Secondary Containment Monitoring Overview
### Why Secondary Containment?

#### Leak Sources

<table>
<thead>
<tr>
<th>Source</th>
<th>Occurrence Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spill buckets</td>
<td>43%</td>
</tr>
<tr>
<td>Piping</td>
<td>16%</td>
</tr>
<tr>
<td>Dispensers</td>
<td>12%</td>
</tr>
<tr>
<td>Tanks</td>
<td>12%</td>
</tr>
<tr>
<td>Line Leak Detectors</td>
<td>3%</td>
</tr>
<tr>
<td>STPs</td>
<td>3%</td>
</tr>
<tr>
<td>Delivery Vehicles</td>
<td>3%</td>
</tr>
<tr>
<td>Flex Connectors</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>6%</td>
</tr>
</tbody>
</table>

*Occurrence rates are FL Report data quoted in Oil Express, Oct 9, 2006*
UST Monitoring

- Secondary containment on UST’s designed to capture releases from primary containment
- Sensors are designed for notification of releases via TLS console

Double Walled Underground Storage Tanks (USTs)
Fiberglass UST Interstitial Sensor - Brine

- **794380-303** Dual Point
- **794380-301** Single Point

**Single Point Version**
- ✓ Leak in inner or outer wall – “Fuel Alarm”

**Dual Point Version**
- ✓ Leak in inner wall – “Low Level” alarm
- ✓ Leak in outer wall with high groundwater – “High Level” alarm
Fiberglass UST Interstitial Sensor - Brine

Fig. 12 Typical Hydrostatic Dual-Point Sensor Installation
Fiberglass UST Interstitial Sensor - Dry

- 794390-401, 404, 407, 409

✓ Detects any liquid in interstitial space of double walled fiberglass tanks
✓ Available in different lengths to accommodate UST radius
✓ “Fuel Alarm” if liquid is detected
Fiberglass UST Interstitial Sensor - Dry

Fig. 7 Typical Interstitial Sensor Installation - Fiberglass UST
Steel UST Interstitial Sensors

- **794390-420**  16’ Cable
- **794390-460**  30’ Cable

✓ Used in interstitial of double walled steel tank to detect presence of liquids

✓ Float switch technology

✓ “Fuel Alarm” with detection of liquid

✓ Non-discriminating
Steel UST Interstitial Sensors

Fig. 8 Typical Interstitial Sensor Installation - Steel UST
Containment Sump Monitoring

- Containment sumps designed to capture component or piping releases
- Sensors are designed for notification of releases via TLS console
Sump Sensors (non-discriminating)

- **794380-208** (12 ft. cable)
- **794380-209** (30 ft. cable)

✓ Used in bottom of tank sumps and UDC’s
✓ Float/magnetic reed switch technology
✓ “Fuel Alarm” if liquid is detected
✓ Compatible with all fuels
Sump Sensors (non-discriminating)

*Containment sump sensor should:
1. Rest in the lowest point of sump.
2. Be positioned as close to outer wall as possible.
3. Be mounted in a true vertical position.

Fig. 1 Typical Containment Sump Sensor Installation
Sump Sensors (non-discriminating)

• 794380-323

✓ Used in bottom of tank sumps and UDC’s
✓ Position sensitive; “Sensor Out” alarm
✓ “Fuel Alarm” if liquid is detected
✓ Float/magnetic reed switch technology
✓ Compatible with all fuels
Sump Sensors (non-discriminating)

Fig. 4 Typical Position-Sensitive Sensor Installation
Discriminating Sensors
Mag Sump Sensor (Discriminating)

- Dual Float technology
- Detects water and fuel
- Programmable water warning/alarm levels
- Multiple sizes

Fig. 3 Typical Mag Sump Sensor Installation in Containment Sump
UST Interstitial Sensor (Discriminating)

14" min. dia. manhole

4" dia. riser

Cord grip

1/2" rigid conduit (to Console)

Seal-off

Weatherproof junction box with 1/2-inch N.P.T. threads (16 Cubic inch volume minimum)

Sensor Switch must reach bottom of tank

Fiberglass tank

Fig. 7 Typical Interstitial Sensor Installation - Fiberglass UST
Other Sensors
Micro Sensor

• 794380-344

✓ Solid state electronic technology
✓ Liquid detection in any confined space
✓ Small (.4” x .8” x 2.2”)
✓ Stiff, easy to push cord
✓ Any liquid triggers “Fuel Alarm”
Micro Sensor

Fig. 10 Typical Interstitial MicroSensor Installation - Steel UST

Fig. 11 Typ. MicroSensor Installation in Riser Containment
“Stand Alone” UDC Sump Sensors

**Feature**
- Leak detection sensor option in retrofit UDC applications without wiring to TLS
- Provides dispenser shutdown only

![Diagram of leak detection sensor system]

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**Dispenser pan sensor should:**
1. Rest in the cup or the lowest point of the dispenser pan.
2. Be positioned so as to be removable by pulling the sensor straight up out of the pan.
3. Be mounted in a true vertical position.

Fig. 5 Typical Stand-Alone Dispenser Pan Sensor Install
Continuous Monitoring
Secondary Containment Vacuum Sensing (SCVS) System
SCVS Overview

Features

- Maintains a continuous vacuum on a secondary space
- Designed and compatible with tanks, lines and sumps
- Detect a leak before it enters into the environment
- Simple Installation
  - Uses the submersible pump as a vacuum source
  - Multiple sensors can share one vacuum source
Why Continuous Monitoring?

- Inherent assumption that both walls of a double walled system are competent for the life of the system

- “Active” monitored components of an UST system are continuously monitored

- “Passive” monitored components of an UST system are periodically monitored for the presence of liquids

- California studies showed hazardous liquids still entering the environment via passively monitored UST systems

- No releases into environment since CA adopted continuous monitoring requirements in 2004

- Continuous monitoring required for all tanks, piping and sumps in CA
Mini Hydrostatic Sensor

Fig. 13 Typical Single-Point Mini-Hydrostatic Sensor Installation
Sensor Operability Testing
Testing Procedures

Veeder-Root manual
# 577013-814

Line Leak Detection Systems, UST Leak Detection Equipment, Mag Sump Sensor, and Other Sensors

Operability Testing Guide
## Testing Procedures

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Sensor</th>
<th>Test Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>794380-320</td>
<td>Solid State Discriminating Pan Sensor</td>
<td>Ref Procedure A</td>
</tr>
<tr>
<td>794380-350</td>
<td>Solid State Discriminating Sump Sensor</td>
<td>Ref Procedure A</td>
</tr>
<tr>
<td>794380-322</td>
<td>Discriminating Pan Sensor</td>
<td>Ref Procedure A</td>
</tr>
<tr>
<td>794380-352</td>
<td>Discriminating Sump Sensor</td>
<td>Ref Procedure A</td>
</tr>
<tr>
<td>794380-85x series</td>
<td>Fiber Tranch Sensor</td>
<td>Ref Procedure A</td>
</tr>
<tr>
<td>794380-341, -343</td>
<td>Discriminating Interstitial Sensor</td>
<td>Ref Procedure B or D</td>
</tr>
<tr>
<td>794380-208, -209</td>
<td>Piping Sump Sensor</td>
<td>Ref. Procedure C</td>
</tr>
<tr>
<td>794380-321</td>
<td>Solid State Pan Sensor</td>
<td>Ref. Procedure C</td>
</tr>
<tr>
<td>794380-351</td>
<td>Solid State Sump Sensor</td>
<td>Ref. Procedure C</td>
</tr>
<tr>
<td>794390-420, -460</td>
<td>Interstitial Liquid Sensor for Steel Tanks</td>
<td>Ref. Procedure C</td>
</tr>
<tr>
<td>794380-341, -343</td>
<td>Discriminating Interstitial Sensor (Used in the non-discriminating mode)</td>
<td>Ref. Procedure D</td>
</tr>
<tr>
<td>794380-345</td>
<td>Interstitial Sensor for High-Alcohol</td>
<td>Ref. Procedure D</td>
</tr>
<tr>
<td>794380-340, -344</td>
<td>MicroSensor</td>
<td>Ref. Procedure D</td>
</tr>
<tr>
<td>794390-40x series</td>
<td>Interstitial Sensor for Fiberglass Tanks</td>
<td>Ref. Procedure E</td>
</tr>
<tr>
<td>794380-301, -302, -303, -304</td>
<td>Hydrostatic Sensor</td>
<td>Ref. Procedure F</td>
</tr>
<tr>
<td>794380-62x</td>
<td>Groundwater Sensor</td>
<td>Ref. Procedure G</td>
</tr>
<tr>
<td>794390-700</td>
<td>Vapor Sensor</td>
<td>Ref. Procedure H</td>
</tr>
<tr>
<td>847990-001, -002</td>
<td>Standalone Dispenser Pan Sensor with Dispenser Control Interface</td>
<td>Ref. Procedure I</td>
</tr>
<tr>
<td>794380-323</td>
<td>Position Sensitive Sensor</td>
<td>Ref. Procedure J</td>
</tr>
<tr>
<td>857280-100, -200, -30x</td>
<td>Vacuum Sensor (TLS-350 only)</td>
<td>Ref. Procedure K</td>
</tr>
</tbody>
</table>
Testing Procedures

Testing Procedure C:


1. Fill one of the test containers with a minimum of 2 inches of water.
2. Remove sensor carefully from tank or containment area. Visually inspect the sensor for any damage as defined by sensor category in the Periodic Maintenance Checklist in the console’s Operators manual, such as damage to the cable or to the sensor housing.
3. While holding the sensor vertically, place the sensor into the container until it is submerged. Test only one sensor per test container (multiple test containers may be used). Test times may run as long as 5 minutes depending upon console type and configuration. If the sensor does not issue a "Fuel" alarm after 5 minutes, the sensor has failed the test.
4. Remove the sensor from the test vessel after observing a response. Allow the sensor to completely dry off in order to clear the alarm. Document the alarm and proceed to the next step.
5. Press the Alarm/Test key on TLS-350 consoles, or touch the Alarm button twice on TLS-450 consoles to clear the alarm before moving on to the next sensor.
6. Reinstall the sensor(s) upon verification of proper operation.
7. Print the test history and console status for your records. This completes the test procedure. Report any performance concerns to Veedor-Root while on site.
Pretesting and Periodic Testing

• Pretesting procedures insure component integrity before use:
  ✓ Tanks utilize pressure or vacuum
  ✓ Sumps filled with water and observed for leaks
  ✓ Piping pressurized and observed for loss of pressure
    ➢ Inert gases (helium) also used for pretesting of UST components

• Periodic testing insures component integrity during use:
  ✓ Operability testing of all leak detection equipment
  ✓ Sump integrity testing
  ✓ Typically every 36 months
Alarm History Reports
Alarm History Reports

- Alarm History Reports are available via TLS console printer
- They provide a record of the last three (3) occurrences of each type of alarm or warning condition
- Liquid Sensor Alarm History Reports record alarms for the liquid sensor that is selected
Alarm History Reports

MMM DD, YYYY HH:MM XM
ALL FUNCTIONS NORMAL

VEEDER-ROOT
• Alarm History Reports are accessible via TLS DIAGNOSTIC MODE

• Press MODE until the following message:
• Press FUNCTION until the following message:

**ALARM HISTORY REPORT**
PRESS <STEP> TO CONTINUE
• Press STEP until the following message:

L#: ALARM HISTORY
PRESS <PRINT> FOR REPORT
• Press PRINT to print report for specified Liquid Sensor:
ALARM HISTORY REPORT

----- SENSOR ALARM ----
L 1: SIMULATOR SENSOR
OTHER SENSORS
SENSOR OUT ALARM
NOV 29, 2010 11:18 AM

FUEL ALARM
NOV 29, 2010 11:18 AM

FUEL ALARM
NOV 29, 2010 11:17 AM
Alarm History Reports

• Press TANK/SENSOR to access other Liquid Sensors:

L#: ALARM HISTORY
PRESS <PRINT> FOR REPORT
• Press PRINT to print additional sensor reports:
### Alarm Definition

#### Table 29-5: Liquid Sensor Status Indicators - Piping Sump, Steel or Fiberglass Tank Interstitial Sensors

<table>
<thead>
<tr>
<th>Display Message</th>
<th>Front Panel Indicator</th>
<th>Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUEL ALARM</td>
<td>Alarm</td>
<td>An interstitial or piping sump liquid sensor detects liquid in a tank's interstitial space or piping sump.</td>
<td>Call for service following the procedures established for your site.</td>
</tr>
</tbody>
</table>
### Alarm Definition

**Table 29-5.- Liquid Sensor Status Indicators - Piping Sump, Steel or Fiberglass Tank Interstitial Sensors**

<table>
<thead>
<tr>
<th>Display Message</th>
<th>Front Panel Indicator</th>
<th>Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>SENSOR OUT ALARM</td>
<td>Alarm</td>
<td>A sensor is disconnected or is not functioning properly.</td>
<td>Call for service following the procedures established for your site.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Liquid sensor setup was performed incorrectly.</td>
<td>Reenter this liquid sensor’s setup values.</td>
</tr>
</tbody>
</table>
Table 29-6.- Liquid Sensor Status Indicators - Normally Closed Sensors

<table>
<thead>
<tr>
<th>Display Message</th>
<th>Front Panel Indicator</th>
<th>Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUEL ALARM</td>
<td>Alarm</td>
<td>An interstitial or piping sump liquid sensor detects liquid in a tank's interstitial space or piping sump.</td>
<td>Call for service following the procedures established for your site.</td>
</tr>
</tbody>
</table>
# Alarm Definition

<table>
<thead>
<tr>
<th>Display Message</th>
<th>Front Panel Indicator</th>
<th>Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH LIQUID ALARM</td>
<td>Alarm</td>
<td>A sensor in a brine-filled interstice detects an increase in the brine level increase. Liquid is entering the riser pipe, or in a high groundwater area, an outer wall rupture has occurred.</td>
<td>Call for service following the procedures established for your site.</td>
</tr>
<tr>
<td>LOW LIQUID ALARM</td>
<td>Warning</td>
<td>A sensor in a brine-filled interstice detects a decrease in the brine level. A hole is in the tank’s inner wall, or in low groundwater areas, a hole is in the outer wall.</td>
<td>Call for service following the procedures established for your site.</td>
</tr>
<tr>
<td>SENSOR OUT ALARM</td>
<td>Alarm</td>
<td>A sensor is disconnected or is not functioning properly.</td>
<td>Call for service following the procedures established for your site.</td>
</tr>
</tbody>
</table>
# Alarm Definition

## Table 29-8.- Liquid Sensor Status Indicators

<table>
<thead>
<tr>
<th>Display Message</th>
<th>Front Panel Indicator</th>
<th>Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dual Float Discriminating Dispenser Pan and Containment Sump Sensors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHORT ALARM</td>
<td>Alarm</td>
<td>An internal short has occurred in the sensor.</td>
<td>Call for service following the procedures established for your site.</td>
</tr>
<tr>
<td>HIGH LIQUID ALARM</td>
<td>Alarm</td>
<td>Liquid reached 8” on the dispenser pan sensor or 10” on the containment sump sensor.</td>
<td>Immediately follow the alarm reporting procedures established for your site.</td>
</tr>
<tr>
<td>FUEL ALARM</td>
<td>Alarm</td>
<td>Fuel is present in the area being monitored by the sensor.</td>
<td>Immediately follow the alarm reporting procedures established for your site. Refer to the System Setup Manual for more information on recovering from an alarm due to leak or spill in the containment area.</td>
</tr>
<tr>
<td>LIQUID WARNING</td>
<td>Warning</td>
<td>Liquid reached 1 inch (25.4 mm) on the dispenser pan or containment sump sensors.</td>
<td>Immediately follow the alarm reporting procedures established for your site.</td>
</tr>
<tr>
<td>SENSOR OUT ALARM</td>
<td>Alarm</td>
<td>The sensor is disconnected or is not functioning properly.</td>
<td>Sensor problem must be corrected or sensor replaced. Call for service by following the procedures established for your site.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Liquid sensor setup was performed incorrectly.</td>
<td>Reenter this liquid sensor’s setup values.</td>
</tr>
</tbody>
</table>
Thank You!

David Emmington  
Manager Environmental Products  
The Veeder-Root Company  
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916 638-2066