SPECTRAL EVOLUTION

Pinpoint Leaks, Spills, and Seepage

Contamination of soil due to gas and oil leakage or spills is dangerous, costly, and apparently widespread. According to a report by the U.S Pipeline and Hazardous Materials Safety Administration, natural gas leaks alone cause 17 fatalities, 68 injuries, $133 million in property damages, and as much as $3 billion in lost resources each year.

Current methods for identifying a hydrocarbon leak are costly and time-consuming, requiring retrieval and transport of contaminated soil to a lab for wet chemical analysis. Typically Total Petroleum Hydrocarbon (TPH) measurements are used as TPH includes a mix of different hydrocarbons to indicate if petroleum is present in soils. Using a full spectrum, 350-2500nm spectrometer or spectroradiometer offers a fast and non-destructive means for measuring hydrocarbons in soil. Hydrocarbon spectra are typically characterized by four main absorption features at 1180 and 1380 nm and 1730 and 2310 nm. By looking at the four hydrocarbon absorption bands, other compounds can be eliminated and hydrocarbon presence confidently identified. By building a model based on known TPH samples from chemical analysis, spectroscopy plus regression analysis can measure and identify different hydrocarbons in different soil components.

In addition to soil analysis, hydrocarbon leaks can also be detected through the effects on vegetation, especially the amount of chlorophyll in leaves. Reflectance properties of vegetation in the visible range are dominated by the absorption properties of chlorophyll with absorption at 660 and 680nm. Changes in chlorophyll concentration produce spectral shifts near 700nm—the red edge. The red edge shifts toward the blue area of the spectrum when chlorophyll is lost and shifts toward the red with increased chlorophyll. Lack of chlorophyll is an indicator of potential for oil and gas.

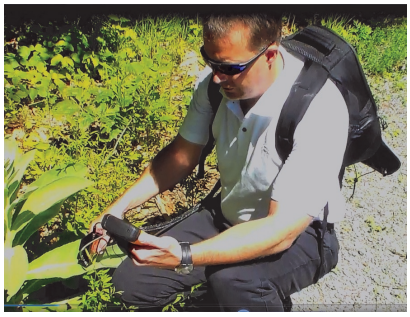
UV/VIS/NIR spectrometers and spectroradiometers from SPECTRAL EVOLUTION deliver fast, accurate, and flexible ways to measure both hydrocarbons in soil and changes in vegetation with:

- Fast collection of data in minutes with no sample prep or sample destructionj
- Precision, accuracy, and a wealth of information—especially if the spectra are combined with chemometrics analysis
- Affordable measurement technology
- *In situ* measurement with portable, field spectroradiometers and spectrometers

A full range spectroradiometer or spectrometer, such as SPECTRAL EVOLUTION's PSR-3500 or oreXpress provides:

- Spectral range of 350-2500nm
- Reliable one-touch operation with autoshutter, autoexposure and auto-dark correction before each new scan – no optimization step
- Small and lightweight with rechargeable Li-ion batteries
- Superior signal to noise ratio: faster scan times and better reflectance measurement
- Single user operation with optional rugged tablet that provides a sunlight readable screen plus the ability to tag spectra with GPS, digital images, and audio notes

SPECTRAL EVOLUTION field spectroradiometers and spectrometers are simple, non-destructive, reliable, fast and accurate for TPH in soil measurements.



SPECTRAL EVOLUTION's spectroradiometers and spectrometers are ideal for measuring and analyzing vegetation stress as an indication of hydrocarbon leakage.

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