

## Alternative Remedy Metrics: Are Your Fish Ready for a Five-Year Review?

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**Background/Objectives.** USEPA is required to complete a five-year review (FYR) process for remediated sites where hazardous substances, pollutants, or contaminants remain. The FYR process assesses if the remedy is or will be protective of human health and the environment. For most sediment sites, data to support the FYR process include chemical concentrations for sediment, surface water, and biota. A typical FYR key consideration is the magnitude and trend of chemical concentrations in fish tissue over time based on human health risks. Significant reductions in fish tissue chemical concentrations often require 10 or more years to materialize and complicate the process for understanding and communicating how the selected remedy is performing. Similar challenges exist for traditional sampling media (surface water and sediment) due to high degrees of spatial and temporal variability. This presentation identifies and evaluates tools for alternative remedy metrics that are focused on remedy effectiveness for sediment sites over time periods consistent with the FYR process.

**Approach/Activities.** We are evaluating a range of alternative remedy metrics tools in parallel with the remedial investigation/feasibility study (RI/FS) process for the Operable Unit 4 (OU-4) portion of the Anniston PCB Site located in Anniston, AL. The OU-4 portion of the site includes 37 miles of creek with sediments and biota containing PCBs. The remedy metrics evaluation includes field testing to assess tools that may be carried forward in the FS. The end goal is to have alternative remedy metrics and tools that USEPA can include in the selected remedy to assess and communicate the effectiveness of the remedial actions. All the alternative remedy metrics tools being field tested are capable of assessing a range of remedial approaches including source control, removal (dredging), isolation (capping), and natural recovery. A key consideration in selecting these tools for testing is their ability to quantify system responses within a five-year window. Other considerations included agency and community communication goals, field safety, and cost. The remedy metrics tools we tested during phase 1 of the program included sediment traps, caged bivalves, and semipermeable membrane devices (SPMDs).

**Results/Lessons Learned.** The first phase of testing confirmed that sediment traps are best deployed in low-velocity areas of the creek, that caged bivalves are highly variable and complex to harvest and deploy, and that SPMDs are challenging to deploy and limited to water column settings. Initial plans for the second phase of field testing include deploying polyethylene (PE) samplers in three applications, including as an alternative to SPMDs for dissolved phase water column exposure; assessing the bioavailability of PCBs in surface sediments; and assessing the bioavailability of a fine-grained sediment floc that periodically develops along a gravel-surface water interface. Plans for the second phase of sampling also include a specialized deployment device that operates from the water's surface and avoids the use of divers to increase safety and reduce costs.