Hydrostatic Monitoring

Superior Security for Fuel Tank Installations

Cary Etter

Presenting on behalf of Fiberglass Tank and Pipe Institute

FIBERGLASS TANK & PIPE INSTITUTE

Members

- Xerxes
- NOV Fiber Glass Systems
- Hobas Pipe USA
- AOC

Cary Etter

Western U.S. Regional Sales Manager, Fuel Products – Xerxes

- Has been in the fuel equipment **industry for 35 years**
- Held several management roles in both the fuel and water markets since **joining Xerxes in 1996**
- Works directly with key customers, including some of **North America's largest corporations**
- Works closely with Xerxes' engineering, manufacturing and marketing teams
- Xerxes has been a **member of PEI for 50 years**
- Xerxes is a **founding member** of the **Fiberglass Tank and Pipe Institute**

Xerxes is a premiere fiberglass tank brand, with a 45-year history of underground storage innovation of fuel and water products, and with six North American manufacturing facilities.

Xerxes' newest innovations are its HydroChain™ stormwater products.

Agenda

1. Recap of Fuel Tank Installations
2. EPA Regulations
3. The Damage and the Costs in the Event of a Leak
4. The Shift Toward Hydrostatic Monitoring
5. Beyond Leak Detection: Tank-Tightness Testing
6. Hydrostatic Monitoring for Superior Security

A Recap of Why Hydrostatic Monitoring Matters

According to EPA data, approximately 542,000 underground storage tanks (UST) are in service to store petroleum or hazardous substances in the United States.

Leaks from USTs can occur for a variety of reasons:

1. **Aging infrastructure –** especially tanks susceptible to failure due to inadequate or compromised corrosion-resistance
2. **Improper installation or maintenance –** especially when inspection or checks are not adequately held
3. **External factors –** such as nearby construction and natural disasters

Why Hydrostatic Monitoring Makes a Difference

- Contamination of groundwater – the source of drinking water for nearly half of all Americans – is the greatest potential threat from a leaking UST.
- The EPA, states, territories and tribes work with industry partners to protect human health and the environment from contamination resulting from such leaks.

EPA website as of August 2025

Adding hydrostatic leak-monitoring and tank-tightness testing to corrosion-resistant fiberglass tanks can provide the highest level of protection in fuel installations.

Federal Regulatory Framework to Address the Issue

The EPA requirements under the Resource Conservation and Recovery Act (RCRA) include regulations for tank design, installation, operation, and closure.

Specific protections include:

- Corrosion protection
- **Leak detection systems**
- Periodic inspections
- Operator training

The focus here is leak detection.

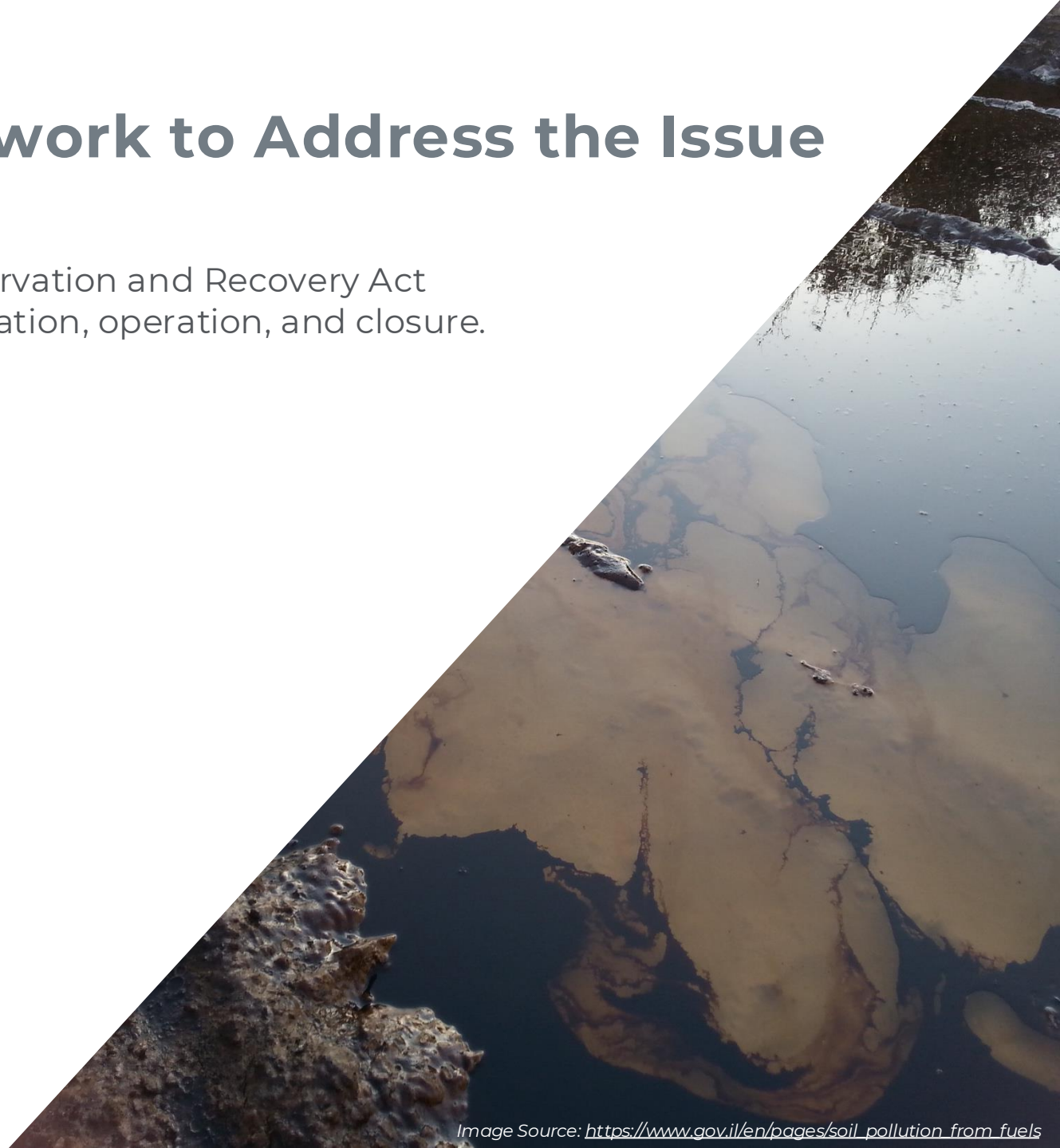


Image Source: https://www.gov.il/en/pages/soil_pollution_from_fuels

EPA Requirements for Leak Detection

An underground fuel tank system needs to meet these 4 requirements for detecting leaks:

1. Detection of a leak from any portion of the tank that routinely contains fuel
2. Leak detection that is installed and calibrated in accordance with the manufacturer's instructions
3. Leak detection operated, maintained, and tested in accordance with the manufacturer's instructions
4. Leak detection using one of the seven methods described in the federal regulations (Section 280.43)

EPA website as of August 2025

The Consequences if a Fuel Tank Leaks

The damage caused by leaking fuel includes damage to human health, the environment, the community, business operations and reputation, such as:

1. **Contamination of groundwater and water resources**
2. **Soil contamination** that makes land unusable for agriculture, recreation and any other development – and can result in loss of property value
3. **Pollution of air** from gas leaks in the area
4. **Disruption of business operations** for the tank operator – and for businesses in the surrounding area
5. **Costly fines and cleanup costs**
6. **Damage to reputation** – both locally and nationally
7. **Potential lawsuits** by others impacted

Factors that Determine the Financial Cost of Cleanup

The cost of cleanup depends on a variety of factors, such as:

- The **extent of the contamination to the groundwater and/or surrounding soil**
- The amount of soil and/or water that needs to be removed and treated
- Whether resources of drinking water in area are impacted
- The **cleanup standards** of the state in which the leak occurs

While the **average cost of cleanup is approximately $154,000, when leaks affect groundwater, the cost can be between $100,000 to more than $1 million** to take additional corrective action to remedy the damage.

EPA website as of August 2025

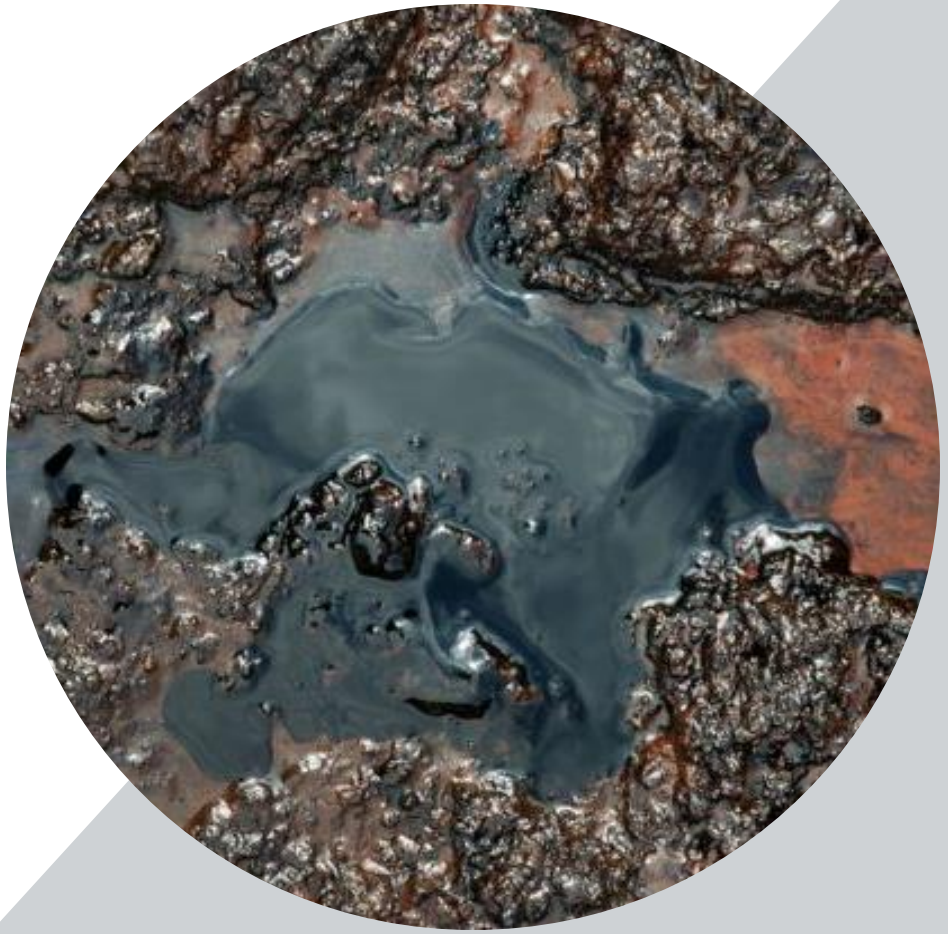
The Costs of Not Having Continuous Monitoring

The Association of State and Territorial Solid Waste Management Officials (ASTSWMO) take annual surveys of the costs incurred by state fund programs for the cleanup of releases from underground storage tanks.

These state fund programs raise and spend a total of approximately $1 billion per year.

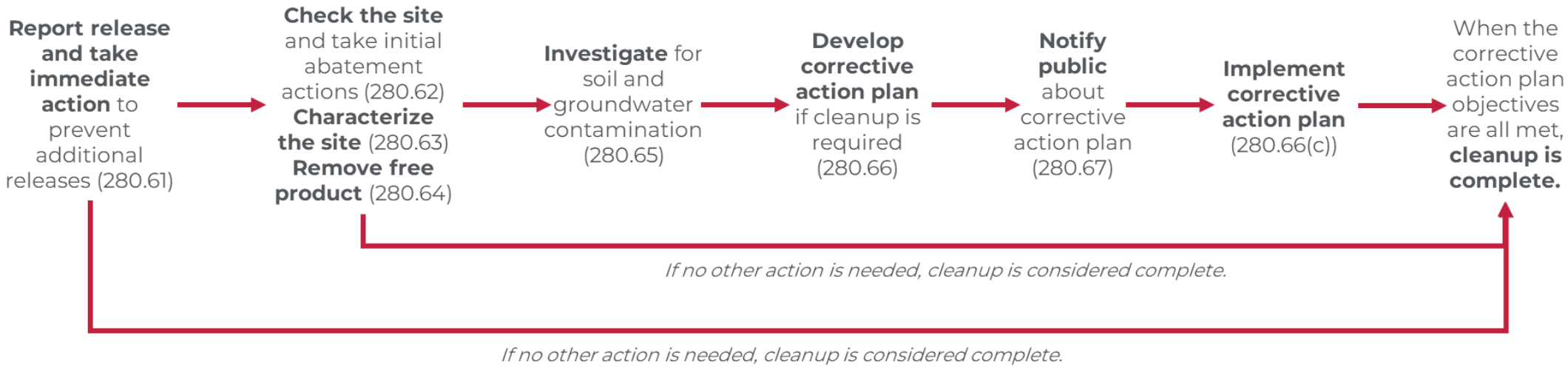
Note: This is in addition to federal outlays from the Leaking Underground Storage Tank Trust Fund and additional amounts paid by individual parties held responsible for contamination.

EPA website as of August 2025



EPA Corrective Action Plan for Leaking USTs

- Requires a **multistep process**
- Involves **multiple people & organizations**
- Takes **months to years**



Leak-Detection Monitoring Options

Two types of monitoring are commonly used for double-wall fuel tanks today.

Dry monitoring

- The system monitors the "dry" space between the inner and outer walls.
- If liquid enters the interstice, the sensor detects it and alarms.
- This indicates that there is a leak in either the inner or outer tank wall.

In some scenarios, a leak will not activate an alarm.

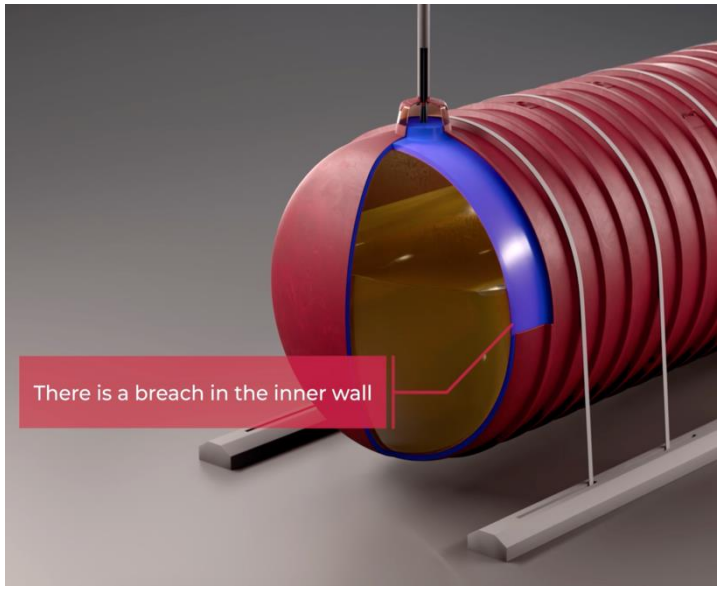
Hydrostatic monitoring

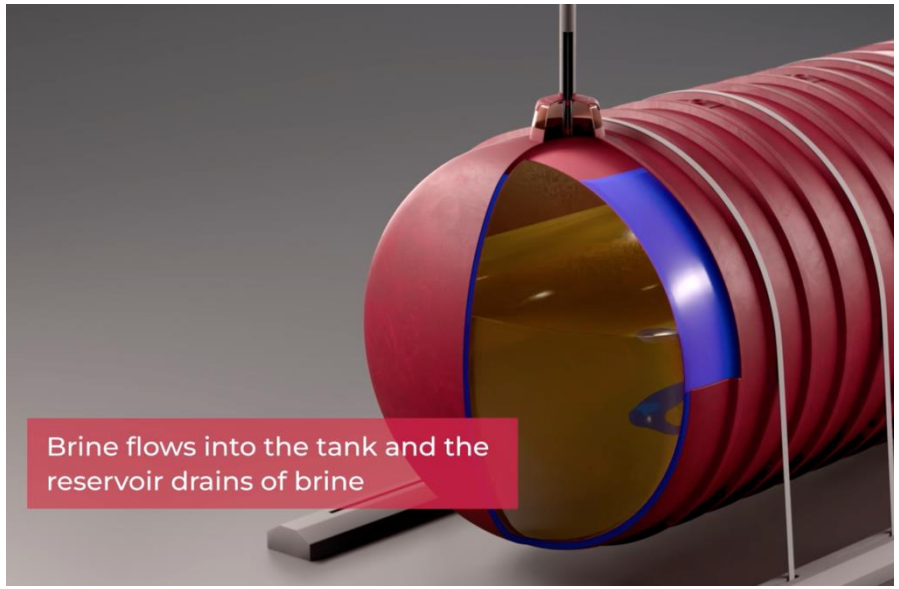
- The interstice is factory-filled with a brine solution.
- This creates a small hydrostatic pressure on both tank walls.
- The brine solution level is monitored within a reservoir on top of the tank.
- Any change in level – either up or down – is monitored and alarmed.

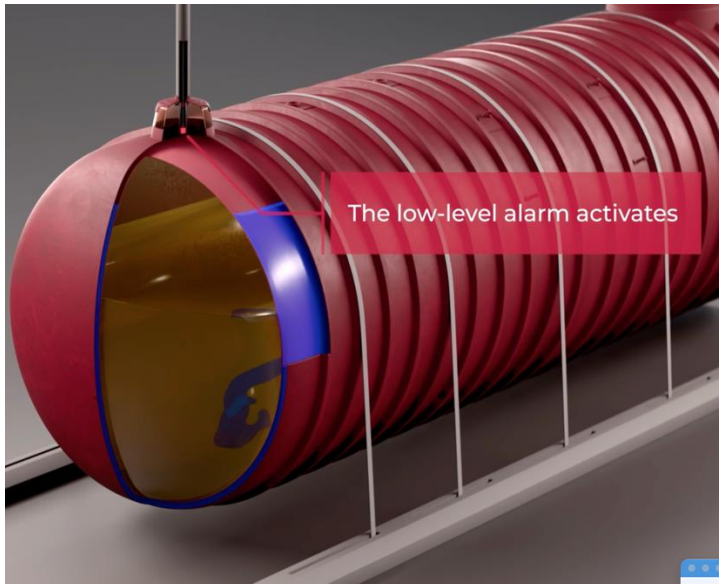
Every incidence of a leak activates an alarm.

What Happens if a Tank's Inner Wall Is Breached...

In a dry hole or a wet hole with hydrostatic monitoring

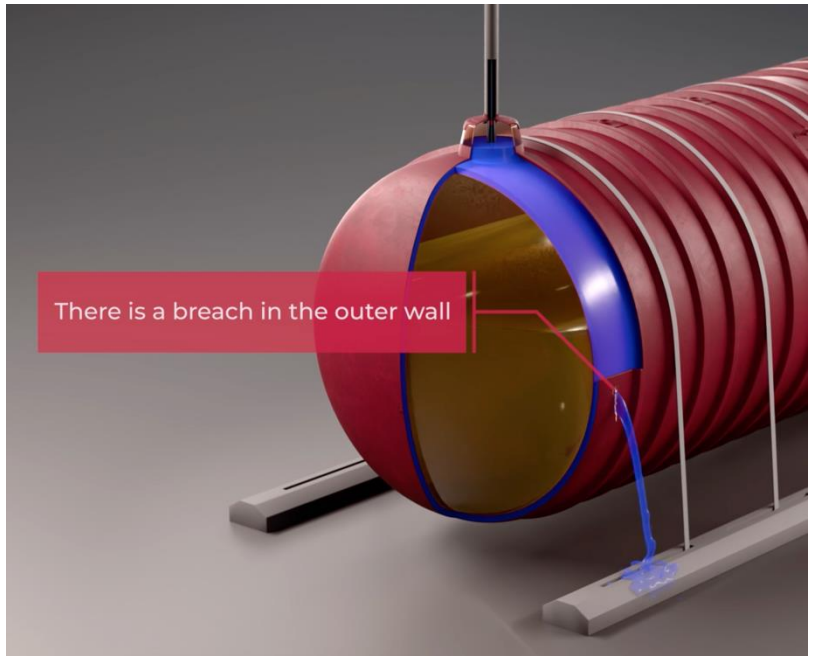


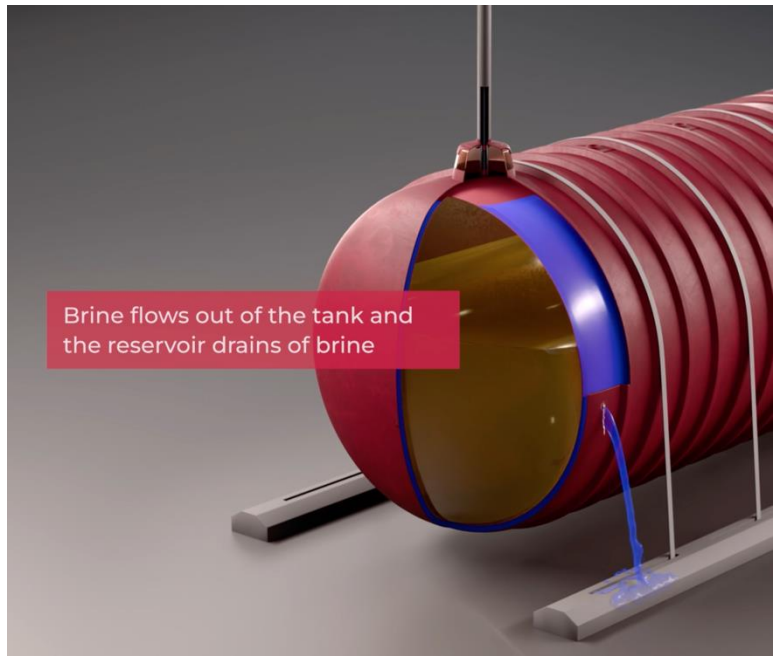


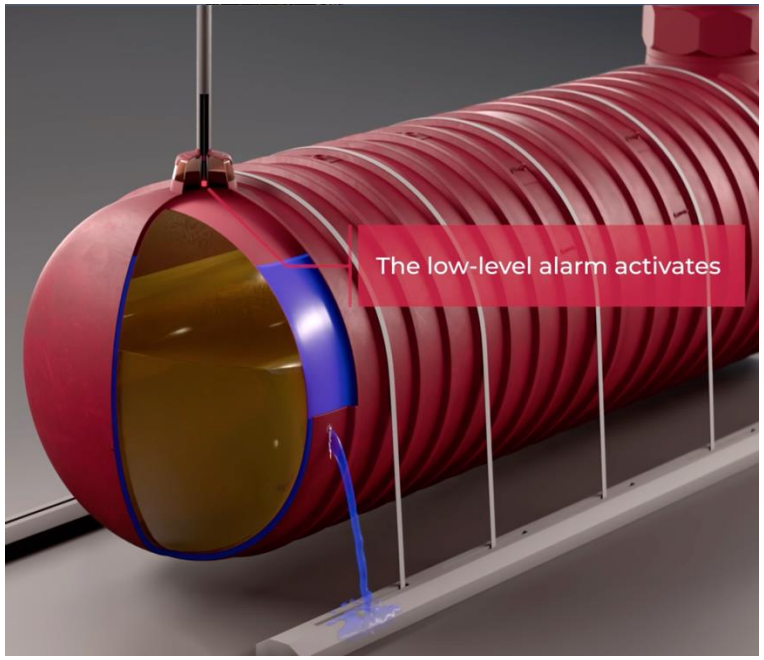


What Happens if a Tank's Outer Wall Is Breached...

In a dry hole with hydrostatic monitoring

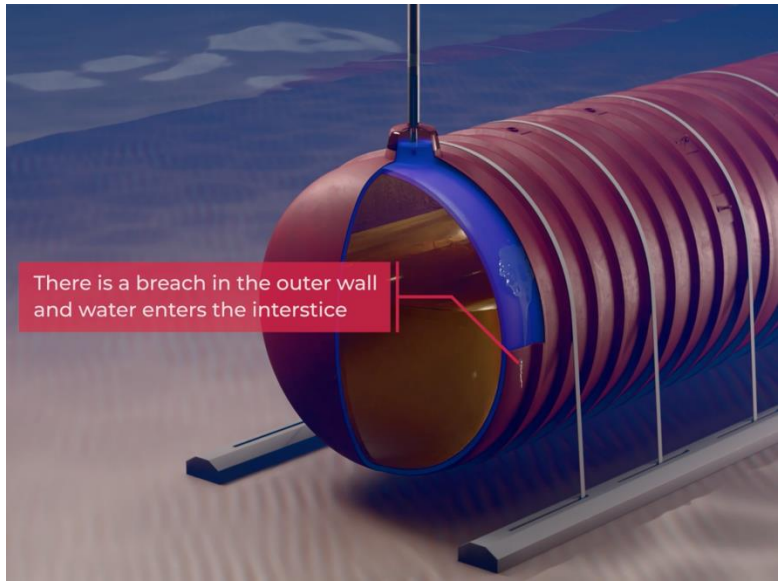


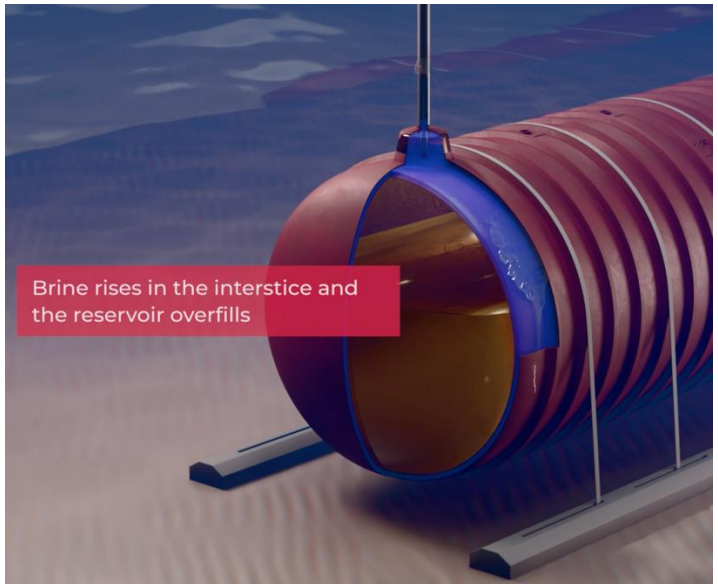


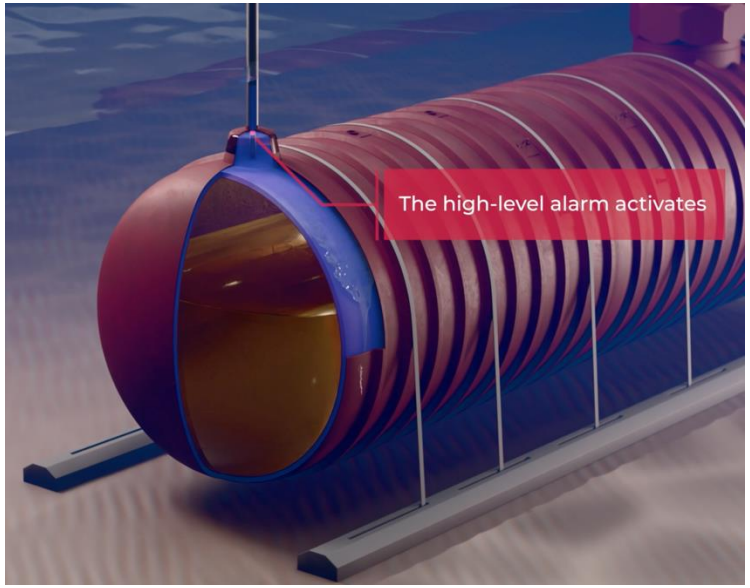


What Happens if a Tank's Outer Wall Is Breached...

In a wet hole with hydrostatic monitoring

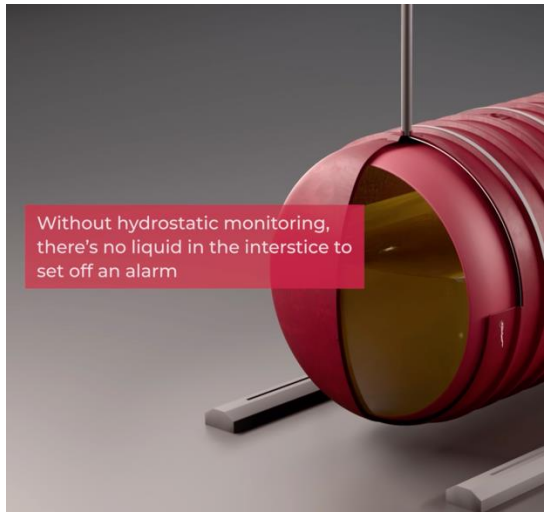


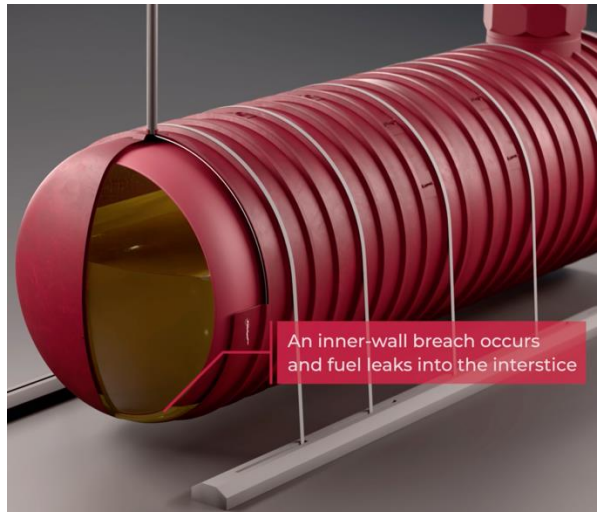


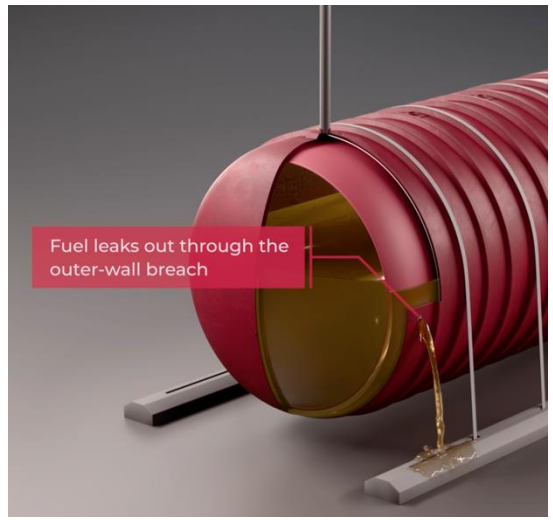


What Happens if a Tank Leaks...

In a dry hole with dry monitoring







Why the Shift from Dry to Hydrostatic Monitoring?

The drawbacks of dry monitoring

- The outer wall has no effective monitoring unless the breach is below the water table
- **Outer wall failure can go undetected until an inner wall leak occurs**

The History of Hydrostatic Monitoring Technology

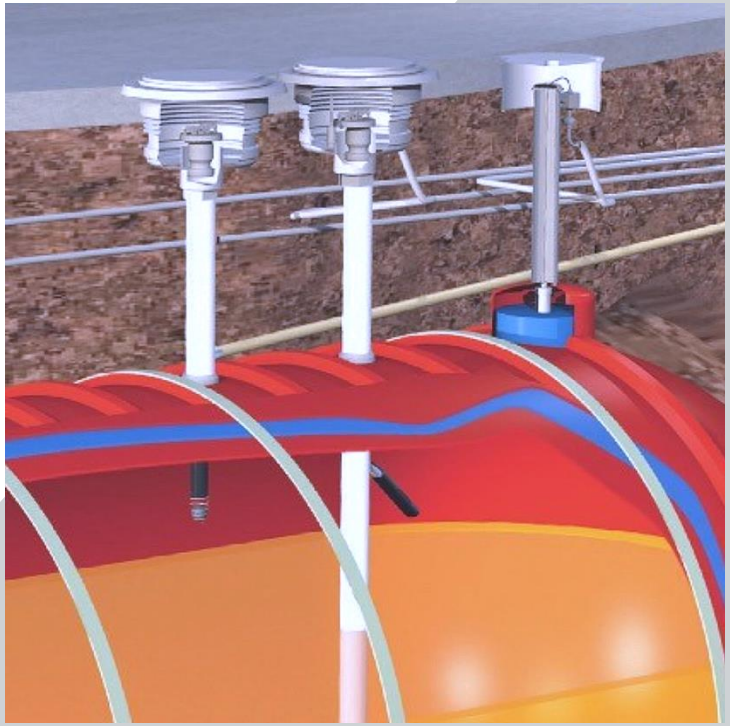
Proven Performance

- For more than **30 years in North America**
- In **100,000+ fiberglass double-wall fuel tank installations**
- Tanks can be delivered with the monitoring system installed

Dual Functions

1. **Continuous hydrostatic monitoring**
   - 24/7 leak detection for both inner and outer tank walls
   - Monitors in both dry-hole and wet-hole conditions
   - Ensures compliance with regulatory requirements for continuous monitoring

2. **Tank-tightness testing (third-party verified)**
   - Two levels of testing
   - Avoids the expensive periodic testing of the tank's interstice that can be required with dry monitoring
   - Listed with the National Work Group on Leak Detection Evaluations



Beyond Leak Detection: Tank-Tightness Testing

The **second benefit of hydrostatic monitoring** is that it can provide tank-tightness test options:

- Tests are verified by UL as **meeting EPA and NFPA 329 criteria**
- Tests are **verified by the National Work Group on Leak Detection Evaluations** (NWGLDE) as compliant with acceptable test protocols

Tank-Tightness Test Options

Tank is NOT Dispensing Fuel:

10-hour test procedure

- The fuel system for a tank is not in operation
- Meets the strict NFPA 329 criteria
- Is capable of detecting liquid loss in the tank:
  - At a rate of 0.05 U.S. gallons per hour
  - **With a 99% probability of detection (PD)**
  - With a 1% probability of false alarm (PFA)

Tank is Dispensing Fuel:

4-hour or 6-hour test procedure
(depending on tank diameter)

- The fuel system for a tank continues to operate
- Exceeds EPA's tank-tightness test criteria
- Is capable of detecting liquid loss in the tank:
  - At a rate of 0.05 U.S. gallons per hour
  - **With a 95% probability of detection (PD)**
  - With a 5% probability of false alarm (PFA)

The High Cost of Not Protecting Against a Leak

A fuel station in the Northwest was recently **fined nearly $5 million** in penalties and cleanup costs for an underground leak that was detected in 2023.

Example of a leaking fuel system that had significant consequences, including:

- **Shut down of** the both the fuel station and local **businesses**
- **State expenditure of more than $4.1 million** to remove contaminated water from nearby basement sumps and to operate vapor-mitigation systems to make the area safe again
  - This is **after insurance was depleted**
- **Negative publicity** for the company operating the station – at both the national and community levels

Photo copyright of Tri-City Herald

How Companies Protect Themselves in the Event of a Leak

EPA regulation requires UST owners and operators to be able to pay for cleanup or to have third-party liability compensation.

Fuel tank owners have **three options for protecting themselves against catastrophic costs** in the event of a leaking tank:

- Private insurance
- Self-insurance
- State-managed funds

According to the Association of State and Territorial Solid Waste Management Officials (ASTSWMO) State Fund Survey, **since 2002 state UST financial assurance funds have paid approximately $20 billion to clean up leaking UST sites.**

EPA website as of August 2025

Note: *Many states have funds to clean up UST releases, but not all meet the federal financial responsibility regulation. Abandoned tank funds is an example of a fund what is not compliant.*

Hydrostatic Monitoring for Superior Security

Historically, dry monitoring was the common choice because of cost. Today, states are shifting toward regulations that require fuel installations to have continuous monitoring.

Only hydrostatic monitoring provides true continuous monitoring in all tank installation scenarios.

Hydrostatic monitoring is the ultimate solution for the ultimate goal:
To protect the health of the community and the environment – as well as a business' operation, assets, and reputation.

Thank you!