

**South River Science Team  
February 25, 2003  
Harrisonburg, Va.**

**AGENDA**

<b><u>Time</u></b>	<b><u>Issue</u></b>	<b><u>Responsible</u></b>
<b>9:00</b>	<b>Welcome, introductions</b>	<b>Don Kain</b>
<b>9:15</b>	<b>Va. Tech Fish diet study update (T. Newcomb joining us by phone)</b>	<b>Greg Murphy</b>
<b>10:00</b>	<b>Cesium dating</b>	<b>Erin Mack Dick Jensen</b>
<b>10:30</b>	<b>Break</b>	
<b>10:45</b>	<b>Coring Results and Sediment Input Proposal</b>	<b>Erin Mack Dick Jensen</b>
<b>11:45</b>	<b>Newsletter</b>	<b>Mike Liberati</b>
<b>12:00</b>	<b>Lunch</b>	
<b>12:30</b>	<b>DEQ 2002 Fish Tissue Update</b>	<b>Billy Van Wart</b>
<b>12:45</b>	<b>DEQ Water and Sediment 2003</b>	<b>Don Kain/ Ted Turner</b>
<b>1:00</b>	<b>Floodplain soil characterization</b>	<b>Annette Guiseppi-Elie Nancy Grosso</b>
<b>1:30</b>	<b>Plant uptake studies</b>	<b>Bill Berti</b>
<b>2:15</b>	<b>Manuscript</b>	<b>Ralph Stahl</b>
<b>2:30</b>	<b>Working hypotheses / Brainstorming</b>	<b>Ralph</b>
<b>3:00</b>	<b>Wrap-up, next meeting</b>	<b>Ralph / Don</b>
<b>3:15</b>	<b>Adjourn</b>	

## Meeting Summary

**Welcome, introductions.** Don Kain welcomed the attendees and reviewed housekeeping. Attendees are listed on Attachment 1.

**Va. Tech Fish diet study update.** Greg Murphy provided a status report on this study. Tammy Newcomb joined by phone. Phase I has gone well, with target numbers and species met in most cases. Greg also outlined the scope and schedule for Phase II of the project. This phase will include collections of prey organisms, followed by mercury analyses of those species. Greg plans to present some findings from this study at the spring meeting of the Virginia Academy of Science. Greg's presentation is included in the Presentation folder.

**Sediment Core Data Update.** Erin Mack presented preliminary core dating results from the fall 2002 sediment core sampling near Dooms. Data indicate soil horizons of elevated mercury 20-30 cm below the surface. The deep soils with higher mercury concentrations seem to have low concentrations of methyl mercury, suggesting low bioavailability. Elevated mercury in the surficial sediments may suggest an ongoing source. Core dating results with cesium and lead 210 are expected to yield insights on the history of the sediment contamination.

Dick Jensen shared a conceptual plan to sample sediments entering the river during storm events. This approach will help determine if secondary sources on the floodplain are contributing to the bedload in the river. Dick solicited input on implementing a "rapid response" sampling approach during storm events, including logistics, practicality, field crews, etc. Refer to the Presentation folder for the slides from Erin and Dick's presentation.

**DEQ 2002 Fish Tissue Update.** Billy Van Wart provided results of total mercury analyses for fish samples collected during 2002 (Presentation folder). Concentrations were similar to those found in 1999 collections. As with data from earlier years, concentrations increased with distance downstream from the DuPont footbridge, with highest values found in the Dooms-Crimora reach. Downstream from that point, concentrations decreased with distance. Data have been shared with VDH, and no changes in the current advisory are anticipated. Methyl mercury results have not yet been received from the laboratory, but are expected in time for the April 2003 Science Team meeting.

**DEQ Sediment Sampling.** DEQ's long-term monitoring plan (see Presentation folder) calls for the next sediment sampling event in 2007. Don Kain solicited input on ideas for this work in an effort to gain more meaningful data. Past samples were taken at preselected river sites and may have not been directly comparable in cases, since samples were analyzed only for total mercury, with sediment composition and particle size unknown. DEQ would like to standardize the sediment trend sampling, such that similar types of material (composition and grain size) are sampled at all sites. The intent is to sample the sediment component that is most susceptible to high concentrations of mercury at all sites. Don will set up a conference call with several members of the Science team who expressed interest in providing input (included Mike Newman, Mike Sherrier, Bob Luce, Erin Mack, and Dick Jensen).

**Newsletter.** Mike Liberati requested input for the next newsletter (spring/summer 2003). Some suggested topics are included in the Presentation folder. Mike Newman suggested that an article be included in the future on the history of the Waynesboro DuPont plant.

**DuPont Stormwater.** Mike Liberati also outlined a proposed stormwater and process water effluent sampling program on the DuPont site to address the issue of whether or not any mercury is currently leaving the DuPont plant property via these outfalls (Presentation folder). DuPont is lining up a crew to respond to storm events. Ideally, the sampling should coincide with a South River sampling event.

**Floodplain soil characterization.** Annette Guiseppi-Elie outlined plans for floodplain sampling for comparison to earlier (1980s) data and to evaluate the potential for uptake by crops (Presentation folder). Based on literature, mercury in soils does not appear to pose a health risk to consumers of crops grown in those soils. DuPont will conduct soil sampling at the Virginia Dept. of Forestry station in Crimora in 2003 and use the data in conjunction with crop uptake studies (see next presentation) to validate that hypothesis.

**Plant uptake studies.** Bill Berti provided an outline and asked for input on the proposed mercury crop uptake study. He has been in contact with VA Dept. of Forestry staff, and it appears that the field portion of the study will take place on the Crimora Forestry Station property. Details regarding site criteria, chemical analyses, crops, etc were discussed (see Presentation folder).

**Manuscript.** Ralph Stahl led a discussion for development of a manuscript outlining the mercury history, monitoring, current Science Team activities, and plans for future work. He has done some preliminary exploration with several technical journals (see Presentation folder). One possibility would be development of a paper for Transactions of the American Fisheries Society. Ralph will put together a conference call to explore this further with the manuscript team (Don, Ralph, Brenda, Annette, Bob Hoke, Khizar Wasti). He also asked if there was interest in developing an abstract for the November 2003 SETAC meeting. There seemed to be greater support for targeting the 2004 SETAC meeting.

**Working hypotheses / Brainstorming.** Ralph shared the latest update to the working Hypotheses (See Attachment 2, page 5). There was minimal discussion, but Ralph asked Science Team members to look over the information and provide comments for future discussion.

Team members were invited to join DuPont and DEQ staff for informal discussion the evening before most of these meetings. Those interested should contact either Don or Ralph.

**Wrap-up, next meeting.** The next meeting was set for Tuesday, April 29 in Harrisonburg, followed by a tour of the DuPont grounds on Wednesday morning.

## Attachment 1. Attendees

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SOUTH RIVER SCIENCE TEAM MEETING – February 25, 2003

Name	Organization	Phone No.	E-Mail Address
Don Kern	DEQ	540-574-7315	DEKERN@DEQ.STATE.VA.US
BILL BERTI	DUPONT	302-366-6762	WILLIAM.R.BERTI@USA.DUPONT.COM
Bill Van Wert	DEQ	540-574-7061	wjvanwert@deq.state.va.us
Bob Luce	Friends of Shenandoah	540-622-6370	lucerb@shen.net
Gary Murphy	VT	540-250-1314	gmurphy@vt.edu
Don Orth	VT	540-231-5573	dorth@vt.edu
Stephen Reeser	VDGIF	540-248-9372	reeser.s@dgif.state.va.us
Eric Trumbo	VDGIF	540-248-9572	etrumbo@dgif.state.va.us
Tom Benzing	JMU	540-568-2794	benzintr@jmu.edu
Marshall Bowles	JMU	540-438-2275	bowlesmw@jmu.edu
Ralph Stahl	DuPont	302-892-1369	ralph.g.stahl-jr@usa.dupont.com
Brenda Kennell	DTI	540-946-1320	brenda.l.kennell@usa.dupont.com
Annette Guisepi-ELIE	DuPont	804-383-4584	annette.guisepi-elie@usa.dupont.com
Allen Gutschall	VDH	540-332-7830	agutschall@vdh.state.va.us
Kelly Vander	VDH	540-222-3480	KVANDER@VDH.STATE.VA.US
Bob Hoke	DuPont	302-451-4566	robert.a.hoke@usa.dupont.com
Mike Newman	VIMS	752-886-0289	newman@vims.edu
Mike Skerrier	DuPont/URS	(302) 992-1168	Michael.P.Skerrier@usa.dupont.com
Mike Liberati	DuPont	302-892-7001	Michael.L.Liberati@usa.dupont.com
Dick Johnson	DuPont	302-547-6286	Johnson@DPLANSKE.NET
Bill Jordan	VDH	540-332-7850	WgJordan@vdh.state.va.us
TOD TURNER	DEQ	(540) 574-7558	tturner@deq.state.va.us
ERIN MAEK	DuPont	(302) 366-6762	erina@usa.dupont.com
Doug Larson	VDH	540-232-7831	dlarson@vdh.state.va.us
LARRY MOHAJ			
DEAN COCKING			

**Attachment 2. Working Hypotheses – Ralph Stahl**

Working Hypothesis	Experimental Concepts / Actions
<p><b>1. Ongoing sources of Hg to the South River are present and have prevented the expected decline of Hg in fish tissue. The potential sources for existing Hg inputs to the river can be separated into: (a.) existing inputs potentially derived from historical releases; and (b.) existing inputs based on current releases.</b></p> <p><b>Potential pathways for historical inputs include:</b></p> <ul style="list-style-type: none"> <li>• Groundwater</li> <li>• Sediments</li> <li>• Floodplain soils</li> <li>• Landfills</li> <li>• Dumping</li> <li>• Dredge spoils</li> </ul> <p><b>Potential pathways for current inputs include:</b></p> <ul style="list-style-type: none"> <li>• Groundwater</li> <li>• Atmospheric deposition</li> <li>• Point source discharges</li> <li>• Non-point source discharges</li> <li>• Dumping</li> <li>• Fertilizers</li> </ul>	<p><b>a. Utilize information on Hg in water column collected during bi-monthly sampling of South River for TMDL.</b></p> <p><b>b. Examine potential for old landfill near 2<sup>nd</sup> st. bridge area to have received Hg contamination and now acts as a source to the South River. (work on hold pending resolution with city of Waynesboro.)</b></p> <p><b>c. Conduct intensive sampling of water column downstream of DuPont footbridge to verify and expand on results obtained by Ralph Turner. (one sample session completed in 2002; another planned for 2003)</b></p> <p><b>d. Review historical records and / or obtain anecdotal results of dredging activities in South River after flooding events. (Larry Mohn made the contact for this issue.)</b></p> <p><b>e. Conduct stormwater / wastewater sampling of plant site to determine if Hg inputs are occurring. (planned for 2003.)</b></p> <p><b>f. Conduct sediment studies / coring at selected locations on the South River. (completed in 2002; sediment dating is pending.)</b></p> <p><b>g. Additional studies to determine Hg association with specific sediment constituents are being discussed.</b></p>

<p><b>2. Water quality conditions (e.g. sulfate, chloride additions) have changed in the South River over the last 20 years in a manner that favors the formation of MeHg and this has resulted in increases in Hg concentrations in fish tissues.</b></p>	<p><b>a. Review information developed by Friends of the Shenandoah – look for trends and correlations. (putting data into Excel spreadsheet for analysis.)</b></p>
<p><b>3. Observed changes in fish tissue Hg concentrations result from changes in the dietary preferences of important fish species in the South River during the last 20 years (locational differences).</b></p>	<p><b>a. Conduct fish dietary studies in South River and other locations (as reference). (work ongoing in 2002-2003)</b></p>
<p><b>4. Wetland areas in the South River watershed have increased during the last 20 years and are contributing larger</b></p>	<p><b>a. Map locations and test against locations where fish tissue levels have remained high. (see also 1f)</b></p>

amounts of MeHg to the surface water.	b. Consider in-situ studies of MeHg production in selected wetland locations; develop flux estimates.
5. Changes in water levels, providing a regular wetting and drying cycle leads to periodic increased production of MeHg in the South River (similar to filling and draining of lakes and reservoirs) which in turn keeps levels in fish tissue from declining.	a. Map flow / flood conditions over the past 20 years against fish tissue data results for the same period.  b. Consider in-situ studies in floodplain.
6. Clearing of forested areas (or other land use changes) along the South River watershed over the last 20 years has altered the availability of Hg from soils in these areas and resulted in increased inputs of MeHg to the surface water.	a. Review historical aerial maps to look for trends.  b. Consider in-situ studies in floodplain.
7. The observed changes in fish tissue Hg levels over the last 20 years result from sampling artifacts and variability, e.g. changes in tissues sampled and method of collecting tissues, changes in analytical methods and laboratories, or changes in data inputs – non detects vs zero, etc.	a. <b>Adjust statistical methods to account for size, weight of fish and analyze data accordingly.</b> (already done)
8. Changes in agricultural practices in the floodplain and watershed have resulted in decreases in Se levels in the South River and thereby increased the availability of Hg in the system.	a. Consider analyzing for Se in floodplain soils, sediments and the water column.
9. The South River has an unusually low level of Se which provides a mechanism for Hg to be more bioavailable.	a. Consider analyzing for Se in water column. <b>(preliminary data from DEQ indicates Se levels are not abnormally low.)</b>
10. Mercury levels in South River biota have actually decreased over the past 20 years but are not reflected in the fish.	a. Consider additional biological indicators – Corbicula or other. <b>(preliminary scoping study with Corbicula completed in 2002, 17 locations sampled.)</b>
11. Mercury in soils of the South River floodplain is contributing to Hg levels in the water column and sediments; and potentially are source for human exposure.	a. Consider floodplain soil / rainfall study to determine if Hg is carried to the river via soil erosion.  b. Consider floodplain soil studies with food crops to determine uptake rates.

