LEAK DETECTION SERVICES

Leak Prevention Building Tighter Systems with Enhanced Leak Detection



CG

Everything Leaks!

It's up to the user to determine what leak rate is acceptable.



Power Steering Units



2e-4 cc/sec

Engine Blocks



1e-3 cc/sec

Pacemakers



1 E-9 cc/sec (1 cc in 31 years).

What leak rate should be acceptable for a new UST system?

Current QC Testing Methods

Pressure/Vacuum Decay
Soap Bubble / Visual
Hydro





Commission Testing

 Precision Tank and Line Testing
Monitoring System
Enhanced Leak Detection





e Provided by CGRS, Inc.

Current Standards

Tank Monitoring - 0.2 gph (1,752 gallons) in 1 year). Precision Tank Testing - 0.1 gph as liquid (876 gallons in 1 year). Precision Line Testing – 0.02 gph as liquid (175 gallons per year). ELD standards - 0.005 gph as vapor (2 E-3 cc/sec) or (44 gallons of vapor per year).

Enhanced Leak Detection (ELD)

A leak testing method with a sensitivity capable of detecting a 0.005 gallon per hour leak (as vapor) with a 95% probability of detection and 5% probability of a false alarm.

Leaks of this order of magnitude will not pass liquid.

California ELD Requirements

Adopted in July of 2003
Newly installed USTs must pass an ELD test in order to receive an operating permit.



Why?

Continued Problems

- Double wall system
- More complex in-field construction practices
 - Vapor and liquid releases continue to occur



New Construction ELD

- New UST systems are required to pass an ELD test after construction is complete.
- Primary containment systems only.
- One time test.
- Only one technology met this standard.



Ouch!!!

- Initially failure rates approached 90%
 In some cases, new piping systems had to be removed and replaced
- Angry tank installers, owners and equipment manufactures.
- Could new systems meet this standard?

DISASTER!!



Solution!

- Perform helium pre-test prior to backfilling.
- Final test failure rates immediately dropped to less than 2%.
- Problem solved.







Concept

Develop a helium based ELD method for quality control testing newly constructed fueling systems.

Helium Leak Testing in Industry

- Originally used on Manhattan project during WWII for detecting small leaks in the gas diffusion process in the early 40's.
- Commercialized in the early 50's spurred on by the space program.
- Rapid leak testing with helium is used extensively in industry today.

Automotive Industry



- Fuel Tanks
- Cylinder heads
- Valves

Energy Industry

Heat exchange and steam condensation lines



Semiconductor Industry



Critical gas distribution lines

Aviation Industry

Aircraft Wing Tanks and Oxygen Piping



The point is...

- Quality control leak testing with helium is not a new concept.
- Using a refined, scientific based process for in-field quality control testing of fuel systems would be a new application.
- 0.005 gph as vapor sensitivity could be done in the field with a high degree of confidence.

R & D









Leak Simulation



Permeation Curve





Enhanced Leak Detection (ELD) Method

Certifications

- Ken Wilcox and Associates EPA Non-Volumetric (tracer) Protocol.
- National Work Group on Leak Detection Evaluation Listing (NWGLDE)
- California State Water Resource Control Board (SWRCB) listing



How it Works



Process

Pre Testing
Final Testing







Piping Primary



Tank Primary



Components in Containment



Test Setups



Connection at the turbine



Piping Systems



Test Manifold Detail



Air Management System



No Leak – 15 min

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0.005 gph Leak – 15 min

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0.005 gph as vapor



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Example



Example







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Test Certification

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Test C Post Installation Enha	ertification Inced Leak Detection (EL	D)				
Location:	CGRS Project # :	3-5447-11325-7711				
7-Eleven 32241 - Market Number 2133 Test Date: November 12, 20						
4101 Calloway Drive	CGRS Techs: Tony Oddo					
Bakershelu, CA 93306	~	dani Geigei				
This document certifies that the systems list	ed below at the above re /005 tightness test. CGRS	ferenced location have further certifies that the				

Post	Installation ELD Test Results	
Reg NL (87)	Primary Containment System	Pass
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Neviewed by.	Chris Murphy - CA Operations Manager	Date

Leak Locate



Effect?

- Materials handling
- Installers strictly follow installation instructions
- Piping tools kept sharp and in good condition
- Eliminated unnecessary fittings
- Modification of secondary access fittings
- Installers learned to build tighter systems

Today

- We find 1-6 leaks on every site during pretesting and rarely does a system ever fail a final.
- Installers like knowing that their work has been checked by a 3rd party – before backfilling!

Owners sleep better knowing that their installation has been QC tested to a very tight standard.

Leak Prevention

Insuring tighter installations today will prevent releases in the future.





Eric Hick ehick@cgrs.com Thank you for your time!

