

Activated Carbon Placement on the Lower Columbia Slough

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Background/Objectives. The Columbia Slough, located in Portland, Oregon, comprises a 19-mile main channel that parallels the Columbia River, with approximately 12 additional miles of secondary waterways which drain over 32,700 acres of land. Much of the land use immediately adjacent to the Slough is industrial. Stormwater runoff and historical discharges have contaminated sediment and fish tissue throughout the waterway. PCBs have been found at elevated concentrations in sediments and fish tissue, and represent the primary risk driver in the Slough.

Sediment adjacent to the former Pacific Meats site is one of the polychlorinated biphenyl (PCB) hot spots targeted for remedial action in the Lower Columbia Slough. Significantly contaminated sediment extends over an approximately 60,000 square foot area adjacent to three stormwater outfalls. Because this hot spot area has relatively consistent PCB concentrations and sediment conditions over a large area, it provides a uniquely suitable location to compare approaches for reducing the bioavailability of PCBs to aquatic receptors. Apex implemented the pilot study/hot spot cleanup on behalf of the Oregon Department of Environmental Quality (DEQ). This pilot study/ consisted of placing two types of activated carbon (AC) products in separate cells within the study area. This presentation summarizes the unique challenges of the permitting required for this project, as well as strategies used to overcome design and implementation changes.

Approach/Activities. The two AC products were to be delivered to the Slough within the application area at the design-specified thickness, accounting for variable placement conditions and drift during delivery. Challenges associated with the AC placement were significant and included:

- Very thin design amendment layer thickness;
- Permit-limited in-water work window;
- Limited over-water access due to low water conditions during in-water work window;
- Daily tidal fluctuations;
- Limited upland access and bank use restrictions on both sides of the waterway; and
- Distributing two different AC products within the application area at the design-specified thickness, accounting for variable placement conditions and drift during delivery.

Results/Lessons Learned. Multiple project design iterations were necessary prior to successful implementation. Hurdles encountered included limited contractor interest due to unpredictable conditions and financial risk associated with project access uncertainties, as well as challenges in finding an application method that ensured accurate layer thickness.

Apex and DEQ overcame these implementation challenges by working with adjacent property owners to create temporary upland access areas; employing low water access techniques, including inflatables, kayaks, air boats, and floating docks; and applying innovative value-engineered design solutions, modifying AC application techniques to include the use of landscape-product blowers and telebelt trucks to achieve project quality assurance goals while avoiding disturbance of the Slough bank.

The result of this project was the successful application of activated carbon to the sediment surface at this PCB contaminated site. The unique implementation challenges of applying activated carbon in the Columbia Slough were overcome, and lessons were learned that can be applied to other similar sites.

Post-carbon sampling showed an 86% and 95% reduction of total PCBs in porewater in the Sedimite™ and AquaGate+PAC™ cells respectively. Visual mixing was evident in the AquaGate+PAC cell, but could not be seen in the Sedimite cell. However, both cells show significant reduction in PCB porewater concentrations.