Application of Passive Sampling for Measuring Dissolved Concentrations of Organic Contaminants in the Water Column at Three U.S. EPA Marine Superfund Sites

Platform Presentation

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ABSTRACT

At contaminated sediment sites, including U.S. EPA Superfund sites, it is critical to measure water column concentrations of freely dissolved contaminants to understand the complete exposure of aquatic organisms to hydrophobic organic contaminants (HOCs). Historically, acquiring the freely dissolved concentration (C_{free}) of HOCs was challenging. In recent years, passive sampling has been demonstrated to be an effective tool for determining C_{free} in the water column and in sediment interstitial waters. Currently, there is an effort underway encouraging remedial project managers (RPMs) at contaminated sites to use passive sampling to collect C_{free} data in order to improve site assessments. The objective of this investigation was to evaluate the use of passive sampling for measuring water column C_{free} for several HOCs at three U.S. EPA Superfund sites. Sites investigated included New Bedford Harbor, Palos Verdes Shelf and Naval Station Newport and the passive samplers evaluated were polyethylene (PE), solid phase microextraction (SPME), semi-permeable membrane devices (SPMD) and polyoxymethylene (POM). In general, the different passive samplers demonstrated good agreement with C_{free} values varying by a factor of two to three. This level of agreement was demonstrated, in particular, at Palos Verdes Shelf where elevated C_{free} determined by different types of passive samplers deployed in studies over several years varied by less than a factor of two (i.e., 320 to 460 pg/L for sum of polychlorinated biphenyls, PCBs). Further, at New Bedford Harbor, where conventional water sample concentrations were also measured (i.e., grab samples), passive sampler-based C_{free} agreed within a factor of two. This evaluation demonstrates the utility of

passive sampling for generating scientifically accurate water column C_{free} which is critical for making informed environmental management decisions at contaminated sediment sites.