

Agenda

South River Science Team

Feb 10, 2004

Participants: Full Science team (Expert Panel Members by phone 11:00 – 1:00)

Time	Topic	Presenter
9:00	Welcome, introductions	Don Kain
9:15	Clam studies	Tom Benzing, Doug Graber Neufeld
9:45	Crop studies, Phase 2	Bill Berti / Dean Cocking
10:15	Floodplain sampling	Annette Guiseppi-Elie
10:30	Fish Contaminant Symposium briefing	Erin Mack
10:45	Break	
11:00	Status of surface water sampling	Ralph Turner (via phone) Ted Turner
11:30	Status of shake and bake experiments	Rob Mason
12:15	Working Lunch	
12:15	Review / analysis of Hg data	John Rudd (via telephone)
12:45	Stormwater sampling, Phase 2	Mike Sherrier
1:15	Geomorphology / Modeling	Nancy Grosso
1:30	Outreach / communications <ul style="list-style-type: none"> • General • Newsletter • Bilingual signs, communication with non-English speaking community 	<ul style="list-style-type: none"> • Rick Straitman • Mike Liberati • Paul Bugas, Chris Nye
2:00	DEQ Hg Technical Advisory Committee	Don Kain
2:15	Statistical projections	John Greene (via phone)
2:45	Manuscript	Ralph Stahl
3:00	-Working hypotheses -Data gaps / priorities -Other Issues, Next Meeting	Ralph / Don

South River Science Team Bimonthly Meeting Summary: 10 February, 2004

Welcome and Introductions - Don Kain.

- Ms. Bonnie Nauman, reporter for News Leader introduced.
- Don gave brief history leading to formation and mission of the South River Science Team (SRST).
- 30 members in attendance (see Attachment 1, page 9)
- Explained original monitoring schedule devised as result of LMS study (see Attachment 2, page 10) and used that as a reference point to indicate the increased level of monitoring effort attributable mostly to SRST.

Clam Studies. Tom Benzing and Doug Graber-Neufeld

- Collected at 7 of 10 planned sites; tough year finding clams; possibly blown out by Hurricane Isabel.
- Frontier lab did the analyses; used new technique with lower detection limit.
- MeHg % ran approx. 20-50% of total.
- MeHg results were much less variable than the total Hg
- Clam Hg concentrations lower in 2003 than in 2002. (maybe “clean” clams swept downstream by Isabel in Sept., didn’t have time to accumulate to “full” concentration)?
- John Rudd commented that lower levels could be due to clean sediment having been swept downstream for in-place clams to filter.
- Clam tissue Hg lower this year; would fish tissue also have been lower? Might be interesting to investigate, especially if want to use clams as surrogates for fish. Might be interesting to do side-by-side clam and fish studies for several seasons or years. Recall that Greg Murphy found seasonal differences in fish tissue.
- Doug reported that caged clam experiments are currently underway.
- After 5 weeks, clean clams collected from North River adjacent to Bridgewater College and “planted” at Forestry Center had increased tissue conc. to approximately 50% of local clams at Crimora Forestry Station during Nov./Dec.
- Resident clams from the Forestry Center (contaminated section of river) have been relocated to a “clean” portion of river to monitor decreases in Hg levels over time.
- Clams are being removed and sacrificed for analysis at 5-week intervals. After 3 months, samples for MeHg will also be run.
- The method seems to be working well, now just need to establish sites for full blown investigation.
- Ralph Stahl noted that fish Hg appears to be higher in high flow years, yet clams seem lower this year, which has been very high flow.
- Interest from the team in getting an update in April at the next SRST meeting and in pursuing
- Refer to Presentations folder for Tom and Doug’s Powerpoint slides.

Fish Contamination Symposium. Erin Mack

- Presentation evaluated human risks vs. health benefits of fish tissue consumption;
- Some question as to potential Hg contamination in not just fish, but also in fish-derived omega-3 fatty acid supplements
- Indicated that medical Drs. are good routes of informing public of potential health risks; public trusts doctors; pregnant women most at risk almost always visit Dr. early in pregnancy, good time to reach that group
- Reported that USGS will build a web site demonstrating “how to build a fish consumption advisory”
- See Presentations folder for more details.

Status of Surface Water Sampling. Ted Turner (live) and Ralph Turner (via conf. call)

- Ted gave background of Intensive South River Survey adjacent DuPont Plant in Waynesboro (see Presentations folder); sample expedition results pending. Samples bracketed an area in South River adjacent to DuPont plant in which total Hg levels from August 2003 sampling increased from single digit parts per trillion numbers to about 25 ppt within 200 yards.
- Ralph Turner discussed results of Lumex and sparging apparatus used during sampling in the vicinity of DuPont outfall 001.
- Prior to sampling, had discussed that cold and wet were the worst case scenarios for the equipment to function; condensation problems, low volatilization rate of elemental Hg. This survey, however, occurred under exactly these conditions, and functioned well in spite of them.
- Had planned to do real-time, continuous readings, but was forced to use batch sparging due to cold weather
- Ralph T. thinks there’s still promise in the real-time sparging to “snoop” for hotspots
- Will check Lumex results against clean total Hg samples collected alongside DEQ during the DuPont 001 vicinity sampling event; look to see how well results correlate; but still probably can’t translate concentrations too effectively (would depend on speciation)
- Ralph T. suggests that Lumex will be most effectively used sniffing for potential hotspots, then following up on “hits” with standard clean techniques, speciation
- John Rudd pointed out that Lumex detects only volatile, elemental Hg, and that would represent Hg that could be readily oxidized in sunlight, then methylated
- Ralph and Dick found high Lumex readings around bridge at Crimora; will check out stretch from Dooms to Crimora at later date to see where jump occurs
- Dick pointed out an anecdotal incident in which the Lumex instrument was able to detect mercury from an individual’s breath (presumably related to amalgam filling) which were comparable to readings measured in South River near DuPont outfall 001.

Status of “Shake and Bake” Experiments. Rob Mason (by conference call; no slides)

- Siol / sediment samples were collected along South River during the last week in January 2004.
- Currently analyzing samples for total and MeHg; should have data in about 1 week
- Start pilot run Fri. 13, then initiate actual trial following week
- Will ensure environment is controlled between trials
- Also will plan to add DOC to mixture to stimulate bacterial activity
- If positive results (i.e., MeHg is produced), then we can probably assume that soils washing in from flood plains and eroded banks, resuspended sediments in stream beds, are still available for methylation. But if negative results, how confident to rule out bioavailability?

Stormwater Sampling; Phase II. Mike Sherrier

- Initial study (baseflow and storm) performed at 1.6 parts per billion detection limit; may have missed Hg in otherwise non-detect areas; will perform additional storm and baseflow sampling at lower detection limit (method 1631)
- Will analyze total and dissolved (assumption that dissolved will be representative of bioavailable fraction for methylation) However, Ralph’s Lumex results of “sniffing 001 yielded high spike, which J. Rudd thinks could be bioavailable
- Plan to perform 3-6 more baseflow sample events, under varying conditions, measuring tot. Hg, diss. Hg, and TSS
- Will probably do 3-4 more storm events, to see range of variance with differing intensity storms
- During storm events, can’t logistically sample total and filtered simultaneously (if filter clogs midway through, no way of knowing when it clogged, or how much it reduced flow prior to clogging)
- To filter after flow weighted composite is collected won’t be as useful, since diss. Hg can sequester onto suspended solids in very short time (Ralph Turner)
- Will try to begin sampling for both storm and baseflow sampling in Mar. ’04
- May have Ralph Turner use sniffer (Lumex) to check out Jones Hollow/Rockfish Run
- Will also look upstream into stormwater “tribs” at Hg in water and sediment (some collects at junction boxes in system, cleanouts and such)
- See Presentations folder.

Geomorphology Modeling. Nancy Grosso

- At this point, sub-team is recommending Dr. Jim Pizzuto to assess sediment transport and fate in South and South Fork Shenandoah Rivers
- Would like to have Dr. Pizzuto come down to tour the river sometime within the next couple of months
- Want to address the assumption originally made by LMS; is it better to let the river stabilize or take some sort of remedial action? A lot of this may depend on the results of the shake and bake experiments

- SRST agreed to proceed with having Dr. Pizzuto come down, tour river, then begin modeling; try to have him come down for next SRST meeting (in April).
- See Presentations folder.

Floodplain Sampling. Annette Guiseppi-Elie (no slides)

- View slides of maps, spreadsheet, from October meeting (see Presentations folder)
- Need to do recon. run in March
- Need to ID and procure permission from landowners (and city) to sample; Annette will provide DEQ with list of sites and requested owners and DEQ will initiate contact.
- Will attempt to discern “representative samples concentrations”
- Results of Shake and Bake experiments may force change of scope of sample plan

Crop Studies: Phase II. Bill Berti and Dean Cocking

- Slide gives distribution through garden plot of Hg concentrations, but patterns difficult to discern, since soil has been frequently disturbed by Forestry personnel
- For Phase II, will use Random Complete Block Design
- Vegetable concentrations to date well below levels of concern, even though soil concentrations in some spots exceed 70 ppm
- For phase II, may want to also do particle size analysis, to see if variability in Hg conc. is a function of soil particle size
- Bonnie Nauman suggested including soybeans in some plots, since many folks grow them locally and use them as feed for livestock
- Mike Neuman suggested testing beef and dairy from floodplain, to close any potential concerns in that area
- See Presentations folder.

Outreach Communications Pt. 1. General. Rick Straitman (No Slides)

- Stressed need for bilingual advisory signage that is not phrased in jargon; should be easily understood.
- Rick is currently communicating w/ Bill Hayden (DEQ) about developing a communication plan for the Science Team.
- Rick and Mike Liberati recently met with Bonnie Naumann, reporter from the Staunton News Leader, and are looking forward to having the media get the Science Team’s message out to the public.

Outreach Communications Pt. 2. Newsletter. Mike Liberati

- Winter Newsletter should be out in a few weeks.
- For Tech Corner in next issue, Ralph Turner’s Lumex would be an interesting item.
- Mike will soon be seeking input for the next newsletter.

Outreach Communications Pt. 3. Bilingual Signs, Communication with non-English Speaking Community. Mike Liberati, Paul Bugas, Chris Nye

- Paul informed the group that the only bilingual signs in place currently are at Andy Guest State Park.
- Recommended that the Science Team / state agencies begin working on getting bilingual signs developed and posted.
- Get out advisory information in Spanish speaking newspapers
- Concern addressed for individuals illiterate in both English and Spanish; signs may be ineffective for this portion of the population.
- Chris Nye (Associate Director Institute for Innovation in Health and Human Services @ JMU) works with Hispanic community on education issues. Discussion on effective ways to reach this population.
- Chris involved with Community Health Interp. Service “Health Promoter” 40 hr. curriculum for Spanish speaking women, take the info back into the community
- VDH, either Gutshall or Larsen to start working on signage issue (VDH responsible for wordage on advisories). Consideration for icons, in addition to verbiage, on signs was suggested.
- Maybe have a newsletter for nurses at poultry processing plants (large percentage Hispanic workers) addressing health issues
- Mike L. proposed a sub-team to brainstorm ideas along lines of the above issues; proposed group of Paul Bugas, Don Kain, Rick S., Alan Gutshall.

DEQ Hg Technical Advisory Committee. Don Kain (No slides)

- As a result of discovery of other streams in the coastal plain (Dragon Run Swamp/Piankatank River, Blackwater River, Great Dismal Swamp Canal), DEQ is forming an expert panel including individuals with industrial, educational, and professional backgrounds.
- Committee members from the SRST include Alex Barron, Mike Neuman, and Annette Guiseppi-Elie
- Will address issues similar to those currently undertaken by the SRST, but on a state-wide basis.

Statistical Projections. John Greene (No slides)

- Proposal to attempt to develop model that would predict Hg tissue reduction rates if “new” Hg is removed. Ralph Stahl informed group of similar approach in great Lakes for PCBs.
- Problematic to develop model that will predict decline in Hg concentration, since data to date doesn’t show any statistical decrease
- Ralph Stahl – Rob Mason asked what the biomass is in the drainage downstream of DuPont, and given the biomass, what amount of Hg would be the minimum required to maintain observed fish tissue levels? Paul Bugas said DGIF may be interested in estimating fish biomass as early as 2005

- John Rudd suggested adding 001 effluent to uncontaminated sediment, then test to see whether it becomes methylated (shake and bake modification)
- Question again as to whether atmospheric deposition is significant; based upon North River control site results, atmospheric deposition appears negligible.
- John Green said that it would be feasible to model rate of sediment transport through the system (John Rudd and John Greene agreed to work on this).
- “Shake and Bake” data will play role in developing models for sed./fish tissue relationships, and estimates of time to recovery.
- Paul Bugas said DGIF planning to do biomass estimates in South and South Fork during 2005.

Manuscript. Ralph Stahl (no slides)

- Bob Hoke and Annette will help with editing.
- Will attempt to get draft manuscript by this summer.
- Ralph will email to solicit more manuscript volunteers and set up a conference call for the work group.
- June 1st, need to submit abstract to SETAC for 2004 meeting; may have a garden study poster, Greg Murphy will present fish diet study

Working Hypothesis/Data Gaps/Priorities, Other Issues. Ralph Stahl, Don Kain

- See Attachment 3, page 10.
- Would be useful to develop a gannt chart to plot intended field work for this summer; many activities scheduled for water, soil, sediment, garden, Hg “sniffing” stormwater, etc.)
- Maybe use “sniffer” to directly check trib draining old Waynesboro landfill; could also take clean metal sample at trib mouth
- John Rudd mentioned that some recent work has come out suggesting that periphyton not significant sites of methylation
- Dean Cocking mentioned looking at atmospheric deposition of Hg-bearing dust on collection plates
- May want to look again at ponds in floodplains as potential methylation sites (Yount property, etc.; maybe look at ox-bows) DEQ will look into sampling these
- DEQ will plan to do “Guzzler” work to look for Hg in sediment, cracks in bedrock, etc. this summer; maybe team up with Lumex, since we’re looking for elemental Hg
- **Next meeting tentatively scheduled for April 14 (Wednesday).**

Attachment 1. List of Attendees

SOUTH RIVER SCIENCE TEAM MEETING – Feb. 10, 2004

Name	Organization	Phone No.	E-Mail Address
BONNIE NAUMANN	THE NEWS LEADER STAFF	540-213-9129 540-815-0315	braumann@newleaders.com
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Allison Kelley	JMU	540-612-7211	kellejal@jmu.edu
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DON KAIN	DEQ	540-574-7815	DEKAIN@DEQ.STATE.VA.US

n = 30

Attachment 2. 100 year monitoring plan

VIRGINIA DEQ
100-YEAR MERCURY MONITORING PLAN
SOUTH RIVER / SOUTH FORK SHENANDOAH RIVER

	1990	92	93	96	97	99	2002	05	07	12	17	22	27	32	37	42	47	52	57	62	67	72	77	82	87	92	
FISH	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SEDIMENTS					X				X		X		X		X		X		X		X		X		X		
WATER		X			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FLOOD PLAIN									X				X				X				X					X	
CONSULTANT*					X				X		X		X		X		X		X		X		X		X		

* A consultant's report will be prepared every 10 years to address data and trends from water, sediments and fish over the life of the project to date.

At some point during the project a special review of data following a 100-year flood event will be conducted.

...mercury100-yr-schedule.doc

Ongoing or Completed

- **Sediment Sampling and Coring**
- **Corbicula Studies, Phase 1 (& intensive around plant site)**
- **Fish Diet Studies**
- **DuPont Site Stormwater Investigation**
- **Intensive Water Followup**
- **Tributary & Bridge Sampling**
- **River / land use survey**
- **Food Crop Study, Phase 1**
- **Publications (need some common definitions)**
- **Water Column Sampling (ions, etc.)**
- **Atmospheric Deposition Studies (summer 04 results)**
- **Initial Estimate of Bird Exposure and Risk**
- **Water and Flow Balance**
- **Corbicula, Phase 2**
- **Stormwater repeat for plant site**
- **Food crops, Phase 2**
- **Water column Hg at DuPont site and downstream**
- **Shake and bake of soils, sediments (maybe clams added)**
- **Modeling / Geomorphologist**
- **Floodplain soils investigation**

Planned or Proposed

- **Investigate 2nd St. Landfill (depends on other sampling in the area)**
- **Re-emergent Hg (globules under sediment surface in river bed)
(Guzzler or Sniffer)**
- **Sampling Periphyton / Aquatic Vegetation (Bill made presentation)**
- **Sediment Sampling & Analysis**
- **Floodplain ponds – ground truth and / or sampling**
- **Outreach (website, workshop participation)**
- **Sediment Traps – sedimentation rate**

- **Non Trust-fund Fish Sampling (forage fish for TL3 estimates - 2005)**
- **Bird exposure (feather or tissue analysis – geese, ducks)**
- **Develop set of bioindicators (including fish)**
- **Predictive modeling**
- **Hg Speciation**

Suggestions from 2003 Expert Panel meeting – testing hypotheses

1. Are floodplain soils a source of bioavailable mercury
Shake and bake study using soils, river water and measuring MeHg production over time
2. Are river bed sediments a source of bioavailable mercury
Shake and bake study using sediments, river water and measuring MeHg production over time
(could combine with clam uptake studies)
3. In 1 and 2, add organic matter to provide food source for bacteria (to stimulate microbial activity) – stack the deck. Maybe have a streamside flow through system – soils / sediments, river water, and clams (and enhancements to microbes) to see if bioavailable mercury is released.
4. For slow drip hypothesis, or new source hypothesis: need intensive water column study with total and dissolved Hg along with low detection limit. Sample at low flow period if possible. Include tributaries and other potential inputs other than the point at which the transect is specified. Need to check the ratio of total to methyl along with the change in this ratio downstream. Separate inorganic data from methyl data. The change in these will be reflective of new inputs to system – may need a statistical power test to help identify how many samples are needed to determine whether we'll be able to detect a difference.
5. For slow drip, hot spots of methylation: need intensive water column study and target areas in river conducive to methylation for MeHg analysis. Need to include flow measurements with this effort, particularly when going to areas where methylation might occur. Have to combine upstream, in the zone, and downstream of these areas.
6. For hypothesis # 3, for this to work, there would have to be an erosional process in the sediments and soils that would provide the continued input of inorganic Hg to the system. In the absence of the erosional process, it is likely that the levels in fish would have gone down.
7. For the globules hypothesis – difficult to distinguish from other hypothesis. Headspace analysis in water, sediment or soil samples (using inert gas like Argon) and measure elemental mercury content. Might be able to use PIMS or similar type of sampler. Difficult to distinguish among various forms particularly when adding air or other medium drives changes in speciation. Soil / vapor analysis might be useful for soils but it is unlikely that elemental mercury will be present. Might be helpful for studies on the plant site, particularly along river bank that are wetted during rain events (but need 10-20 ppm in soils to be able to measure any elemental mercury; need to have about 100 ppm before able to measure anything in vapor).
8. Mass balance estimate: how much biomass is produced each year and knowing the MeHg, how much mercury would be required to maintain this level.