

US EPA ARCHIVE DOCUMENT

COMPARISON OF POLYETHYLENE AND ORGANISM UPTAKE OF POLYCHLORINATED BIPHENYLS (PCBS) IN A STANDARD LABORATORY BIOACCUMULATION STUDY WITH SUPERFUND SITE SEDIMENTS. RM Burgess¹, Carey L. Friedman² (Friedman.Carey@epa.gov), NB Sturgeon³, MM Perron⁴, MG Cantwell¹, SA Ryba¹, KT Ho¹, SA Rego¹, R Lohmann²

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Marine sediments accumulate nonionic organic contaminants like polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) and some pesticides. Because of the recalcitrant geochemical behavior of these types of contaminants they remain in sediments for many years. During this time, these toxic contaminants may pose an ecological risk to benthic organisms and organisms feeding on benthic organisms including wildlife and humans. The most contaminated marine aquatic sites, and those representing the greatest risk, are designated as Superfund sites by the U.S. EPA. One measure of exposure from Superfund site sediments is bioaccumulation of contaminants by benthic organisms. Bioaccumulation demonstrates contaminants associated with the sediments are bioavailable and may cause toxicity. A common method of measuring bioaccumulation is the 28 day whole sediment test using the polychaete *Nereis virens*. However, bioaccumulation tests are labor-intensive and expensive. Consequently, for the last several years, alternative methods of measuring contaminant bioavailability from sediments have been evaluated. In this study, PCB bioaccumulation by *N. virens* was compared to accumulation by passive polyethylene (PE) samplers. PE samplers are simple thin plastic films (< 1 mm thick) deployed in sediments where contaminants diffusively partition and equilibrate with the material. Exposures were performed with three Superfund site sediments: New Bedford Harbor (MA, USA), Hudson River (NY, USA) and Palos Verdes (CA, USA), and one uncontaminated reference sediment from Long Island Sound (NY, USA). Following the exposures, polychaete and PE PCB accumulation were found to be significantly correlated ($p < 0.05$) with r^2 values for concentration data ranging from 0.47 to 0.86 for the three Superfund site sediments. These data suggest PE samplers may ultimately be used as an inexpensive and labor saving tool for predicting organism bioaccumulation.