

GE-Housatonic River Superfund Site

Silver Lake 2025 Sediment Cap Maintenance

HISTORY OF SILVER LAKE CONTAMINATION AND RISKS HUMAN HEALTH AND THE ENVIRONMENT

The past discharges from the GE facility in Pittsfield, MA and the placement of contaminated fill at properties that abut the lake resulted in extensive contamination of Silver Lake. High concentrations of polychlorinated biphenyls (PCBs), which pose potential carcinogenic and non-carcinogenic effects, were detected in lake sediments during monitoring conducted from 1980 to 1995.

Historical PCB concentrations in Lake sediments were found up to 6,350 parts per million (ppm) throughout the Lake, with higher concentrations ranging between 11,000 and 20,689 ppm near an outfall from the GE facility at the northeast corner of Silver Lake. The average PCB concentration in the top foot of sediments (excluding the highest concentration of 20,689 ppm) was approximately 330 ppm. High concentrations of PCBs were also measured in surface water and fish tissue. The concentrations of PCBs in sediment, soil, and fish tissue posed an unacceptable risk to human health and ecological receptors including:

- Prolonged direct contact with lake sediments; and
- Consumption of fish by humans and wildlife.

The PCB contamination in Silver Lake also served as an ongoing source of PCBs to the Housatonic River through a discharge culvert.

OVERVIEW OF SILVER LAKE CLEANUP

In 2000, GE entered an agreement in federal court, called a Consent Decree, with the United States Environmental Protection Agency (EPA), the Commonwealth of Massachusetts, the State of Connecticut, and other affected parties. The Consent Decree required GE to address PCBs and other hazardous constituents in soils, sediment, and groundwater in several "Removal Action Areas" (RAAs) located in or near Pittsfield, Massachusetts. Silver Lake and adjacent commercial and residential properties were designated as a RAA.

Based on capping studies for Silver Lake and the requirements in the Consent Decree, GE Implemented the following cleanup activities under EPA oversight and approval:

- Removed bank soils and non-bank soils at non-residential and residential properties abutting the Lake to achieve the cleanup performance standards listed in Table 1 and to achieve non-PCB performance standards required by the Consent Decree.
- Removed and replaced 400 cubic yards of highly contaminated sediments near the northeast corner outfall from the GE facility. These sediments were disposed of off-site by truck.
- Installed a 14-inch capping system across the entire 26-acre Lake bottom and armored the entire perimeter of the Lake with stone riprap to prevent bank erosion.
- Constructed a shallow-water shelf along the shoreline to provide improved habitat for aquatic species.
- Performed natural resource enhancement and restoration activities including:
 - i. Activities related to fish removal in Silver Lake;
 - ii. Capping the scrub-shrub "island" or peninsula near the GE Facility Outfall;
 - iii. Planting appropriate wetland vegetative species on the surface of the shrub/scrub island cap;
 - iv. Constructing a walking path with benches along the eastern and northern sides of the Lake; and
 - v. Planting trees and shrubs along the recreational portions of the eastern and northern banks.



Photo: View of Silver Lake following remediation.

Table 1: Performance Standards for Bank Removal

Adjacent Property Type	Performance Standard (Spatial Average)	
	Bank Soils of Commercial Properties and Separate Recreational Areas	Non-Bank Soils of Commercial Properties ²
Non-residential property with EREs ¹	10 ppm (top foot) 15 ppm (1-3 feet)	25 ppm (top foot) 200 ppm (1-6 feet)
Non-residential property without EREs ¹	10 ppm (top foot) 10 ppm (1-3 feet)	25 ppm (top foot) ³ 25 ppm (1-3 feet) 200 ppm (1-6 feet)
Residential Property	2 ppm (top foot) ⁴ 2 ppm (1 to X-feet) ⁵	2 ppm (top foot) ⁴ 2 ppm (1 to X-feet) ⁵

1) EREs – Environmental Restriction Easement

2) For the non-bank portion of commercial properties, the Statement of Work does not specify Performance Standards for the Silver Lake RAA. GE applied the Performance Standards for commercial properties in the floodplain areas adjacent to the 1 1/2 Mile Reach of the Housatonic River.

3) For any non-bank commercial area that exceeds 0.5 acres in size, GE applied a not-to-exceed level of 125 ppm in the top foot of soil in unpaved areas.

4) For any non-bank or combined residential area that exceeds 0.25 acres in size, GE applied a not-to-exceed level of 10 ppm for the top foot of soil in unpaved areas.

5) “X” equals the depth of PCBs

GE continues to perform periodic reviews of effectiveness and integrity of the cap. If performance standards for the cap are not met, GE is required to evaluate additional actions and implement them as necessary.

SILVER LAKE CHEMICAL ISOLATION CAP

The chemical isolation cap was designed to sequester the underlying PCBs in lake sediment from the overlying water column. From top to bottom, the cap is composed of three layers (Figure 1): a 6-inch bioturbation zone, a 6-inch isolation layer, and, finally, a 2-inch “mixing” zone. The bioturbation zone is capping material that prevents organisms from being exposed to PCBs and disturbing the isolation layer. The isolation layer functions as a contaminant “sponge” that adsorbs PCBs and contains the contaminated sediments from the overlying lake water. The mixing zone at the bottom of the cap accounts for potential mixing of the isolation material with the underlying contaminated sediment during cap installation. Where the cap met the shoreline (and where contaminated bank soil was removed) a shoreline protection system of armor stone was placed to prevent wind, waves, or other erosive forces from undermining the cap. A 4-inch layer of sand and gravel was placed on top of the stone to provide suitable habitat for biota at the edge of the shoreline.

Figure 1: Cross-Section of Chemical Isolation Cap Design

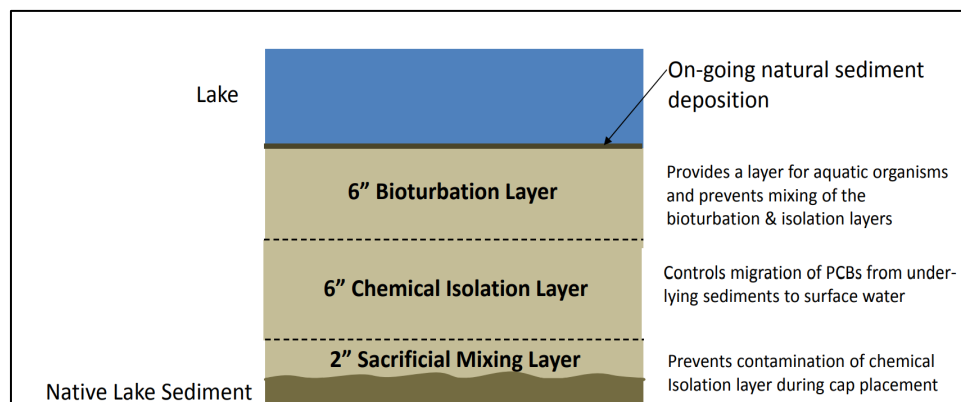


Photo 1: Installation of cap materials with the barge and spreader bar



Photo 2: Installation of cap materials with an excavator

Material in the Lake was placed from a barge using a spreader bar and in nearshore areas using an excavator from the shore (shown in Photos 1 and 2).

MONITORING CAP EFFECTIVENESS AND INTEGRITY

As required by the Consent Decree, GE monitors the cap to ensure the design thickness is maintained, the isolation layer remains effective in controlling PCB migration, and the shoreline armor layer is effectively preventing erosion. If the inspections and monitoring indicate that the cap design standards are not achieved or maintained, GE is required to evaluate, propose, and implement, upon approval by EPA, appropriate corrective maintenance to achieve the design standards.

GE conducted the cap monitoring program annually for the first five years following completion of capping. GE conducted the first of the monitoring events in October 2014. Monitoring activities include the collection of sediment cores (Photo 3) to determine (1) the cap thickness; (2) PCB concentrations in the isolation and mixing layers to assess migration of PCBs; and (3) PCB deposition (if any) on the cap surface. The sediment cores were collected at the same general locations in each event to track cap thickness over time. Table 2 provides the cap thicknesses observed during monitoring of the cap from 2013 through 2023. The measured cap thickness varies over time due to several factors including consolidation of cap material, sediment deposition, ecological activity, disturbances from debris or human activity, variability in the lake-bed topography, and differential settling patterns during cap placement.



Photo 3: Example sediment cores collected during monitoring activities

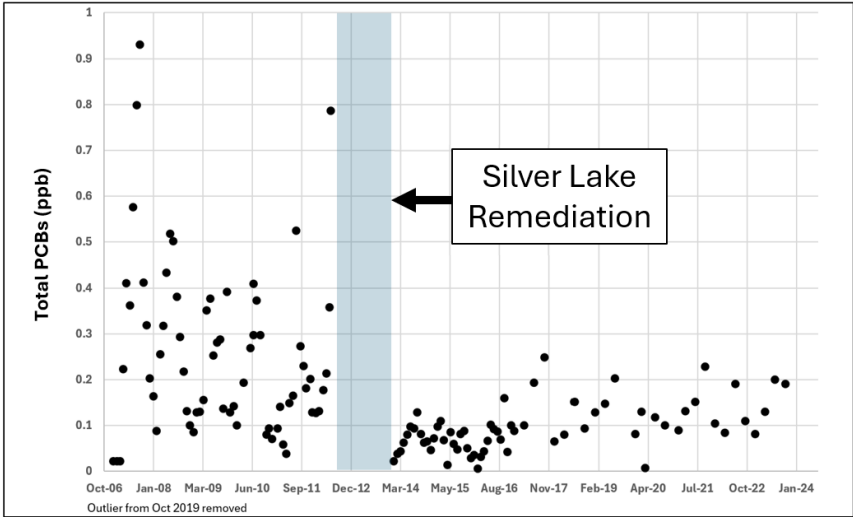
Table 2: CAP THICKNESS, 2013-2023

Core ID	2013 Post-Construction	2014 (Year 1)	2015 (Year 2)	2016 (Year 3)	2017 (Year 4)	2018 (Year 5)	2023 (Year 10)	10 Year Average
1	14	28.5	28.5	22.75	28.25	14.75	18.88	22.2
2	19.5	16.5	15	15.5	16.5	15	NA	16.3
3	14	15	15.75	15.5	13.25	16	NA	14.9
4	15.5	16	15.5	18	15.5	15	15	15.8
5	15.25	15	17	22.5	15	18.5	NA	17.2
6	18.5	20	14	16.75	13.5	17	14	16.3
7	14.5	14.5	12.8	11.9	15	13.25	14	13.7
8	16.75	16	18.25	15.5	17.5	15.75	16.5	16.6
9	15.5	17.5	16	15	16.75	15.5	NA	16
10	19	15	14.25	14.5	15.75	17	14	15.6
11	18	14.5	26.5	14.2	20	12.5	9.41	16.4
12	15.5	18.5	17.4	15.2	15.75	14.25	18	16.4
13	33.5	18.5	20	18.25	20	18	NA	21.4
14	21.5	27	16	14.5	17	14.5	15	17.9
15	18.25	19	18	18.25	21.5	18.5	NA	18.9
16	14.25	17	14.1	14.5	15.5	14.75	16.75	15.3
17	14	14.5	18.5	13.6	14	13.5	14	14.6
18	16.25	20	20.25	25.75	21.25	18.5	NA	20.3
19	18.5	15	18.5	18.5	16.75	18.75	14	17.1
20	16	16	15	17.5	17.25	23	18	17.5
21	19.25	21.5	15.5	16.75	18	16	NA	17.8

SURFACE WATER CONCENTRATIONS OF PCBs

GE and EPA conducted surface water monitoring at the outfall of the Lake to the Housatonic River routinely from 2006 to 2023. As shown on Figure 2, following remediation the measured PCB concentrations in surface water have been reduced by approximately **63%** from pre-remediation concentrations (the average pre-remediation concentration was 0.25 parts per billion (ppb), post remediation average is 0.09 ppb).

Figure 2: Silver Lake Outfall Surface Water PCB Concentrations, 2007-2023



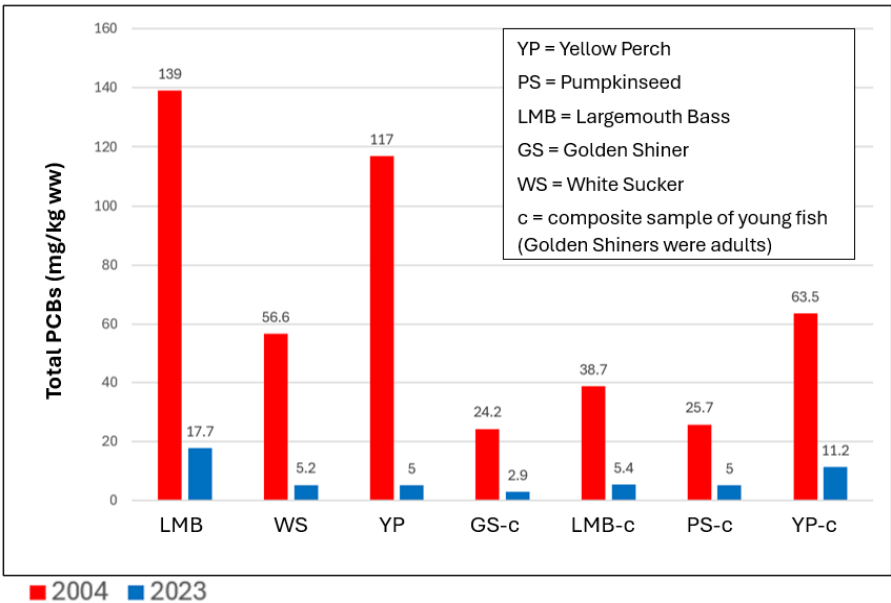
SEDIMENT CONCENTRATIONS OF PCBs

As mentioned above, the average PCB concentration in the top foot of sediments (excluding the highest concentration of 20,689 ppm) was 330 ppm. Ten years following the completion of the cleanup, total PCB concentrations in sediment were below laboratory detection limits in almost half of the samples, with an average total PCB concentration of 0.044 ppm – a greater than **99.9%** reduction in sediment PCB contamination following cap installation.

FISH TISSUE CONCENTRATIONS OF PCBs

Fish tissue sampling was conducted in Silver Lake in 2004 by the United States Fish and Wildlife Service (USFWS). In 2023, GE repeated fish tissue sampling and the results are shown illustrated on Figure 3. Whole-body fish tissue concentrations have been reduced in edible size largemouth bass from pre-cleanup concentrations by **87.2%**, and in yellow perch by **95.7%**. A nearly **90%** reduction of whole-body fish tissue has been observed across comparable species.

Figure 3: Silver Lake Average Whole-Body Fish Tissue Concentrations, 2004-2023



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SUMMARY OF MONITORING AT SILVER LAKE OVER THE PAST TEN YEARS

The cap monitoring program has demonstrated that the cap has remained stable over the ten years since remediation. In 2014, a small area was identified in the southern portion of the Lake along East Street that required further investigation and maintenance. In 2014, GE placed an additional 45 cubic yards of cap material over a 3,400 square feet area to achieve the required cap thickness. In the following four years of monitoring there were no locations that required any maintenance. After the completion of the 2018 monitoring, EPA and GE agreed that the next cap monitoring would be performed in 2023.

Cap monitoring in 2023 was performed at 13 locations and the monitoring results inferred that at 12 locations the cap continued to be stable, with additional sediment deposition observed at many locations on top of the cap.

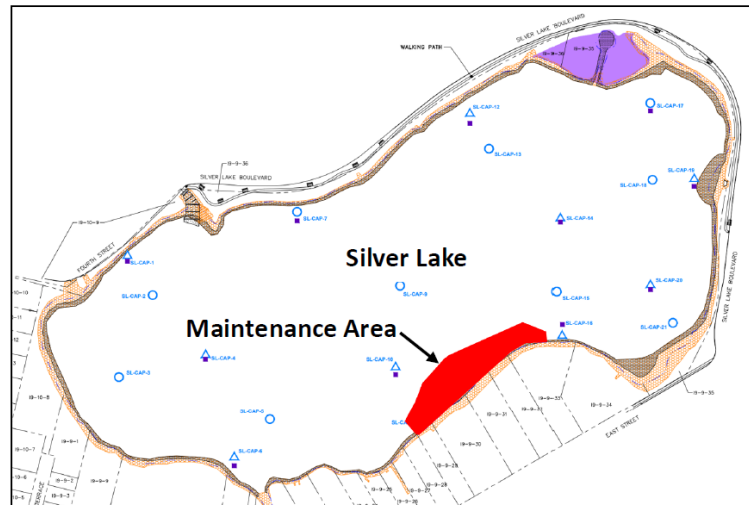


Figure 4: Approximate Area of the 2025 Cap Maintenance

However, at one location in the southern area of the Lake along East Street, it appeared that the cap thickness was less than the required 14 inches. Three additional cores were collected in the surrounding area and the average measured thickness was 9.4 inches. In 2024, GE collected an additional 12 cores in the southern area for a total of 16 cores to further define the area requiring maintenance. As noted above, the measured cap thickness can vary over time due to several factors. The exact factors causing the variability in cap thickness are uncertain, which underscores the importance of monitoring and maintenance. The maintenance of the cap does not indicate cap failure. Monitoring and maintenance is a routine requirement of any cap installation.

Based on the results, GE identified an area of approximately 33,000 square feet over which they propose to add an additional 6 to 9 inches of cap material (approximately 810 cubic yards of material in total). The material will be placed both from the shore and from a floating platform on the Lake. Turbidity curtains will be placed to minimize the movement of material away from the Lake. Upon completion, any disturbed areas along the shore will be restored. The approximate area over which this cap maintenance will occur is shaded red in Figure 4.

The work is scheduled to be conducted starting in mid- to late August 2025 and lasting for a period of approximately three weeks. Monitoring of the maintenance area will be performed by GE one year and five years following completion of the work. Monitoring of the Lake-wide cap will be conducted in 2033. EPA will oversee GE's work and subsequent monitoring.

For more photos of Silver Lake and the cleanup activities, please visit <https://www.epa.gov/ge-housatonic/silver-lake-ge-pittsfieldhousatonic-river-site> or scan the QR code.



For questions or comments, please email EPA at R1Housatonic@epa.gov and/or Olivia Lopez at lopez.olivia@epa.gov

SILVER LAKE PROJECT SUMMARY

- **Protection of Human Health and the Environment** - The Silver Lake cleanup resulted in significant reductions in PCB concentrations in surface water, sediment, and fish tissue.
- **Restoration** - During the cleanup GE removed a large quantity of debris from around the Lake. The restoration following the cleanup provides increased recreational opportunities such as fishing and use of the public walking trail and improved wildlife habitat.
- **Achieving Performance Standards** - GE has conducted the inspection, monitoring, and maintenance of the Silver Lake cleanup under EPA oversight. Except for the thickness issue around the southern area of the Lake along East Street, which will be corrected by GE's upcoming maintenance work, GE has achieved the cleanup performance standards for Silver Lake.