Treatability Study for Under-Pier Activated Carbon Amendment Treatment of Polychlorinated Biphenyl (PCB)-Contaminated Sediments, Pearl Harbor, Hawaii

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Background/Objectives. Sediment polychlorinated biphenyl (PCB) contamination has been identified in under-pier areas of Pearl Harbor as the result of historical harbor activities. The Navy completed a feasibility study that identifies activated carbon (AC) amendment treatment as the preferred remedy for under-pier areas where access and pier structure impede the implementability of more conventional engineering remedies including dredging or capping. A pilot treatability study (TS) was initiated in 2014 at the Navy's Pier Sierra 1B in Pearl Harbor's Southeast Loch. While still ongoing, extensive data on implementation and treatment effectiveness has been generated. Approximately 8,000 square feet (ft^2) of under-pier areas was selected at the Navy's Pier Sierra 1B with PCBs-impacted sediment for TS. The top 1-foot layer of sediment in these areas has been targeted for in-situ treatment with AC amendments. The under-pier areas present a significant remediation challenge due to several factors: 1) access is limited by fender and support pile placement, utilities, and tides; 2) the sediment surface is often steeply sloped from the shore side to the face of the pier; and 3) natural and man-made structures and debris limit removal options. Sierra 1B is just one of a large number of piers in Pearl Harbor requiring remediation. The TS is necessary to evaluate the implementability and effectiveness of the preferred remedy for under-pier areas prior to full-scale implementation. The TS objectives for evaluating effectiveness include reduction of PCB bioavailability, biological impacts of AC treatment, and implementability of the remedy in sloped areas with limited access.

Approach/Activities. Two test plots were studied during the TS, each using a different AC amendment material (AquaGate+PAC and SediMite). Each material was applied to a target thickness that achieved a calculated dose of AC. The test plots have undergone baseline (pre-treatment), 6-month, 18-month, and 42-month performance monitoring analysis of PCBs in bulk sediment and porewater as well as laboratory bioassay testing. Passive sampling techniques including solid-phase micro-extraction samplers and polyethylene samplers were used for the PCB porewater sampling.

Results/Lessons Learned. The evaluation of the data indicates that PCB porewater concentrations have been reduced by over 90 percent from both amendments. Sediment cores showed evidence of bioturbation and mixing. Both amendment materials showed effectiveness, but there are differences in ease of placement and effectiveness of the amendment in reduction of porewater PCB concentrations. The TS results suggest that AC amendment may offer a long-term solution for PCBs sediment remediation in terms of effectiveness and implementability.