PCBs and Public Swimming Pools

Many municipally-run pools were built in the 1960s and 1970s using PCB-containing caulk. Decades later the PCB's are leaching into adjacent materials and structures.

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The public swimming pools owned and operated by public recreation agencies are important recreational resources, many of which are located in urban areas. As maintenance, renovation, or replacement of these essential resources are planned, sometimes Polychlorinated Biphenyl (PCB) contamination is encountered in caulk, paint, mastic, concrete, and soil. Remediating these pools and ensuring that they are available for the summer swimming season is critical for the continued vitality of these communities.

PCBs have been used as plasticizers and sealing agents in products such as rubber and plastics, adhesives, paints, inks, gaskets, sealing compounds, and caulking. Many of these PCB-containing products have been used in the construction of public swimming pools, including caulk for the pool's expansion joints, the concrete decks, and surrounding auxiliary structures; paint used to coat pool surfaces and portions of the decking; and mastic-like materials behind pool gutters. Often PCB-laden paint is found beneath layers of clean paint. Particularly challenging, PCBs migrate out of these caulks, paints, and adhesives and contaminate adjacent concrete and soils.

PCB Disposal

Materials containing PCBs at concentrations greater than 50 ppm must be disposed of at a TSCA permitted PCB disposal facility or a federally permitted hazardous waste landfill in accordance with TSCA manifesting, reporting, and record keeping requirements. Waste with less than 50 ppm PCBs may be disposed of at a TSCA permitted facility, a hazardous waste landfill, a permitted state municipal solid waste landfill, or a state non-municipal non-hazardous waste landfill. Unless it is assumed that all materials have concentrations of PCBs greater than 50 ppm, TSCA provides for an intensive and prescriptive testing program to ensure that wastes containing greater than 50 ppm do not end up in a solid waste landfill.

PCB remediation waste is managed at its "as-found" PCB concentration and it is characterized based on in situ sampling rather than post-excavation or demolition composite samples collected from waste piles and roll-off containers. Sampling is straightforward. However, the in situ sampling frequency for characterization sampling and post-remediation verification sampling is high.

Federal Regulations

The EPA regulates the use, storage, and disposal of PCBs with concentrations of 50 parts per million or more (≥50 ppm) under the Toxic Substances Control Act (TSCA) regulations. TSCA prohibits the use of PCB products at levels above 50 ppm, as well as the building materials that those products have contaminated. While TSCA regulations do not require owners to test building materials for PCBs, if PCB concentrations are detected in the materials above the regulatory limit, then the regulations require the removal and proper disposal of those materials. Once removal is initiated, PCBs must be cleaned up to less than one ppm in the remaining materials, unless a deed restriction is placed on the property. Testing is often conducted when renovations or demolition is planned, so that waste materials are disposed of appropriately.

In Massachusetts, PCB-contaminated caulk, paint, and concrete are not regulated by the state. However, if PCBs have been released to the soil at concentrations greater than two ppm, then the cleanups are also subject to the Massachusetts Contingency Plan. A cleanup plan documenting the results of site characterization sampling and a remediation plan must be submitted to EPA at least 30 days before conducting cleanup activities. Unless the characterization and verification sampling frequencies specified in the regulations are adhered to and the applicable TSCA cleanup standard is achieved, the work cannot proceed until written approval is received from EPA.

PCBs in Swimming Pools

PCB remediation affects the schedule, planning, and costs associated with the renovation or reconstruction of swimming pools and needs to be coordinated with the capital improvement program, often done before renovation or reconstruction of the pools. Integrating the environmental requirement into the design package is an alternative, however, general contrac-

tors for pool construction are typically not experienced, equipped, or trained to conduct the remediation and therefore it may need to be performed by a specialty contractor. The in situ characterization and cleanup plan approval process can take months, which must be factored into a total project schedule. Conducting characterization in the fall, once the swimming season has ended in temperate climates, will likely provide sufficient time for a spring construction project. Once PCBs greater than 50 ppm are discovered at a pool, the EPA may not allow its use until its remediation; therefore, conducting characterization in the late winter or spring may result in closure of a pool over the summer season.

Case Study: Shine Memorial Pool

At the Shine Memorial Pool in Worcester, MA, demolition of the existing 6,200-sq ft swimming pool, 560-sq ft tot pool, and surrounding decking, and replacing them with a new zero-entry pool and decking was planned. However, PCBs at concentrations greater than 50 ppm were encountered in the paint coating the pools, caulking within the pool and decking expansion joints, and the mastic behind the pool stainless steel gutters. Before demolition and removal of the decking and pools, the PCB contaminated decking and pool concrete, which had been contaminated by caulk and paint, needed to be removed. In addition, soil beneath the decking expansion joints, which had been contaminated by the PCB caulk in the joints, and the soil behind the gutters, which had been contaminated by the PCB mastic, needed to be remediated.

A total of 137 tons of PCB-impacted material (concrete, soil, and stainless steel gutter) characterized as containing greater than 50 ppm PCBs were transported to a hazardous waste landfill for disposal. Seventeen tons of concrete and 26 tons of paint chip impacted soil characterized as containing less than 50 ppm PCBs were disposed of at a non-municipal solid waste facility. The cleanup goal of one ppm PCBs was achieved in all areas of the site except for one location, where it was impractical to remove PCB-impacted concrete walls, so the contaminated portions were encapsulated in an epoxy coating to eliminate the exposure pathway.

Remediation Activities at Shine Memorial Pool

- ❒ Removal of the paint coating the pools, gutters, and a portion of the pool walls from beneath the gutters.
- ❒ Removal of concrete adjacent to the main pool expansion joints.
- ❒ Removal of the water seal behind the main pool expansion joints and decking expansion joints, including concrete, caulking, and backer rod.
- ❒ Removal of the decking adjacent to the pool gutters.
- ❒ Excavation of the PCB-contaminated soil beneath the decking expansion joints and behind the pool gutters.
- ❒ PCB containing waste paint chips had been disposed of in a portion of the outlying property, and the paint chips along with the co-mingled soil was cleaned up to one ppm.

A notice was recorded on the deed to the property that will in perpetuity notify any potential purchaser that PCBs are present in some portions of concrete that have been coated to encapsulate the residual PCBs. A long-term Monitoring Maintenance Implementation Plan was developed documenting the required inspections, maintenance, and sampling required to monitor and evaluate the long-term effectiveness of the coating.

Case Study: Senator Casey Memorial Pool

The Senator Casey Memorial Pool in Milford, MA, includes a 6,110-sq ft main pool and a 560-sq ft tot pool, a building that includes a bath house, an office, and the tot pool

At left, the Casey Memorial Pool during rehabilitation. At right, the Casey Memorial Pool following rehabilitation and in use.

filter room, a separate filter building, and concrete decking. Initial remediation activities included removing paint from the surfaces of the main and tot pools, removing caulk from the main pool and decking expansion joints, and removing about 1.5 in. of concrete from both sides of the main pool expansion joints to a depth of 1.5 in. Following abatement, the surfaces of the pools were re-painted and the expansion joints were reconstructed. However, PCB-impacted concrete in the main and tot pools remained and soil beneath the decking expansion joints was impacted with PCBs from the caulk. The remaining impacted concrete and soil could not be remediated before the summer swimming season.

To open the pool for the summer season, EPA required that an Interim Measure be conducted to eliminate the potential exposure pathway to PCBs on accessible surfaces. This Interim Measure included coating the main and tot pool surfaces, collecting wipe samples from the coated surfaces to confirm that the coating was effective, and collecting two rounds of pool water samples from both the main and tot pools for PCB analysis to evaluate whether PCBs from the pool concrete were migrating into the pool water.

An Interim Measure was done to open the pool for the season; remediation of the remaining PCB impacted materials was included as part of planned pool renovations. Additional site characterization data was collected and a PCB Cleanup and Disposal Plan was prepared for EPA approval. The additional site characterization data indicated that in addition to the pool and decking, concrete and the soil beneath the decking expansion joints, the pool gutters, and soil behind the gutters were also PCB contaminated.

During the cleanup and disposal activities, the contractor attempted to use steel shot and glass abrasive blasting methods to remove the existing non-PCB paint and underlying PCB-impacted concrete from the main pool. However, these methods were not effective at removing the paint or sufficient PCB-impacted concrete beneath the paint. As a result, and to meet the schedule for reconstructing and opening the pool in time for the summer 2010 swimming season, the contractor was instructed to discontinue attempts at remediating the main pool concrete and to construct the new pool shell over the existing pool shell, thereby encapsulating the existing PCB-impacted concrete shell with a new concrete shell ranging in thickness from six to eight in. The tot pool concrete shell was demolished and transported offsite for disposal as PCB remediation waste.

Because PCB concentrations remain beneath the main pool shell, a notation will be recorded on the deed to the property that will notify a potential purchaser of the property that it has been used for PCB remediation waste disposal and of the existence of the cap and the requirement to maintain the cap.

The Shine Memorial Pool and the Casey Memorial Pool are just two examples of the complexities of abating swimming pools contaminated with PCBs. Remediation of PCBs contaminated pools must be carefully coordinated with operations and capital planning to ensure that sufficient time is available to conduct the sampling and obtain required approvals. The appropriate expertise, including consultants and contractors, must be engaged for successful remediation to protect the public from contact with PCB contaminated swimming pools.

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At Shine Memorial Pool, both the gutter around the tot pool as well as concrete adjacent to the deck expansion joints was removed.