



2014 WEDA Environmental Excellence Award Nomination

Project Name: Hudson River PCBs Superfund Site

Award Category: Environmental Dredging

Project Owners: *Lead Agency:* U.S. Environmental Protection Agency (USEPA) - Region 2
Project Owner: General Electric Company (GE)

Nominating Entity: Mark Surette P.E. (Current WEDA Member) Ecology and Environment, Inc.

Lead Agency Team (USEPA)	Project Role
U.S. Army Corps of Engineers – Kansas City District	Construction Management
Ecology and Environment, Inc.	Technical Support and RA Oversight
The Louis Berger Group, Inc.	Technical Support and RA Oversight

Project Owner Team (GE)	Project Role
Parsons Corporation	Construction Management
Cashman Dredging	Dredging Contractor
Chicago Bridge & Iron Company (CBI)	Processing Facility Contractor
Arcadis	Project Engineer
Anchor QEA, LLC	Technical Support

Project Summary

The Hudson River PCBs Superfund Site encompasses an approximately 200-mile stretch of the Hudson River, from the source of the contamination near Hudson Falls, New York, to the river's terminus near the Battery in New York City. The primary goal of the cleanup is to protect people and the environment from unacceptable risks due to PCB-contaminated sediments in the Upper Hudson River. In February 2002, the U.S. Environmental Protection Agency (USEPA) issued a [Record of Decision \(ROD\)](#) for the Hudson River PCBs Superfund Site that calls for targeted environmental dredging of approximately 2.65 million cubic yards of PCB-contaminated sediment from a 40-mile section of the Upper Hudson River encompassing nearly 500 acres of river bottom. The primary pathway of human exposure to PCBs in the Hudson River is through the consumption of fish from the river, some of which have elevated levels of PCBs from exposure to the contaminated sediments.

Cleanup of the Hudson River is occurring in two phases. Phase 1 of the project was conducted by GE, with oversight by the USEPA, from May to November 2009. During this phase, approximately 283,000 cubic yards of PCB-contaminated sediment was removed from a 6-mile stretch of the Upper Hudson River near Fort Edward, New York. After an extensive evaluation by an independent panel of scientists and input from a broad range of stakeholders, the USEPA developed plans for the second part of the cleanup. Phase 2 began in June 2011 and is being conducted at full production to remove the remainder of the contaminated river sediment targeted for dredging. Phase 2 targets the removal of approximately 2.4 million cubic yards of sediment. Dredging occurs between May and October, when the Champlain Canal is open for the season. It is estimated that the second phase of the cleanup will take five to seven years to complete. The project is currently entering the fourth year of Phase 2 (Phase 2 Year 4). During the first three years of Phase 2 (2011–2013), nearly

1,654,000 cubic yards of contaminated sediment containing approximately 93,000 kilograms of PCBs were removed, exceeding the USEPA's annual goal of 350,000 cubic yards. Furthermore, the extent of the dredge areas that did not attain USEPA's anticipated residual PCB concentration and thus required an encapsulation layer was reduced from nearly 36% in Phase 1 to approximately 6% during Phase 2 (to date).

Environmental Benefits

Through the targeted environmental dredging of nearly 40 miles of the Upper Hudson River, approximately 2.65 million cubic yards of PCB-contaminated sediments will be removed, processed for transportation, and disposed of in off-site permitted landfills. Currently, various fish consumption advisories issued by New York State Department of Health (NYSDOH) either limit or prohibit the taking of fish from the Hudson River. The goal of the Hudson River PCBs cleanup project is to significantly reduce the mass of bioavailable PCB-contaminated sediments in the Hudson River, which serve as the primary pathway for PCB-related risks to human health and the environment. By reducing the mass of bioavailable PCB-contaminated sediments, it is envisioned that eventually fish advisories within the Hudson River will either be relaxed or altogether eliminated.

Following the removal of the contaminated sediments, a significant habitat reconstruction effort commences for the remediated areas. This includes placing clean backfill material over the dredged areas, reconstructing riverine fringing wetlands that may have been impacted by the remedial activities, and extensive replanting of sub-aquatic vegetation within a large portion of the remediated footprint. In combination with the more active habitat reconstruction efforts, an extensive monitoring program is being implemented to assess the reconstructed areas with regard to, among other items, the natural recolonization of habitat areas not included in the active planting/habitat reconstruction efforts.

Innovation

In 2003, when the remedial design of Phase 1 was initiated, only a limited number of large-scale environmental dredging projects had either commenced or been completed. Since that time, the Hudson River Project has been at the forefront of environmental dredging. For example, the USEPA developed the Quality of Life Performance Standards (QoLPSs), the first of their kind, for this Project. The QoLPSs developed numerical and qualitative criteria covering air (PCB emissions and dust), odor, light, navigation, and noise. The intent of these standards was to establish project thresholds, which are continually assessed during the remedial action by an extensive monitoring network covering both in-river activities and the Sediment Processing Facility. These standards enable the Project Teams to assess impacts on the local community and, when needed, implement corrective actions to mitigate those impacts.

Furthermore, due to the historic background of the Hudson River corridor, an extensive archaeological and cultural resources program has been implemented to identify potential culturally significant artifacts within the project footprint and to either minimize or mitigate those impacts. This program requires significant in-river and terrestrial evaluations, using various means of assessment, to identify and further investigate any potential artifacts prior to conducting dredging operations in those areas. In addition, due to the known limitations and challenges associated with underwater assessments, an 'unanticipated discoveries' protocol was developed and is being implemented to rapidly respond to artifacts that may be found during the dredging operations.

Economic benefits

Given the magnitude of the project, numerous efforts have been taken by the Project Teams in order to streamline and expedite the overall remedial action while adhering to the project's objectives. These efforts include the following:

- A significant resampling program that was implemented following Phase 1 in order to better delineate the extent of contaminated sediments that require removal. Through this updated delineation, the dredging operations were able to reduce the overall number of dredge passes needed to remove the PCB-contaminated sediments and meet the project's cleanup objectives.
- To reduce disposal costs and minimize the amount of material being disposed of in a facility designed to handle sediments with PCB concentrations greater than 50 milligrams per kilogram (mg/kg)—and therefore subject to disposal requirements under the Toxic Substances Control Act (TSCA)—an innovative approach was implemented to delineate and identify sediments with low-PCB concentrations. This approach includes segregating the materials above and below 50 mg/kg throughout the dredging and material handling process, including developing separate processing and treatment systems at the project's land-based Sediment Processing Facility.
- In implementing an Adaptive Management framework, an evaluation of the prior year's dredging activities is performed by the USEPA and GE Project Teams before the initiation of the following year's activities. This 'off-season evaluation' is intended to allow the Project Teams to identify areas where further efficiencies can be identified, evaluated, and potentially implemented.

This project also creates jobs for the local community. The project employs nearly 500 personnel, many of whom were hired locally or have established themselves within the region. In addition, many different contractors and subcontractors, beyond those listed above, work on the project. To-date, more than \$1 billion has been spent by GE during the implementation of the Hudson River cleanup. A portion of this has gone to local entities that support the work and the overall economy of local communities surrounding the project area. In order to promote the use of local goods and services, GE developed a website where local service providers can easily submit information to GE regarding their company and how they can support the project.

Transferability

The numerous lessons learned during Phase 1 and throughout Phase 2 to date are directly applicable to both small- and large-scale sediment remediation projects. Given the limited number of large-scale, targeted environmental dredging projects that have been completed to date throughout the United States, the Hudson River PCBs cleanup project provides a great opportunity for others to evaluate and implement the various aspects of the project that have made it very successful. Also, due to the size of the Hudson River project, a variety of challenges associated with varying sub-bottom characteristics and overall project logistics have been encountered and overcome. The lessons learned on this project can be applied to a wide-range of other project. For example, during Phase 1, persistent woody debris, i.e., a distinguishable layer or mat of wood debris was often



encountered in many of the areas targeted for remediation. An example of this is shown in the figure above.

As became evident once dredging operations were underway, the overall extent of wood debris present within the areas targeted for remediation during Phase 1 was greater than had been anticipated during design. During Phase 1 operations, the wood debris affected the remedial operation's ability to meet the USEPA's project performance standards. The presence of wood debris required the use of alternative methods to sample the entire depth of PCB-contaminated sediments, including sediments intermixed within wood debris and the underlying material. To accomplish this, a barge-mounted sonic drilling machine was mobilized to the site. This sonic drilling machine was expected to penetrate the wood debris and obtain sub-bottom samples in areas with extensive wood debris that were not conducive to sampling via vibracoring. In order to test the ability of the new sampling approach, previously collected sediment cores were analyzed to define areas of uncertainty. By looking at the existing sediment core data in conjunction with the frequency at which the historical sediment core samples had encountered wood debris, specific areas could be defined and targeted for resampling utilizing the sonic drilling method. This sampling and study technique could be applied in other waterbodies where extensive woody debris impedes environmental sampling and/or dredging.

Outreach and Education

Numerous public outreach activities were completed prior to the initiation of Phase 1 dredging to engage the public during the remedial-design phase of the project. This was done to not only inform the public about the project but also to gather input from local residents and interested stakeholders. The intent of the extensive public outreach program was to minimize, to the extent practicable, the overall project impacts on local residents. Once the remedial action commenced, public outreach activities continued so that the public could be informed on the progress of the work and updated on anticipated future activities.

The community outreach program has included the following:

- Quarterly meetings with the Community Advisory Group (CAG), which is a group of residents and stakeholders from the local community that represent an array of public interests.
- Multiple project websites hosted by both Project Teams where information regarding the planned project activities, project documents and information, and near real-time monitoring data is available to the public.
- Direct mailings, letters, and informational handouts are routinely provided to residents along the project area where dredging activities will commence.
- Each summer, representatives from the USEPA Project Team staff an information booth at the local county fair to provide an opportunity for the public to directly ask questions of the project staff about the project.
- Both the USEPA and GE Project Teams have full-time staff available at local project offices. The USEPA's Hudson River Field Office also serves as a public information office where the community has the ability to directly discuss questions or concerns with USEPA project staff.



Figure 1: Overview of Project Area (40 Miles)



Figure 2: Processing Facility Overview (110 acres)



Figure 3: Dredging Activities



Figure 4: Dredging Activities



Figure 5: Initial Habitat Reconstruction Efforts