectors every 12 months.

No two SIR methods are exactly alike, and not all SIR methods cover all types of USTs. Tank owners/operators are responsible for ensuring that the SIR method selected satisfies monthly monitoring requirements for their tanks. Some SIR programs are not certified for manifolded tanks or for tanks greater than a certain capacity. If your facility operates infrequently or seasonally, make sure SIR will work for you. The North Dakota Department of Environmental Quality keeps a list of SIR vendors for facilities interested in this leak detection method. The "SIR Vender List" is available on the NDDEQ Underground Storage Tank Program website.

## *Required Equipment*

**Method to Accurately Measure Tank Contents**

The contents of each UST should be measured on each operating day. An operating day is any day that product is removed from or added to the UST. This daily measurement may be accomplished using either of the following methods:

- A gauge stick marked in 1/8-inch increments. Replace any stick worn at the bottom or whose numbers are hard to read. Smear a fuel sensitive paste over the 6-inch portion of the stick where you expect the fuel level to be. Use a water-sensitive paste on the end of the stick to monitor for the presence of water in the bottom of the tank. Gauge for water at least once each month, or more often if your SIR vendor requires it.

- Fluid levels from the tank can be obtained from an automatic tank gauge inventory report readings in place of gauge stick readings.

## *Required Equipment*

### Tank Chart

The tank capacity chart used to convert stick readings into gallons must be the correct one for the tank's size and dimensions. The chart should have stick measurements listed in 1/8-inch increments. If you are using the ATG instead of stick readings, the ATG software should make this conversion for you.

### Dispensers

The dispenser's totalizer is used to gather information on the daily gallons sold.

## *Start-up Information Required*

Your SIR vendor will require information from you about each of your tanks in order to set up a computerized statistical analysis program tailored to your facility. Typical information requested will include, but may not be limited to, the following:

- Tank size (capacity, diameter, length)
- Identification of manifolded tanks
- Tank type, material of construction, manufacturer
- Product type in each tank

## *Data Required for Each Reporting Period*

For each reporting period, you must provide to your SIR vendor data for each tank. Your SIR vendor should provide a form for entering this data. It is important to enter all required data for each operating day. An operating day is any day when product is dispensed from or added to the tank. Data you will record for each operating day includes:

- The date the reading or measurement was taken
- Daily stick reading or ATG reading: inches and volume (converted gallons, per the tank capacity chart)
- Daily sales volume (gallons sold)
- Gross (not temperature corrected) deliveries.
- Water (measured in inches). Measure for water at least once per month, and more often if required by your SIR vendor.

It is the responsibility of the tank owner/operator to ensure the accuracy and completeness of the data before submitting it to the SIR vendor for analysis.

Some SIR vendors may request other information, such as net deliveries in addition to gross deliveries. Provide all information to your SIR vendor as soon as possible after the end of each reporting period.

## *What to Expect from Your SIR Vendor*

**Before You Get Started**

Before you begin using SIR, your vendor should provide you with:

- Documentation of the vendor's third-party certification.
- Tank calibration charts to ensure that you correctly convert stored product from inches to gallons. If your SIR vendor does not provide the necessary tank calibration charts, contact the tank manufacturer.
- Form (hard copy or electronic) to record profile information about your facility and each UST. Your vendor will use this information to set up the SIR program for your facility.
- Forms for recording daily data.

## *What to Expect from Your SIR Vendor*

**Ongoing**

Once you begin using SIR, your vendor will provide to you:

- A 30-day analysis report indicating a “pass” or a “fail” for your UST system and a leak rate.
- Comments on the quality of the data submitted.
- Suggestions for what may have caused the tank system to receive a “fail” or “inconclusive” report and suggestions for investigating and correcting the problem.

## *Optimizing Your SIR Experience*

Like any statistical program, a SIR report directly reflects the quality of the data on which the report is based. Poor quality or insufficient data can create a false "fail" or an "inconclusive" SIR report. Moreover, an "inconclusive" report means you have not performed release detection for that reporting period.

## *Optimizing Your SIR Experience*

The following quality control actions can improve SIR data quality:

- Take stick/ATG tank readings and totalizer readings at the same time.
- Make sure the drop tube extends to within one foot of the tank bottom.
- Replace any gauge stick that is worn on the bottom or whose numbers are unreadable.
- Check over/short figures each day. Investigate any unusually large daily variances. A significantly large over/short number that is not reversed the next day and cannot be otherwise explained is an unusual operating condition that may indicate a possible leak and should be investigated.
- Gauge for water at least once each month, or more often if your SIR vendor requires it.
- If water is removed from the tank, record the amount and date according to the directions provided by your SIR vendor.
- Make sure only properly-trained personnel obtain and record the data required by your SIR vendor.

## *Understanding the SIR Report*

The SIR analytical report will give each tank system one of the following status categories:

- **PASS**: The system is tight.
- **FAIL**: The system is not tight. The leak rate is above the regulatory threshold.
- **INCONCLUSIVE**: Neither a pass nor a fail. The data submitted is not adequate for the SIR program to determine with a 95% probability whether the system is tight.

## *Reporting a Suspected Release*

Report any “fail” or “inconclusive” SIR report as a suspected release to the NDDH within 24 hours of receiving the SIR report. ***Exception***: If you can determine within 24 hours that the "fail" or “inconclusive” SIR report does not indicate a release, you do not have to report the suspected release to the NDDEQ. Document why it is not a suspected release and attach the documentation to the SIR report for future reference. ***Example:*** You do not need to report a suspected release if, within 24 hours of receiving the SIR report, you examine the data submitted to your SIR vendor, note that a delivery was omitted, provide that data to your vendor, and obtain from the vendor a written “pass” report.

## *Investigating a Suspected Release*

Besides an actual release, a “fail” or “inconclusive” SIR report can result from other problems, including the following:

- Failure to note one or more deliveries
- Mis-entered data (e.g., transposed numbers)
- Using the wrong tank chart to convert inches to gallons
- Failure to post gallons pumped on an operating day
- Improperly calibrated dispensers (meter or totalizer)
- Gauge stick worn at bottom, not in 1/8” increments, worn numbers
- Malfunctioning ATG causing inaccurate gallonage readings
- Equipment failure
- Theft (employee or customer)

## *Investigating a Suspected Release*

If you find a correctible data error (e.g., transposed numbers, unrecorded delivery), send the corrected information to your SIR vendor and request a revised report. Remember, you should have reported the "fail" or "inconclusive" to the NDDEQ as a suspected release unless you confirmed within 24 hours that no release occurred.

If you find that data error resulted from an equipment problem – worn gauge stick, improperly calibrated dispenser, malfunctioning dispenser or ATG, etc. – you obviously cannot go back and obtain correct numbers. Report your finding to the NDDEQ, and the NDDEQ will advise you whether you need to take additional action.

North Dakota UST Rules require you to keep all SIR documents at your facility for at least 12 months.

## What are the regulatory requirements for SIR?

- All release detection equipment needs to be tested and inspected every year.
    - If you use an automatic tank gauging (ATG) system to gather SIR data, annually test your ATG system. At a minimum, test the alarm, battery backup, and verify the system configuration. For probes and sensors, you must inspect for residual buildup, 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.
    - If you stick your tank to gather data for the SIR vendor, make sure your stick can measure to one-eighth of an inch and can measure the level of product over the full range of the tank's height.
- Keep results of your 30-day SIR release detection tests for at least one year.
- Keep results of your annual release detection system operation tests for at least three years.
- Keep all records of calibration, maintenance, and repair of your release detection equipment for at least one year.
- Keep any schedules of required calibration and maintenance provided by the release detection equipment manufacturer for at least five years from the date of installation.
- Keep all performance claims supplied by the installer, vendor, or manufacturer for at least five years. This includes the documentation of the SIR method discussed above.