

Criteria for Sediment Remediation Technology Selection

Contaminated Sediments Virtual Workshop Session 3 - Remediation
Technologies

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My Background: Multiple Sides of Consultancy

- Start: consultant for industry
- Middle: consultant for NRDA trustees
- Current: consultant for EPA and state regulators

- Biggest remedy selection hurdles I've encountered regardless of position?
 - Data-related issues
 - Thinking “outside the box”
 - Incorporating adaptive management
 - Creating a win-win-win scenario

Tools in the Toolbox

- Dredging/excavation
 - Residuals control
- Capping
 - Sand
 - Amendments
 - Geotextile
- MNR/EMNR
- In situ treatment/immobilization
- To be determined?

- Evaluating the Tools in the Toolbox
 - Protection of human health and the environment
 - Compliance with ARARs
 - Long-term effectiveness and permanence
 - Reduction of toxicity, mobility or volume
 - Short-term effectiveness
 - *Implementability*
 - *Cost*
 - *State acceptance*
 - *Community acceptance*

Regardless of Tool: Data, Data, Data

- **Accurate CSM and adequate baseline data set is KEY**
 - If baseline data set is inadequate...
 - Selected remedy might not be effective
 - Selected remedy might BE effective, but you can't show that it is
- Data needs to be sufficient to:
 - Overcome environmental sample variability
 - Understand contaminant distribution, develop CSM, and select remedy
 - Measure the effectiveness

Understanding Data: Developing Models and CSMs

- **Understand model strengths and limitations**
 - Models are only as good as the data that goes into them
 - Consideration when collecting data sets
 - Models are “A” line of evidence, not “THE” line of evidence
 - Need to understand implicit assumptions in models
- **Ensure CSM reflects the empirical data**

After CSM, Can We Remediate “Outside the Box”?

- **Sequential targeting**
 - Target most “significant” areas first
 - Allows recovery to happen while working through the rest of the process
- **Use mixture of approaches**
 - Utilize natural processes to advantage
 - May not be a one size fits all approach
 - Technologies may be better suited based on accessibility, level of contamination, volume of material, etc.
- **Pilot scale projects and treatability studies**
 - Allows verification that a technology, especially a novel one, can be effective

Remediating “Outside the Box”

Interactive Example

- Shallow braided river
- Northern climate (i.e., snowmelt runoff)
- Contaminated sediment deposits scattered in eroding banks and floodplains
- Primary risk drivers: fish in the river, moles in the floodplains
- Landowners want to be able to eat the fish again (willing to accept some burden), but wants natural river function

How could we address this site? How do we select a remedy that protects the fish and moles, but is implementable and cost-effective?



https://en.wikipedia.org/wiki/Braided_river#/media/File:Waimakariri01_gobeirne.jpg; Accessed 09-September-2019

Remediating “Outside the Box”

Interactive Example

- Could attempt the usual dredge/excavate, but accessing all the sediment deposits would face logistical concerns and potentially be cost prohibitive.
- What could be an effective remedy?
 - Targeted removal and capping of the terrestrial deposits that pose risk to the moles
 - Channel realignment to provide a clean fish corridor
 - Benching to allow natural connection between river and floodplain, but limit erosion of banks and floodplains
- Who wins?
 - Regulator achieved risk reduction
 - Implementing party achieved an effective remedy with minimized cost
 - Landowner acquired resource use

Utilizing Adaptive Management

- Key to complex sediment sites
- Allows us to deal with unknowns or unexpected developments
- Likely be a part of most major remedies going forward!!!!
- In practice, not as simplistic as it sounds
 - Stepwise process can get it accomplished
- AM steps need to be defined to have collaborative stakeholder engagement

Utilizing Adaptive Management

Interactive Example

To help get all parties on board with an adaptive management approaches, what 5 main components of an adaptive management plan need to be identified and agreed upon?

Utilizing Adaptive Management

Interactive Example

- Identify ***objectives*** of remediation
- Identify ***indicators*** of the objectives
- Identify empirical ***lines of evidence*** for indicators
- Identify ***triggers/thresholds***
 - Temporal scale
 - Spatial scale
 - Empirical values
- Identify ***actions*** for attainment or non-attainment

- Expect updated guidance from EPA

Creating Win-Win-Win Scenarios

- **IT IS DIFFICULT, but can be better than the alternative....**
- **Open and honest communication**
 - Use of smaller technical working groups
 - Everyone has different constraints
 - Everyone has different desires
- **Understand that everyone can win “something”**
 - Parties are more likely to work collaboratively if they have something to actually gain

Creating Win-Win-Win Scenarios

- **Find opportunities for cost sharing/savings**
 - Beneficial reuse
 - Multitasking
 - e.g., piggy-back field work to minimize costs
 - Cost sharing
 - easier to do when all stakeholders at table

Remedy Selection: Implementability, Cost and Acceptance

- **Accurate data adequate for needs**
- **Understand model strengths and limitations**
- **Be flexible when it comes to choosing technologies**
- **AM steps need to be defined to have collaborative stakeholder engagement**
- **Open and honest communication**
- **Creative with costs**



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