

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. These findings suggest that all of the samplers were experiencing and measuring similar  $C_{free}$  during their respective deployments. 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.