2009 Expert Panel Feedback Review and Discussion

South River Science Team Meeting

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Questions to Guide Expert Panel Feedback

1. **Have we sufficiently characterized the South River aquatic environment?**
    - Consensus on predominant pathways by which IHg & other constituents/conditions for methylation enter & move through aquatic system to sites of methylation
    - Consensus on how Hg subsequently bioaccumulates within food web to fish?
2. **Are we considering an appropriate blend of innovative watershed management & remedial technology options for managing risk & reducing MeHg levels in fish?**
    - Overlooking opportunities to modify critical methylmercury production compartments/ processes or bioaccumulation pathways that will reduce MeHg concs. in South River biota?
3. **Have we collected & analyzed sufficient data to reach a consensus understanding of fate & dynamics of Hg in the terrestrial environment adjacent to the South River?**

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Summary of Expert Panel Recommendations

#1

- Confirm conceptual models (for baseline conditions in particular) via data synthesis/analysis & “minimum essential” numerical modeling.
- Reduce uncertainty via manipulation experiments in lab & field
  - Hyporheic zone & link between Hg in eroding banks & riverbed
- Implement exp. programs to manipulate MeHg conc. in major production compartments
  - Microbes, microhabitats, & chemical inhibitors
- Better understand MeHg points of entry into invertebrate community
  - How to manipulate and impact of nutrient reduction

#2

- Form 3 remedial option working groups to pursue
  1. Engineering options
  2. Microbial methylation
  3. Trophic modification
- Drive **above** experimental & modeling efforts from within work groups
- Include microbiologists
- Partner w/ TMDL implementation projects for DO, P, & habitat improvements

#3

- Use population level effect as benchmark for terrestrial environment & assess data to date to confirm
- Focus on reducing MeHg bioaccumulation in aquatic organisms first

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Follow-up Since October Meeting

- Requested additional comments/clarifications from expert panel members on their recommendations
  - received some clarification notes from Gary Bigham
- Processed panel feedback within DuPont SRST and discussed evergreen action plan
- Reconciled characterization and remedial options recommendations (#1 & #2) from expert panel with recommendations from the Innovative Remedial Options Task Team
  - pleased with consistency and overlap
  - discussed and processed at ROPs Workgroup meeting on 12/2/2009
- Action items in progress
  - Form 3 ROPs working groups as suggested
    - team structure and team members proposed (Nancy Grosso presentation to follow)
  - Category #1 recommendations will be processed within ROPs working groups
    - working groups will propose action plans in 2010
  - Mass balance task team met in December to review study area pore water data to date and develop action plan for consensus building and closure

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Expert Panel Recommendations from October 2009 Meeting in More Detail

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1. Have we sufficiently characterized the South River aquatic environment?

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- Consensus on how Hg subsequently bioaccumulates within the food web to fish?

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Question 1: Answer

Assumptions made by expert panel:

- Goal of "sufficiently characterized" is to guide remediation options.
- We are not recommending options with goal of reducing Hg in fish to some specific tissue concentration. Recommendations are to continue to make progress and guide remediation.

We suspect the answer is yes, but it hasn't been demonstrated yet in a <u>weight of evidence fashion</u> (e.g., are data collected from various studies consistent with each other?). <u>The data need to be synthesized</u>.

Question 1: Recommendations for IHg

Quantify conceptual model using existing data and starting with low-flow (baseline) conditions

- Map out potential sources (e.g., channel margin deposits, bedrock, cobble beds). (HIGH)
- Assign source terms and mass balance and compare with water quality data. (HIGH)

Reduce uncertainty through manipulation (e.g., laboratory experiments, field pilot studies) to help support modeling efforts

- Determine connection of eroding banks and riverbed in parallel with modeling effort (HIGH)
- Determine mechanism of circulation within cobble/hyporheic zone (embedded gravel beds) (HIGH)

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Question 1: Recommendations for MeHg

Conduct experimental work to see how MeHg concentrations can be manipulated, focusing on major potential sources of MeHg to the food chain

- Manipulate microbial communities or discourage specific microhabitats to understand MeHg in hyporheic zone (HIGH)
- Investigate potential chemical inhibitors

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Question 1: Recommendations for Bioaccumulation

Understand points of entry for MeHg into the invertebrate community to identify a potential component that can be beneficially manipulated. (HIGH)

Evaluate the effects of nutrient reduction on the macroinvertebrate community. (HIGH)

Questions to Guide Expert Panel Feedback

2. **Are we considering an appropriate blend of innovative watershed management & remedial technology options for managing risk & reducing MeHg levels in fish?**
   - Overlooking opportunities to modify critical methylmercury production compartments/ processes or bioaccumulation pathways that will reduce MeHg concs. in South River biota?

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Question 2: Answer

Good start, but need to form work groups to allow input from a larger group of individuals

Question 2: Recommendations

Form 3 working groups to start formulating and designing pilot studies (coordinate efforts with manipulation experiments mentioned in Q1). (HIGH)

- Engineering options (sediment caps, bank stabilization, and point source control)
- Microbial manipulation (methylation)
- Trophic modification

Include microbiologists in work group(s). (HIGH)

Continue to partner with others working with nutrient, dissolved oxygen, and physical habitat issues in this reach of the South River (e.g., Dominion Power). (HIGH)

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Questions to Guide Expert Panel Feedback

3. Have we collected & analyzed sufficient data to reach a consensus understanding of fate & dynamics of Hg in the terrestrial environment adjacent to the South River?

Question 3: Answer

Assumptions made by expert panel:

- We assume that no "population level effect" exists in the terrestrial environment. Should this assumption be demonstrated to be invalid, we would need to revisit this question.

We don't believe that data have been collected and analyzed in an appropriate manner to answer this question (e.g., a manner to be able to make inferences about population and a manner to determine whether the MeHg in spiders is coming from an aquatic or terrestrial source). It may not be necessary to address details of MeHg cycling in the terrestrial environment unless population level effects are demonstrated. Successful population level effect studies have been performed and are possible.

Question 3: Recommendations

Use population level effect as a benchmark in the terrestrial environment

- Assess data gathered to date to determine whether a population level effect exists (HIGH)

Focus on reducing MeHg bioaccumulation in aquatic organisms first (HIGH)

Observe the effect on the terrestrial food web. (LOW at this time)