New Bedford Harbor Superfund Site

New Bedford, Massachusetts :
April 2004 – Present

“Hybrid dredging operation in the Upper Harbor”

Introduction

The 18,000-acre New Bedford site was an urban tidal estuary with sediments which are highly contaminated with polychlorinated biphenyls (PCBs), heavy metals, lead, chromium, copper, and cadmium. Manufacturers from the Aerovox Mill Building used PCBs while producing electric devices from 1940 to the late 1970s, when the use of PCBs was banned by the EPA. These facilities discharged industrial wastes containing PCBs directly into the harbor and indirectly via the city’s sewerage system. The site was placed on the National Priorities List in 1982. As a result, the harbor was contaminated in varying degrees for at least 6 miles, from the upper Acushnet River into Buzzards Bay. Bio-accumulation of PCBs within the marine food chain resulted in closing the area to lobstering and fishing, and recreational activities and harbor development have been limited by the widespread PCB problem.

Scope of Work

Sevenson was contracted to perform sediment remediation activities for Jacobs Engineering under its long-term U.S. Army Corps of Engineers TERC. This included both hydraulic and mechanical dredging. Sevenson initiated work in the spring of 2004 with mobilization and establishment of site facilities. An existing 40,000 ft^2 building was modified to accommodate Sevenson’s liquids/solids separation and wastewater treatment systems. Sevenson erected a 15,000 ft^2 temporary structure to house the desanding operations. Both buildings were designed to operate this fully integrated dredging, desanding, dewatering, and wastewater treatment system to process up to 900,000 yd^3 of contaminated sediments in a controlled environment. The primary scope included debris removal, dredging, desanding, wastewater treatment, dewatering, and load-out for transportation and disposal via truck and train. Later, mechanical dredging from multiple shoreline locations was added to our scope of work.

“Contaminated sediment removal in marsh area using a Hyundai 220LC Swamp Hoe”

Sevenson has worked continuously at the New Bedford Harbor Superfund Site for over 16 years. We have been a remedial team member to prime contractor Jacobs Engineering, performing the dredging and dewatering of harbor and shoreline sediments from 2004 through 2014 under the Total Environmental Remediation Contract.

We have continued in this role since the award of the Interim Remedial Action Contract (RAC) for the New Bedford Harbor in 2014. From the fall of 2015 through 2018, Sevenson’s SOW focused on the mechanical dredging and disposal via bottom dump scow of contaminated sediments into the sub-aqueous CAD cell.


"Multi-layer cap placement near source area using a Komatsu PC450"

Remedial Action

Debris Removal: Sevenson modified our equipment with a rake attachment, vertical controls and conducted mechanical debris removal activities ahead of dredging to prevent dredge line clogs, equipment damage, and associated schedule impacts. This eliminated driving contaminants deeper into the sediments, mitigated costly downtime for repairs and eliminated rework of dredged areas. To support the dredge system, Sevenson installed a series of single steel sheets. The sheet piles have provided the necessary cabling system tie-offs to allow dredges to operate dredge designated piles areas.

Hydraulic Dredging: Crews used two hydraulic auger-head dredges to remove/pump contaminated sediment from the harbor bottom through low lift transfer pumps to the downstream processes. The system contained over 20,000 linear feet (lf) of Sevenson installed piping and pumps to accommodate slurry transfer to the treatment area. The pumps delivered slurry to the WWTP, which was a scalable system that could treat up to 3,000 gallons per minute (gpm) of slurry with USACE- and EPA-required solids content of 15% or greater. Scalability of the system was critical for future production requirements when funding was expected to dramatically increase. Hydraulic dredging continued through the 2015 season and mechanical dredging became a major focus in 2015 and 2016.

The liquids/solids separation system included eight 160,000-gallon sludge slurry storage tanks, ±10,000-lf of 6-12-inch piping and six plate and frame filter presses, each 220 CF capacity. The presses consistently achieved high solids and yield a clean filtrate stream (<50 TSS) that is pumped to the wastewater treatment system. Filter cake was removed from presses and staged for sampling and analysis for contaminants, paint filter and percent solids. Finished piles greater than 50 ppm PCBs were loaded and shipped off-site to a permitted TSCA facility. We improved our process by optimizing polymers, cycle times, and chemical dosages in the non-homogenous sediments to achieve our objectives with minimal materials and bulking and to maximize production. From 10/17-09/19, 194,059 yd^3 of sediments were removed.

Sevenson encountered several challenges during sediment removal operations which included tidal influences (3-6 ft.) and the need for cathodic protection to offset the potential for corrosion to equipment and treatment systems due to high salt content in the water. Modification to equipment and applications of special coatings were required to ensure the longevity of process components.

Mechanical Dredging: During the TERC, we dredged PCB-impacted sediments prior to backfilling and we performed confirmatory sampling to ensure cleanup goals were met.

We performed shoreline restoration activities that included plantings and seeding according to three prescribed elevation zones. In the fall of 2015-2016, the EPA and USACE focused the operations on areas planned for mechanical dredging until a replacement contract could be competed and awarded with increased ceiling. During this two-year period Sevenson mechanically dredged approximately 71,000 yd^3 in the lower harbor using

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"Raking debris prior to hydraulic dredging"

hydraulic excavators and material handlers (PC450, PC800, and Sennebogen 850) with a level cut environmental clamshell bucket. The material was placed into a bottom dump scow and placed in a CAD cell in the lower harbor.

In very shallow areas where draft was an issue for the bottom dump scow, we used small 100 yd^3 scows and then transferred the material into the bottom dump scow in deeper water prior to placement in the CAD cell. We also mechanically dredged approximately 5,000 yd^3 of intertidal areas in the upper harbor using hydraulic excavators and conventional buckets from shore. This material was excavated, hauled to the DDA, stabilized using Portland cement, and loaded and hauled off site for disposal by others.

Mechanical dredging from multiple shoreline locations has been added to our scope of work. Thus far, 76,700 yd^3 of PCB contaminated soil and sediment has been removed. Materials are loaded into scows and transferred to the CDF for disposal.

Aerovox Mill Building

Encompassing a 10-acre plot in New Bedford, Massachusetts, the Former Aerovox Facility, constructed in the early 1900s, is located on the western shore of the Upper New Bedford Harbor. From 1947 to 1978, the Facility used PCBs to manufacture electrical products. PCB contaminants were subsequently released throughout the building and the surrounding area, impacting the municipal sanitary sewer and adjacent harbor. PCB contamination ranges from 10–27,000 mg/kg, with contamination depths reaching 25-ft. BGS. Other major COCs at the site include CVOCs, TCE, and chlorobenzenes. Sevenson executed this $8.3M FFP task order, as the major self-performing team subcontractor, under Jacobs' contract with USACE. We completed all SOW activities on schedule and within budget.

Mobilization: Sevenson mobilized a fleet of company-owned capping equipment, including PC450 and PC220 excavators, WA380 and WA450 loaders, D39PX dozer, multiple floats (40-ft. x 200-ft. barge system, with spuds and winches), Telebelt TB130 conveyor and Telestacker conveyor, multiple feed hoppers, and composite mats. On-site personnel included 5 full-time Sevenson personnel (2 Foremen, QC, SSHO, and project engineer); 2 part-time Sevenson staff (PM and Site Superintendent); 0 subcontractors; and 10 union personnel (8 operators/2 laborers).

Site Preparation: Prior to installing the interim shoreline cap and interim sub-tidal cap, Sevenson was required to protect the existing asphalt surface which was designated as the equipment staging area for the site. This was accomplished with the placement of geotextile fabric and dense-grade structural fill which was then covered using composite mats with interlocking panels. Site preparation activities also included retaining site security personnel; installing traffic control, such as truck signage for equipment deliveries; work area controls, including track mats to prevent soil/sediment material from being transported off site; identification of utilities; and installation of sediment and erosion controls (silt fencing and hay-bales, specifically).

The team established turbidity controls, including 3-ft.-long silt curtains, to minimize transport of solids suspended in the water column. Field crews also installed controls to minimize the potential for NAPL impacts to harbor waters. For example, absorbent booms were installed inside the silt curtain before beginning capping operations. Additionally, Sevenson assembled and staged all material mixing equipment required for blending cap materials. This involved staging and assembling various feed hoppers within the designated capping material stockpile area.

Installation of Interim Shoreline Cap: For shoreline cap placement, Sevenson implemented a mechanical placement methodology using a PC300 long-front excavator equipped with GPS positioning software. We placed 2,000 tons of cap material to encompass 10,000 SF of harbor shoreline. The excavator's technology included DREDGEPACK® software, two Trimble antennas, receivers, and a 450 MHz radio antenna. This equipment provided the equipment operator with real-time bucket position data and color gradients that illustrated an updated color-coded view of the cap surface area. Additionally, this equipment also generated GPS positioning correlations to determine the vertical elevation of the bucket cutting plane. This equipment included two inclinometers (one mounted on the boom and one mounted on the stick), an additional two

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inclinometers (both mounted on the roof of the operator's cab), and a rotation censor and shaft encoder (to determine the bucket location relative to the machine). The software and technology provided real-time location data to the operator, which reduced the likelihood of misplacing material and/or overlooking an area designated for cap placement.

To install the interim shoreline cap, Sevenson first utilized a material consisting of 85% sand- 15% organic clay material used to fill the existing retaining wall voids (minimum of 6 in.) with a varied thickness to create a smoothing/isolation layer based on the slope of the rip rap but not to exceed 12 inches; the crews then placed geotextile fabric over the smoothing isolation layer. To ensure the fabric material was accurately placed, Sevenson's excavator extended the boom/stick and progressed down the barge while unrolling the fabric in a straight line. Riprap was then placed over the fabric on a 3:1 slope followed by installing grass plantings over the rip rap.

"Filter press operator in D building"

Sevenson verified the accurate placement of cap materials using visual inspection to ensure cap thickness and overall uniformity of material placement. Additionally, an elevation survey (using GPS) was completed to confirm cap layer achieved the required thickness and elevation criteria. The shoreline isolation layer combined with the sub-tidal isolation layers provide adequate confinement of PCB contamination.

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Installation of Interim Sub-tidal Cap: Sevenson was required to dredge the perimeter of the area to be capped before material placement. The overall objective of this initial dredging work was to establish a level surface for cap installation. Additionally, Sevenson covered shallow areas within the cap footprint, specifically where the dock/barge could come into contact with existing contaminated sediments at low tide, with 6 inches of clean sand. Following the completion of dredging operations, Sevenson mobilized all required equipment for mechanical placement of capping material. Major equipment included a 40-ft. x 200-ft. floating platform equipped with hydraulic spuds. Spuds stabilized the barges along the excavated perimeter.

The floating platform was designed so that it could be moved after each capping lane was completed. The floating platform was moved by a cable winch system, which was attached to the sheet piles placed around the cap perimeter. Before initiating capping operations, Sevenson was required to mix the organoclay and sand materials that would eventually comprise the isolation layer. Materials were blended on site in separate batches within the designated capping material stockpile area. Individual batches of blended material weighed up to 100 tons.

The appropriate blending of organoclay and sand depended on organoclay density and the percentage required to achieve the necessary permeability. Field personnel mixed sand and organoclay by loading the material into two variable-speed hopper drives, which conveyed the media into a quad-screw feed hopper. Each of these feed hoppers had discharge openings in various belt speeds to attain the required mix ratios. Following material blending, the mixed media exited the quad-screw hopper and was placed into individual batch piles. On-site QC staff conducted regular visual inspections to ensure material homogeneity. Each batch was numbered and documented according to weight and whether it passed QC inspection. Our blending operations resulted in cap material that passed specifications 100% of the time.

To move cap material from the shoreline area to the capping barge, Sevenson mobilized a Telebelt system capable of conveying material to the barge. To do so, cap materials were delivered to the on-shore pad area; sand materials were blended with organoclay as well. To load materials onto the barge, Sevenson implemented the Telebelt system, which has a reach of 126-ft. from its point of rotation. The Telebelt system conveyed one of two roll-off boxes containing cap material directly to the capping barge deck. The roll-off boxes had a 25-yd^3 capacity and were transported on steel rails. Sevenson moved the boxes from one end of the barge to the other using a cable winch system. As one roll-off box was loaded using the Telebelt system, the other was staged near the excavator that was placing the cap material. The roll-off boxes were cycled up and down the barge, to the excavator, to supply a steady feed of cap material.

Sevenson mobilized an excavator equipped with a material handling clamshell bucket to place the cap material in 3-in. lifts. The capping excavator was outfitted with DREDGEPACK, which accurately monitored the precise location and elevation to within a 2-in. accuracy. The excavator operator placed each lift of capping material by positioning the bucket at the water line and slowly releasing the material evenly over the area. Sevenson's sub-tidal cap required the placement of 35,000 tons of material, encompassing 130,000 SF. Sevenson mechanically placed the interim sub-tidal cap materials in the following sequence:

- Placed clean sand to level the preexisting elevation to create a new surface, with no topological variations, for cap materials;
- Placed a 12-in. layer of sand over the entire cap area;
- Placed a 6-in. layer of material that consisted of 15% organoclay and 85% sand material;
- Placed another 6-in. layer of sand;
- Placed a final 6-in. layer of course gravel.

Following placement of this layer, Sevenson installed an armor covering over the entire cap lane which consisted of 1.5-in. washed stone. Ongoing verification of cap placement accuracy was conducted using visual, catch pans, and push core samples. Samples were collected using 100-ft. grids following the installation of each cap layer.

"Restoration crew planting Sparna Alterniflora"

Elevation surveys were also conducted after samples verified the appropriate thickness of each layer. The project team's surveys recorded cap thickness and elevation for each installed cap layer.

Desanding operation

Quality Control: Under this task order, Sevenson performed all remediation operations in accordance with the prime contractor's USACE-approved Construction Quality Control Plan. Major aspects of construction quality control throughout the course of this project included regular inspection and documentation of all capping materials and their subsequent placement both on the shoreline and in the sub-tidal area. Cap materials were visually inspected prior to placement to ensure proper material ratios, consistency, and quality. The project team's QC personnel required all material providers to provide accurate documentation of the following data: grain size, in-situ moisture content, and specific gravity of media. These material tests were required to be completed prior to initial material delivery to the site and per every 1,000 yd^3. QC inspections of cap material following its installation were subject to various verification methodologies, such as physical in-situ measurement with catch pans, push core sampling, and visual observation.

Transportation and Disposal: NBH was executed under the requirements of CERCLA, TSCA, DOT, the Rivers and Harbors Act, State Regulators, and other regulations. Sevenson has received zero notices of non-compliance and all QC, confirmation, and bathymetry sample and surveys have demonstrated full regulatory compliance. All T&D material has been accepted without exception and we removed 59.9 tons of PCB Aroclors from the harbor. (See ad on pg. 17) ❍