PetroSense
REAL-TIME PETROLEUM HYDROCARBON MONITORING SYSTEMS.

February 23, 2015
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Oil Spills, Cleanups And Remediation
Hydrocarbon Monitoring Technologies

Introduction

The oil spill in the Gulf of Mexico has increased the interest in technology in oil spills, cleanups and remediation.

The Gulf of Mexico oil spill presented challenges to every person in the region whose livelihood or operations depend on access to clean water and air. While the obvious presence of crude oil floating on the surface appears to have diminished, the concern that the bulk of the oil is still lurking beneath the surface, perhaps dispersed into tiny droplets, introduces new challenges. Reports of water sheens and the apparent presence of toxic decomposition products do not bode well for the future of the area.

Every user of the Gulf's water, be it for aquiculture, cooling, aquariums, etc., must now be prepared for the potential problems brought on by the sudden onset of contamination. At the same time, the breakdown of the oil and its dissolution may introduce toxic chemicals and aromatics such as benzene, toluene, ethylbenzene, xylene (BTEX) and other volatile compounds that have the potential to pollute both the water and the air. Oil-contaminated sand dumped in landfills has the potential to break down and pollute groundwater.

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While the Gulf Spill may be the largest on record, it is not an isolated incident, as a pipeline rupture in Michigan demonstrated, and the soil and groundwater in and around many tank farms, gas stations, airports and military bases are potentially contaminated with petroleum fuels of many types. Most regulated sites are subject to periodic monitoring, but Murphy's Law often comes into play.

What to do?

The key to addressing most of these issues is real-time monitoring. Recent introductions of in-situ continuous monitoring technology allows for early warning of potential problems. New technology using continuous and portable instruments are available to provide real-time detection of dissolved and airborne contaminants.

Fiber Optic Chemical Sensor Technology

Dissolved total petroleum hydrocarbons (TPH) and BTEX compounds can be monitored in-situ, utilizing a patented, fiber optic chemical sensor technology from PetroSense (FCI Environmental), which also gives rapid response to the onset of oil sheens. This technology provides 99.9 percent correlation for BTEX with EPA Method 8020 for fresh or salt water, making it equally applicable for water intakes for desalination plants and groundwater beneath landfills or tank farms.

It is available in portable and continuous configurations. This technology has a long and successful history monitoring storage tanks for leaks across the state of Florida.

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PetroSense® Fiber Optic Chemical Sensors

Fiber optic chemical sensors utilize changes in the refractive index caused by petroleum hydrocarbons present on the surface of a treated fiber. The process is fast in the case of oil sheen, and reversible. The fiber sensor is stable and has a long service life. When used to detect dissolved hydrocarbons from petroleum, usually the soluble BTEX fraction, ppm detection limits can be achieved and there is excellent linearity over the range of interest.

The EPA's published Water Quality Benchmarks for Aquatic Life acute benchmarks for dissolved BTEX compounds are 27 ppm for benzene and 3.6 ppm for total xylenes. Independent data* from KWA Inc., Midland, Texas, on the fiber optic sensor indicates lower detection limits of 3 ppm for field applications.

Advances in recent years have also made such technology portable. Such monitors allow the detection of BTEX compounds directly in groundwater monitoring wells, while continuous CMS 100 provides real time tracking – and Web-based reporting – of the onset of sheen or dissolved BTEX.

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In-situ Continuous Vapor And Water Monitoring

While continuous monitors for VOCs have been available for some time, the capability to continuously monitor in situ in a monitoring well is relative new. Heretofore, monitoring wells, be they on a landfill or at a gas station, were almost always periodically monitored using portable detectors.

Proven technology is available to assist in monitoring spill sites for the presence and onset of petroleum hydrocarbons as sheen, dissolved or as vapor. The combination of in-situ continuous vapor and water monitoring provides a level of protection not previously available or affordable.

The PetroSense instruments are being used in a number of applications where hydrocarbons need to be monitored. They are finding wide acceptance by the oil industry as well as the environmental monitoring industry. The uniqueness of these sensors allows them to be used in process control and environmental monitoring. These sensors can be used either in vapor and water or in many environments where hydrocarbons are encountered.

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