

LEAK DETECTION BY GROUNDWATER MONITORING

Risks of Groundwater Contamination

Hydrocarbon leakage, from Underground Storage Tanks (USTs) and from the bottoms of above-ground tanks, can seep into the groundwater, where it forms a floating oil sheen, growing to a thick oil layer over time. This layer, if left undetected, will eventually dissolve and cause severe damage to water quality. Health standards in some countries allow a maximum concentration of only a few PPBs of hydrocarbons and other organic solvents in drinking water. This translates to a quantity of 1 liter of hydrocarbon being able to contaminate several million liters of drinking water resources, which become scarce as the population increases.

Remediation of contaminated groundwater involves extremely high costs. It is therefore essential to use reliable on-line leak detection system that can detect the smallest leaks and give an early warning, thus reducing the damage and costs as much as possible. The Leakwise ID-221 Oil Sheen Detector was designed to make this possible.

Other Leak Detection Methods

1. Interstitial Monitoring

Regulations have been set that all new tanks should be double-walled. A detector installed between the double walls should activate an alarm in the event of liquid penetration due to leakage from one of the walls. However, these regulations do not solve the leakage problems of most of the existing tanks, which are still single-walled. Environmental authorities have therefore approved several in-tank and out-tank leak detection methods.

2. Level Monitoring

Tank level gauges are used to detect small changes in the level of the product. Changes which are not caused by temperature or inventory are interpreted as leaks. However, the best gauging systems are incapable of detecting leaks smaller than 0.4 liter/hour. On a yearly basis, these undetected leaks may accumulate to a very large quantity of contamination:
 $0.4 \text{ liters} \times 24 \text{ hours} \times 365 \text{ days} = 3,500 \text{ liters}$ of undetected hydrocarbons per year!

3. Vapor Monitoring

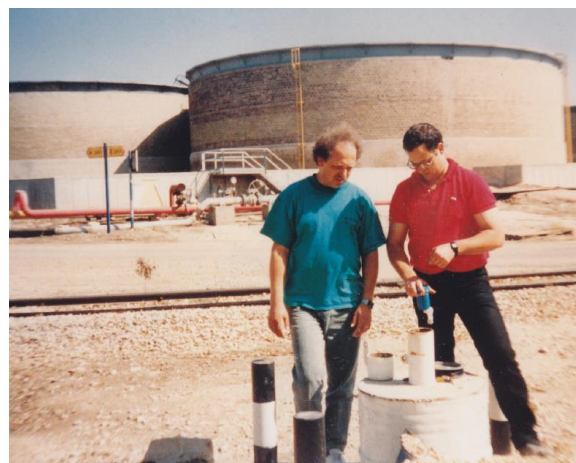
Vapor sensors installed around tanks may cause many costly false alarms due to the existence of hydrocarbon vapor, resulting from non-leak events such as accidental spills, etc.

4. Liquid Monitoring

Liquid monitors, such as cable sensors, set off an alarm due to changes in conductivity when contacted by hydrocarbons. These sensors must be installed in a special containment, making the installation rather expensive. After each alarm event, the sensor needs to be replaced. Vapor condensate may cause false alarms. Different sensors may be required for different liquids.

5. Groundwater Monitoring

Leak detection by groundwater monitors may appear to be too late for an early detection since it's done after the groundwater started to be contaminated. However, closer analysis of the risks of non-detection and false alarms inherent in using other methods, may reveal that especially in sites with shallow groundwater, this may be the only effective detection method. An important precondition for using a groundwater monitor is that it can detect hydrocarbon seepage reliably as soon as it occurs, and without false alarms.



Inserting a Leakwise ID-221 Detector into a Groundwater Monitoring Well in a Tank Farm

Oil Detection in Sewer Systems

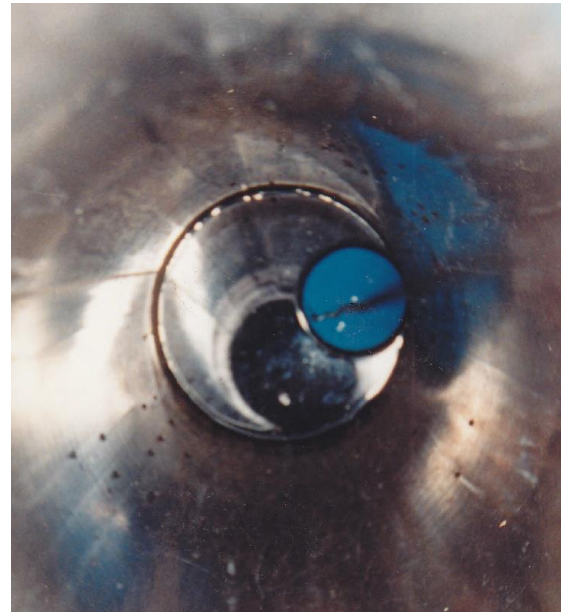
Manual groundwater sampling, which is done periodically in some sites, does not provide an ample solution since it may not detect the seepage as soon as it occurs. Also, oil sheen displacement occurs when immersing a bailer into a monitoring well, which does not allow detection of very small oil layers.

On-line capacitance and conductivity floating detectors are incapable of detecting hydrocarbon layers thinner than 3-4 mm (1/8 in). These sensors require extensive maintenance since dirt and hydrocarbon coating on their detection electrodes cause false alarms. Changes in water level may result in reducing their detection capability to a minimal layer of 10 mm, and re-calibration is often required.

Leakwise ID-221 Oil Sheen Detector

This is the preferred and proven solution for groundwater monitoring.

By using the principle of energy absorption, the Leakwise ID-221 Oil Sheen Detector supplies the best available solution to local and remote on-line groundwater monitoring. The ID-221 Sensor detects hydrocarbon layers as thin as 0.3 mm (1/80 inch) and thus provides an early alarm of hydrocarbon seepage, earlier than any manual sampling or other floating detectors. Its capability to detect small layers is maintained regardless of water table fluctuations. Dirt and coating of hydrocarbons on the detection antenna can be out-calibrated without the need to clean the antenna. The ID-221 Oil Sheen Detector has a unique capability to monitor an increase in the thickness of the contaminating layer and can be calibrated to give low and high alarms. The Leakwise ID-225 Oil Thickness Monitor has a 4-20 mA linear output of oil layer thickness in the range of 1-100 mm or 1-200 mm – It is used to monitor heavily contaminated groundwater. Both the Leakwise ID-221 and ID-225 Sensors are suitable for installation in monitoring wells with a minimum diameter of 4 inches, with unlimited depth and water table fluctuations.



ID-221 Detector inside a Monitoring Well



ID-221 Detector: Dirty but Operational