

Above Ground Oil Storage Tanks

GE Analytical Instruments has over 15 years of experience supplying reliable Leakwise Oil Spill and Leak Detection systems to oil/fuel storage facilities all over the world. The systems are being used in a variety of applications to address health and safety directives, environmental regulations, and economic necessity.

Figure 1 shows some areas where Leakwise technology is currently being used in fuel storage facilities worldwide.

1 Ground Water Monitoring

Even sophisticated tank gauging systems cannot detect small leaks of oil or fuel from large tanks. Current health standards allow drinking water to have less than 1 ppm of hydrocarbons. This means that an undetected leak of 1 liter/gallon of hydrocarbons can contaminate more than 1 million liter/gallons of ground water. Managers of contaminating facilities risk personal prosecution, huge remediation costs, severe fines, adverse publicity, and potential fire hazard. An ID-221 Leakwise Oil Sheen Detector installed in a monitoring well near the tank (**Figure 2**) will give a reliable warning on hydrocarbon seepage into the ground water much earlier than any manual sampling.

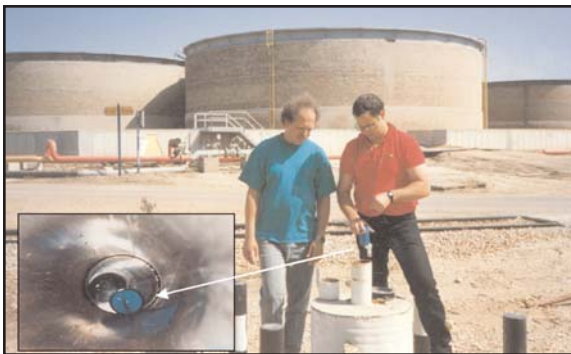


Figure 2. Ground water monitoring

2 Floating Roof Drainage Pipe Monitoring

Stormwater accumulated on a storage tank's concave roof may affect its flotation, making it necessary to drain the water (**Figure 3**). This is usually done through a flexible pipe running from the floating roof down the tank, with an outlet above ground near the tank base. The outlet from this drainage pipe needs to be monitored since:

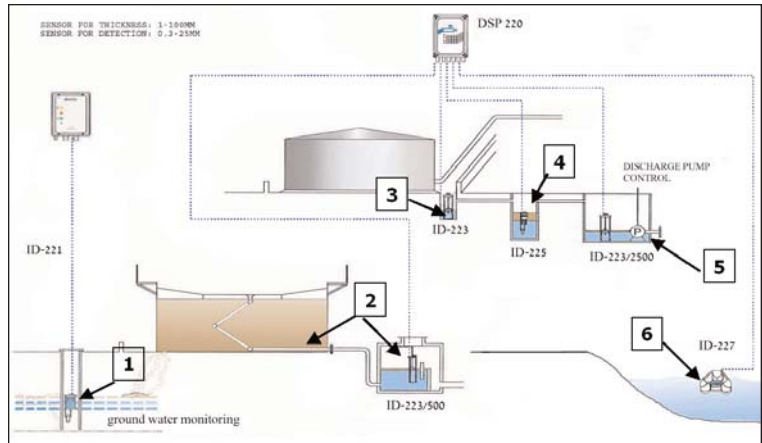


Figure 1. Typical Leakwise applications in a fuel storage terminal

- Product from the tank can penetrate the flexible pipe through pinholes or cracks and be discharged through the drainage system unnoticed.
- Product from the tank can occasionally run over the roof's seal and exit through the water drainage line.
- In many areas local regulations require that all roof water be treated.

Monitoring the drain exit of an individual tank with an ID-223 Sensor is the most reliable way to inform management that leaks have occurred and which tank needs to be repaired.

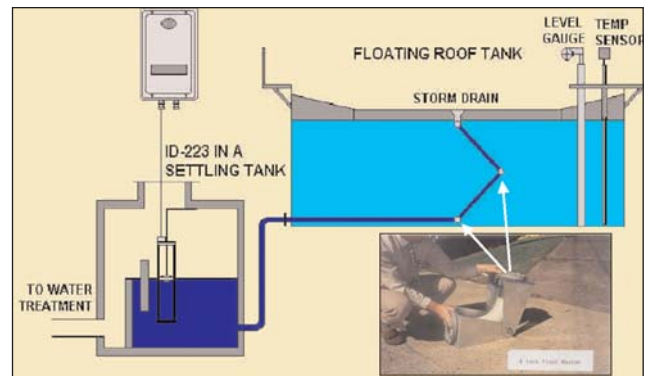


Figure 3. Oil storage tank with a floating roof



Figure 4. Monitoring oil thickness buildup

3 Tank Bunded (Diked) Area

Drainage channels and sumps around storage tanks collect and drain storm water. However, they also collect any hydrocarbons from leaking pipes, valves, or pumps. Even accidental overflow should be contained in the bunded area. These sumps, which can be wet or dry, should be continuously monitored for the following reasons:

- **Health and Safety** — Undetected build up of flammables in the bund area risks harmful vapors and even fire or explosion.
- **Environmental** — Leaks or spills should be detected before they are released from the contained area
- **Economic** — Product loss is a direct cost against the business. However, an additional cost can be incurred when clean stormwater from the bunded area is sent for treatment. Having the ability to monitor for oil sheens lets the operator send only oily water through the treatment process, potentially saving money on the size of the treatment area and treatment costs.

A Sensor installed in the collecting sump will continuously monitor its water outlet. If water is detected, it can be diverted into retention tanks or directly discharged into the sea, a river, or public drainage. If oily water is detected, an alarm will be set off and the ID-223 Oil Sheen Detector will shut the water outlet valve. The oily water



Figure 6. Storm water discharge interceptor



Figure 5. Rain water run off from bunded area



could then be manually or automatically diverted into an API separator or any other oily water treatment system. This operation will reduce the load on the treatment system and cut treatment costs.

4 Monitoring Oil Separators

In many tank storage facilities water is collected and sent to a separator, or interceptor, where oil is separated and water is discharged directly to the sea, river or public drainage. In other cases, water from the tank area could be treated in an API separator. An ID-225 Oil Layer Thickness Monitor will continuously monitor the thickness of the accumulated layer and inform the operator when to skim the oil. Oil skimmers can be automatically controlled by the ID-225 Sensor, starting the skimming at a user-set oil thickness, and stopping before water is removed with the oil. This can result in considerable savings in treatment and disposal costs.

5 Water Treatment Discharge Monitoring

Installing an ID-223 sensor in the final retention tank will continuously monitor the discharge water and ensure treatment is running smoothly. A spill condition will be detected and the operator notified, or the system can automatically stop the discharge and contain the spill, allowing the operator time to take appropriate action.



Figure 7. Monitoring final discharge from site

6 Monitoring Offshore Terminal

The ID-227 Wave Rider Detection Systems are installed at tanker offloading terminals to detect oil spills during loading/ offloading near loading docks or monobuoys. The Leakwise Sensors are mounted on the wave rider that can be self contained with solar panel charging, PTP Radio or GSM communications or, wired and powered to local supply. This enables operators to react when unnoticed oil spills occur during product transfer.



Figure 8. Monitoring tanker offloading to fuel storage depot



Figure 9. Monitoring mono buoy operations

System Technology

Hydrocarbon Detection – Sensor

The unique Leakwise technology is based on Electromagnetic Energy Absorption. Water/air/insoluble hydrocarbons all have different absorption rates of high frequency electromagnetic energy. The Sensor can indicate whether it is in water or air, detect small layers of insoluble hydrocarbon (oil, fuels) layers, monitor continuously the hydrocarbon layer buildup, and indicate the layer's thickness. A variety of sensor configurations are available to suit different applications in both wet and dry conditions. All sensors are certified to be intrinsically safe for operation in hazardous areas.

Hydrocarbon Detection – Controller

A variety of control options are available to suit site requirements. All provide automatic low and high level oil alarm, system status alarm, and continuous oil thickness indication. Controllers can be supplied for installation in both hazardous and safe areas. Models include:

Controller PS220 — Analogue controller for single sensor applications with wired or wireless communication.

Controller DSP 220 — Digital System Processor, can manage up to 40 sensors in a wired network

Controller PS220W/L (PTP) — Multi-unit wireless network using secure radio communications to a centralized receiver/controller, modbus interface with site data acquisition system or customized alarm protocols.

System Benefits

Most multinational oil companies are using the Leakwise technology because:

- It provides reliable detection of hydrocarbon leaks and spills, and dramatically reduces the possibility of a false alarm because the technology is largely unaffected by changes in conductivity, pH, temperature, or even coating of the sensor.
- It can detect hydrocarbon sheens, monitor oil layer changes, and react to emulsions.
- It has the ability to reset alarm set points in sumps when oil is always present.
- Installation is straightforward and the technology offers low cost of ownership.

Multinational, Multi-Unit Leakwise Customers

Some of the global companies using Leakwise include:

- BP Exploration
- BPA (British Pipeline Agency)
- British Petroleum
- Castrol Oils
- Central Termica de Aceca
- Chevron
- Chinese Petroleum
- CLH
- DOPCO Korea
- Exxon Mobil
- Formosa Taiwan
- Neste Oil Co.
- Oil Tanking Belgium
- OMV Germany
- Rotterdam Rhine Pipeline
- Shell
- SPSE France
- Total Fina
- Total France
- Trapil France
- Veba Oil
- Vopak

Note: See also the Leakwise application note 300 00056: Oil Storage Tank with a Floating Roof.

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