

SECONDARY CONTAINMENT TESTING PROCEDURES

BENEFITS OF THE VPLT SYSTEM



Presented by
Brad Hoffman



**TECHNICAL SYMPOSIUM:
SECONDARY
CONTAINMENT
TESTING
OF UST SYSTEMS**

**SACRAMENTO, CA
DECEMBER 4, 2001**

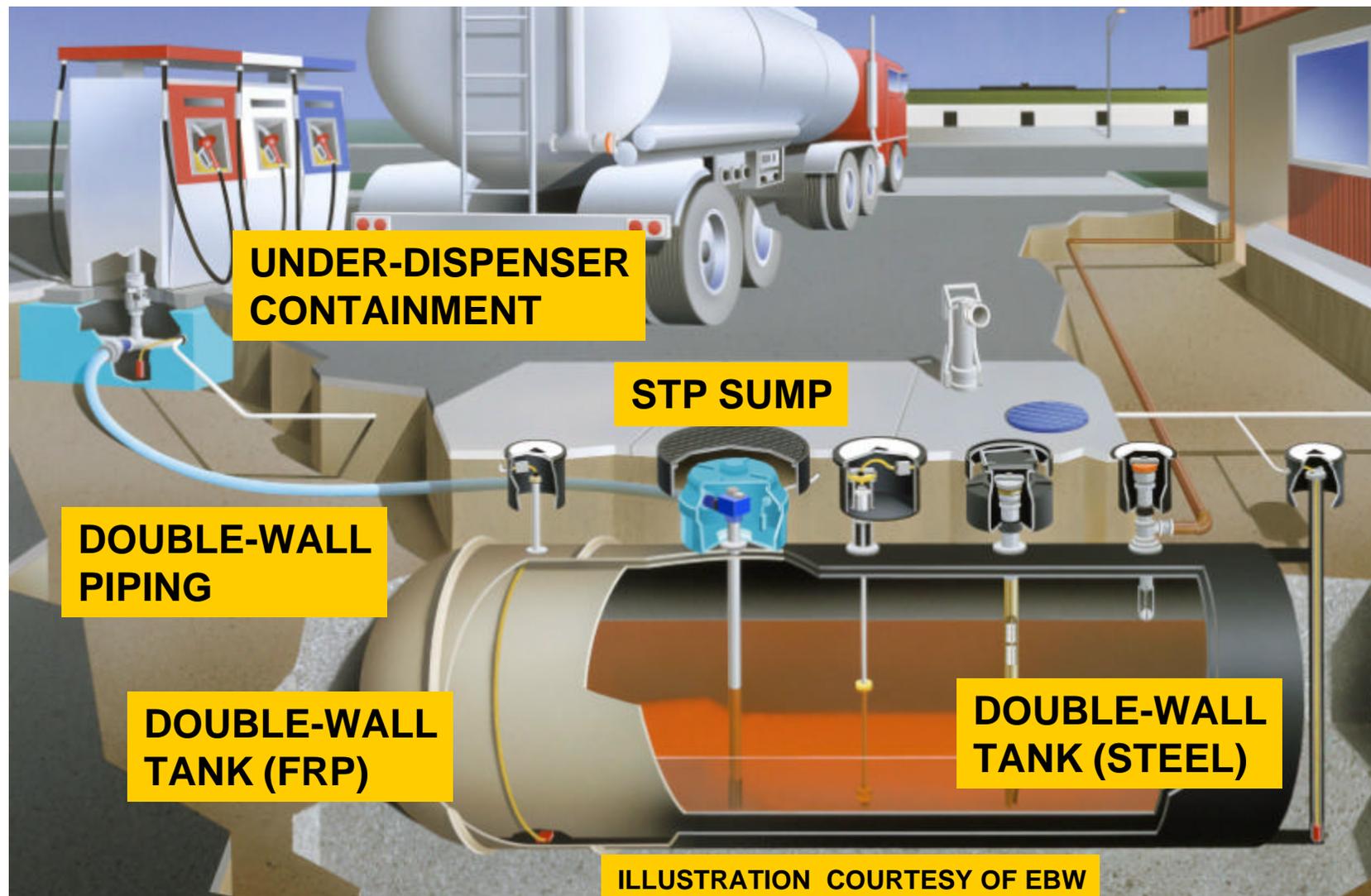


OUTLINE

- Background
 - Types of Secondary Containment
 - Reasons for Testing
 - Regulations (S.B. 989)
- Sump Test Options
 - 24-Hour Test
 - **VPLT Test Method**
 - VPLT -vs- 24-Hr Test
- Other Secondary Testing
 - Tank Interstitials and Line Interstitials



TYPES OF SECONDARY CONTAINMENT



REASONS FOR TESTING

- Regulatory Requirement
 - Comply with the Regulations
- Environmental Protection
 - Prevent contamination of groundwater
- Risk Management
 - Avoid costly remediation
- Good Business Practice
 - 6 month test provides warranty inspection



REGULATIONS (CA S.B. 989)



■ TESTING REQUIREMENTS

- Testing shall be conducted using a test procedure that demonstrates that the system performs at least as well as it did upon initial installation.
- These tests shall be performed in accordance with manufacturer's guidelines or standards.
- If there are no manufacturer guidelines, follow industry code or engineering standard.
- If there are no applicable guidelines, codes, or standards, then use a test method approved by a state registered professional engineer.

REGULATIONS (LG-160)

■ *How should secondary containment systems be tested?*

- *Secondary containment systems must be tested using a procedure to demonstrate that the system performs at least as well as it did when it was installed. [Cal Code Regs., tit. 23, § 2637, subd. (a)(2).] The SWRCB chose this general standard to allow flexibility in testing methods and to encourage the development of new technology.*
- *Similarly, a system that was tested upon installation using an overnight hydrostatic test with a crude level measurement may be tested under the new requirements using a shorter hydrostatic test with a more accurate measurement device.* *The key is to ensure that the test method demonstrates that the secondary containment system performs at least as well as it did upon installation.*

TEST OPTIONS FOR SUMPS

■ Hydrostatic Testing

■ 24-Hour Test with crude level measurement

- | Follow manufacturer's procedures

■ **VPLT System** with precision level measurement

- | Professional Engineer Approval for Sump Testing

- | 3rd-Party Certification as UST Tightness Test

■ Other type of "Accelerated" Test

- | Look for Approvals and Credentials

■ Vacuum Testing

■ Follow manufacturer's procedures

- | Only for "new" sumps designed and installed to be air-tight

24-HR SUMP TEST

- 24-Hour Hydrostatic Test
 - Fill sump with water
 - Mark level w/paint
 - Visual check in 24 hours
 - Look for 1/4" to 1/2" drop



VPLT SYSTEM FOR SUMPS

- **Fill sump with water (test fluid)**
 - Any level - per MFG or customer or regulatory requirement
- **Short Test Time**
 - 15 minutes for Dispenser sumps
 - 30 minutes for STP sumps
- **Measures Actual Leak Rate**
 - Threshold - 0.05 gph leak rate
- **Measures Level Change**
 - 1/10,000" resolution
 - For MFG protocols which specify level change



VPLT SYSTEM FOR SUMPS

- **3rd-Party Certified for UST's up to 18,000 gallons.**
 - Ken Wilcox Associates
 - Listed in California SWRCB LG-113 Manual
 - System has tested many thousands of UST's
- **CA Professional Engineer Approval**
 - James H. Ray - RHL DESIGN GROUP



PC-based
Data
Acquisition
Unit



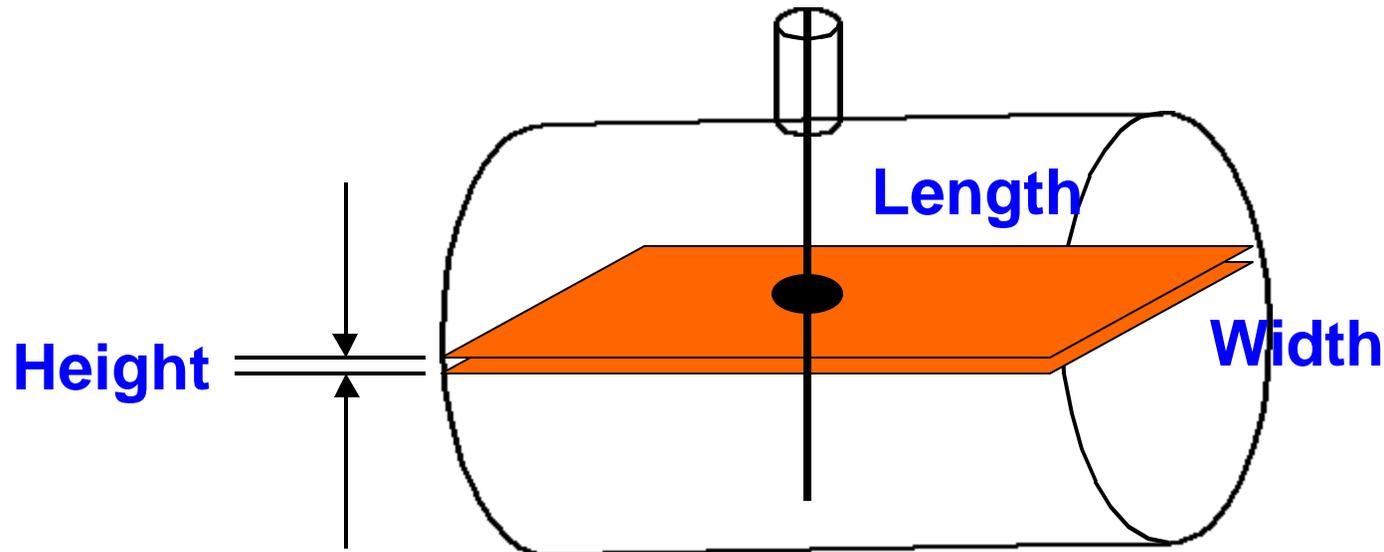
LVDT
Probe
(Linear
Variable
Differential
Transformer)

VPLT TEST METHOD

- **DESIGNED TO DETECT LEAKS IN ANY TYPE OF VESSEL**
 - Horizontal Cylinder (UST)
 - Vertical Cylinder (STP SUMP)
 - Rectangular Container (DISPENSER SUMP)
- **MEASURES LEAK RATE**
 - Uses Threshold of 0.05gph to detect 0.1gph leak
 - Probability of Detection = 99.9%
 - Probability of False Alarm = 0.1%
- **Leak Rate = Actual Vol. Change - Expected Vol. Change**
 - **Actual Volume Change**
 - Measured by Level Sensor
 - **Expected Volume Change**
 - Measured by Temperature Sensors

VPLT LEVEL MEASUREMENT

- Level Sensor Measures Fluid “Height”
 - Float attached to LVDT sensor
 - Resolution 22 microns - better than 0.0001 inches
 - Need better than 0.0003” to detect 0.1gph leak in 12K tank
 - Calculate Surface Area of product (Length x Width)
 - **Actual Volume Change = Length x Width x Height**



VPLT TEMPERATURE MEASURE

Temperature Measurement

Measure Temperature Change

- Utilize NASA grade thermistors

Measure Specific Gravity

- Use Hydrometer; Typical S.G. = 0.72 (gasoline)
- Water = 1.0

Calculate Coefficient of Thermal Expansion

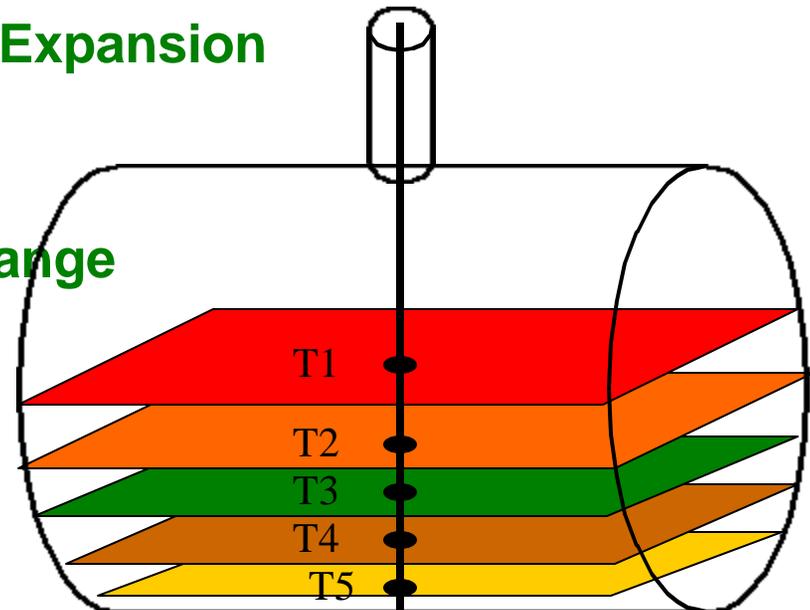
- Gasoline C.O.E. = 0.00068
- Water C.O.E. = 0.000115

Calculate EXPECTED volume change

- Expected Volume Change =
Gals. x Degrees x C.O.E.

Slight impact on sump tests

- Usually insignificant



VPLT TEST TIMES

COMPARISON OF TEST TIMES FOR SUMPS TO UST'S

	Diameter (") (or width)	Length (")	Fluid ht. (")	Surface Area (sq. in.) (1/2 full)	Volume (gals)	Min. Test Time (min.)	Percent of area	Percent of volume	Percent of test time
1,000 gal. Tank	46	144	23	6624	500	60	100%	100%	100%
Dispenser Sump	20	40	10	800	35	15	12%	7%	25%
STP Sump	48	N/A	30	1810	235	30	27%	47%	50%
12,000 gal. Tank	96	384	48	36864	6000	120	100%	100%	100%
Dispenser Sump	20	40	10	800	35	15	2%	1%	13%
STP Sump	48	N/A	30	1810	235	30	5%	4%	25%

Times for Tanks from 3rd-Party Certification. Times for Sumps based on Laboratory and Field Testing.

Surface Area and Volume for Sump Tests are much less than for Tank Tests.

Coefficient of Expansion for Water (0.000115) is much less than Gasoline (0.00068).

Test Times for Sumps allow for deflection and stabilization after adding water.

VPLT -VS- 24HR TEST

■ MORE ACCURATE TEST RESULTS

- **More precise measurement capability.** The VPLT utilizes a precision electronic level measurement, with resolution better than 1/10,000th inches. The VPLT measures for a leak rate of 0.05gph. The 24-hour test relies upon a crude visual check of a paint mark on the inside of a dark sump. Some manufacturers don't specify an loss threshold, and others allow as much as 1/2" drop in level.
- **No unsupervised testing period.** With the VPLT, the entire test is supervised by the trained crew, and may be witnessed by a regulatory agency inspector or tank owner. With the 24-hour test the site is left unsupervised overnight, which may provide opportunity for tampering or interference with the test.
- **Recorded results available.** With the VPLT, an electronic file of the test results is saved to ensure the results are valid. With the 24-hour test, there is no electronic documentation of the test result.

VPLT -VS- 24HR TEST

■ SAFER FOR THE ENVIRONMENT

- **Less release of fluid in the event of a leaking sump.** With the VPLT, the fluid is quickly pumped out as soon as a leak is identified. For the 24-hour test, the fluid level isn't checked until the next day, and a much greater volume of contaminated fluid can escape into the ground.
- **No overnight shutdown of the leak detection system.** With the VPLT, a trained crew monitors the tank and piping system during testing. With the 24-hour test, the leak detection system is disabled for 24 hours without any supervision. Any leaks during that time would go undetected.



VPLT -VS- 24HR TEST

■ MORE PRACTICAL

- **Reduced quantity of “test fluid” required.** With the VPLT, the same fluid can be transferred from sump to sump, reducing the overall volume required. The volume is typically less than 500 gallons of fluid that may be transported to other sites and used for additional testing. With the 24-hour test, all sumps must be filled up at the same time, generating several thousand gallons of contaminated water that must be disposed of as a hazardous waste.
- **Quicker repair and retest capability.** With the VPLT, minor troubleshooting, repairs and retests can be completed the same day. For 24-hour tests, the troubleshooting and repairs must be done the next day, then it takes another 24 hours to conduct the retest.

TEST PROCEDURES - TANKS

■ TANK INTERSTITIAL

■ Vacuum Test (typical)

- | About 10" Hg
- | Hold for 1-2 hours
- | Per MFG procedures

■ Pressure Test

- | API/PEI/NFPA spec.
- | About 3 - 5 psi
- | Hold for 1 hour
- | If no MFG procedures

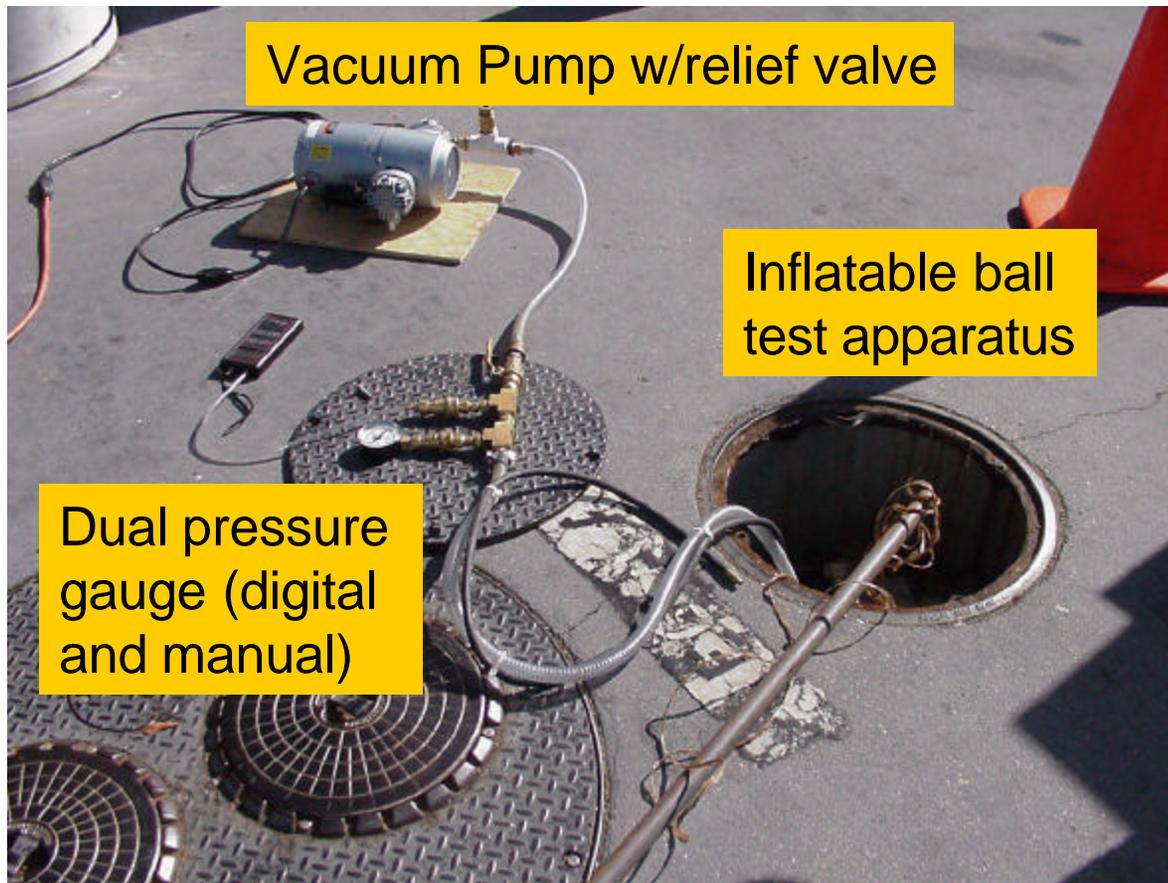


Venturi vacuum pump

Cone-style test apparatus

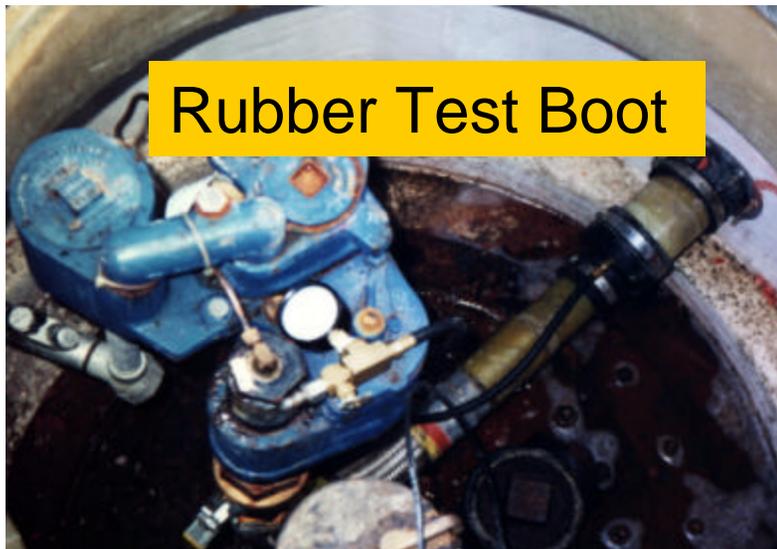
TEST PROCEDURES - TANKS

TANK INTERSTITIAL TEST



TEST PROCEDURES - LINES

- LINE INTERSTITIAL (DOUBLE-WALL PIPE)
 - Pressure Test with Nitrogen (typical)
 - Fiberglass Piping - not to exceed 10psi (5psi with rubber boot)
 - "Flexible" Piping - not to exceed 5psi
 - Hold for about 1 hour
 - Follow MFG procedures for specific times and pressure



TEST PROCEDURES - LINES

■ LINE INTERSTITIAL TEST



Test Valve Extension
Jumper Hose Apparatus
Dual Pressure Gauge
Digital Timer

FOR MORE INFO:



Brad Hoffman
8900 Shoal Creek Blvd #200
Austin, TX 78757
(512) 380-7154
bhoffman@tanknology.com