USE OF POLYETHYLENE PASSIVE SAMPLERS TO ESTIMATE WATER COLUMN PCB CONCENTRATIONS AT THE PALOS VERDES SUPERFUND PRIOR TO REMEDIATION

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The Palos Verdes Superfund site is located in over 50 meters of water on the continental shelf and slope off the coast of southern California (USA). The site includes 27 km^2 of seabed contaminated over several decades by municipal treatment plant effluent discharged via outfall pipes at a depth of 60 meters. Contaminants of concern include industrial chemicals like polychlorinated biphenyls (PCBs) and the pesticide DDT and its degradation products. Planned remediation of the site includes capping of erosive areas designated as hot spots with clean material. A risk at the Palos Verdes site is the resuspension of contaminated sediments as capping material is placed on the seafloor. Resuspension of sediments and resulting desorption of dissolved contaminants into the water column could cause aqueous concentrations of PCBs and DDTs to exceed marine water quality criteria (WQC). For this preliminary pre-remediation investigation, passive sampling polyethylene devices (PEDs) were deployed one to five meters above the seabed for three to six months at seven stations with various levels of sediment contamination. Acoustic Doppler current profilers (ADCPs) were deployed at five of the same stations to measure current velocities. The objective of these measurements was to quantify baseline concentrations of dissolved PCBs in the water column and assess their transport from the site. PEDs absorb contaminants from the water column and provide a robust method for estimating dissolved contaminant concentrations at very low levels conventional water sampling procedures would not be able to detect. Concentrations of total PCBs on the PEDs ranged from 60 to 400 ng/g polyethylene which corresponds to estimated water column dissolved concentrations ranging from 90 to 1000 pg/L. Mean flow measured by the current meters is along the shelf toward the northwest. Water column PCB concentrations were highest above and to the northwest of the most contaminated sediments, suggesting PCBs are partitioning into the water column from the more contaminated sediments and being transported northwest from the Superfund site by the mean current. These preliminary baseline data, along with more extensive baseline monitoring data, will be compared to similar measures taken during and after the remediation to access the magnitude of contaminant release and probability of exceeding WQC. Future research plans include deploying PEDs at the sediment water interface to estimate the flux of contaminants into the water column.