

Case Studies

- Caps have been used at more than 75 sites across the U.S., many of which have been in place for 30 years
- Each site has unique conditions that inform the cap's design
 - Specific contaminants
 - Contaminant distribution and phases (solid, liquid, gas, etc.)
 - Sediment properties
 - Gas transport
 - Erosion or deposition caused by environmental or human activity at a site (industrial activity, vessels, etc.)

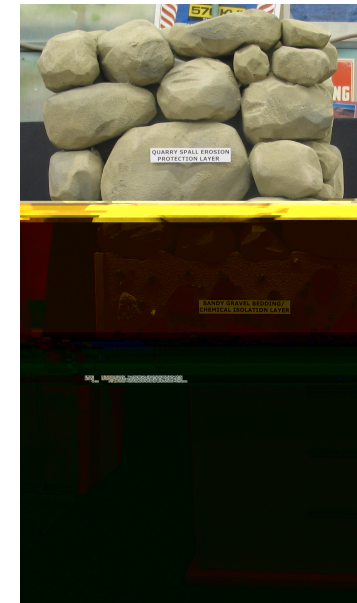


Using Caps to Limit NAPL Migration: Fox River (Wisconsin)

- 39-mile-long river and industrial waterway near Green Bay, WI with PCB-impacted sediment
 - Single largest contaminated sediment cleanup site in the United States
- Caps designed/installed at over 120 acres of the site
- Variety of erosive forces could impact the site, including large ships
- Cap incorporated organoclay for one portion of the site to address PAH-impacted sediment containing NAPL
- Latest Five Year Review (2019) indicates that the caps are performing as designed
- Monitoring of fish and water show significant reductions in PCB concentrations and are decreasing to meet the Remedial Action Objectives as intended in the Record of Decision



Source: Ryan Photography



Using Caps to Limit NAPL Migration: Pine Street Canal (Vermont)

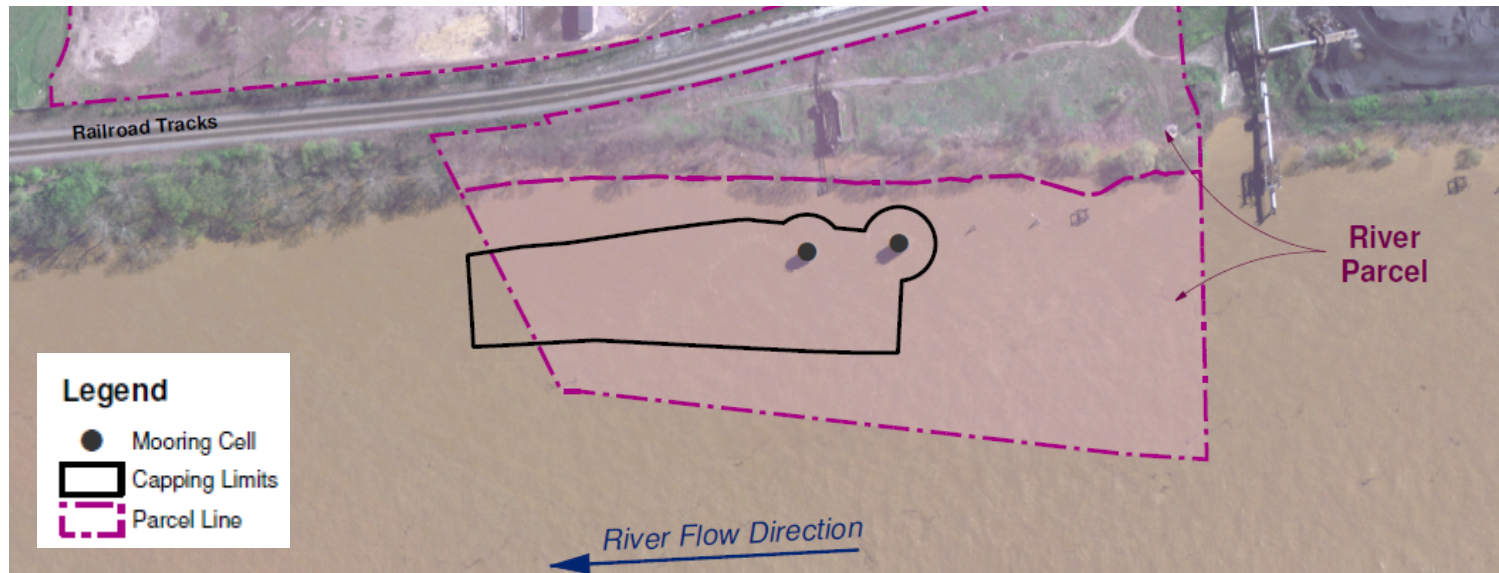
- 38-acre site in Burlington, VT consists of a canal and turning basin, adjacent wetlands, a pond, and land
- 2004 remedy included capping with sand over 8 acres of contaminated sediments
 - Initial cap design did not include an amendment to control NAPL
- Post-construction monitoring identified ongoing release of coal tar in a limited area of the canal
- An amended cap was constructed in 2010 to address releases of oily sheen and coal tar found during monitoring, which included organoclay to address NAPL
- Latest Five Year Review (2021) concluded that the cap remains in place and is functioning as designed



Source: Burlington Free Press: [Pine Street Barge Canal, Burlington VT: A legacy of poison and beauty](#)

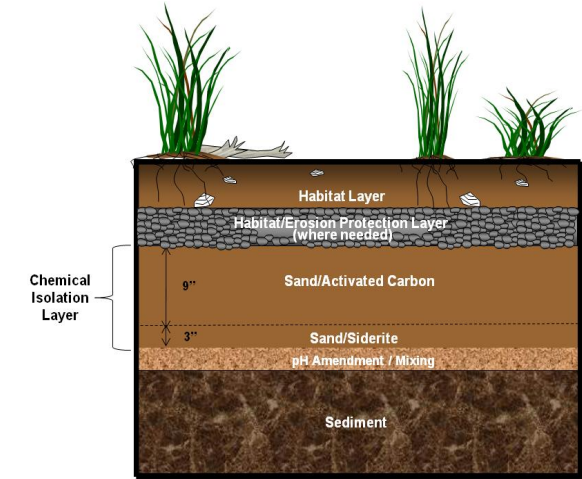
Using Caps to Limit NAPL Migration: Ohio River (Ohio)

- Cap designed to isolate over 2 acres of PAH-contaminated sediments containing tar and NAPL in some areas
- Long-term cap monitoring has demonstrated effectiveness for more than 10 years



Onondaga Lake (New York): Construction, Monitoring, and Habitat Restoration

- A multi-layer, multi-function cap was placed over ~400 acres from 2012-2016
 - Design incorporated granular activated carbon to isolate contaminants and a siderite amendment for pH control
- During cap construction, a disturbance in the cap was identified due to very soft sediments at the bottom of the lake
- Design refinements were rapidly developed, and the cap was successfully reconstructed
- Long-term monitoring is ongoing, and the latest Five Year Review (2020) concludes that the cap remains physically stable and is functioning consistent with the design
- Caps included dedicated layers designed to support habitat restoration



Q & A