

# South River Science Team

April 26, 2011

## Minutes

**Welcome, Introductions:** *Don Kain, DEQ*

**Eco-Study Field Schedule:** *Greg Murphy, URS*

- This year's objectives:
  - Further assess potential impacts to benthic macroinvertebrate communities
  - Further develop baseline physical and biological monitoring data sets for potential future remedial options testing
  - Assess benthic macroinvertebrate community structure and colonization dynamics along mercury gradient
  - Baseline Monitoring Program
  - Monitor surface water Hg concentration along with VDEQ parameters
  - Monitor Hg concentrations in the muscle tissue of bass using non-lethal sampling approach
    - Will Clements asked if lipids would be included in tissue sampling. Answer was no. Mercury is not attracted to lipids like PCBs.
- Next steps:
  - Conduct field sampling
  - Meet with NRDC May 24
  - Integrate 2011 data and continue statistical evaluations
  - Draft ecological report

**South River Conceptual Model Update:** *Nancy Grosso, DuPont; Greg Murphy, URS*

- Objectives:
  - Identify Hg sources and pathways that are primarily responsible for elevated Hg levels in smallmouth bass in the South River
  - Identify specific pathways that are feasible to interrupt to effectively reduce Hg levels in smallmouth bass
- Approach

- Focus on RRM 0-5
  - Focus on Hg sources and pathways leading to bass as the receptor
- Some example key assumptions/observations for abiotic pathways in the CSM:
  - Key assumption:
    - Inorganic Hg sources in the outfall, tributaries, in bank soils, GW and others are assumed to be equally available for methylation.
    - MeHg production in the river is based on bed area and measured pore water concentrations (bed area x pore water concentration).
  - Key observation:
    - Direct loading of MeHg from floodplain soil is small compared to MeHg production within the wetted perimeter of the river.
- Created table of Hg sources and data/references.
  - Example:
    - Tributaries- Eco Study Data (April/May/June 2008); Calculated Daily Mercury Budget for South River (Dyer and Flanders, revised 4/2/2011)
- Created similar table for biotic pathways
- Some example key assumptions/approach for biotic pathways in the CSM:
  - Key approach:
    - Top down approach emphasizes relative importance of final MeHg pathways to smallmouth bass; while bottom up approach emphasizes relative importance of initial MeHg pathways from basal resources to aquatic consumers.
  - Key assumption:
    - Differences between dietary and aqueous treatments observed during in situ uptake experiment are representative of true conditions.
- Next steps:
  - Develop schematic “Mercury Movement through the South River”
  - Refine CSM by incorporating results of 2011 efforts
  - Develop Aquatic CSM under storm conditions
  - Develop aquatic CSM for rrm 5-11
  - Develop floodplain CSM
- Implications of storm event on abiotic portion of CSM:
  - Key issue is the potential for a major storm to mobilize Hg and induce a newly contaminated state
  - Floodplain runoff contribution likely to increase
  - Need to consider impact of wet-dry cycling on methylation in banks and on floodplain.
- Implications of storm event on biotic portion of CSM:
  - Wet-dry cycling and inundation-induced methylation impact on terrestrial biota
  - Potential change in aquatic invertebrate biomass and community structure; through evidence that effects are short-term in duration
  - Change in mercury bioavailability for aquatic invertebrate uptake

- Effect on fish reproduction
- Clarifications/comments:
  - Most bank erosion occurs in small events but there is more erosion during wet years than dry. Freeze/thaw events causes much of the erosion.
  - Baseflow=baseline
  - Foodweb sources: 90% aquatic; 10% terrestrial
  - Will model change going down stream?
    - Upstream contribution will increase
  - Question on quality of organic carbon. Possibly use SUVA analysis.

**Waynesboro STP Upgrade:** *Audra Sandridge, City of Waynesboro*

- Old plant built in 1950. 4 MGD capacity with wet weather flows ranging from 10-14 MGD. Bypass occurred around 10 MGD. Discharge parameters: BOD-6 mg/L, TSS-13 mg/L, TN-14 mg/L, TP-3 mg/L
- New plant upgraded to 6MGD activated sludge facility. It has successfully handled wet weather flows at 21 MGD with no bypass. Discharge parameters: BOD-0 mg/L, TSS-0 mg/L, TN-1.78 mg/L, TP-.15 mg/L

**Update on University of Waterloo Studies:** *Rich Landis, DuPont*

- Waterloo continues to treat South River soils and sediments with different carbon soil amendmets. See slides for data. A brand of charcoal called "Cowboy Charcoal" found to do a good job at preventing methylation of Hg from contaminated South River soils. Because of experiments, Cowboy Charcoal chosen for amendment work.

**Amendment Pilot Update:** *Ceil Mancini, URS*

- A pond has been selected on Wertman property in the 2 year floodplain (RRM 9.3) for amendment experiment. Pond has been thoroughly characterized. Barrier will be placed in pond to create two cells. Cowboy Charcoal will be used as carbon amendment.
- 3 working hypothesis:
  - Addition of amendment will reduce Hg concentrations in pore water by at least 50%.
  - Addition of amendment will reduce Hg concentrations in benthic invertebrate tissue by at least 50%.
  - Benthic community structure does not differ among control and amended cells within pond.
- Backup may need to be selected if invertebrates and fish are found to have low levels of methyl mercury.

**Additional Floodplain Sampling:** *Ceil Mancini, URS*

- Because of findings from the 2008 floodplain sampling, EPA and DEQ have asked DuPont to take additional floodplain samples and to also sample fish in floodplain ponds. This work will be done May/June.

**Geomorphology Update:** *Jim Pizzuto, University of Delaware*

- Scour chain work at RRM 4.3
  - Virtually no scour during 1 year events.
- New topographic data from USGS LiDAR from Jan 2010
  - Data are incomplete, noisy and difficult but still useful.
- Estimates of Hg concentrations and loadings in streambanks RRM 0-10
  - Map has been created

**South River Nutrient Study:** *Robert Brent, JMU*

- Robert and students took water samples and, placed out rock trays and collected periphyton samples, measuring growth of periphyton, nutrients and Hg concentrations above and below STP discharge before and after upgrades.
- Conclusions:
  - Upgrades definitely reduced nutrients in effluent.
  - Upgrades significantly reduced downstream phosphorus and to a lesser extent nitrogen.
  - Upgrades appear to have little effect on periphyton biomass.
  - Upgrades may have contributed to reduce methylation or reduced uptake in periphyton.
  - Study should be continued this summer to compare results with the same season.

**Outreach Proposal-JMU Promotores Program:** *Susannah Lepley and Joanna Jensen, JMU*

- The Promotores de Salud program is a lay health worker program that uses members of the Latino community to communicate and promote healthy living to members of their community by improving access to health care and health education. Historically health topics have included community resources, HIV/AIDS, family planning, vaccination, blood pressure, etc. DuPont /SRST will be using the Promotores Program to effectively communicate the fish consumption advisory on the South River and South Fork Shenandoah to the Latino community.

**Wrap up. Action Items, Next Meeting:** *All*

- There will not be a summer SRST meeting. Rather than assembling the full SRST, there will be a meeting between DuPont and the entities involved in legal or regulatory issues regarding the South River or the former plant site. Date and location TBA.
- Next meeting of the SRST will be the Expert Panel Meeting. Date set for October 12th and 13<sup>th</sup> (Wednesday and Thursday).