

## Calculating the Diffusive Flux of Persistent Organic Pollutants between Sediments and the Water Column on the Palos Verdes Shelf Superfund Site Using Polymeric Passive Samplers

Loretta A. Fernandez<sup>1</sup>, Wenjian Lao<sup>2</sup>, Keith A. Maruya<sup>2</sup>, Robert M. Burgess<sup>1</sup>

<sup>1</sup>*U.S. Environmental Protection Agency, Atlantic Ecology Division, Narragansett, Rhode Island, United States*

<sup>2</sup>*Southern California Coastal Water Research Project (SCCWRP), Costa Mesa, California, United States*

### ABSTRACT

Passive samplers were deployed to the seafloor at a marine Superfund site on the Palos Verdes Shelf, California, USA, and used to determine water concentrations of persistent organic pollutants (POPs) in the surface sediments and near-bottom water. A model of Fickian diffusion across a thin water boundary layer at the sediment-water interface was used to calculate flux of contaminants due to molecular diffusion. Concentrations at four stations were used to calculate the flux of DDE, DDD, DDMU, and selected PCB congeners from sediments to the water column. Three passive sampling materials were compared: PE strips, POM strips, and SPME fibers. Performance reference compounds (PRCs) were used with PE and POM to correct for incomplete equilibration, and the resulting POP concentrations, determined by each material, agreed within 1 order of magnitude. SPME fibers, without PRC corrections, produced values that were generally much lower (1 to 2 orders of magnitude) than those measured using PE and POM, indicating that SPME may not have been fully equilibrated with waters being sampled. In addition, diffusive fluxes measured using PE strips at stations outside of a pilot remedial sand cap area were similar to those measured at a station inside the capped area: 240 to 260 ng cm<sup>-2</sup> y<sup>-1</sup> for p,p'-DDE. The largest diffusive fluxes of POPs were calculated at station 8C, the site where the highest sediment concentrations have been measured in the past, 1100 ng cm<sup>-2</sup> y<sup>-1</sup> for p,p'-DDE.

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