

## **Remediation of DDT Contaminated Sediment Using a Scour-Resistant Sediment Cap**

*David M. Dailer, P.E.* ([ddailer@ch2m.com](mailto:ddailer@ch2m.com)) (CH2M HILL, Portland, Oregon, USA)

*John L. Childs, P.E.* ([jchilds@ch2m.com](mailto:jchilds@ch2m.com)) (CH2M HILL, Portland, Oregon)

Dennis W. Shelton ([dshelton@ch2m.com](mailto:dshelton@ch2m.com)) (CH2M HILL, Corvallis, Oregon)

Dan Bersanti (Rhodia Corporation, Butte, Montana)

The purpose of this paper is to describe the requirements that were necessary to delineate DDT-contaminated sediment, design a protective cap remedy, obtain regulatory approval, and construct the scour-resistant sediment cap for the Rhodia Suttle Road Facility project. The project site is located along the southern shore of the Oregon Slough of the Columbia River (North Portland Harbor), just north of the Rhodia, Inc., Suttle Road Alum Facility in Portland, Oregon. The Suttle Road Facility was built in 1941 for Stauffer Chemical Company to produce alum for use in water purification. Agricultural chemicals and pesticides were also formulated at the site from 1954 to 1985.

Pesticides were unintentionally introduced to alum mud through the co-use of grinding equipment in the alum production process from 1954 to 1968. The alum mud was discharged using an outfall from the Rhodia facility into the Oregon Slough. An investigation of sediments near the outfall indicated contamination. DDT and DDE concentrations in the alum deposits and surface sediments along the shoreline were detected at levels exceeding the Record of Decision (ROD) cleanup criteria established by the Oregon Department of Environmental Quality (DEQ) for protection of benthic organisms.

Delineation of the contaminated sediment was achieved through a field sampling program performed during the remedial investigation. The compounds that governed the extent of the remedy were 4,4'-DDD and 4,4'-DDT. Although the risk assessment concluded that unacceptable risks to ecological receptors, including benthos, fish, and avian species, were not present, an action was required because the ROD criteria were exceeded. The selected sediment remediation alternative as approved by DEQ consisted of capping a contiguous area such that the resulting residual 90-percent upper confidence limit of the mean sediment concentration was below ROD screening values for DDD and DDT. This residual risk assessment approach provided a more cost-effective alternative than remediation on a point-by-point basis.

Design of the sediment cap required consideration of river hydraulics, including current, wind-induced waves and boat traffic causing potential erosion, the soft nature of the alum mud, construction methods, and the acceptability for area ecology and aesthetics. The cap area is located in a zone that is affected both by tides and by seasonal variations in river water level that can leave the cap either fully exposed or fully submerged.

The regulatory approval process required authorization or consultation from the U.S. Army Corps of Engineers, NOAA Fisheries, U.S. Fish and Wildlife, Oregon Department of State Lands, Oregon Department of Environmental Quality, Oregon Department of Fish and Wildlife, and city of Portland. Construction of the scour-resistant cap began in December 2004 and was completed in February 2005.