

**ENVIRONMENTAL PROTECTION DIVISION
COMPLIANCE GUIDANCE FOR
STATISTICAL INVENTORY RECONCILIATION (SIR)**

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**ENVIRONMENTAL PROTECTION DIVISION
COMPLIANCE GUIDANCE FOR
STATISTICAL INVENTORY RECONCILIATION (SIR)**

AUTHORITY

The purpose of this guidance document is to assist the regulated community, SIR vendors, and other interested parties in understanding Georgia's policies for satisfactory utilization of SIR as a monthly monitoring method. Georgia recognizes SIR as one of the "other methods" of monthly monitoring allowed under Georgia's Rules for Underground Storage Tank Management, Chapter 391-3-15-.07, which incorporates §40 CFR 280.43(h). This Rule states that "any other type of release detection method, or combination of methods, can be used if the following performance standard can be met:

It can detect a 0.20 gallon per hour (GPH) leak rate or a release of 150 gallons within a month with a "PROBABILITY OF DETECTION of at least 0.95 and a PROBABILITY OF FALSE ALARM of no more than 0.05."

Probability of detection means that if 100 UST systems are tested, all of which are leaking at exactly 0.2 GPH, the test will correctly identify at least 95 of them as leakers. Probability of false alarm means that if 100 UST systems are tested, none of which are leaking (0.00 GPH), no more than 5 of them will incorrectly fail the test.

For any SIR method to be an acceptable stand alone monthly monitoring method for leak detection it must have received a third party evaluation and subsequent certification that the method can meet the performance standard stated above. The O/O must maintain a copy of the third party evaluation above.

INTRODUCTION

Statistical inventory reconciliation analyzes inventory, delivery, and dispensing data collected over a period of time to determine if the UST system (tank and associated product lines) is leaking. Each operating day the UST owner/operator (O/O) measures the product level using a gauge stick or other tank level monitor. The O/O also keeps complete records of all withdrawals and all deliveries to the UST. After data has been collected for a specified period of time (not to exceed thirty days), the O/O provides the data to the SIR vendor for processing. The SIR vendor processes the data and provides the O/O with monthly results showing the status of the UST system. Computer software is used to conduct a statistical analysis of the data to determine if the UST system is leaking. Some SIR methods can report if dispensers are out of calibration, theft is occurring, or product deliveries are inaccurate.

"Stand-Alone" SIR software systems are available whereby the O/O gathers the data, analyzes the data once per month and maintains the results in their leak detection records. These SIR software systems must also have an independent third party evaluation/certification indicating the system is capable of meeting the requirements of §40 CFR 280.43(h). The O/O must maintain a copy of the third party evaluation.

DEFINITIONS

Performance Standard (PS): To qualify as a leak detection method, SIR must be able to meet the performance standards of being able to detect a 0.2 GPH leak rate. The method must be able to detect a 0.20 GPH leak rate or a release of 150 gallons within a month with a PROBABILITY OF DETECTION of at least 0.95 and a PROBABILITY OF FALSE ALARM of no more than 0.05.

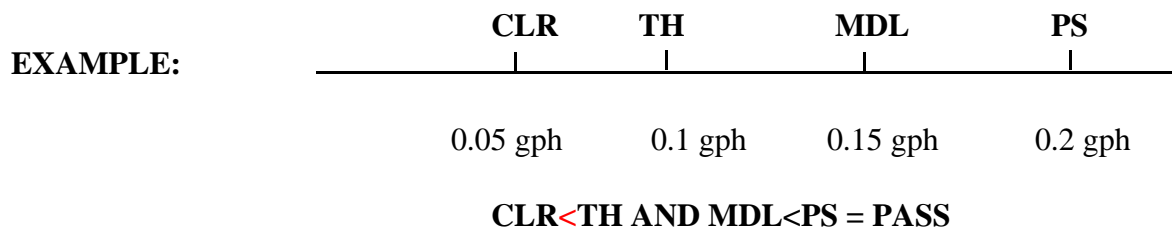
Threshold for Declaring a Leak (TH): The TH is the leak rate that defines the boundary between pass and fail results. When the calculated leak rate is greater than the TH, the test result is “fail.”

The TH for a SIR vendor is determined by the third party evaluation and is most often equal to 0.1 GPH. The TH must be smaller than the performance standard (0.1 GPH) in order to be 95% sure of detecting 0.2 GPH leaks.

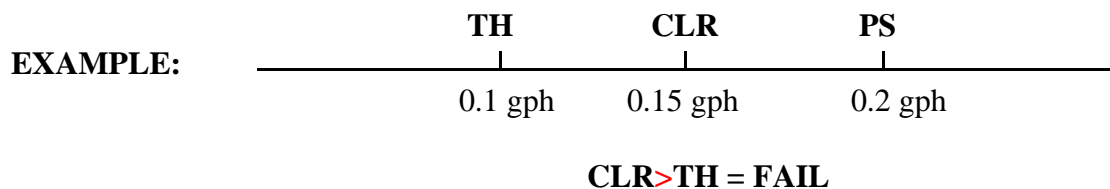
Minimum Detectable Leak Rate (MDL): MDL is the smallest leak that can be reliably detected in a given set of data. To be in compliance with leak detection regulations, the MDL must be less than or equal to the performance standard for a SIR analysis to provide conclusive results. In other words, if the quality of a set of data is so poor that a leak of 0.2 GPH cannot be detected with at least 95% accuracy, then the performance standard has not been met and the test result must be inconclusive or fail.

Calculated Leak Rate (CLR): CLR is the estimated leak value, always expressed in GPH, for a given set of data. To obtain the most accurate calculated leak rate, the SIR analysis must account for conversion errors caused by tank tilt and/or deformation, mechanical problems and temperature fluctuations prior to analysis. Once all discrepancies are taken into account the residual cumulative over/short becomes the estimated leak rate for a given data set.

Pass: If the CLR does not exceed the TH and the MDL is less than or equal to the PS (0.2 GPH), the test result will be a “PASS”.



Fail: If the CLR is greater than the leak TH value of 0.1 gph, the test result will be a “FAIL”.

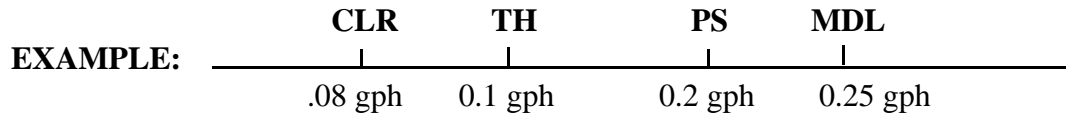


NOTE: A loss or gain of product in excess of the threshold is a fail.

Inconclusive: A SIR test result is inconclusive when it produces a MDL that **exceeds** the certified performance standard of 0.2 GPH, and a CLR that is less than the TH.

An inconclusive generally indicates that the inventory records are too poor, have too much variability, or are of insufficient length such that the data could not be analyzed with reliable results.

An inconclusive result has been interpreted by EPD as noncompliance with the leak detection requirements for the period of time on which the inconclusive was based. What an O/O must do to resolve an inconclusive is discussed under EPD REQUIREMENTS No. 9, below.



CLR < TH and MDL > PS = INCONCLUSIVE

NOTE: In determining whether a result is inconclusive, the absolute value of the MDL should be compared to the PS.

ENSURING QUALITY DATA

Conclusive SIR analysis results are contingent upon proper and sound inventory practices. An owner/operator must ensure that the following practices are employed:

- Measure the product level accurately to the nearest one-eighth inch (1/8") at the same time every day the site operates. When measuring the product level, take the average of two stick readings prior to converting inches to gallons.
- The equipment used must be capable of measuring the level of product over the full range of the tank's height.
- No dispensing can occur between product level readings and meter readings.
- Record all sales on a daily basis. All figures must be rounded to the nearest one gallon.
- Record all delivery information accurately and as it appears on the bills of lading. Whether gross or net delivery figures should be submitted for SIR analysis is determined by your SIR vendor.
- Check for water in the USTs at least once a month. Measurements must be made to the nearest one-eighth inch and must be taken into consideration in the SIR determination of tank status.
- Calculate and evaluate overages and shortages daily. If any inaccuracy is detected, verify all records for that day and the day before for any computation or measurement errors.
- Keep all inventory records independently for each tank. If the site operates a manifolded tank system, sales and delivery information may be combined. Separate tank product level readings must be maintained for every tank in the manifold set.

EPD REQUIREMENTS:

- 1) The procedures specified in §40 CFR 280.43 (a) for inventory control can be used to gather data for SIR. Drop tubes which extend to within one foot of the tank bottom are required for inventory control and are likewise required for gathering data for SIR.
- 2) Monthly SIR results must be reported on Georgia Form, GUST -126, "Monthly Statistical Inventory Reconciliation Report" (copy attached) or on an equivalent form. The Georgia form is consistent with the form developed through a joint effort between EPA Region IV States and EPD.
- 3) The results reported must contain the language: "**pass, fail, or inconclusive**" in accordance with the definitions presented above.
- 4) In addition to all the information listed on Georgia Form, GUST-126 (noted in No. 2 above), all results reported **MUST** state the threshold level, calculated leak rate, minimum detectable leak rate, tank capacity, the number of data points analyzed for a given month, number of days submitted by the owner or operator and the final system results for the month.
- 5) SIR reports should be received by the O/O no later than twenty (20) business days after the end of the reporting period.
- 6) The threshold leak rate must be in accordance with to the third party certification.
- 7) Monthly reports consisting of raw inventory data, plus the resulting SIR determination must be maintained by the owner/operator. The last three years of SIR results must be maintained for EPD review if the facility is a participant to the GUST Trust Fund. If the facility is not participating in the GUST Trust Fund , the last twelve months of SIR results must be maintained.
- 8) SIR may not be used as a substitute for tightness testing.
- 9) If the result of a SIR monthly analysis is inconclusive, the O/O must conduct a release investigation within seven (7) days from the date of receipt of the vendor's report or their own report if they are utilizing a stand alone SIR system. The O/O should use the vendor's standard investigation procedures to review inventory records and calculations to determine if there are any errors. If the problem is determined not to be a data problem, the O/O must check for physical problems such as meter miscalibration and inspect all accessible portions of the UST system for evidence of leakage.

If the first monthly report after completion of the investigation into the cause of the previous months' inconclusive is again inconclusive, unusable or anything other than a definite conclusion, the O/O must:

- a) report a suspected release to EPD within twenty-four hours of receipt of the vendor's report or their own report if a stand alone system is used;
- b) perform a tightness test within seven (7) days, to determine whether or not a leak exists in the tank or piping and submit the results within thirty (30) days to EPD.

- c) Any time two (2) consecutive months of SIR monthly analyses yield reports of inconclusive, the O/O must consider another method of release detection until a determination of the problem is made and resolved.
- 10) If the result of a SIR monthly analysis indicates a failure, the O/O must:
- A) report a suspected release to EPD within (24) hours of receipt of the vendor's report or their own report if a stand alone system is used, and
 - B) conduct a release investigation within seven (7) days of obtaining the report. The O/O should use the vendor's standard investigation procedures in conducting the investigation. After completing the investigation, the O/O should proceed as follows:
 - 1) If the investigation does not reveal a cause for the failed test result, a tightness test must be performed within seven (7) days to check on whether a leak exists in the tank and or piping, and the test results must be submitted to the EPD immediately.
 - 2) If the investigation indicates that factors accounting for the loss trend are not related to a release, these factors must be immediately corrected, and no tightness test is required. However, if the first monthly report after completion of the investigation into the cause of the previous month's loss trend again indicates a loss or is inconclusive, the O/O must
 - I) report a suspected release to EPD within twenty-four (24) hours of receipt of the vendor's report or their own report if a stand alone system is used; and
 - ii) perform a tightness test within seven (7) days to determine whether or not a leak exists in the tank or piping and submit the results to EPD.
- 11) If the result of a SIR monthly analysis is a fail and the leak rate is negative, the O/O must check the tank immediately and daily thereafter for at least seven days for the presence of water. This means that you are gaining product. Increase in product can be due to water entering the tank or miscalibrated meters. The following procedures must be followed:
- A) Calibrate meters;
 - B) Check for water for seven days.
- If there is no water in the tank, or if the water level is one inch or less and does not change from day to day, the O/O must document the results of the water checks and follow the vendor's standard investigation procedures to determine the reason for the gain trend and correct the problem.
 - If the daily water checks show more than 1 inch of water in the tank the O/O must have the water pumped out of the tank. If subsequent daily water checks show no water in the tank, the O/O must document the results of the water checks and follow the vendor's standard investigation procedures to determine the reason for the gain trend and correct the problem.

- If the water has been pumped out of the tank and subsequent daily water checks show that there is again water in the tank, or if the water level in the tank changes from day to day, the O/O must:
 - A) report a suspected release to EPD within 24 hours; and
 - B) perform a tightness test within seven (7) days to determine whether or not a leak exists in the tank or piping and submit the results to EPD immediately.
- 12) O/O's using a Stand Alone SIR System should establish their reporting period based on the first and last date of each month (monthly basis). If a loss trend occurs during any part of the month, it is acceptable to report it immediately as a suspected release. EPD will not penalize an O/O for waiting until the end of the month to report.
- 13) If the result of a SIR monthly analysis is pass, retain records for three years.

**GEORGIA ENVIRONMENTAL PROTECTION DIVISION
MONTHLY STATISTICAL INVENTORY RECONCILIATION (SIR) REPORT**

FACILITY NAME		EPD ID #
TANK LOCATION	Address	City
	Phone ()	Zip
TANK OWNER	Name	
	Address	
	City	Phone ()
TANK OPERATOR	Name	Phone ()

SIR Provider		Phone ()
SIR version		Date of SIR report
Period Covered		What is the required number of usable inventory days per tank?

TANK				Current Month						Last Month			Two Months Ago			
No.	Product	Max. SIR test (gal.)	Capacity (gal.)	Leak Threshold gph	Minimum Detectable Leak Rate ^{6c} gph	Calculated Leak Rate ^{6b} gph	Pass, Fail, or Inconclusive			Pass, Fail, or Inconclusive			Pass, Fail, or Inconclusive			
							P	F	I	P	F	I	P	F	I	

- The tank owner is required to have an SIR report for each month.
- Monthly reports must be submitted to the Georgia EPD upon request.
- The tank owner is required to have the completed report by the 20th business day of the following month.
- If, for any reason, the test is neither "pass" or "fail," the "inconclusive" column must be marked.
- The UST system owner/operator must notify EPD within twenty-four (24) hours at (404) 362-2687 of a suspected release and conduct a tank and piping tightness test within seven (7) days of the occurrence of one of the following :
 - The monthly analysis indicates a "fail,"
 - The monthly analysis produces an unexplained loss/gain of product, or
 - The second consecutive monthly analysis is inconclusive, or fail.
- All SIR Methods:
 - A leak threshold, minimum detectable leak rate, and calculated leak rate must be provided for each tank. If not, the report is incomplete and will not be accepted by EPD.
 - If the calculated leak rate for a tank is greater than the leak threshold, the tank failed the SIR test. (leak threshold = one half of the required performance standard of 0.2 gph)
 - If the minimum detectable leak rate for a tank is greater than the required performance standard, the test is inconclusive for that month.
- A conclusive result of "pass" or "fail" is required to meet the monthly leak detection requirements.
- The results of monthly measurements for water in each tank, must be recorded in inches on the following lines:
 1) _____; 2) _____; 3) _____; 4) _____; 5) _____

Person conducting evaluation			
Signature (optional)		Date	

Georgia Department of Natural Resources

Environmental Protection Division

Underground Storage Tank Management Program

4244 International Parkway, Suite 104, Atlanta, Georgia 30354

Lonice C. Barrett, Commissioner

Harold F. Rehels, Director

(404)362-2687

ENVIRONMENTAL PROTECTION DIVISION COMPLIANCE GUIDANCE FOR STATISTICAL INVENTORY RECONCILIATION (SIR)

The Underground Storage Tank Management Program (USTMP) has completed a guidance document for Statistical Inventory Reconciliation (SIR) use and reporting. This document is the result of a coordinated effort between the USTMP, seventeen (17) SRI vendors and several UST owners.

The purpose of this guidance is to assist the regulated community, SIR vendors, and other interested parties in understanding Georgia's policies for properly utilizing SIR as a monthly monitoring method. Georgia recognizes SIR as one of the "other methods" of monthly monitoring allowed under Georgia's Rules for Underground Storage Tank Management, Chapter 391-3-15-.07, which incorporates 40 CFR 280.43(h).

This guidance ensures reporting language consistency by establishing **"pass", "Fail", and "inconclusive" as the only terms for use in reporting results.** In addition, the guidance provides clarification concerning reporting of suspected releases and inconclusive results. This guidance will also facilitate the review process of SIR results by USTMP staff.

If you use SIR, Please ask your vendor if they are aware of this guidance and whether or not they have a copy. A copy of this guidance can be obtained by contacting Shaheer Muhanna at (404) 632-2687.

The USTMP is requesting that this guidance be implemented in **March of 1998.**