

ROP Work Group Update

South River Science Team
Meeting

April 23, 2010

ROP Task Teams

- Engineering Options
- Methylation and Demethylation Processes
- Trophic Modification

Engineering Options Task Team Members

- Robert Brent (JMU / VADEQ)
- Reed Harris (Reed Harris Environmental, Ltd.)
- Ralph Turner (RT Geosciences, Inc.)
- Dick Jensen (Unique Environmental Services)
- Jim Pizzuto (University of Delaware)
- Todd Morrison (URS)
- Bill Berti, Jim Dyer, Nancy Grosso, Rich Landis, Mike Liberati, Mike Sherrier (DuPont)

Engineering Options Task Team Purpose and Scope

- Identify, explore, evaluate, and test engineering solutions for the South River system that impact physical transport. In so doing, we will
 - Use the conceptual pathway and exposure diagrams as a guide
 - Focus on the technical and scientific aspects of an option
 - Explore and evaluate deployment methods of different technologies
 - Identify and define potential unintended consequences of a technology, and explore tradeoffs
- Evaluate effectiveness of pilot tests in achieving goals, and determine feasibility of implementation on a larger scale.
- Recommend promising technologies to the SRST ROP and SRST for consideration as a remedial alternative.
- Communicate activities and progress to greater South River Science Team

Engineering Options Activities for 2010

1. Conceptually design and cost out an amendment pilot
 - Identify suitable areas
 - Continue lab studies of *SediMite* and University of Waterloo characterization
 - Candidate treatments: *SediMite*, biochar, MnO₂, Others

2. Conduct a survey of eroding banks and HRADs that might be significant sources of loading to the SR
 - Establish important parameters needed to identify suitable design elements
 - Compile suite of designs desired that span a range of engineering complexity

3. Support development of Mesocosm Test System for experimental manipulation at SR

4. Develop program to identify the significant Hg pools:
 - Establish link between soil in eroding banks and aquatic biota
 - Invite Experts to discuss feasibility of using stable Hg isotopes
 - Evaluate the effect of sediment aging with respect to decreased bioavailability

5. Other Activities
 - Track Trophic Modification and Methylation / Demethylation Task Team activities
 - Track Eco study and other results as they inform the conceptual model / exposure diagram
 - Review and interpret effectiveness monitoring data at Bank Pilot

Methylation / Demethylation Processes Task Team (M/DPTT) Members

- Ralph Turner (RT Geosciences, Inc.)
- Reed Harris (Reed Harris Environmental, Ltd.)
- Todd Morrison, JR Flanders (URS)
- Erin Mack, Nancy Grosso, Jim Dyer, Bill Berti, Mike Liberati (DuPont)

M/DPTT Team Purpose and Scope

- Identify, explore, and where possible, quantify processes controlling the concentration of methylmercury in the South River. In doing so we will:
 - Evaluate the current scientific knowledge on methylation and demethylation processes and how it may apply to the South River system.
 - Use the existing research programs current data set, conceptual pathway, and exposure diagrams as a guide
 - Explore and evaluate different technologies for controlling methylation and demethylation processes in situ
 - Identify and define potential unintended consequences of a technology, and explore trade-offs
- Using the information generated from these activities we will:
 - Evaluate effectiveness and large scale feasibility of laboratory scale experiments or pilot tests addressed at reducing the concentration of methylmercury in the South River system.
 - Recommend promising technologies to the SRST ROP and SRST for consideration as a remedial alternative.
 - Communicate activities and progress to greater South River Science Team

M/DPTT Activities for 2010

- Table of “turnable environmental knobs” that affect meHg production (*Dyer, Harris, Flanders*)
 - Table / Diagram / Hypotheses
- Literature review on demethylation processes (*Flanders, Dyer*)
- Demethylation Processes “Summit” (*Mack*)
 - Involve researchers / collaboration w/Oak Ridge
- Workshop on nutrient effects on net methylation of Hg (*Dyer, Harris*)
- Peer review of SediMite program (*Grosso*)
 - Collaborate with other interested groups
- Revisit role of SAV in net methylation of Hg (*Morrison*)

M/DPTT Discussion

- What will be the effect of scheduled changes in STP nutrient inputs?
 - What data is needed to document changes and effects?
 - How can we take advantage of this event?
 - Can we integrate our work on environmental controls of MeHg against the backdrop the STP changes? (e.g. test hypotheses)
- How to measure changes in net meHg production?
 - Environmental measurements?
 - Tissue concentrations?
 - Assays?

Trophic Modification Task Team Members

- Don Kain, Calvin Jordan – DEQ
- Paul Bugas – DGIF
- Greg Murphy – URS
- Mike Liberati, Bob Hoke, Nancy Grosso – DuPont

Trophic Modification Task Team

Purpose and Scope

- Identify, explore, evaluate, and test options for the South River system that will increase the opportunity to catch a fish that is safe to eat (meHg < 0.3ppm), or provide other benefits for stakeholders. In so doing, we will
 - Focus on the technical, scientific, and stakeholder aspects of the options
 - Use the conceptual pathway and exposure diagrams as a guide
 - Identify and define potential unintended consequences of a technology, and explore tradeoffs
 - Propose pilot tests of promising options
- Evaluate effectiveness of pilot tests in achieving goals, and determine feasibility of implementation on a larger scale.
- Recommend promising options to the SRST ROP and SRST for consideration as a remedial alternative.
- Communicate activities and progress to greater SR ROP and SRST

Discussion Results

- Two broad categories of options
 - Increase the recreational opportunity to catch more fish, larger fish, and/or safe-to-eat fish
 - Manipulate the aquatic system to promote production of safe-to-eat fish

Increase Recreational Opportunities Options

- Expand trout stocking program
 - Supplement system with clean (perhaps adult) fish (different species “golden”, common trout, triploid trout)
- Create a trophy/quality bass river
 - May need a more stringent consumption message

Manipulate Aquatic System Options

- Increase fish growth rates to decrease fish tissue Hg burden
- Reduce SAV, if it is determined to be associated with increased fish tissue Hg levels
- In cold water areas, modify river habitat to favor trout