

EXECUTIVE SUMMARY

Polycyclic Aromatic Hydrocarbons (PAHs) are common constituents of aquatic sediments in navigable waterways. The need for maintenance dredging and concern over proper disposal of dredged sediments requires that the distribution and concentration of chemicals such as PAHs be known. This report presents preliminary findings from laboratory and field tests of a portable fluorescence imaging system for mapping PAH distribution in sediment.

The UltraViolet-Remote Ecological Monitoring Of The Seafloor (UV-REMOTS®) instrument collects a vertical profile image of the top 6–8 cm of sediment at the sediment-water interface. Adapted from the photo REMOTS® system, it is designed to provide a two-dimensional digital image wherein each component pixel constitutes a full spectral characterization of fluorescence emission in response to a UV light source. The excitation and emission frequencies are selected to optimize for the known PAH fluorescence response to UV light. Because PAHs are composed of many different compounds, variation in intensity and spectral pattern correspond to changes in PAH concentration and composition.

Results of the laboratory tests with spiked sediments indicate the UV-REMOTS® system can detect differences in PAH concentration and composition in the range of 10–100 ppm (ug/g dry weight) and above. Field results from the Providence River suggest measurable differences in fluorescence between sampling locations as well as small-scale variation in fluorescence within the image of a single sample. Based these results, it is concluded that UV-REMOTS® shows good promise as a tool for rapid assessment of PAH concentration, composition and spatial distribution.