

Contaminated Sediment Management Using Risk Assessment

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Presentation Overview

- Objective
- Approaches to Establishing Extent
- Why use Risk Assessment Approach
- Conducting a Risk Assessment
 - Key Decision Points Along the Way
- Future Considerations

Objective

Collect data to understand the extent of contamination, the risk, and support remedial action decisions relative to the size and complexity of the site

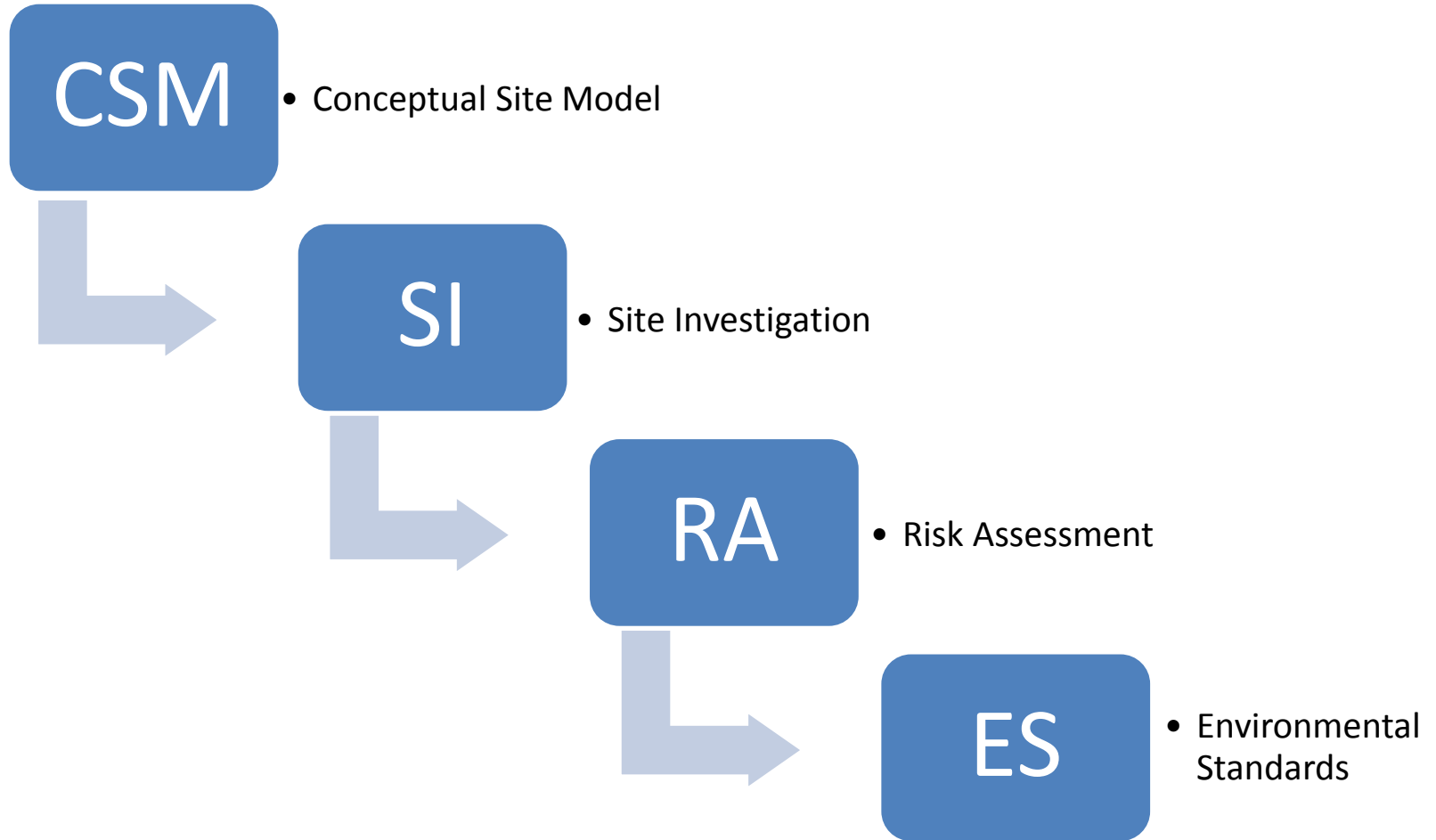
Approaches to Establishing Extent

- Generic look-up values
- Develop site-specific screening levels (considers site use and ambient)
- Assess bioavailability/risk:
 - Indirect Methods
 - Equilibrium partitioning sediment benchmarks with total organic carbon and black carbon
 - Pore water (e.g., Solid Phase Micro-extraction)
 - Direct Methods
 - Toxicity testing

Why Choose a Risk Assessment Approach

- There are no sediment standards in Wisconsin
 - Use of screening levels as remediation goals may result in overly conservative remedial options with significant increase in cost and no commensurate benefit to the environment
- Multiple sources that are difficult to untangle
- Rivers are unique and dynamic environments
- There is no one size fits all for sediment sites
 - Select risk assessment methods to match site complexity and desired objective

Conducting a Risk Assessment





CSM

Conceptual Site Model

- Focus where there is a potential risk
 - Is source material available to human exposure?
 - If not, human exposure is not a driver
 - What ecological species are using the site?
 - What are the reasonably foreseeable future conditions?
 - Identify Constituents of Potential Concern (COPC)
 - Bioaccumulative COPCs?
 - Identify potential upland and upstream sources
- Are there controls on river flow or navigation
- Refine the CSM with SI data, as appropriate

CSM

Conceptual Site Model

- Media of Concern
 - Sediment
 - Surface Water
 - Air
- Human Health Receptors
 - Industrial/commercial workers
 - Construction worker
 - Recreational
 - Residential



- Ecological Receptors
 - Birds
 - Mammals
 - Fish
 - Benthic invertebrates

- Sensitive receptors
 - Non-bioaccumulator – Benthic
 - Bioaccumulator - Fish
- COPC determination based on
 - Historic operations
 - Upland and upstream contaminants
- Identify existing regulatory requirements on the river (e.g., navigation channel dredging)
- Agreement on who will complete the risk assessment and who will participate in review and approval throughout the process

The logo consists of the letters 'SI' in white, centered within a blue rounded square.

Overview

- Collect data that supports the objective to be achieved
- Sampling Design
 - Transects adjacent to site/previous dataOR
 - Statistical Methods
 - Random
 - Stratified random
 - Simple simulations can help determine sample density

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Work Plan

- Focus on the CSM
 - Media of concern
 - Analysis of COPCs
 - Sample depth
 - Targeted sample locations
 - Water depth
 - Benthic community structure analysis
 - Reasonably foreseeable future conditions
 - Current/future benthic zones

SI

Work Plan, Continued

- Investigation stratified to assess present and reasonably foreseeable risk in:
 - Surface (0-6 inches)
 - Near-surface (6-30 inches below mudline)
 - Sub-surface (>30 inches below mudline)
- Consider the potential for future dredging activities to expose sub-surface sediment
- Stability evaluation
 - Geophysical surveys & modeling tools

SI

Work Plan, Continued

Bioavailability Assessment

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- Look up table

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- Equilibrium Sediment Partitioning
- Pore Water Testing

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- Toxicity Testing
- Biologic Testing



SI

Key SI Inputs

- Which bioavailability assessment or combination of assessments is appropriate for the size and complexity of the site

RA

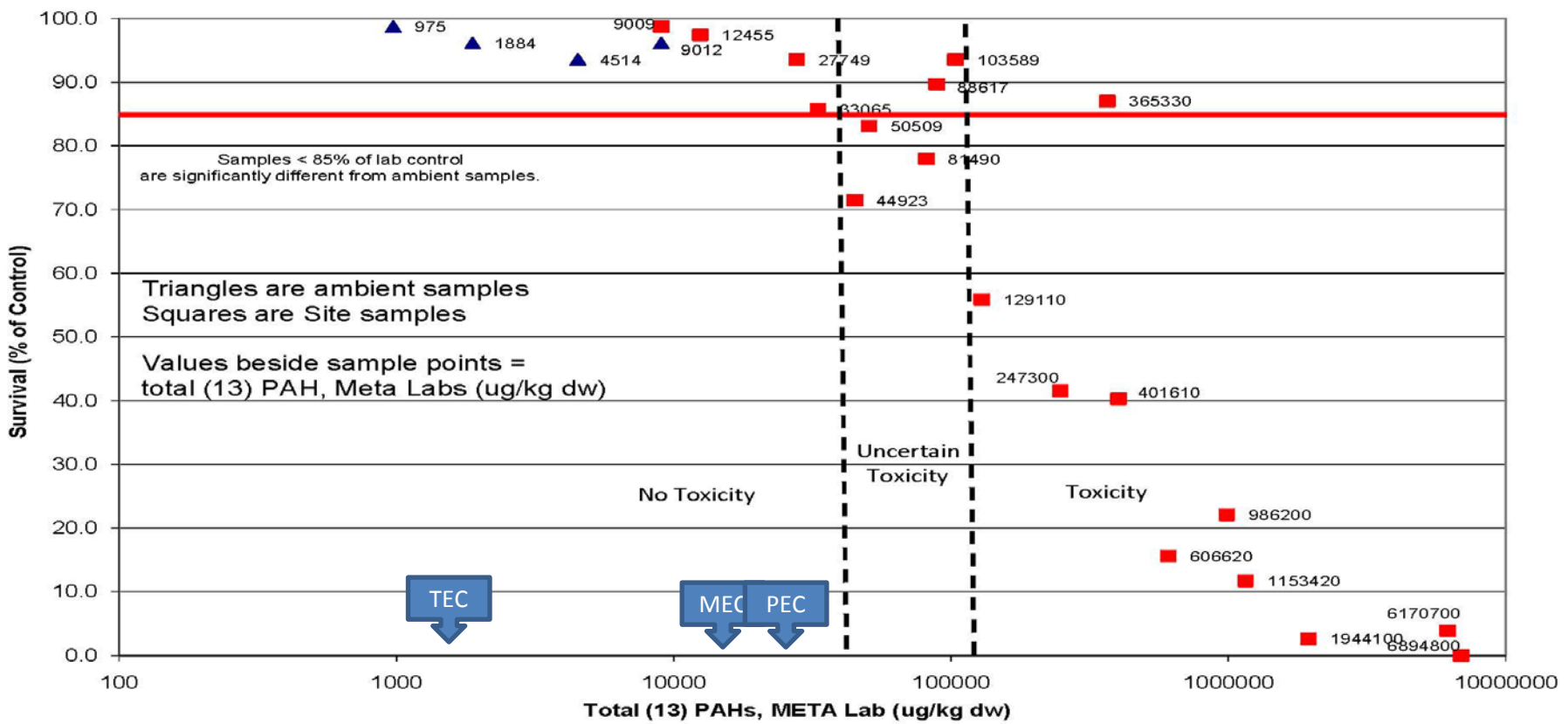
Risk Assessment

- Data is provided to risk assessor for statistical analysis to develop risk values
- There are many statistical tools available which can be a source of disagreement in interpretation.
 - What is an acceptable rate of correlation?
 - What is an acceptable percent growth and survival?



Using Risk to Establish Environmental Standards

Figure D9-1. Total (13) PAH vs. Survival (% Lab Control)



ES

Key Points of Agreement

- That the department will review the risk assessment and use the results as the environmental standard and site-specific cleanup value
- Understanding that the results of the risk assessment are site specific and are not intended for use as generic cleanup targets for other sites (i.e., site specific numbers should not be subject to the perception of setting precedent for other sites)

Future Consideration

- Develop a vetted set of enforceable sediment standards to provide an off ramp for sites
- Establish clear guidelines on methods for determining background and ambient conditions
- What numbers apply to mudflats and other areas that are partially submerged during the year?