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# COLORADO DEPARTMENT OF LABOR AND EMPLOYMENT DIVISION OF OIL AND PUBLIC SAFETY

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## STATISTICAL INVENTORY RECONCILIATION (SIR)

## GUIDANCE DOCUMENT

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**July 2001**

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# 1.0 Statistical Inventory Reconciliation (SIR)

## 1.1 Overview

Statistical Inventory Reconciliation (SIR) is an approved monthly monitoring method for underground storage tanks (USTs) and pressurized lines. 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 a tank system is leaking. The vendor provides to the tank owner a monthly report of that analysis. A SIR method that has received third-party certification meets the Environmental Protection Agency (EPA) and the Colorado regulatory requirement for monthly monitoring and is able to detect a 0.2 gallon per hour leak rate or a release of 150 gallons within a month with a probability of detection of 0.95 and a probability of false alarm of 0.05. [7 CCR 1101-14, §2-4-4(h)] Using SIR does not relieve tank owners/operators of the requirement to equip all pressurized lines with operational in-line leak detectors, and to test the leak detectors every 12 months in accordance with the manufacturer's requirements.

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 particular tanks. Make sure the SIR method chosen is certified for the tanks at your facility. Variables to consider include each tank's dimensions, capacity, and configuration. For example, some SIR programs are not certified for manifold tanks or for tanks greater than a certain capacity. If your facility operates infrequently or seasonally, make sure SIR will work for you. Ask the SIR vendor for a copy of the third-party certification for the SIR method you use. Keep this certification available for inspection by the OPS. EPA's website has a list of certified SIR vendors and methods: <http://www.epa.gov/swerust1/ustsystem/nwgolde.htm>.

*Note: The OPS does not recognize Statistical Inventory Reconciliation as an approved release-detection method for aboveground tanks.*

## 1.2 Required Equipment

### 1.2.1 Method to Accurately Measure Tank Contents

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

- Gauge stick should be marked in 1/8" increments, starting with the bottom of the stick. 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.
- Automatic tank gauge (ATG) readings can be used in place of stick readings.

### 1.2.2 Tank Chart

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

### 1.2.3 Dispensers

Improperly calibrated meters or mechanical failures within the pump (e.g., valves, totalizers) can result in inaccurate data. Inaccurate data can create a false "fail" or "inconclusive" SIR monthly report.

## **1.3 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)
- Manifold tanks identified
- Tank type, material of construction, manufacturer
- Product type in each tank
- Blend system ratio

## **1.4 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:

- Date reading 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. [*Note: If water exceeds 2", you should shut down the UST system and pump out the water before dispensing any more product in order to avoid performance problems in engines fueled from the tank.*]

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 to ensure you will receive your SIR report no later than the 20<sup>th</sup> calendar day following the end of the reporting period.

If you provide a hard copy of data, keep a photocopy for your own records. If you provide data electronically – via diskette, phone modem, Internet – retain a backup copy.

## **1.5 What to Expect from Your SIR Vendor**

### 1.5.1 Before You Get Started

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

- 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.

### 1.5.2 Ongoing

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

- Monthly analysis reports. Find out from your vendor how long the turnaround time will be from the day you submit your monthly data to the time you receive the SIR monthly status report. Contact your vendor if you do not receive any monthly report by the date promised.
- 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 for investigating and correcting the problem.
- Other vendor-specific management reports.

## **1.6 Optimizing Your SIR Experience**

Like any statistical program, a SIR report directly reflects the quality of the data on which that 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, which can trigger enforcement.

The following quality control actions can improve SIR data quality:

- Take stick/ATG tank reading and totalizer reading at the same time. Any sales or deliveries between these two readings can distort the SIR report.
- Instead of recording deliveries solely on the amount shown on the delivery ticket, it is good business practice to verify that amount by measuring product in the tank just before and after each delivery.
- Make sure the drop tube extends to within one foot of the tank bottom.
- Store the gauge stick in a dry location.
- Replace any gauge stick that is worn on the bottom or whose numbers are illegible.
- Check over/short figures each day. Investigate any unusually large daily variances. [Note: A significantly large over/short number that is not reversed the next day and cannot be otherwise explained is an unusual operating condition that must be reported to the OPS as a suspected release and investigated. [7 CCR 1101-14, §4-1(b)]]
- 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.
- Record separately, and in the manner requested by your SIR vendor, any product removed that does not go through the meter and any product added other than via a normal, recorded delivery.
- Submit data for manifold systems according to your SIR vendor's directions.
- Submit data for blended systems according to your SIR vendor's directions.
- Make sure only properly-trained personnel obtain and record the data required by your SIR vendor.
- Require the person who takes the tank reading and enters the data to initial each entry.

## 1.7 Understanding the SIR Report

The monthly 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 or not the system is tight.
- **NO DATA:** This means no data was provided for the reporting period.

#### 1.7.1 If the Tank System Receives a "Pass"

Although a “pass” rating means your system has tested tight, it is a good business practice to review the entire report to find out if the SIR vendor has comments on the quality of data submitted and any suggestions for improving data quality.

#### 1.7.2 If the Tank System Receives a "Fail" or an "Inconclusive" SIR Report

- Although tank owners/operators understand that a “fail” report must be taken very seriously, an “inconclusive” report is also very serious. **The OPS requires tank owners/operators to report every (even the very first) “inconclusive” as a suspected release.** Moreover, an “inconclusive” SIR report can trigger enforcement for failure to perform release detection during the reporting period. Receipt of either a “fail” or “inconclusive” SIR report triggers two important time clocks: Within 24 hours after receiving the report, report the suspected release to the OPS.
- Within seven calendar days after receiving the report, confirm whether or not a release has actually occurred.

### **1.8 Investigating a “Fail” or “Inconclusive” SIR report**

Whenever you have a suspected release, you must within seven calendar days determine whether or not you have an actual release. Because the entire investigation – which can include rechecking data, performing a system test on your UST, and performing a site check – must be completed within seven calendar days, it may be necessary for you to conduct some activities simultaneously. If you cannot complete your investigation within seven calendar days, contact the OPS Technical Assistance line (303-318-8547) to explore the possibility of extending the seven-day deadline.

If you receive a “fail” or an “inconclusive” SIR report, you must take the following actions:

#### 1.8.1 Reporting the Suspected Release

Report any “fail” or “inconclusive” SIR report as a suspected release to the OPS within 24 hours of receiving the SIR report. [7CCR 1101-14 34-1] **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 OPS. Document why it is not a suspected release and attach the documentation to the SIR report for future reference. The documentation should include the SIR report based on the corrected data. **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.

*Note: Because it is seldom possible to complete all of these activities within 24 hours, it is a good business practice to report any "fail" or "inconclusive" SIR report immediately and to follow up with a second report to OPS if the investigation leads to a "pass" SIR report.*

### 1.8.2 Investigating the Suspected Release

After reporting the suspected release to the OPS, begin an immediate investigation in order to determine whether you have had an actual release. Look closely at the SIR vendor’s comments on the report. Follow any suggestions for identifying and correcting the problem. You may need to conduct aspects of the investigation simultaneously in order to complete the investigation within seven calendar days. If you cannot complete the entire investigation, including any necessary system test and site check, within seven calendar days, contact the OPS Technical Assistance Line (303-318-8547) to request an extension.

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)
- Improperly reported blending ratios

### 1.8.3 When There is a Data Error

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. Keep the original and corrected reports. Remember, you should have reported the “fail” or “inconclusive” to the OPS as a suspected release unless you confirmed within 24 hours that no release occurred.

### 1.8.4 When There is an Equipment Problem

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 OPS, and the OPS will advise you whether you need to take additional action.

### 1.8.5 When You Must Conduct a System Test

If you cannot rule out the possibility of a release, you must conduct a system (tightness) test of the tank and/or piping. [See 7 CCR 1101-14, §4-3(a)] If the system tests tight and there is no other reason to suspect a release (e.g., environmental contamination), you do not have to investigate the release further. It is good business practice, however, to report to the OPS the results of the system test. If the system does not test tight, take immediate steps to repair or replace any defective portions of the tank system. You must also perform a site check. Early detection of a release can reduce clean up costs.

### 1.8.6 When You Must Perform a Site Check

If your investigation of a “fail” or “inconclusive” SIR report indicates that the tank system is not tight, you must perform a site check, in accordance with the requirements of 7 CCR 1101-14, §4-3(b). The site check must be completed within seven calendar days of the date you received the “fail” or “inconclusive” SIR report. Refer to §5.2.2 of the *Petroleum Storage Tank Owner/Operator Guidance Document* for instructions on proper sampling (number, location).

If the site check confirms the presence of a release, you must report the confirmed release to the OPS within 24 hours, and begin the corrective action process in accordance with 7 CCR 1101-14, Article 5.

## **1.9 Investigating a “No Data” SIR Report**

If you receive a “no data” SIR report, make every effort to determine the reason why. The most likely reason is failure to submit to the SIR vendor data for the reporting period. If this is the case, submit the data immediately and request a report. A "no data" SIR report can trigger enforcement for failure to perform release detection during the reporting period.

## **1.10 Penalties for not Using SIR Properly**

Penalties for not using SIR properly include enforcement and reduction of reimbursement by the Petroleum Storage Tank Fund.

Consequences for not using SIR properly include:

- Environmental damage
- Enforcement by the OPS
- Negligence determination by the Petroleum Storage Tank Committee (PSTC) making you ineligible for any reimbursement of cleanup costs.
- Loss of revenues while site is shut down.

### 1.10.1 Enforcement

- The following list identifies some of the more common SIR-related regulatory violations that could subject a tank owner/operator to enforcement by the EPA or the OPS: Failure to obtain a "pass" or "fail" SIR report each month. An "inconclusive" or "no data" SIR

report means release detection was not performed on the tank system during that reporting period.

- Failure to install or test at least once every 12 months, leak detectors on pressurized lines.
- Failure to report an "inconclusive" or "fail" SIR report to the OPS as a suspected release within 24 hours.
- Failure to complete the release investigation or obtain an approved extension, within seven calendar days.
- Failure to report a confirmed release within 24 hours to the OPS if the release investigation shows contamination is present.

Failure to perform release detection is a regulatory violation and could result in penalties not to exceed \$5,000.00 per tank for each day of violation. [§8-20.5-107 (6) CRS]

### 1.10.2 Petroleum Storage Tank Fund

If contamination is discovered and reimbursement of remediation costs is sought from the Petroleum Storage Tank Fund, regulatory violations can result in a substantial percentage reduction to the reimbursement award.

Examples:

| <b>Regulatory violation</b>   | <b>Maximum reduction</b> |
|---|--------------------------|
| Failure to perform release detection for any month. This includes obtaining an "inconclusive" or "no data" SIR report   | 25%                      |
| Failure to report a suspected release to the OPS within 24 hours after receiving an "inconclusive" or "fail" SIR report | 10%                      |
| Failure to report a confirmed release to the OPS within 24 hours of confirming the presence of contamination            | 10%                      |
| Failure to complete the release investigation within seven calendar days  | 20%                      |
| Failure to submit or implement the corrective action plan on a timely basis   | 10%                      |
| Failure to install leak detectors on pressurized lines  | 20%                      |
| Failure to verify operation of line leak detectors every 12 months  | 5%                       |

See the Petroleum Storage Tank Committee's Policies 4 and 16 for an itemization of other potential percentage reductions.

### **1.11 Document Retention**

Record retention requirements pertaining to SIR are found at 7 CCR 1101-14, §§ 2-3-4(f), 2-3-5(b)-(d), and 2-4-6. It is good business practice, however, to **keep records indefinitely**. You

may be required to produce older records for purposes other than routine inspections by the OPS, including application for reimbursement from the Petroleum Storage Tank Fund.

## **1.12 Additional Internet Sources of Information**

### 1.12.1 EPA Office of Underground Storage Tanks (OUST)

- EPA/OUST home page: <http://www.epa.gov/swerust1/index.htm>
- Technical Compendium on Release Detection:  
<http://www.epa.gov/swerust1/compend/rd.htm>
- Introduction to Statistical Inventory Reconciliation for Underground Storage Tanks:  
<http://www.epa.gov/swerust1/pubs/sir.pdf>:

### 1.12.2 Division of Oil and Public Safety

- OPS home page: <http://oil.cdle.state.co.us/>
- Colorado Petroleum Storage Tank Statutes: <http://oil.cdle.state.co.us/Oil/statutes.html>
- Colorado Petroleum Storage Tank Regulations:  
<http://oil.cdle.state.co.us/Oil/regulations.html>
- OPS Petroleum Storage Tank Owner/Operator Guidance Document:  
<http://oil.cdle.state.co.us/tech%20stuff/guidancedoc.html>