

## **Contaminated Freshwater Sediments: Considering In Situ Alternatives**

Point and non-point source discharges from industrial facilities, municipalities, and dump sites combined with urban and agricultural runoff to the Great Lakes have resulted in major contamination issues. Many of the toxic substances (e.g., polychlorinated biphenyls (PCBs), heavy metals) identified during the Remedial Action Plan (RAP) process accumulate in sediments. In fact, EPA's Great Lakes program identifies polluted sediments as the largest major source of contaminants to the Great Lakes food chain. Contaminated sediments have been identified as a major problem in 42 out of 43 Great Lakes Areas of Concern (AOCs) by the US/Canada International Joint Commission (IJC).

Sediment management strategies pose some of the most challenging issues facing the Great Lakes region. Volumes of contaminated sediments tend to be large and contaminant concentrations low such that application of expensive conventional control technologies such as incineration or disposal in a secure landfill may be cost-prohibitive. As a result, environmental managers are seeking in situ alternatives such as capping or enhanced recovery processes that involve manipulation strategies designed to stimulate natural fate pathways in sediments may be desirable.

This presentation summarizes perspectives gained from two studies on contaminated freshwater sediments. The first study focused on sediments that were collected from the Ottawa River in June 2004 containing PCBs up to 1,000 mg/kg. The goal was to stimulate indigenous microorganisms to increase the rate of PCB dechlorination by providing excess electron donors. The second study is an ongoing collaborative project comparing the effectiveness of varied capping regimes (sand cap, synthetic aggregate cap, no cap) using contaminated freshwater sediments from the Anacostia River in DC collected in Spring 2005 and Fall 2006. Besides sequestering contaminated sediments, researchers are interested in determining whether capping will encourage subsequent contaminant degradation and/or biogas production.

For reduction of the human and ecological risks associated with sediment contamination, capping and/or enhanced recovery strategies may be preferred to conventional approaches (e.g., sediment removal and storage) which are labor intensive and may be cost-prohibitive in many locations. Our research suggests that these alternatives provide promise for mitigating sediment contamination by reducing PCB concentrations and effectively sequestering contaminants under caps. However, consideration must be given to the significant potential for biogas production resulting from addition of excess electron donor (enhanced recovery) and by environmental changes (temperature, carbon availability, pressure) due to cap placement. Biogas production may result in sediment destabilization, contaminant/nutrient transport, and/or cap damage.