Silver Lake

August 2016

Location: Silver Lake

Type: Sediment remediation/thin layer capping

Area: 26 acres

City: Pittsfield

County: Berkshire

Agencies: US Environmental Protection Agency, Region 1

State/Province: Massachusetts

Country: United States

Taken from USEPA website, 2013 Citizens Coordinating Council Meeting

Background

Silver Lake is located downtown Pittsfield, MA and is bounded to north by Silver Lake Boulevard and Fourth Street, and the west and south by residential and commercial properties. The lake has a total area of 26 acres and a maximum water depth of 30 ft. Silver Lake discharges to the East Branch of the Housatonic River through a 48-in. diameter concrete pipe located in the southwest portion of the lake (Aracadis 2015). Historic discharges of Polychlorinated Biphenyls (PCBs) and other chemicals from a General Electric (GE) facility resulted in moderate to high concentrations of PCBs in the lake's sediments. PCBs pose a risk to people and the environment, therefore, the lake was designated as a cleanup area by USEPA. USEPA required that GE dredge 400 CY of "hot spot" sediment, remove additional near-shore sediment, clean up contaminated bank soil, and place silty sand-based cap on the entire bottom of the lake (USEPA 2014).

Project Description

The thin layer capping portion of the project started with a pilot study (2006) that was used to develop the conceptual design of the cap and the final work plan for this project.

As part of the pilot study, a 1 acre area was divided into 3 test sections to evaluate the effectiveness of 3 different capping systems. The cap material consisted of a sand and topsoil mixture with a 2.5:1 ratio (sand:topsoil ratio by volume) to achieve a target TOC of 0.5%. The three areas involved the use of this mixture; however, two of these areas also involved the use of a geosynthetic material. 14 in. of material were placed in multiple thin lifts (10-1 in. lifts and 2-2 in.lifts) with a placement system that consisted of a conveyor system, modified mix tank, make-up water and slurry pumps, 1,800-foot slurry pipeline, floating barge structures, and a custom-designed slurry dissipator barge. This system was specially designed to prevent sediment disruption and mixing since the bottom sediments of the lake were soft and easily disturbed. The thin lifts used in this study help avoid settlement or slope failure resulting from the relatively low-strength,

highly-compressibile sediments and steep slope of the lake floor near the shore ((Svirsky 2009). Along the shoreline the material was placed mechanically in 2 to 3 in. lifts due to shallow water. Woven geotextile fabric and an armor stone layer were incorporated to protect the cap from wind-induced wave erosion.

Full-scale remediation initiated in the summer of 2012 and was completed in December 2013. Multiple capping systems were incorporated in different areas of the site. The majority of the lake bottom was capped with a 14-in. thick layer. The near-shore portion of the lake was capped with a non-woven geotextile followed by a 10-in. thick layer of cap material, and an armor stone layer. The cap material consisted of a mixture of sand and topsoil with a minimum in-place TOC of 0.5%. The material was characterized prior to placement. The material was placed as described previously (pilot study).

In 2014, GE initiated inspection, monitoring and maintenance activities at the site to ensure that the multiple capping systems incorporated at the site are functioning effectively. The following elements will be monitored for a time period of five years (from 2015 to 2018): cap thickness and integrity, PCB migration from the underlying sediments to the isolation layer, PCB and sediment deposition on the surface of the cap.

Findings

The pilot study results showed that the capping system produced minimal disturbance to the underlying sediments and provided an effective barrier to PCB-contaminated sediment. Also, the geosyntethic material did not appear to benefit construction significantly (Svirsky 2009). The TOC was generally at the target level of 0.5%. The following include lessons learned during the pilot study (Sevenson n.d.) that are relevant to thin layer placement:

- The cap material was screened to eliminate stones, roots, and debris that were disrupting the placement process by clogging the inlet piping from the slurry pump to the modified mix tank or by clogging the nozzles located across the discharge pipe of the slurry dissipator barge.
- Thin lifts of 1 in. were necessary to mitigate the disturbance and mixing of the bottom sediments. The target lift thickness was achieved by coordinating the flow rate of the slurry and make-up water pumps with the feed rate of the conveyor system and the travel speed of the slurry dissipator barge. Sediment Profile Imagery (SPI) monitoring indicated that the thin lifts were effective at minimizing the disturbance and mixing.

The implementation of the remediation efforts achieved the applicable performance standards for the Silver Lake Site (Arcadis 2015). The installed sediment cap achieved the in-situ minimum TOC of 0.5%. The cap thickness and integrity was generally maintained at the site, except for one location. The results obtained for PCB migration at this point have indicated that the cap is effectively preventing PCB migration from the underlying sediments to the surface water of the lake. The PCB deposition results indicated that PCBs were being deposited in the surface of the cap; however, a potential PCB point source was not identified. The results from the sediment deposition were inconclusive since the sediment traps could not be retrieved.

References

Arcadis of New York, Inc.(2015) Final Completion Report for Silver Lake Area Removal Action. Prepared for General Electric Company Pittsfield, Massachusetts.

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Svirsky, S. (2009) Pilot Study Shows Effective Cap Design for PCB-Contaminated Sediment. https://clu-in.org/products/newsltrs/tnandt/view.cfm?issue=1008.cfm

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Points of Contact

Information on thin layer placement (TLP) case studies has been compiled as part of a DOTS/EWN project to provide a source of information, knowledge, and experience on TLP of sediment or dredged material in aquatic environments. The Thin Layer Placement Website and Map-Portal are funded by the US Army Engineer Research and Development Center (ERDC). POCs for the Thin Layer Placement Website and Map-Portal are:

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