

## Application Note

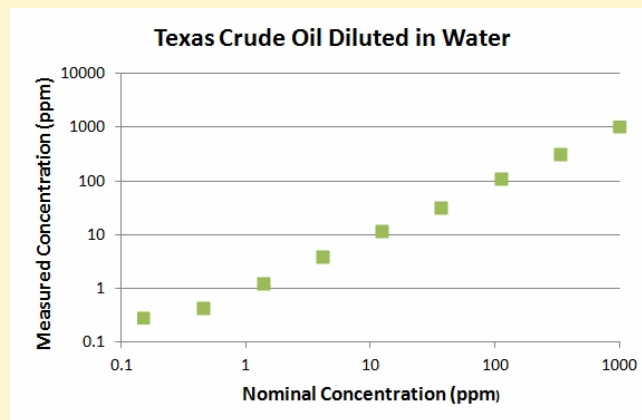
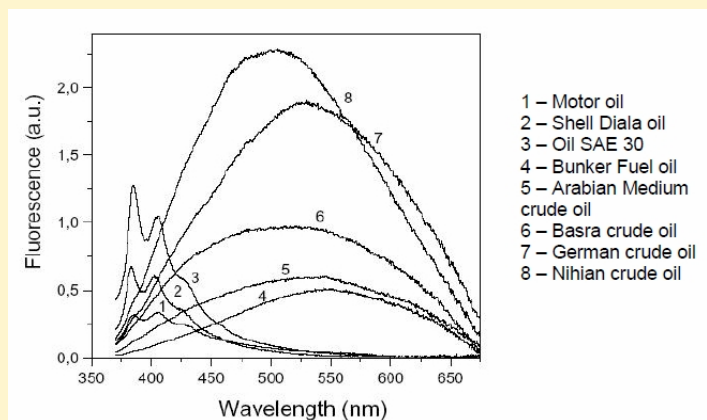
### Detection of Oil Contamination Using UV Fluorometer

#### Background:

PAHs (Polycyclic Aromatic Hydrocarbons) are one of the most widespread organic pollutants. In addition to their presence in fossil fuels, they are also formed by incomplete combustion of carbon-containing fuels such as wood, coal, diesel, fat, tobacco, and incense. PAHs are lipophilic, meaning they mix more easily with oil than water. The larger compounds are less water-soluble and less volatile. Because of these properties, PAHs in the environment are found primarily in soil, sediment and oily substances, as opposed to in water or air. However, they are also a component of concern in particulate matter suspended in air. Hydrocarbon emissions from fossil fuel-burning engines are regulated in developed countries. Natural crude oil and coal deposits contain significant amounts of PAHs, arising from chemical conversion of natural product molecules, such as steroids, to aromatic hydrocarbons. They are also found in processed fossil fuels, tar and various edible oils. Due to their physical properties, PAHs are widely used in many industrial applications, such as lubricating oil, hydraulic oil, and electro-hydraulic control fluid. Their applications also could produce man-made contamination in the water systems due to leakage of the oils.

#### Fluorescence Detection:

The aromatic fraction of PAHs can be excited with UV or near-UV light to emit fluorescent light. The fluorescence intensity is linear with the concentration of the oil. This technology is ideal for monitoring leaking lube oil in the cooling systems or power plants, or leaking crude oil in ocean/lake environment, and there is no significant effect from turbidity or suspended solid in the water. The typical fluorescence spectra of different lube oils and crude oils when excited by 300-400nm light are shown below:



The plot to the right shows the excellent linearity and detection limit of unrefined Texas crude oil using Amiscience's handheld fluorometer (**P/N: FQ-C.Oil-A**) designed for crude oil detection and monitoring. Due to the low interference from other substances, we can see that this technology has the potential of detecting sub-mg/L (< 1-ppm) level of oil contamination in water samples from the environment. And due to its high portability, it can be used anywhere in the field to conduct environmental inspection for potential oil contaminations.

