

Environmental Remediation Project:

Fox River - Phase I: Treatment of PCB-Contaminated Dredge Material

Situation

Decades of manufacturing and recycling carbonless paper along the lower Fox River contributed to high levels of PCB and, to a lesser degree, mercury contamination resulting in the loss of recreation and fishing on the river. The State of Wisconsin, the Wisconsin Department of Natural Resources, and concerned citizens desired a return to clean water, edible fish, and an overall ecological improvement to the Fox River.

Due to the large volume of sediment scheduled for removal and treatment – and the limited amount of land

available – an upland disposal facility was deemed impractical for this environmental remediation project.

Numerous treatment options were considered initially. However, in the end the decision was made to treat and dewater the contaminated sediment using geo-textile tubes. This option would allow for the effective treatment of the broad range of sediment depositions, including fine clays, found in the dredge material.

Process Description and Customer Needs

The first phase of the Fox River project processed approximately 110,000 cubic yards of contaminated sediment. The material was hydraulically dredged and dewatered at 2,000 – 3,200 gpm. No prescreening of the slurry occurred before treatment with flocculant and pumping into geo-textile tubes for dewatering.

Filtrate (or “weep”) from the geo-textile tubes was collected and treated on-site using dissolved air flotation separation followed by sand filtration and activated carbon

treatment. Once treated, the water was discharged back into the waterway.

Because of problems experienced in pilot studies, it was imperative that the treatment process be capable of: (1) handling slurry flow, density, and composition variations; (2) maximizing the efficiency of solids removal with the geo-textile tubes; and (3) minimizing the need for additional chemical application at the on-site water treatment plant.

Treatment solutions for the dredging industry:

- Ciba[®] KRYVALIS[®] dredging coagulants and flocculants
- Ciba[®] ALCOTECH[®] polymer makedown and dose control equipment



Hydraulic dredging operation at Fox River - Wisconsin



Weep from geo-textile tubes filled with flocculated solids



Ciba® ALCOTECH® DWU polymer makedown unit in operation at Fox River project

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Program and Performance

Ciba Specialty Chemicals was called on to employ its expertise in dredge dewatering to find a solution to the identified customer needs.

Comprehensive laboratory testing of the various areas to be dredged indicated that the addition of **Ciba® KRYVALIS® FC2305** or **KRYVALIS® FC2224** (depending on the deposit area) at a dose of approximately 2 lbs./dry ton resulted in the rapid dewatering of fine sediments which, in turn, captured and removed the PCB. Actual polymer dosage averaged 1.4 – 1.7 lbs./dry ton.

To optimize chemical usage, the dry flocculants were made into solution using a high-rate **Ciba® ALCOTECH® DWU** polymer makedown unit. Polymer use was minimized and paced according to

the slurry and flow variations with the use of a **Ciba® ALCOTECH® DS** automated dose control system.

The dewatering operation was so effective that only low levels of suspended solids were sent to the water treatment plant – thereby negating the need for additional chemical treatment – and water discharged back to the Fox River consistently complied with the state discharge permit.

Ciba's total package of services for this project included polymers for the specific areas targeted for dredging, polymer makedown and dosing equipment, dredging applications expertise, technical laboratory, field service, and regulatory support.

Customer Benefits Delivered

Benefits realized by the customer as a result of employing the Ciba treatment system included:

- ✓ Maximum utilization of geo-textile tubes allowed for the efficient use of project site space limitations (*benefit category: economic and environmental*).
- ✓ Increased dredge production and throughput resulting from

effective flocculation and dewatering – led to a reduction in project duration and costs (*benefit category: economic*).

- ✓ Discharge effluent quality consistently in compliance with state permit requirements (*benefit category: economic and environmental*).

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