Evaluation of Porewater Reductions Due to Carbon Placement via Sedimite™ and AquaGate™ at a Contaminated Sediment Site

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Background/Objectives. Contaminant flux and availability in impacted sediments can be significantly reduced with activated carbon (AC) amendment technology. AC is more often placed as a composite material to aid in settling and retention at the sediment surface. A demonstration of two such composite materials, Sedimite and Aquagate, was conducted in open water near Hunters Point Naval Shipyard (HPNS), California. The objective of this study was to evaluate changes in freely dissolved concentration (C_{free}) of polychlorinated biphenyls (PCBs) in the surface sediments and in deeper layers (i.e., 30 cm below the sediment surface) by in situ passive sampling using polydimethylsiloxane (PDMS) coated fibers. Bioaccumulation reductions in bivalves exposed to AC materials was also assessed and compared to co-deployed passive samplers.

Approach/Activities. In situ monitoring of C_{free} with passive samplers was conducted before sediment amendment and up to 26 months following AC placement. Passive samplers with 34.5 µm PDMS coating were preloaded with a wide array of $^{13}C_{12}$ PCB congeners as performance reference compounds (PRCs). PDMS samplers were inserted to unshielded holders, attached to a tripod frame and embedded vertically 30 cm into the sediment at 20 sampling locations. After 28 days the fibers were retrieved, sectioned into a 1-6, 6-11, 11-16 and 21-26 cm segments below the sediment surface and analyzed for PRCs and 111 PCB congeners. C_{free} was calculated from the accumulated PCBs in the passive sampler and the sampler-water partition coefficients.

Results/Lessons Learned. Baseline sampling showed uniform C_{free} across the site with lower concentrations in the near surface versus the deeper layers due to exchange with the overlying water from the shallower zone. Post-placement monitoring showed an 83% decrease of C_{free} after 8 months in the surficial layer with further reductions reaching 90% after 26 months. Smaller but significant reductions in C_{free} was also noted at the deeper depths, which continued to improve with time in line with AC mixing. Bioaccumulation of PCBs in clams (*Macoma Nasuta*) showed very good agreement (i.e., factor of 2-5) with predictions from measured C_{free} using equilibrium partition theory. The presentation provides information on the effectiveness of AC by means of C_{free} measurements and discusses the advancement of AC technology based on results from this demonstration as well as earlier AC studies conducted at HPNS site.