The Role of Tradeoffs in Sediment Management

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EPA's Regulatory Decision Framework for Sediment Sites

- EPA's programs are often the driver
  - Superfund, RCRA, others
- EPA's programs are **risk-based**
  - Reducing the risks from contaminated sediment sites is EPA's goal
    - Risk is often driven by fish consumption
  - This basis may conflict with some other stakeholder expectations
    - These conflicting objectives makes the discussion of tradeoffs difficult

EPA's Program Expectations

- National Contingency Plan (NCP)
  - Broad, risk-based framework
  - EPA balances remedy selection between two opposing views
    - Full restoration → cost not a concern
    - Protect by controlling exposures → cost important
  - EPA uses nine criteria to evaluate options
- 11-Principles policy
  - Stakeholder involvement
  - Scientific framework
  - Decision framework → risk management goals

Superfund's Nine Criteria

- Threshold Criteria
  - Overall protection of human health and the environment
  - Compliance with ARARs
- Balancing Criteria
  - Long-term effectiveness and permanence
  - Reduction of toxicity, mobility or volume through treatment
  - Short-term effectiveness
  - Implementability
  - Cost
- Modifying Criteria
  - State acceptance
  - Community acceptance

Tradeoffs are Not Always Necessary

- Tradeoffs at sediment sites may not be necessary or useful when:
  - Stakeholders agree on the course of action
    - Science is clear
    - Outcome is reasonably certain
  - There are no choices of management options
  - The cost of assessing and resolving tradeoffs is high relative to the cost of the work
- Some situations may be so critical that a response should be immediate

Tradeoffs in Sediment Management

- Study vs. Action
- Limitations of technology vs. risk based goals
- Cost vs. degree of protection
- Short-term impacts vs. long-term risk reduction
- Finality vs. long-term management

Study vs. Action

- Tradeoffs are made when extensive study is occurring vs. implementation of action
  - Basic needs are valid conceptual site model and good understanding of remedial options
- Questions to ask in balancing approaches:
  - How much information and best way to obtain?
  - Can approaches be combined for better outcome?
- Apply a consistent standard of review to information developed
  - Use a weight of evidence approach
  - Balanced treatment of all available data

Study vs. Action (cont.)

- Examples of less effective balance of tradeoffs
  - Studies conducted without being designed to answer a fundamental site question
  - Study for decades with no progress
  - Rushed decisions made without sound science
    - Political, community, or other pressures
- Examples of effective balance of tradeoffs
  - A truly phased approach
    - Combine site progress with ability to get quality data
    - Information from first steps influence later steps

Limitations of Technology vs. Risk Based Goals

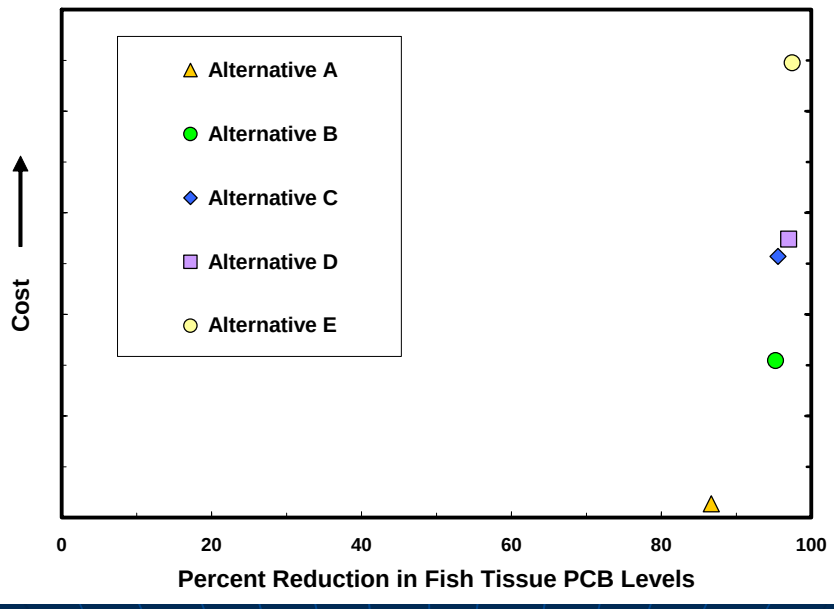
- Goals for sediment cleanups are site-specific consistent with EPA risk based approach
  - Can result in differences between sites including numerical goals and media addressed (e.g. fish vs. sediment metrics)
- Goals at some sites may not be attainable with any technology
- A comprehensive review of technology effectiveness and risk reduction at completed sites is lacking
  - Analysis tends to be anecdotal
  - Analysis does not always focus on key objectives

Limitations of Technology vs. Risk Based Goals (cont.)

- Examples of less effective balance of tradeoffs
  - Unsupported assumptions of what technologies can do leading to remedies that don't reduce risk
  - Site goals that are unclear, unrealistic, or not based on risk reduction
  - Failure to measure remedy performance
- Examples of effective balance of tradeoffs
  - Establishment of key risk-based parameters and measurement of the trends over time
    - Focus on system-wide performance
  - Use of pilots or other studies to establish realistic, site-specific technology expectations

Cost vs. Degree of Protection

- Sediment remediation costs can be significant
  - Driven by the size of the project and technology chosen
- What is reasonable to pay for cleanup relative to the magnitude of the actual risk?
  - In view of degree of uncertainty with remedial outcomes
  - In view of degree of uncertainty in assessing current and expected future risks
- There may be large cost differences for similar expected outcomes
- There are fundamental differences of opinion on the appropriateness of institutional controls to control risk

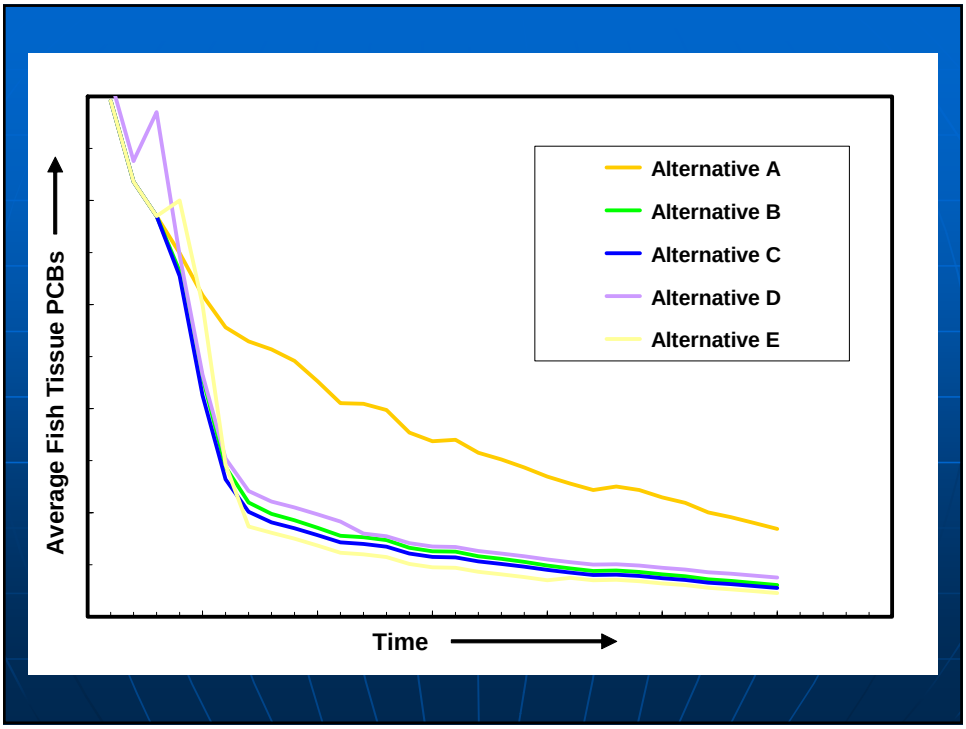


Cost vs. Degree of Protection

- Examples of less effective balance of tradeoffs
  - Spend money, time, resources on remediation and limited or no effect on site risk
  - Decisions that fail to prioritize resources expenditures
- Examples of effective balance of tradeoffs
  - Conduct early, discreet actions that are expected to be beneficial and prioritize resources
  - Expend resources to get best bang for the buck

Short-term Impacts vs. Long-term Risk Reduction

- EPA's short/long-term effectiveness criteria better fit a model of a short construction period
  - Large sediment sites often involve lengthy cleanup
- The science needs to be improved to provide realistic assessments of risk and impacts
- All remedial options will have risk tradeoffs
  - Risks should be assessed against no action
  - Some options may transfer the risk
  - Risks may be manageable, but should be understood



Short-term Impacts vs. Long-term Risk Reduction (cont.)

- Examples of less effective balance of tradeoffs
  - Remedial response that causes harm
  - Failure to account for short term impacts can skew remedy evaluation
- Examples of effective balance of tradeoffs
  - Manageable short-term effects and real long-term risk reduction
  - Use of reasonable construction corrective action triggers to help control short-term effects

Finality vs. Long-term Management

- All parties want closure
- Characteristics of complex sediment sites can make this difficult
  - Limits of technology, risk based goals, costs
- Need to consider ability to meet long term management needs
- Role of permanence
  - Relates to the potential for long-term risk
  - Does not necessarily equate to mass removal

Finality vs. Long-term Management (cont.)

- Examples of less effective balance of tradeoffs
  - Desire for “final” decisions may influence scope without adequate understanding of outcome
  - Lack of follow-up due to desire for finality
- Examples of effective balance of tradeoffs
  - Realistic assessment of relationship between remedial options and long term management needs
  - Flexible phased approaches that provide for modifications based on performance

Concluding Observations

Sound Science is Needed to Assess Tradeoffs

- Science needs to be advanced in fundamental areas to help future decision-making
  - System processes that affect risk and remedial outcomes
  - Effectiveness and limitations of technologies
- Sound science can help assess tradeoffs
  - Fundamental to good decision making
  - Needs to be employed to support realistic assessments
    - What can be achieved from a risk reduction standpoint
    - Cost and consequences of various approaches

Balancing Tradeoffs

- Need to maintain focus on risk reduction as the goal for sediment cleanups
- All parties would benefit from a comprehensive assessment of what happened and why at past cleanups
  - Could provide information on:
    - Technology effectiveness
    - Risk reduction outcomes (short-term and long-term)
    - Cost (predicted vs. actual)

Tradeoffs are Inevitable

- There are no perfect solutions to complex sediment sites
- It is important to try to find a balance in the tradeoffs to allow progress to be made
  - A phased approach may start to reduce risks while providing quality information to assess future decisions
- It is important to work together to try to find common ground