



Bulk Field Constructed Tanks Mass Based Leak Detection



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Vista Precision Solutions, Inc.

VPSI offers asset management solutions to owners and operators of bulk fuel storage and distribution systems worldwide.

- Maximize in-service time
- Comply with environmental regulations
- Minimize operational expense

Corporate Capabilities

- **Testing Systems for Underground Pipelines**

Fixed-In-Place System

Mobile System

- **Leak Location on Pipelines**

- **Bulk Storage Tanks**

Mass-based Detection and Monitoring Systems



Leak Detection for Bulk Storage Tanks



Bulk Field Constructed USTs

Generally, large diameter and volume

60-feet or larger diameter and 15 – 40 feet in height

Not shop fabricated

Typically, vertical and cylindrical orientation

Steel or concrete shell with a reinforced roof

Leak Detection for Bulk Storage Tanks



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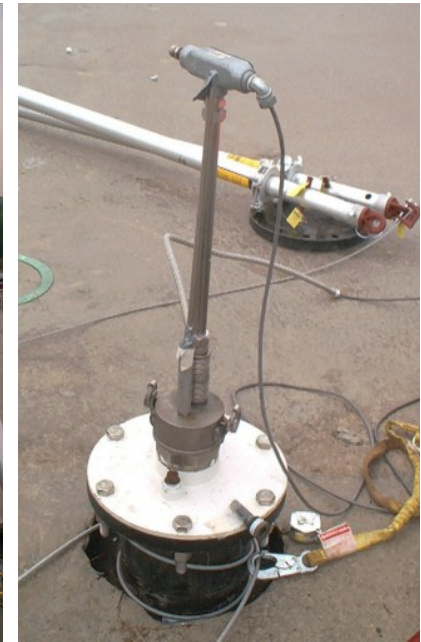
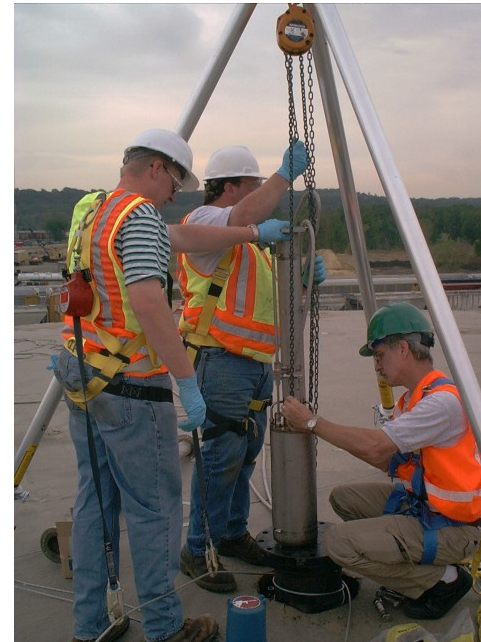
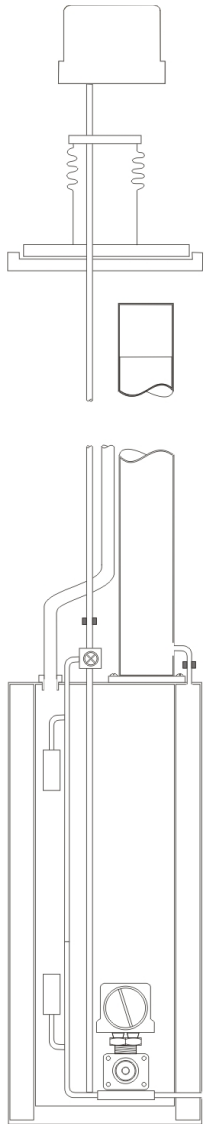


Not much aboveground at
a BFCUST

All receipt and issue lines
underground

Low Range Differential Pressure System

The LRDP System



The LRDP is an in-tank leak detection system

- Or, it can be used as a portable testing system
- It can be permanently installed in the tank

Components of the LRDP



Reference tube

- 3.5 inches in diameter
- contains fuel but is isolated from the fuel in the tank

Valve

- opens and closes the reference tube

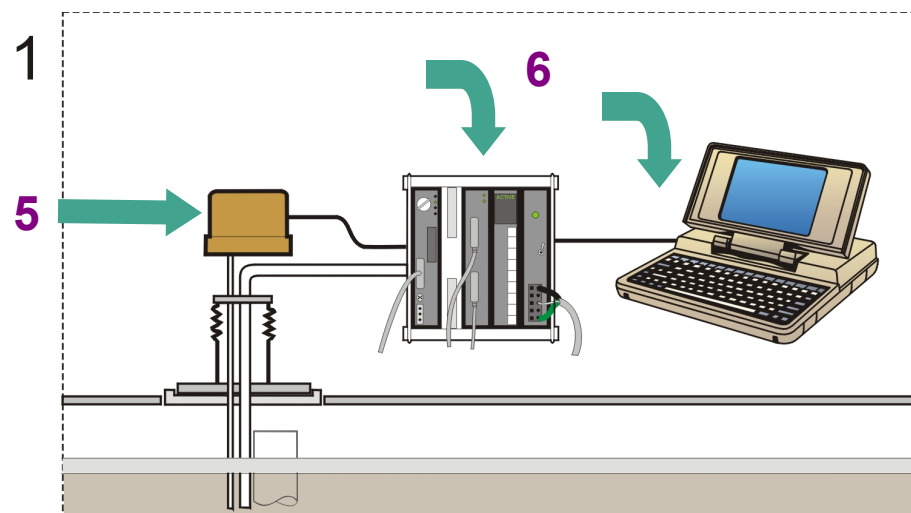
Sensors

- located in a sealed container at the bottom of the tank for thermal stability
- differential pressure sensor to measure the difference in the change of level between the fuel in the tank and the fuel in the reference tube

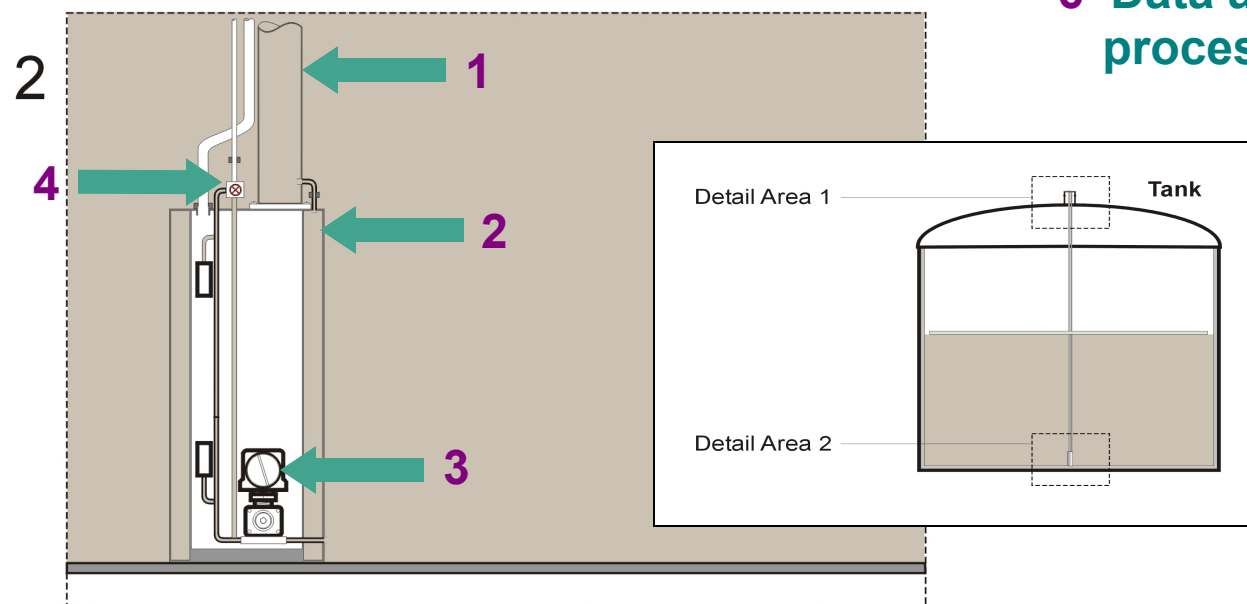
Data acquisition, control and processing system



Components of the LRDP



- 1 Reference tube
- 2 Sealed container
- 3 Differential-pressure cell
- 4 Valve
- 5 Valve actuator
- 6 Data acquisition, processing and control

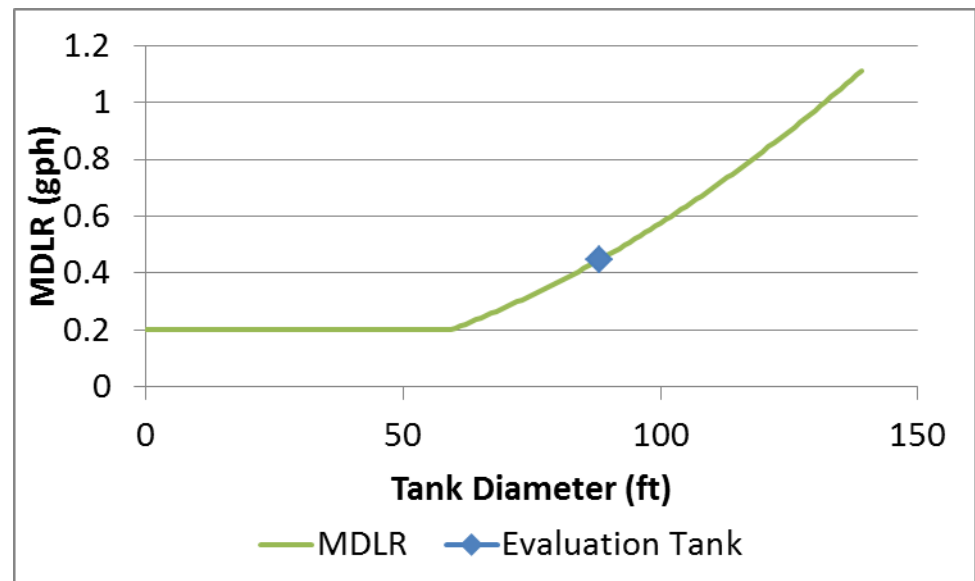


Testing BFCUSTs

- Based on the precise measurement of a very small product level change in the tank over time.
- The level change is converted to a volume rate based on the product surface of the product, i.e. the diameter of the tank (not the volume).
- The Third Party Evaluation is conducted on a tank of a specific diameter and a MDLR is determined.
- The MDLR is then scaled to a new MDLR for a tank of a different product surface area.

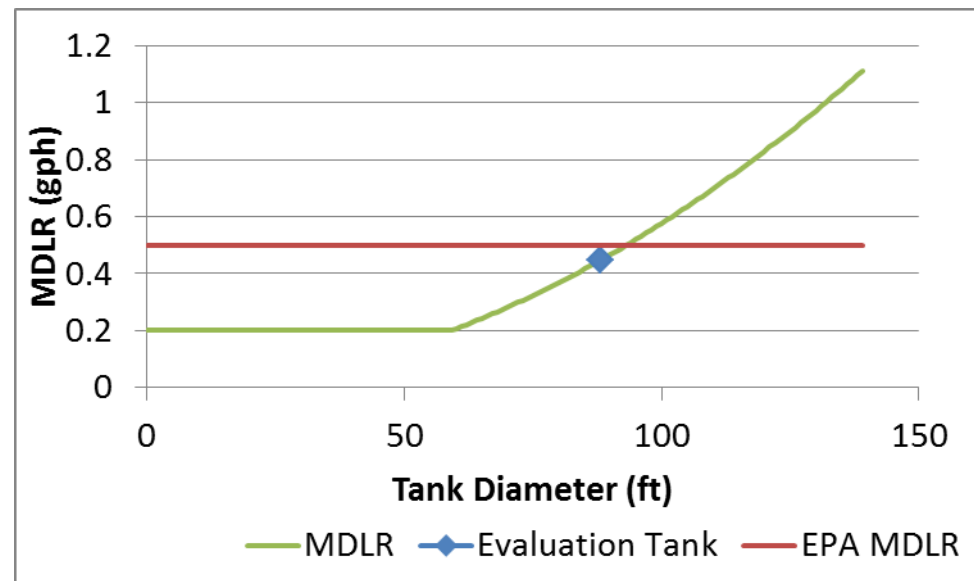
Tank Testing

- An Evaluation performed on a tank with a product surface area of 6082 ft² (88-ft diameter) produces a performance of MDLR = 0.446 gph ($P_D = 95\%$, $P_{FA} = 5\%$)
- This MDLR is scaled to tanks with different product surface areas while maintaining the $P_D = 95\%$ and the $P_{FA} = 5\%$.



40 CFR 280

- The new EPA 40 CFR 280 requirements for field constructed tanks bases the MDLR on a volume rather than a product surface area.
- This can be accomplished in a number of ways
 - Apply the Method as stated but limit it to tanks with a product surface area that produces a MDLR below the 0.5gph EPA requirement
 - Perform multiple tests and perform statistical averaging to produce an MDLR within the EPA requirements.





Example:

- A minimum MDLR (0.2 gph) and a maximum tank product surface area (2.5 X the evaluation tank product surface area) are included in the listing.
- This method of tank testing is currently used by many clients. It is well understood and meets the needs of these sites.

Applying the Method

LRDP-24 (V1.1)

Evaluation Tank 6082 ft²

MDLR @ 95/5 = 0.446 gph

Threshold @ 95/5 = 0.223 gph

Application	MDLR (gph)	Number of Tests Required	Tank Diameter (ft)	Product Surface Area (ft ²)
Annual Tightness Test	0.5	1	≤ 93	≤ 6793
	0.5	2	93 < D ≤ 110	6793 < PSA ≤ 9503
	0.5	3	110 < D ≤ 122	9503 < PSA ≤ 11690
	0.5	4	122 < D ≤ 131	11690 < PSA ≤ 13478
	0.5	5	131 < D ≤ ~139	13478 < PSA ≤ 15205*
Tightness Test Combined with Automatic Tank Gauging System	0.2	1	≤ 58	≤ 2642
	0.2	2-4	58 < D ≤ 83	2642 < PSA ≤ 5410
	.2	5-6	83 < D ≤ 92	5410 < PSA ≤ 6647

*Tank Product Surface Area Limit of Evaluation

Applying the Method

LRDP-48 (V1.1)

Evaluation Tank 6082 ft²

MDLR @ 95/5 = 0.376 gph

Threshold @ 95/5 = 0.188 gph

Application	MDLR (gph)	Number of Tests Required	Tank Diameter (ft)	Product Surface Area (ft ²)
Annual Tightness Test	0.5	1	≤ 101	≤ 8011
	0.5	2	101 < D ≤ 120	8011 < PSA ≤ 11309
	0.5	3	120 < D ≤ 133	11309 < PSA ≤ 13893
	0.5	4	133 < D ≤ ~139	13893 < PSA ≤ 15205*
Tightness Test Combined with Automatic Tank Gauging System	0.2	1	≤ 64	≤ 3217
	0.2	2-4	64 < D ≤ 90	3217 < PSA ≤ 6361
	0.2	5-6	92 < D ≤ 100	6361 < PSA ≤ 7853

*Tank Product Surface Area Limit of Evaluation



Conclusion

While the regulatory requirement is new, BFCUSTs are regularly tested using industry proven methods

Testing methods are listed at NWGLDE.org



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