

## Management of Polycyclic Aromatic Hydrocarbon Impacted Sediments

**Description:** An investigation of the use of a new analytical method to directly measure sediment pore water PAHs and to establish site-specific clean-up goals for PAH-impacted sediments at MGP sites.

**Status:** EPA method number and a provisional ASTM standard method are in place; inter-laboratory validation study is underway to secure a final ASTM standard method.

### BENEFITS

New information generated as part of this project, demonstrates that the development of site-specific screening values may offer greater protection of the environment and reduce site remediation costs. The NYSEARCH ‘sediment’ project establishes a scientific basis for determining site-specific clean-up goals for PAH-impacted sediments upon which cost-effective remedial decisions could be built. Specifically, a better understanding of PAH chemistry, bioavailability, and toxicity is being developed, which will allow remedial decision making to move from a generic to a site-specific basis and ensure that the DEC’s goal of protecting the aquatic environment is achieved.

### BACKGROUND

From the early 1800s through the mid-1900s, utilities operated manufactured gas

plants (MGP) where coal was distilled to produce gas. Byproducts of MGP operations included polycyclic aromatic hydrocarbons (PAHs). Although utilities no longer operate MGP plants, sediments adjacent to MGP sites may still contain elevated concentrations of PAHs.

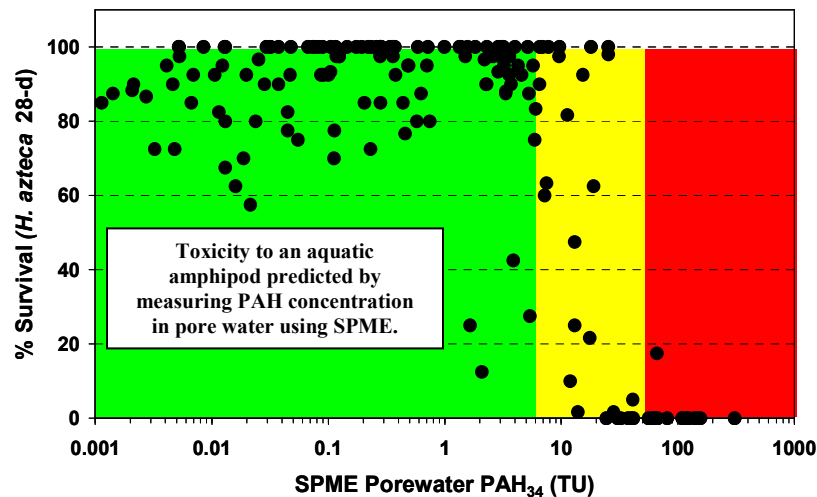
In 1998, the NYSDEC (New York State Department of Environmental Conservation) established a screening level guidance value of 4 mg/kg total PAHs to identify contaminated sediments. It was believed that this sediment PAH concentration was safe for the environment.

Although commonly present in the environment, high concentrations of PAHs are potentially harmful. The toxicity of PAHs to organisms living in sediments is not well understood. Not all PAHs are available to sediment

organisms. The fraction of PAH in the sediment that is “available” to an organism has been found to vary greatly from site to site. Therefore, a better understanding of PAH sediment chemistry, bioavailability, and toxicity is necessary to develop cost effective environmental remediation of sediments at MGP sites.

### TECHNICAL APPROACH

The NYSEARCH sediment research program set out to understand MGP sediment chemistry and establish why sediments with similar PAH concentrations differ in toxicity from site to site. Initially, a review of the evolution of PAH regulatory policy and science was conducted. This review documented the evolution of the current regulatory guidance for sediment management in New York. Current regulation guidance includes the use of generic screening levels for the



identification of impacted sediments. The review discovered that the technical basis for these screening levels revealed the importance of understanding the bioavailability of sediment-bound contaminants. It was observed that non-toxic sediments with high concentrations of contaminants and toxic sediments with low concentrations of contaminants do occur.

To increase the scientific understanding of chemical bioavailability and its use for site-specific remediation decisions, a multi-industry group referred to as the "Sediment Contaminant Bioavailability Alliance", or SCBA, was formed. This alliance was established to develop and evaluate site-specific measures of contaminant bioavailability for sediment management. The goal of the alliance is to increase the scientific understanding governing chemical exposure and

toxicity in sediments. This is accomplished via a collection of an ongoing site specific chemical and biological data base which serves as the basis for regulatory guidance on the use of direct chemical measurements of contaminant bioavailability for sediment management. As part of this effort, field sediment samples have been acquired, analyzed and evaluated from 16 MGP and aluminum industry sites. The program focuses on field samples since they reflect the true complexity of the environment and provide a true test of the capabilities of the proposed chemical measures of bioavailability.

#### PROJECT STATUS

Data have shown that toxicity to aquatic organisms is not related to the concentration of total extractable PAHs in sediments using EPA standard methods. Instead, toxicity is correlated to the concentration of bioavailable PAHs measured using a new analytical method, solid-phase microextraction (SPME) of

sediment pore water. Using this correlation, it is now possible to better predict the exposure and toxicity of PAHs, and perhaps other hydrophobic organics, such as PCBs, in sediments.

Bioavailability data can be incorporated into predictions of chemical exposure and subsequent remedial decisions for sediments and soils.

A provisional ASTM standard D-7363-07 and an EPA Method Number 8272 have been assigned. An inter-laboratory validation study is underway in order to secure the final ASTM standard by 2012. Scientific publications continue to be developed in order to provide regulators and industry with a body of knowledge from reputable sources. Technical guidance is being provided to state and federal regulators. This is accomplished through regulator involvement and project transparency via technical review meetings.

#### FOR ADDITIONAL INFORMATION

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