AUTOMATIC TANK GAUGING SYSTEMS
Achieving Compliance

John D. Sieger, Tanknology
The Objective:
Monitor your Tank & Piping Systems for leaks & Prevent Overfills
TANK GAUGING SYSTEM BRANDS
DOUBLE WALL STEEL TANK MONITORING

Steel Primary Tank
Annular Space for Monitoring
FRP Secondary Jacketed Containment Tank

11/02/2010
DOUBLE WALL TANK MONITORING
DRY FIBERGLASS

Figure 30. Example Interstitial Sensor Installation - Fiberglass UST
MAGNETOSTRICTIVE PROBE
What Information does it provide me?
OVERFILL PREVENTION VIA TANK PROBE provides 90% fill limiting compliance
SINGLE WALL UST MONTHLY MONITORING via 0.2 GPH STATIC TESTING

• NJDEP & USEPA Release Detection Monitoring requirements require at least 1 Passing 0.2 (Gallon Per Hour) GPH leak test, Monthly, for each UST on a facility.
• Commonly set to operate on a weekly basis, at a time when the facility is not in operation. This allows just 4 opportunities per month to achieve a passing test.
• The monitoring console is programmed to run the test for 2, 3, 4 or more hours.
• The results of the test print-out as soon as the test is completed.
  • **NOTE:** The printed results of at least 1 Passing 0.2 GPH in-tank leak test for each registered UST on a facility should be kept for 3 years’ time.
• Common problems achieving a passing monthly test in a given month:
  - 24-Hour station doesn’t afford enough down-time for the tank.
  - In-Tank product level is too low upon the date/time the test is set to be run.
  - A fuel delivery occurs within 8 hours of, or during a test in progress.
  - Static tests are being attempted on a set of siphon-manifolded tanks.
• The most popular means of achieving compliance when the factors above are routinely encountered is to add a CSLD (Veeder Root) or SCALD (Incon) software upgrade to enable 24-hour continuous leak detection capabilities to the ATG console.
• The Veeder Root and Incon consoles store passing test results in memory, by month. This memory will be accessed by NJDEP or County Health Inspectors.
Example of an “Invalid” leak test result on the left. A “Passing” result on the right.
Example of “Good” leak test results stored in the TLS console memory
Example of “BAD” leak test results stored in the TLS console memory

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Test Type</th>
<th>Starting Volume</th>
<th>Percent Volume</th>
<th>Test Length</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 11, 2008</td>
<td>5:00 AM</td>
<td>Passed</td>
<td>98.62%</td>
<td>49.1%</td>
<td>3 hours</td>
<td></td>
</tr>
<tr>
<td>Jan 27, 2008</td>
<td>11:00 AM</td>
<td>Passed</td>
<td>96.60%</td>
<td>60.1%</td>
<td>3 hours</td>
<td></td>
</tr>
<tr>
<td>Jan 6, 2008</td>
<td>11:00 AM</td>
<td>Passed</td>
<td>97.77%</td>
<td>78.6%</td>
<td>3 hours</td>
<td></td>
</tr>
<tr>
<td>Mar 30, 2008</td>
<td>12:00 AM</td>
<td>Passed</td>
<td>98.15%</td>
<td>48.9%</td>
<td>3 hours</td>
<td></td>
</tr>
<tr>
<td>Mar 30, 2008</td>
<td>12:00 AM</td>
<td>Passed</td>
<td>98.94%</td>
<td>50.2%</td>
<td>3 hours</td>
<td></td>
</tr>
<tr>
<td>Apr 9, 2007</td>
<td>8:00 AM</td>
<td>Passed</td>
<td>99.99%</td>
<td>54.8%</td>
<td>3 hours</td>
<td></td>
</tr>
<tr>
<td>May 30, 2007</td>
<td>3:00 PM</td>
<td>Passed</td>
<td>101.5%</td>
<td>54.9%</td>
<td>3 hours</td>
<td></td>
</tr>
</tbody>
</table>

Note the lack of a passing 0.2 GPH static test in the months of Feb. & Apr. 2008.
Monitoring Piping Systems
DOUBLE WALL PIPING MONITORING
via CONTAINMENT SUMP SENSORS

Diagram of a double-walled pressurized piping system. Any fuel leakage that occurs in the piping itself will flow down to the tank-top sump where the liquid sensor will trigger an alarm inside the facility. Leaks from piping components at the tank top are contained in the tank-top sump, while leaks from the dispenser are contained in the dispenser sump.
SINGLE or DOUBLE WALL PIPING MONITORING via ELECTRONIC LINE LEAK DETECTION
TLS-350 PLLD (Pressurized Line Leak Detection)
The setup printout will have a section detailing the PLLD setup for each line: Q1, Q2, Q3, etc.

PRESSURE LINE LEAK SETUP

Q 1: REGULAR UNLEADED
TYP: 2.0/3.01N FIBERGLASS
2.01N DIA LEN: 175 FEET
3.01N DIA LEN: 3 FEET
0.20 GPH TEST: REPETITIVE
0.10 GPH TEST: DISABLED
SHUTDOWN RATE: 5.0 GPH
LOW PRESSURE SHUTDOWN: YES
LOW PRESSURE: 76 PSI
T 1: REGULAR UNLEADED
DISPENSE MODE: STANDARD
SENSOR: NON-VENTED
PRESSURE OFFSET: 0.0581

Note that the 0.2 GPH mode is set to "Repetitive" or constant.
Note that the 0.1 GPH mode is set to "Disabled".
Note that the shutdown rate is set for 3.0 GPH. This can be disabled
also, allowing the line to continue to be used even though a
catastrophic leak is being detected.

A printout of the PLLD Alarm History looks like this.

ALARM HISTORY REPORT
----- SENSOR ALARM -----
Q 1: REGULAR UNLEADED
PLLSD SHUTDOWN ALARM
DEC 26, 2007 11:00 PM

GROSS LINE FAIL
DEC 23, 2007 11:00 PM

FUEL OUT
DEC 22, 2007 3:00 PM

FUEL OUT
DEC 15, 2007 6:10 PM

FUEL OUT
DEC 7, 2007 4:00 PM

FUEL OUT
OCT 26, 2007 9:13 AM

PLLSD SHUTDOWN ALARM
OCT 15, 2007 11:17 PM

GROSS LINE FAIL
OCT 13, 2007 11:17 PM

FUEL OUT
OCT 9, 2007 3:25 PM

FUEL OUT
SEP 23, 2007 9:06 PM

ALARM HISTORY REPORT
----- SENSOR ALARM -----
Q 4: DIESEL
PLLSD SHUTDOWN ALARM
OCT 26, 2007 10:07 PM

GROSS LINE FAIL
OCT 26, 2007 10:07 PM

PLLSD SHUTDOWN ALARM
OCT 26, 2007 11:13 PM

GROSS LINE FAIL
OCT 26, 2007 11:13 PM

PLLSD SHUTDOWN ALARM
OCT 15, 2007 11:36 PM

GROSS LINE FAIL
OCT 18, 2007 11:36 PM

PLLSD SHUTDOWN ALARM
OCT 16, 2007 8:17 AM

GROSS LINE FAIL
OCT 18, 2007 8:17 AM

PLLSD SHUTDOWN ALARM
OCT 16, 2007 12:02 AM

GROSS LINE FAIL
OCT 16, 2007 12:02 AM
Note that the customer can verify 3 years of 3.0 GPH leak detection Functionality Testing, remotely from their desk.
TLS-350 WPLL D (Wireless Pressurized Line Leak Detection)
The setup printout will have a section detailing the WPLL setup for each line: W1, W2, etc.
The setup will look similar to that of the PLLD example.

A printout of the WPLL Line Test Results from the front menu looks like this.

MAY 2, 2008 12:56 PM
WPLL LINE LEAK TEST RESULTS

W 3: REGULAR UNLEADED

3.0 GAL./HR RESULTS:

LAST TEST:
MAY 2, 2008 12:56PM PHS8
NUMBER OF TESTS PASSED
PREV 24 HOURS: 94
SINCE MIDNIGHT: 47

0.20 GAL./HR RESULTS:

APR 10, 2008 2:16AM PHS8
MAR 31, 2008 3:12AM PHS8
MAR 19, 2008 3:12AM PHS8
MAR 7, 2008 1:51AM PHS8
FEB 24, 2008 2:10AM PHS8
FEB 6, 2008 3:28AM PHS8
FEB 4, 2008 3:28AM PHS8
NOV 18, 2007 3:14AM PHS8

0.10 GAL./HR RESULTS:

NOV 18, 2007 3:14AM PHS8
FEB 12, 2007 1:02AM PHS8

* * * * * END * * * * *

This is the 0.2 GPH diagnostic menu printout for the WPLL

WPLL LINE LEAK DIAG
MAY 2, 2008 12:57PM PHS8
W 3: REGULAR UNLEADED

0.20 GPH TEST DIAG

CURRENT TEST:
---TIME---PRESS

PREVIOUS DATA:
---TIME---PRESS
APR 10 31.8 AM 43.0 0.00
21:12 AM 43.2 0.00
12:18 AM 40.8 0.00
12:26 AM 41.4 0.00
APR 28 31.9 AM 37.2 0.00
3:01 AM 34.7 0.00
2:34 AM 34.9 0.00
2:10 AM 35.9 0.00

AUTO-COMIRM DATA

CURRENT TEST:
START TIME: APR 16, 2008
DURATION: 15 DAYS
SEQUENTIAL PASSED: 0
SEQUENTIAL FAILED: 0
TOTAL PASSED: 0
TOTAL FAILED: 0
RESULT REASON CODE:
WORKING
RESULT: NONE
LAST TEST:
START TIME: APR 12, 2008
DURATION: 1 DAYS
SEQUENTIAL PASSED: 0
TOTAL PASSED: 2
TOTAL FAILED: 0
RESULT REASON CODE:
SEQUENTIAL
RESULT: TEST PASSED

0.20 TEST RESULTS

PON RATIO DUR RESULT
APR 16, 2008 3:10AM PHS8
34.4 0.19 65824 PHS8
APR 14, 2008 3:10AM PHS8
33.9 0.19 65823 PHS8
APR 10, 2008 2:45AM PHS8
31.9 0.00 63 PHS8
APR 9, 2008 2:42AM PHS8
39.1 0.25 63 PHS8
MAR 31, 2008 3:26AM PHS8
34.4 0.17 33 PHS8
MAR 29, 2008 1:50AM PHS8
32.8 0.12 33 PHS8
MAR 19, 2008 1:57AM PHS8
36.3 0.32 33 PHS8
MAR 17, 2008 3:19AM PHS8
37.3 0.46 33 PHS8
MAR 7, 2008 1:51AM PHS8
38.1 0.50 33 PHS8
MAR 3, 2008 3:18AM PHS8
32.8 0.10 48 PHS8

NO-VENT TEST ABORTS:
0 OUT OF 10 TEST
GENERAL RECORDKEEPING REQUIREMENTS FOR ATG SYSTEMS

• NJDEP & USEPA Release Detection Monitoring requirements require that the O/O (Owner/Operator) of a regulated UST and Piping system be prepared to demonstrate compliance with Release Detection requirements for the previous 3 years. This demonstration will usually entail the ability to produce printouts from the ATG system console to support a “Normal” or non-leaking condition of the facility’s underground tanks and piping systems. The printouts needed in archive will depend on the configuration of the facility (single wall vs. double wall). A general listing of them is as follows:

1. Passing 0.2 (Gallon Per Hour) GPH In-Tank static leak tests, at least Monthly, for each UST on a facility. (single wall tanks)
2. Passing 0.2 GPH in-line pressurized leak tests, at least monthly, for each line being monitored by the console with electronic in-line leak detection. This will generally be for single-wall piping where electronic line leak detection is the registered means of compliance.
3. Monthly Liquid Sensor Status verification for any sensor being used to monitor the secondary space of a Double-wall UST or Piping system. This will apply when Secondary Containment Monitoring is the registered means of compliance for the tanks and/or piping.

• Some ATG console manufacturers (Incon) have provided programming in their console to enable the O/O to receive an automatic printout from the console that summarizes all “compliance” items (in-tank leak tests and sensor status.
• Unfortunately, the Veeder Root TLS 350 and earlier consoles must have their sensor status reports retrieved manually. In order to stay consistent with archive retrieval, we recommend that the O/O pick a set day of the month to retrieve and file their sensor status reports. It does not matter if it is the 1st, 15th or last day of the month that these reports are retrieved, so as long as they are retrieved every 30 days.
  • NOTE: The ATG console memory keeps track of the Alarm History of Probes and Sensors. With the Veeder Root consoles, for example, the 3 most recent alarms are stored in its on-board memory.
• Bottom line, a conscientious O/O, should be able to ask his/her trusted contractor for guidance on what you should need to do with your ATG console in order to maintain compliance with the NJDEP requirements for Release Detection Monitoring of your underground tanks and piping systems.
Liquid Sensor Status

This printout shows the status of all 2-wire sensors L1, L2, L3, etc. Some Veedor Root sensors are not "Smart" as they can not distinguish from Fuel or Water, simply that liquid has been detected.

A low resistance value received at the console can cause "False" alarms as well.
UST w/ 95% Limiting Drop Tubes

ALARM HISTORY REPORT
--- IN-TANK ALARM -----
T 1: UNLEADED 10E

OVERFILL ALARM
MAR 2, 2008 2:13 PM
JAN 17, 2008 5:31 PM
JAN 11, 2008 9:10 AM

LOW PRODUCT ALARM
MAR 19, 2008 3:22 PM
MAR 4, 2008 7:05 PM
MAR 26, 2008 4:49 PM

HIGH PRODUCT ALARM
NOV 26, 2006 4:15 PM
SEP 27, 2005 7:24 PM
MAR 30, 2005 8:41 PM

INVALED FUEL LEVEL
DEC 15, 2007 11:37 PM
DEC 25, 2007 2:22 PM
OCT 31, 2006 1:12 PM

PROBE OUT
Jan 16, 2006 11:53 AM
Jan 16, 2005 9:12 AM
Jan 16, 2005 11:14 AM

DELIVERY NEEDED
SEP 23, 2005 10:56 AM
SEP 16, 2005 9:10 AM
SEP 11, 2005 10:52 AM

LOW LEVEL WARNING
Jan 16, 2006 1:32 PM
NOV 8, 2004 11:46 AM

UST w/ 90% Limiting Ball Floats

ALARM HISTORY REPORT
--- IN-TANK ALARM -----
T 1: UNLEADED 10E

OVERFILL ALARM
JAN 2, 2008 11:44 AM
NOV 24, 2007 8:47 AM
NOV 18, 2007 6:19 AM

LOW PRODUCT ALARM
JAN 26, 2008 11:17 AM
JAN 25, 2008 11:18 AM
JAN 3, 2008 5:14 PM

HIGH PRODUCT ALARM
DEC 10, 2007 4:42 PM
AUG 20, 2007 5:38 PM
AUG 26, 2007 12:21 AM

INVALED FUEL LEVEL
DEC 7, 2007 8:23 PM
DEC 7, 2007 5:55 PM
NOV 30, 2007 9:14 PM

PROBE OUT
DEC 7, 2007 8:22 PM
DEC 7, 2007 5:11 PM
AUG 27, 2007 3:05 PM

HIGH WATER WARNING
DEC 7, 2007 8:18 PM
AUG 17, 2007 7:26 AM

DELIVERY NEEDED
JAN 25, 2008 11:15 AM
JAN 25, 2008 9:46 AM
JAN 3, 2008 7:26 PM

LOW PRODUCT ALARM
AUG 26, 2007 5:59 PM
AUG 26, 2007 12:22 AM
AUG 25, 2007 11:39 AM

PERIODIC TEST FAIL
DEC 8, 2007 8:00 AM
NOV 22, 2007 4:56 AM
NOV 13, 2007 4:05 AM

95% alarm
within the past
30 days

100% alarm
within the past
90 days

Per. test
fails in past
30 days
Incon TS-1001/2001 Regulatory Report

This printout summarizes all items a DEP inspector could ask for.
This report shows the status of all components of the system, the last 12 months of passing Static Tests & 12 months of Sensor Status Reports.

<table>
<thead>
<tr>
<th>SENSORS</th>
<th>08/29/2007</th>
<th>12:00</th>
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<th>12:00</th>
<th>09/03/2007</th>
<th>12:00</th>
</tr>
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<tbody>
<tr>
<td>SENSORS</td>
<td>08/29/2007</td>
<td>12:00</td>
<td>08/31/2007</td>
<td>12:00</td>
<td>09/03/2007</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>AUX IN</th>
<th>OPERATIONAL</th>
<th>05/03/2007</th>
<th>12:00</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUX IN</td>
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<td>05/03/2007</td>
<td>12:00</td>
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<table>
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<tr>
<th>LEAK TEST</th>
<th>05/01/2006</th>
<th>21:19</th>
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<td>05/01/2006</td>
<td>23:30</td>
</tr>
<tr>
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<td>05/01/2006</td>
<td>23:44</td>
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</tbody>
</table>

<table>
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<th>TANK</th>
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<th>SLOPE</th>
<th>TANK</th>
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<th>SLOPE</th>
<th>TANK</th>
<th>LEAK TEST</th>
<th>SLOPE</th>
<th>CUS TANKS</th>
<th>COMPLIANCE TESTS</th>
<th>CUS TANK</th>
<th>04/09/2008</th>
<th>12:00</th>
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<th>12:00</th>
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<th>04/09/2008</th>
<th>12:00</th>
<th>04/09/2008</th>
<th>12:00</th>
</tr>
</thead>
</table>
Incon TS-1001/2001 Regulatory Report  Pg 2
This printout summarizes all items a DEP inspector could ask for
This report shows the status of all components of the system, the last 12 months of passing Static Tests & 12 months of Sensor Status Reports.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>CUS LINE 1</th>
<th>CUS LINE 2</th>
<th>CUS LINE 3</th>
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<td>SENSOR NO. 4</td>
<td>SENSOR NO. 5</td>
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<tr>
<td></td>
<td></td>
<td>DSL ANNUAL</td>
<td>87 STP SUMP</td>
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<tr>
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<td>12:00</td>
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<tr>
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<td>87 STP SUMP</td>
<td>87 STP SUMP</td>
<td>87 STP SUMP</td>
</tr>
</tbody>
</table>
Contrary to statements by ATG system manufacturers who state their systems are “self-testing”, ensuring the monitoring system’s equipment will perform properly when needed by physically manipulating the components into an alarm condition and ensuring that the required audible/visual indications are received at the ATG system console is recommended in many circles within the industry.

What is done:

- Liquid-level Probes are removed & placed on the surface of the tank-field, re-connected to their probe cables, and then the floats are moved to positions to trigger fuel and water level alarms.
- An external audible overfill horn’s proper function (if present) is also verified with these steps.
Field Sensors are removed for testing:
- Interstitial/Annular space sensors
- Turbine/Piping Sump sensors
- Dispenser Sump/Pan sensors

Electronic Line Leak Detectors should receive a 3.0 GPH functionality test.

- NOTE: NJDEP RDM regulations do not require the ATG system to specifically shut-down the line system in the event a leak is detected. But it must provide an audible/visual indication of the problem when detected.

- Any components of the system found to not be working should be reported to the owner/operator for immediate repair since the ATG system’s ability to provide Release Detection or Overfill Prevention could be ineffective or completely unavailable.

- Testers should attain manufacturer’s Certification for the specific gear being tested.
REALLY GOOD CONCEPTS

EXAMPLES OF THINGS THAT ARE GOOD
AND SOME THAT ARE NOT
How are my spill buckets?
How about this one?
Does this device provide proper RDM, stand-alone?
Would you recognize this?
I’m conducting Interstitial Monitoring of my piping system. See my sensor?
Did you see my Sump Sensor sitting in the high side of the sump?

Is this piping entry ready for RDM??
We elected NOT to install Dispenser Sump Sensors at this site.......

03/14/2011
What’s wrong with this piping RDM setup?
I’m in good shape at my site, no?
I’m sick of being caught with my ATG console not operating.
Just do the RIGHT thing!

If you are not sure if your Monitoring System is Functioning properly, get someone to verify exactly what it is doing.

If a component of your Monitoring System malfunctions, get it fixed ASAP.
Any Questions?

Thank you for your attention and participation in this presentation today.