Baseline Monitoring Design to Support Long-Term Monitoring of PCB Recovery at a Riverine CERCLA Site

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Discussion Topics

1 Background and Site History

2 Long-term Monitoring Challenges and Needs

3 Baseline Monitoring Objectives and Design

4 Baseline Monitoring Outcomes

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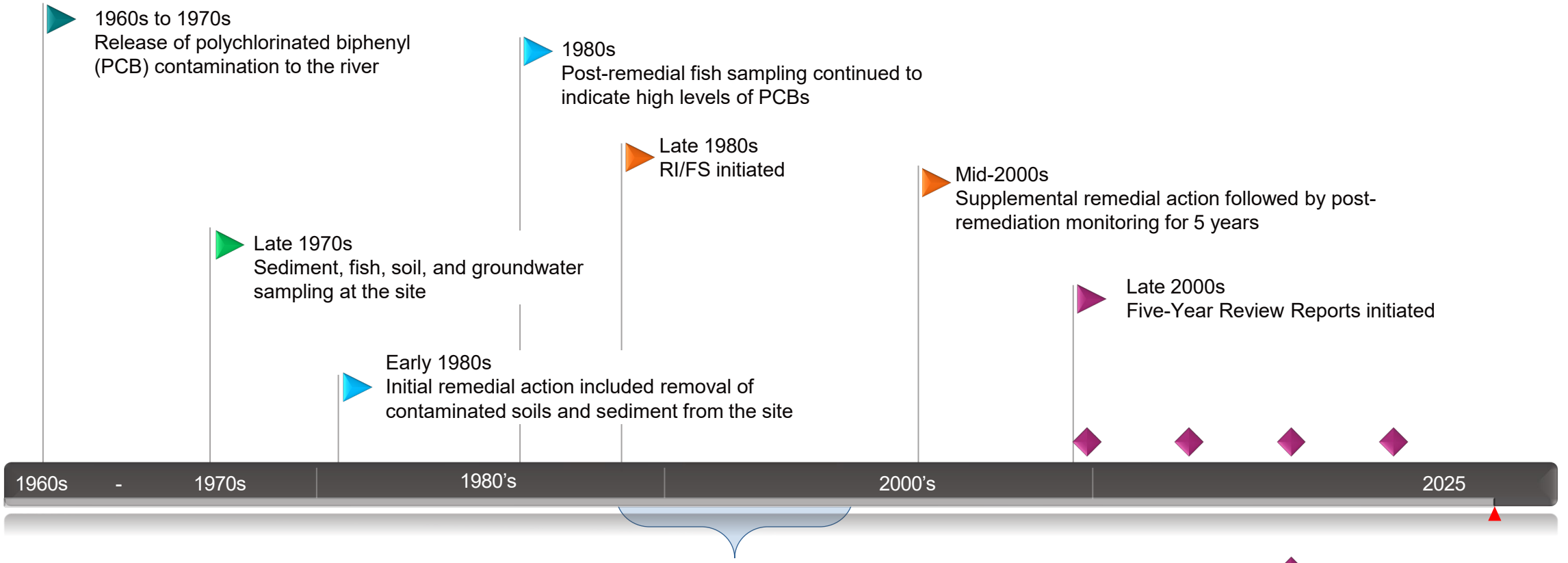
Site Conditions

- Midwest river with legacy impacts from PCB-containing oily wastes at a former industrial facility
- Shallow stream/river environmental with vegetated banks
- Record of Decision (ROD) called for localized removal and monitored natural recovery of PCB in sediments
- Monitoring program was not previously formalized, although long-term recovery has been observed
- Current efforts are to formalize the monitoring program to support clearer determination of rate of recovery toward final SWAC-based goal

Site History



Late 1980s to early 2000s – Remedial investigation/feasibility study (RI/FS) completed with USEPA selecting a remedy that included:

- Supplemental removal of contaminated sediment and floodplain soils
- Subsequent long-term monitoring (LTM) for natural recovery to assess long-term preliminary remedial goal (PRG) for sediment
- Implementation of institutional controls

Five Year Review Findings

- Five-year review process indicated natural recovery not occurring at the rate estimated in the ROD
  - Basis for ROD estimate was not documented nor identifiable
- Recommendations from the recent Five-Year Review Report included:
  - Evaluate natural recovery progress and effectiveness by sampling sediment, surface water, floodplain soil, and biota;
  - Develop and implement a comprehensive LTMP; and
  - Prepare a Monitored Natural Recovery Report every five years.

Long-term Monitoring Challenges and Needs

Needs

1) Assess achievement of RAOs

2) Evaluate remedy performance against risk-based goals defined in the ROD

3) Estimate rate of recovery and time to achieve long-term PRG

Challenges

- Site baseline conditions and background levels were not well-established
- Conceptual site model (CSM) as basis for LTM was not refined or kept current
- A formal Long-Term Monitoring Plan was not prepared
- Variation in sampling designs for sediment, surface water, and fish occurred resulting in inconsistent datasets over three decades – natural recovery assessment findings were not fully supported

Baseline Monitoring Objectives

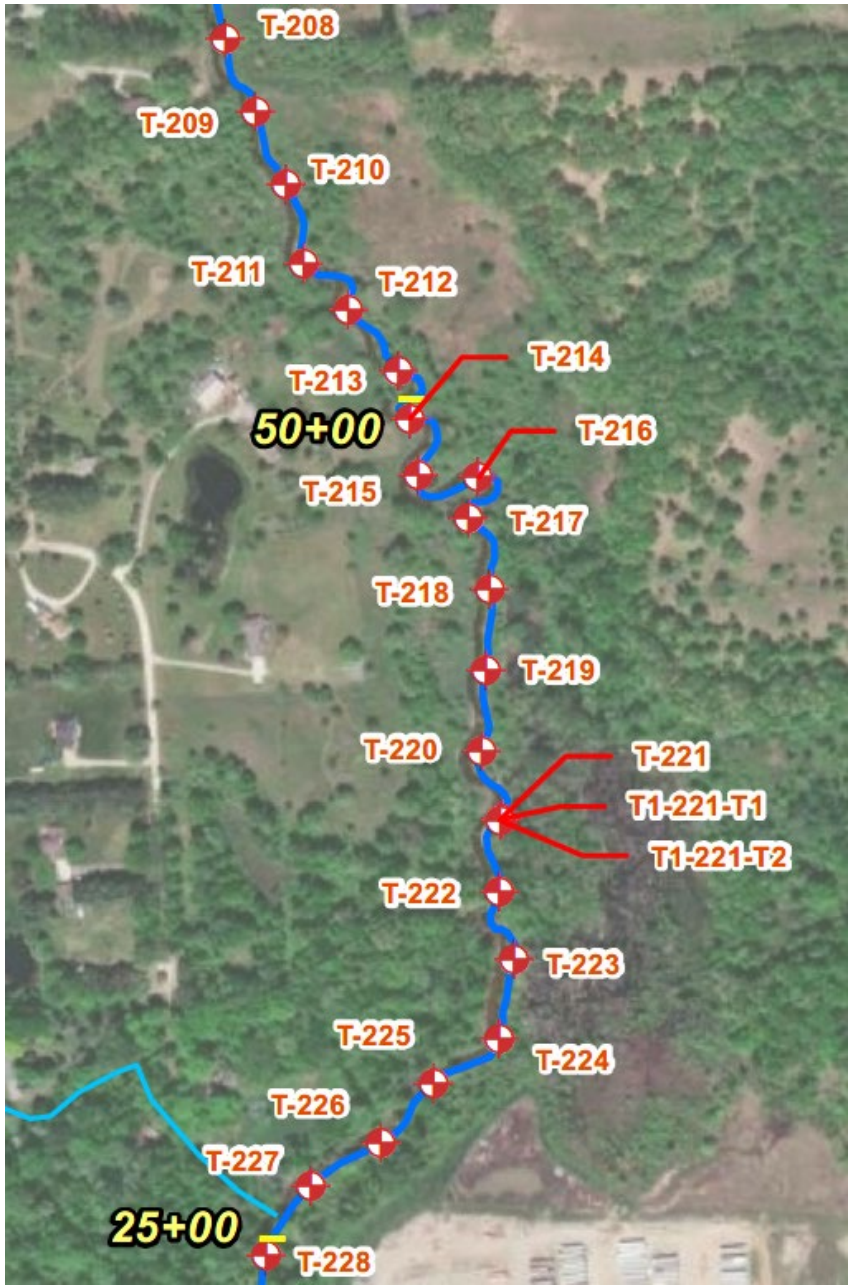
- Assess current conditions - PCB levels in sediment, surface water, and fish tissue
- Provide benchmark data set and methods for comparison to future data to assess MNR effectiveness
- Determine background PCB levels
- Support and update the CSM, especially regarding ongoing PCB sources, if any, and recovery mechanisms

Baseline Monitoring Scope

- A comprehensive LTM baseline monitoring program was designed with a robust sampling components:
  - Systematic sampling of surface sediment for accurate SWAC determination across the 8-mile site
  - Surface water sampling to evaluate spatial patterns and as secondary recovery indicator
  - Fish tissue PCB sampling as a secondary metric and indication of risk reduction trends

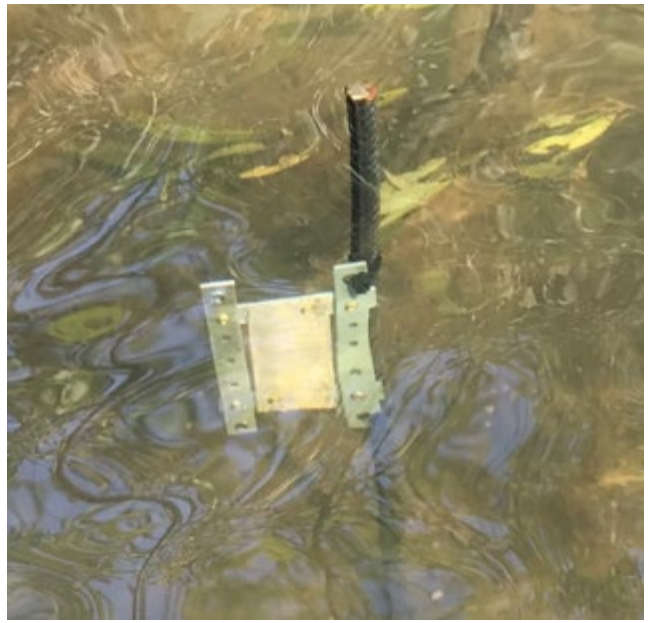
Baseline Sediment Sampling Design

- Transect approach – approximately 30 transects per mile
- 3 to 5 locations per transect
- Composite samples across transect from 0-2 and 2-6 inches
  - 0-2 inch interval most sensitive to recovery processes
  - Total 0-6 inch interval reflective of concentrations used in the risk assessment during the RI – length-weighted 0-6-inch concentrations estimated
- PCB Aroclor analysis for consistency with prior data and long-term PRG



Baseline Surface Water Sampling Design

- 10 locations total over 8 miles (with 7 locations closely spaced within the remediation extent) and two background locations
  - Two rounds of filtered grab sampling with water quality and flow measurements
  - Passive samples deployed over 40 days for time-averaged measurements
- PCB Congeners analysis
  - Allow comparison to historical data
  - Assess concentrations relative to reporting limits and water quality criteria
  - Support load gain analysis
  - Provide repeatable measurement for long-term evaluation of surface water PCB trends during baseflow



Baseline Fish Tissue Sampling Design

- Four sampling areas within the 8-mile site and one background sampling area
  - Targeted the historical sampling areas
  - Preference for size classes consistent with the State's guidance
- PCB Congeners and lipids analysis
  - Allow comparison to historical data
  - Provide repeatable comparable future results to evaluate trends
  - Secondary goal to provide indication of progress towards risk management goals which includes safe consumption of fish

Rock Bass Sample

State will collect additional data to determine if advisories can be removed

Natural Recovery Assessment Questions Supported by the Baseline Data

Baseline (Current Conditions)

- In comparison to historical data, is continuing recovery indicated?
- How do current PCB levels in sediment, surface water and fish compare to long-term goals or relevant criteria?

Baseline vs Future Monitoring Results

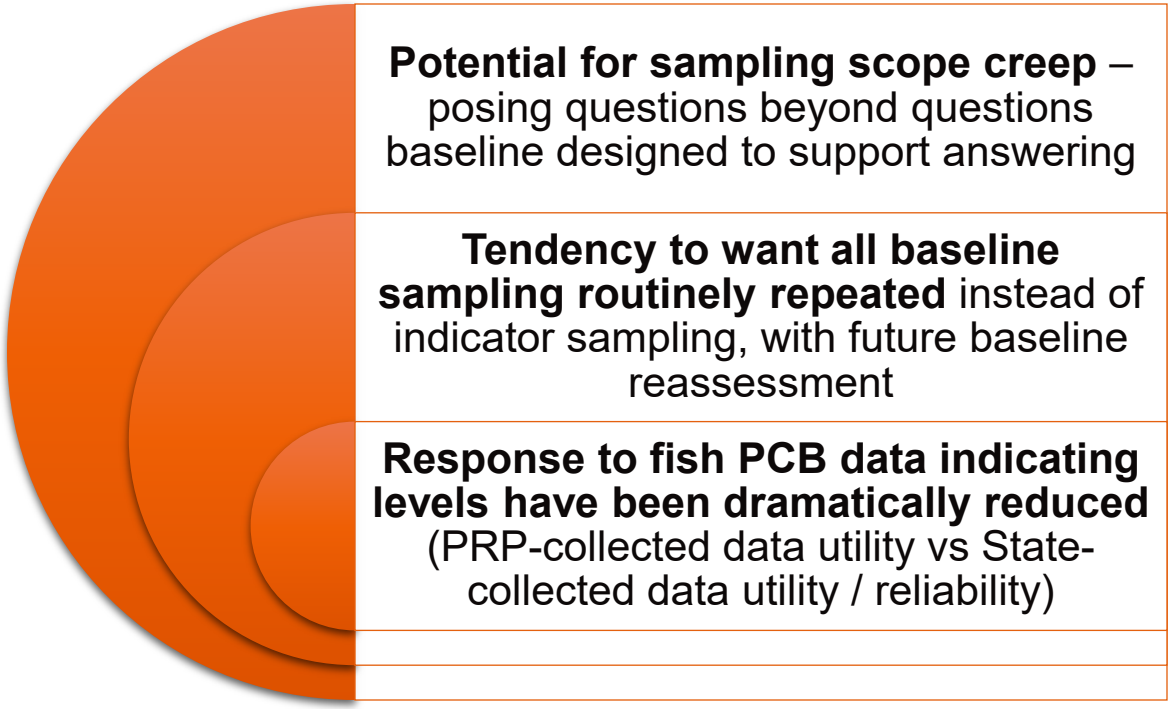
- By comparison of future data to baseline – is recovery continuing?
- At what rates is recovery occurring relative to baseline? (Recognizing historic rates may be different than future)

Baseline Monitoring Outcomes

FINDINGS

Increased Weight of Evidence	• Sediment, surface water, and fish PCB levels show important declines
Residual Sources Remain	• Source attenuation has occurred, but residual is detectable
Repeatable Baseline Established	• Established modern, approved methods for LTM

KEY ISSUES



Potential for sampling scope creep – posing questions beyond questions baseline designed to support answering

Tendency to want all baseline sampling routinely repeated instead of indicator sampling, with future baseline reassessment

Response to fish PCB data indicating levels have been dramatically reduced (PRP-collected data utility vs State-collected data utility / reliability)

Thank you for joining!

Questions? please reach out to:

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