

Repairing Superfund Sites:
Remedial Action and Reuse Assessment at McCormick & Baxter Creosoting Company

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Introduction

Industrially contaminated sites are increasingly being environmentally repaired and recreated as host sites for new development. Major public and private investment is being applied to economically rehabilitate and socially reclaim these sites as icons of sustainable development. The processes involved in this reclamation vary greatly and depend on the type and level of contamination, and the intended reuse of the site. The McCormick & Baxter Creosoting Company site has been subject to high levels of industrial contamination over many decades. What processes and time spans are required to convert this site into a viable site for a public building?

Superfund zones and the Portland Harbor

The 6.2-mile stretch along the lower Willamette River between Swan Island and Sauvie Island is known as the Portland Harbor. As a major transportation hub for over 100 years, this area has been subject to massive amounts of industrial contamination caused by shipping and commercial activity. The condition is such that the federal government designated the Portland Harbor a Superfund zone, and the area was added to the EPA's National Priorities List in December 2000. According to the EPA, "sediments in the Willamette River in Portland, Oregon are contaminated with many different hazardous substances, including heavy metals like mercury, polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), dioxin/furans and pesticides" ("Portland Harbor").



Figure 1. Map, United States EPA, Portland Harbor, Oregon.

McCormick & Baxter Creosoting Company

Site History

This site is a former wood treatment facility that encompasses approximately 41 acres of land and 23 acres of contaminated river sediment in the Portland Harbor. McCormick & Baxter Creosoting Company operated here between 1944 and 1991 and produced treated wood products including lumber, piling and railroad ties. During much of this time, process wastewater were discharged directly into the Willamette River or dumped on other areas of the site. According to DEQ, chemicals used here to preserve wood included creosote, pentachlorophenol (PCP) and preserving solutions of arsenic, copper, chromium and zinc (“M & B Fact Sheet”).

Cleanup of the McCormick & Baxter Creosoting Company site has been the product of a partnership between the United State Environmental Protection Agency and the Oregon Department of Environmental Quality. The EPA has provided funding and technical assistance, while the DEQ manages the overall cleanup. In 2004, the EPA granted \$12 million in funding to the project, supplementing more than \$15 million already given since the EPA joined the project in 1997. As of October 2003, this investment represented the largest investment by the EPA of Superfund monies at a single Oregon site (EPA, “Environmental Fact Sheet”). Oregon had already invested \$8 million before the site was added to the EPA’s National Priorities List.

The McCormick & Baxter Creosoting site is also a part of the EPA’s Superfund Redevelopment Program (SRI), a portion of the Superfund Program that works with communities to consider future reuse opportunities. The EPA states that the goal of this program is to “remove real and perceived barriers to community use by addressing liability concerns and providing key information about the site and available uses that would not interfere with the clean-up remedy,” (“Superfund Redevelopment Program”). The McCormick & Baxter site was one of 10 sites selected in the first round of the SRI Pilot Programs, and received financial assistance from the EPA for activities relating to determining the reuse potential of the site.

Site Contaminates

The industrial operations on the site have resulted in the release of chemical compounds into the soil, groundwater, and sediments on and around the vicinity. Detected contaminants include polynuclear aromatic hydrocarbons (PAHs), PCP, arsenic, chromium, copper, zinc, dioxins/furans, and non-aqueous phase liquids (NAPL). Large NAPL plumes have been identified “migrating to the river and impacting surface water and sediments” (“Second Five-Year Review Report” 4). These plumes can be attributed to three specific contaminate sources that existed on the site: the western corner of the site near the Willamette River housed the former waste disposal area (FWDA) where wood preservation sludge was stored in metal containers; near the middle of the site was the central processing area (CPA) where PCP and ammoniacal copper zinc arsenate were mixed; and in the south-central portion of the site was the tank farm area (TFA) that stored creosote and other wood treatment chemicals.

In addition to concentrated areas of contamination, much of the site is afflicted to some degree. During the Remedial Investigation of 1992, the unpaved road used to transport chemical was contaminated with PAHs and metals. There are several recorded spills on the site, including one in 1950 in which 50,000-gallons of creosote was released in the tank farm area. And, in the early decades of operation, refuse oil tainted with creosote was poured on portions of the site to suppress dust.

Environmental and biological analysis was conducted during the Remedial Investigation to assess what risk contamination on the site had for human health and ecology in a variety of exposure scenarios. The investigation found that risks to fish and shellfish near the site were low, and well as health risks to humans living in the residential areas adjacent to the site. However, activities involving direct exposure to the site were a matter of concern:

... all exposure scenarios that included direct contact with the site (recreational, occupational, or residential) were associated with significant human health risks (greater than 1 in 10,000 chance of developing cancer in a lifetime). These risks are primarily related to the presence of arsenic, carcinogenic PAHs, and PCDDs/PCDFs in soils and sediments. (xxix)

Remedial Action

There are three types of remedial action taken at the M&B site: sediment remedy, soil remedy, and groundwater remedy. The objectives for each of the remedies vary slightly, but they each share two common objectives: preventing human exposure to contaminants and preventing further contamination of the adjacent Willamette River.

The **soil remedy** is composed of two primary components: removal of highly contaminated soil within four feet of ground surface, and capping the remaining contaminated soil with both an impermeable cap and an earthen soil cap. In 1999, approximately 32,604 tons of contaminated soil was removed and disposed at permitted landfills and 33,128 tons of clean sand was imported. In 2005, all remaining structures were removed or abandoned from the site including water, gas, and electrical utilities, fire hydrants and groundwater monitoring wells. Contaminated steel, concrete and water pipe were buried on-site. During this time, new support facilities were constructed including a paved access road, new utility services and a 25-foot by 40-foot shop building.

An impermeable cap was constructed over a 15-acre area inside a subsurface barrier wall. The impermeable cap has a minimum thickness of 29 inches, a maximum thickness of 7 feet, and is intended to minimize rainwater infiltration into the contaminated areas within the barrier wall. This cap is composed of high density polyethylene (HDPE) to prevent water from flowing vertically into the contaminated aquifer, geocomposite plastic fiber that allows water to flow laterally, sand, crushed rock, topsoil and native grasses.

An earthen soil cap designed to prevent direct contact with low-level contaminated soil was constructed on 19 acres of the site outside of the barrier wall. A storm water management system was introduced to prevent runoff to neighboring properties and the Willamette River, directing runoff instead to a retention/infiltration pond. Both caps were constructed with sloped surfaces to direct water towards the drainage swale. Native trees and shrubs were planted in this swale and in the riparian zone of the site to stabilize the soil against erosion.

The primary component of the **sediment remedy** is a sediment cap covering approximately 22 acres. City of Portland sewer lines discovered within the capping area mandated that construction occur in two phases: June through November 2004, and

August through October 2005. The cap is composed of a 2-foot thick to 5-foot thick layer of sand extending from the south end of the property downstream into the Willamette cove to the north. In known NAPL seep areas, the cap includes organoclay. This compound is explained in the Second Five-Year Review:

In the Willamette Cove and TFA NAPL seep area, the cap incorporated 600 tons of organoclay to prevent breakthrough of NAPL through the cap. Organoclay is bentonite or nectorite clay that had been modified to be hydrophobic and to have an affinity for organic compounds. (11)

During inspection in 2005, NAPL sheens were discovered and corrected with 24,150 square feet of organoclay mats. The sediment cap is armored with various types of protective layers including articulated concrete block mats (used along the shore where erosion would be strongest due to wave action), rock armor and riprap used to construct boulder clusters. The 6-acres riparian zone was regraded with clean topsoil, protected with a turf reinforcement mat, and planted with native grasses.

The **groundwater remedy** is composed of two primary components: a subsurface barrier wall and NAPL recovery. NAPL (Creosote) recovery began in 1989, and as of July 21 2006 approximately 6,135 gallons of NAPL have been removed from groundwater through numerous extraction wells on site. During this time various extraction methods were employed to reach optimal NAPL recovery. Automated recovery was used until September 2000, after discovering that manual extraction recovered similar volumes of NAPL at approximately half the cost.

A fully encompassing, impermeable subsurface barrier wall was constructed around 18 acres of the site including the TFA and FWDA to reduce NAPL migration from these areas to the river. The barrier wall is 3,792 linear feet and ranges in depth from 45 to 80 feet below ground surface. The segment of the wall along the bank of the Willamette River is 1,440 linear feet constructed of sheet piles. The 2,335 foot segment to the side and upgradient of the primary contaminate source areas is comprised of a dense soil-bentonite mixture.

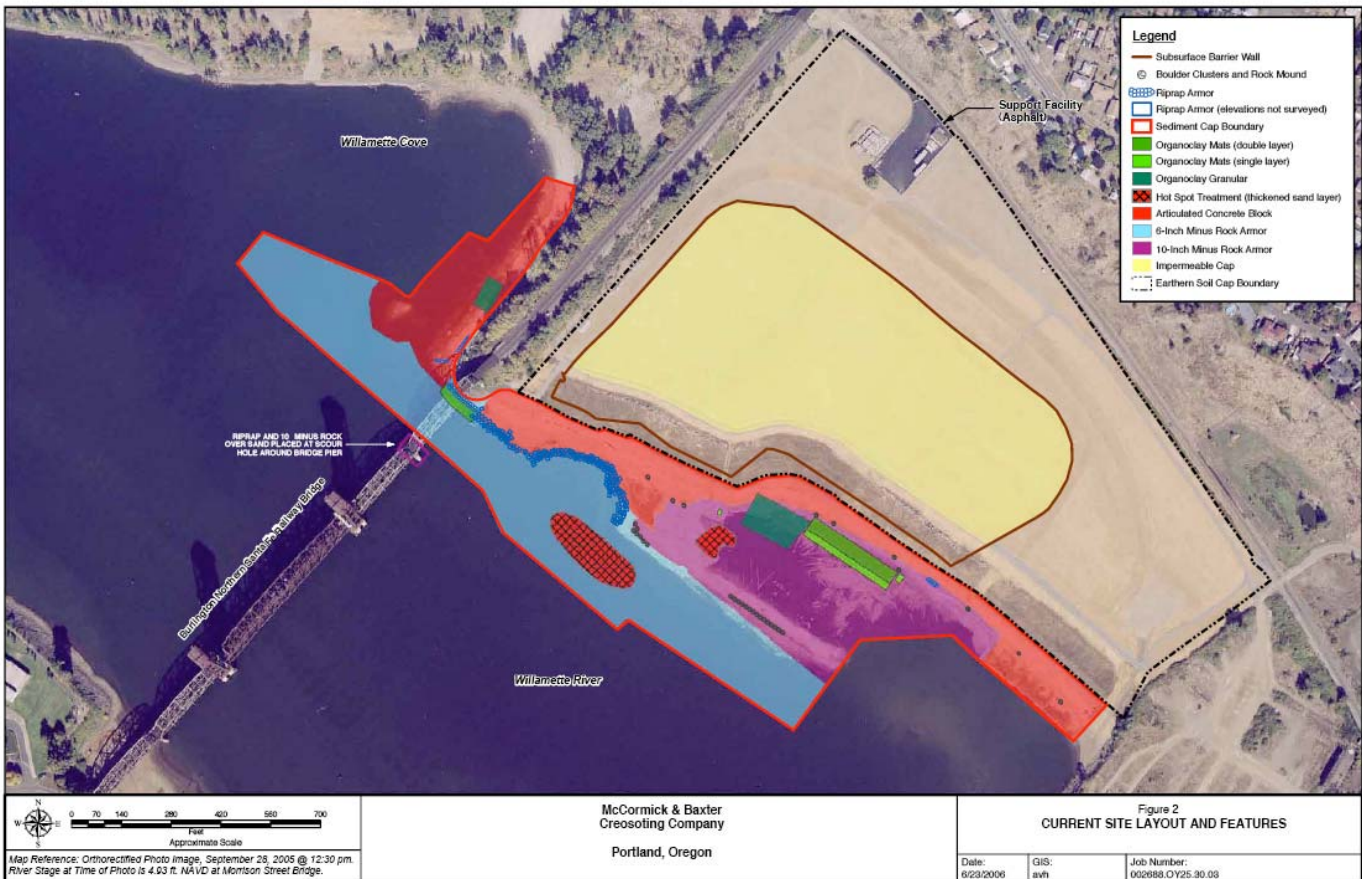


Image 2. Map, United States EPA “Second Five-Year Review.”

Measuring Success

The recent Second Five-Year Review Report for the site stated several issues in the recovery of the site including (among others) lack of post-construction performance data, erosion of the both the soil and sediment cap, and lack of implementation of

institutional controls such as the Restricted Navigational Area. The report recommends further monitoring and inspection for future review.

The lack of performance data for the Second Five-Year review prevented the Oregon DEQ from determining the protectiveness of the interventions on the site at the time. The DEQ has requested that further information be gathered regarding the chemical analysis of the Willamette River surface water and ongoing inspections for the presence of NAPL releases from the sediment cap. This data collection is projected to take two years to complete, after which a protectiveness determination will be made. Access controls such as perimeter chain link fencing, warning signs and buoys will remain in place and development will be stalled until 2008 when the protectiveness is reevaluated.

Reuse Recommendations

In addition to long-term inspection, the site's status as a pilot project for the EPA's Superfund Redevelopment Initiative requires local government to perform a reuse assessment for the project. The City of Portland conducted a community-based reuse assessment for the McCormick & Baxter Creosoting Company site involving community meetings, newsletters and a citizen advisory committee. The results of this process were published in June of 2001 in the City of Portland Bureau of Planning's *McCormick & Baxter Site Reuse Assessment: Final Report*.

Many factors were considered in this assessment including such things as market feasibility, traffic impacts and infrastructure, and compatibility with adjacent residential as well as industrial neighborhoods. Environmental factors were of obvious concern and reuse scenarios were considered in regards to compatibility with clean-up remedies, minimizing future pollution impacts and protecting, enhancing and restoring fish and wildlife habitat. Reuse was also considered in light of Portland Parks & Recreation's *2020 Vision Plan Discussion Draft* (February 2001) in which this site was identified as a potential site for a riverfront park and sports field, and in the *North Beach Vision and Action Plan* 1998 community survey in which 88% of the respondents favored 'recreation' as the most appropriate use for the site (City of Portland 6).

The primary challenges of this assessment, as listed in the Executive Summary of the *Site Reuse Assessment*, involved incorporating the industrial history of the site with

the public investment in clean-up, the precedent that this site could be for other Superfund projects in the Portland Harbor, and the restorative opportunities involved. “What are the opportunities at this site to meet the expanding needs for riverfront habitat restoration, recreation, public access, and sustainable development?” (1).

The Citizen’s Advisory Committee entertained a variety of reuse scenarios and created conceptual site plans (City of Portland, Appendix 3). From those, four reuse scenarios were proposed for further study and public review: open space demonstration site; recreation; industrial – no change; and mixed-use residential, commercial, and university facilities. All scenarios included a riparian greenbelt, 100-300 feet wide, along the riverfront and an extension of the Willamette Greenway Trail across the site. The Committee, with the assistance of the Bureau of Planning, determined that the site should be developed as a permanent park with active and passive recreational facilities (City of Portland 48).

Future of Site and Adjacencies

This type of development is compatible with the proposed development of the former industrial sites adjacent to the McCormick & Baxter Creosoting Company site. Willamette Cove, directly north of the site, was purchased by Metro in 1996 to be restored as a riverfront open space. University of Portland is currently trying to acquire Triangle Park LLC, directly south of the site. According to the EPA, the University is interested using this 35-acre site “so that it can relocate and develop athletic facilities on the Triangle Park property, freeing up its existing land on the bluff for buildings,” (“Triangle Park”). This proposal is open for public comment until December 18, 2006. University of Portland has also expressed interest in purchasing the McCormick & Baxter Creosoting Company site for similar development.

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