

# ROP Work Group Update

South River Science Team  
Meeting

July 14, 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 Activities for 2010

1. Conceptually design and cost out an amendment pilot
2. Conduct a survey of eroding banks and HRADs that might be significant sources of Hg loading to the SR
3. Support development of Mesocosm Test System for experimental manipulation at SR
4. Develop program to identify the significant Hg pools
  - DGT probes, U of Waterloo work
5. Evaluate Effectiveness of Bank Stabilization Pilot
6. Track activities of other SR Task Teams

# Amendment Pilot Planning

- Leading amendment candidates:
  - Activated carbon (“SediMite”)
  - Biochar
- Potential locations identified in Matrix
  - Leading candidates are ponded areas on the floodplan
- Parallel Efforts going forward
  - Define specific pilot objectives, success criteria and metrics
  - Complete lab testing of activated carbon and biochar (Smithsonian and Waterloo)
  - Assess permitting requirements and submit application
  - Complete design 3rd to 4Q2010
  - Complete baseline monitoring for pre-remedy conditions
  - Implement pilot 2Q2011
  - Monitor

# Areas of Significant Loading from Banks

- Initial loading estimates completed by Pizzuto in 2Q09
  - Modeling to refine loading estimates underway 3Q10 (Pizzuto)
    - Examples of Variables that may be controlling factors in Hg deposition and subsequent erosion
      - River slope
      - Elevation of surface
      - River migration / geometry
      - Vegetation (current and historic – if resolvable)
      - Dams
      - Geology
- Test / Confirm Model with sampling (4Q10)
- Preliminarily rank & prioritize banks RRM 0 to 10 (4Q10 to 1Q11)
- Riverbank reconnaissance with Interfluve (2Q11)
- Design Options for stabilization (2Q11)
- Select site(s) for 2012 work
- Explore opportunities to partner with VA DCR and Stakeholders
  - Is there synergy between implementing TMDL plan for nutrients, sediments and bacteria and reducing Hg loads from banks and floodplain?

# Mesocosm Study Update

- ✓ Mesocosms constructed and field tested
  - ✓ 6 week deployment completed
  - ✓ Algae sampled at 2, 4, and 6 weeks to compare Hg levels with river-collected algae
- ❑ Awaiting Hg data



# Mesocosm Study Update

- ✓ Mercury source experiment is underway
  - ✓ 2x2 experimental design with clean/dirty water and clean/dirty sediment is ongoing at Augusta Forestry Center on South River and JMU Farm on North River
- ☐ Experiment will run until August 12

		Sediment Source	
		North River	South River
Water Source	North River	Negative Control	Treatment 1
	South River	Treatment 2	Positive Control

# **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 Activities

- Two conf. calls since April SRST meeting
- Table of “turnable environmental knobs” that affect meHg production (*Dyer, Harris, Flanders*)
  - Draft table prepared with literature references
- Demethylation Processes (*Mack*)
  - Literature review on demethylation processes in prep (*Flanders, Dyer*)
  - Initial outreach to Oakridge as collaborators (*Mack*)
- Nutrient effects on net methylation of Hg (*Dyer, Harris*)
  - Draft figure and table prepared describing effects of nutrients on fish Hg (*Harris*)
  - Review of Robert Brent proposal to characterize SR response to decreased Phosphorous loading from STP (*Group*)
- Peer review of SediMite program (*Grosso*)
- Revisit role of SAV in net methylation of Hg

# 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**

- 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.

# 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
- In cold water areas, modify river habitat to favor trout

## **Next Steps**

- BASS model predictions for stocked fish
- River temperature survey
- Recommendations to ROPs

# Supplemental Slides

# 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

# 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

# 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