

**South River Science Team
April 23, 2002 Meeting
DEQ, Harrisonburg, VA**

AGENDA

Time	Item	Responsible
0900	Welcome / Introductions	Don / Brenda
0910	Floodplain mapping	Dick Jensen
0930	Newsletter	Mike Liberati
0945	RFI update	Mike Liberati
0955	DTI spinoff	Brenda Kennell
1010	TMDL status	Sandy Mueller
1025	Historic dredging / channel clearing on South River – group discussion	Larry Mohn, Dick Jensen, Brenda Kennell
1040	Break	
1050	Landfill / Karst update	Mike Sherrier
1145	Working lunch	all
1200	PIMs / Hg water column efforts	Roger Stewart
1230	2002 Water Sampling - Trust fund - Intensive sampling proposal & discussion	Ted Turner
1300	Va Tech sampling update	Steve Reeser
1315	Fish tissue, sediment, water column Hg plots	Bob Hoke
1330	Sediment sampling, coring, dating	Dick Jensen
1350	Transfer of Hg through the food chain – literature review	Annette Guiseppi-Elie
1415	Working hypotheses	Ralph
1430	Outreach	Ralph
1445	Wrap up, action items	Don / Ralph
1500	Adjourn	

MEETING SUMMARY

Welcome, introductions. Don Kain welcomed attendees and self-introductions were provided. Attachment 1 lists all attendees.

South River TMDL Status. Sandra Mueller outlined the TMDL schedule proposed for the South River. The TMDL development process is expected to begin in 2006 and be completed in 2008. EPA is still developing its methodology for mercury TMDL development. Data from the ongoing work of the Science Team may be used in the South River TMDL development process. Sandy will keep the Science Team informed of the TMDL schedule and of any data needs for TMDL development (see Attachment 2).

Floodplain Mapping. Dick Jensen and Annette Guiseppi-Elie have been working on a mapping project for the South River floodplain area. Preliminary findings were presented (Attachment 3). The map will identify areas at risk within the floodplain. Receptors of particular interest include homes, barns, vegetable gardens, and other areas of high use. The final product will be a digitized map identifying these and other features. This map will help identify target areas for future study.

Newsletter. Mike Liberati led a discussion on the South River Science Team Newsletter and shared a draft copy of the first issue (refer to Presentation folder). Paul Bugas shared an initial mailing list of proposed recipients and agreed to coordinate development of a final list. Bob Luce shared with the group that he has been asked by the Friends of the Shenandoah to prepare an article for their newsletter about the activities of the Science Team. Brad Chewing suggested we add area libraries to the distribution. The target date for release of the first issue is May.

Freshwater Clam (*Corbicula sp.*) Mercury Results. Doug Graeber-Neufeld, a professor at Eastern Mennonite University, shared data from a project he recently completed. Doug and a student collected samples of the Asiatic clam (*Corbicula sp.*) from South River at several locations. Data are summarized in Attachment 2. Relative mercury concentrations from different sites closely mimicked those seen in DEQ's fish sampling at those same sites in recent years. Although Doug has no follow-up work planned for the immediate future, the team was informed by Paul Bugas that Dr. Tom Benzing from James Madison University is interested in conducting similar work in the coming months. The Science Team is interested in this work, and Ralph Stahl agreed to coordinate a conference call between DEQ, DGIF, Doug Graeber Neufeld, and Tom Benzing during May.

DuPont RFI Update. Mike Liberati provided a status report on the RFI for the DuPont Waynesboro site. DuPont has submitted data to EPA and set a preliminary date to meet with EPA and discuss results this summer. This process is often long and cumbersome, but DuPont is hoping to streamline the effort for the Waynesboro site. More ground water sampling may be conducted in early 2003.

DTI Spinoff. Brenda Kennell explained the corporate restructuring that has occurred at the DuPont Waynesboro site. The new corporation (DuPont Textiles and Interiors – DTI) may be under consideration for public sale in another year or two. At this point, it is unclear exactly how the process will move forward.

Historic Dredging. Brenda recently spoke with Mr. Jax Bowman, retired Waynesboro Public Works Director regarding South River dredging and channel reconstruction in past years. He informed her that the 1969 flood flowed through the current location of North Park (just upstream of 2nd Street Bridge). The spoils from the flood were used to rebuild the bank, and the “floodwall” can still be seen on the west bank of the river. He also explained that an oxbow across from and just downstream of the Waynesboro STP was removed, with the right (east) riverbank being reconfigured.

Landfill / Karst Update. Mike Sherrier provided information on the former Waynesboro Landfill near 2nd Street and the karst formation that underlies a portion of the DuPont property (see Presentations folder). The landfill is believed to have operated from the mid-1940s until 1982. Leachate and surface drainage were captured by a diversion trench and collection pond beginning in 1988. Any drainage from the area currently enters the South River via a dry oxbow downstream of 2nd Street. Up until 1985 the oxbow received river flows, but became a dry channel, due to channel rerouting at that time. In 1988 EPA investigated the landfill, collecting samples from surface soils, sediments, surface waters, and nearby residential wells and found no mercury contamination. Mike suggested additional follow-up investigation of the site may be in order, including evaluations of surface water and sediments/shallow soils from the following: Leachate pond, culvert/drainage between the landfill and old river channel, the confluence of the old river channel and drainage from the site, and a downstream portion of the old river channel. No date was set for this follow-up investigation.

Mike also presented information on the karst area underlying a portion of the DuPont Waynesboro property. Ground water flow direction in this formation is believed to be to the north and may intersect the South River at some point north (downstream) of the DuPont property. A review of an RFI report for Genicom Corporation (between 2nd Street and Hopeman Parkway on east side of the river) indicated that no karst areas were encountered on the property. Mike suggested that thermal profiling in South River may identify area(s) where karst formation intersects the river. This technique will be used in DEQ's intensive survey of a portion of the South River during summer 2002 (Presentation folder – Ted Turner's slides). Mike suggested that the river survey be a guide for further investigation of sources, if ground water seeps are identified and believed to be contributing mercury to the system.

Passive Integrative Mercury Samplers (PIMS). Roger Stewart of DEQ's Central Office shared information on a new monitoring tool for mercury. This device, developed by Drs. Jim Petty and Bill Brumbaugh of USGS in Columbia, MO, is called the Passive Integrative Mercury Sampler, or PIMS, consists of a semi-permeable membrane containing a mercury-sequestering reagent. The PIMS can be used for long-term (up to 90 days) unattended sampling in air or water environments. A portion of an informational fact sheet is included as Attachment 3.

The PIMS devices seem to hold promise for the Science Team's investigations into potential ongoing sources of mercury in South River, since the device can "concentrate" mercury in environments where conventional "grab" samples would require ultra clean, low-level technology. DEQ will contact the developers of the device and will consider incorporating PIMS into the summer 2002 intensive survey as a supplemental monitoring tool.

DEQ's 2002 Water Sampling. Ted Turner first outlined DEQ's plans to conduct the "routine" 5-year water column sampling at each of the 17 sites currently sampled for fish tissue. This work will be completed in late spring 2002 and will be used for comparisons against historic data for trend purposes. He then outlined DEQ's proposal for an intensive survey in the South River in Waynesboro in summer 2002, which will attempt to determine whether there are any ongoing mercury sources in the 1.5-mile section of river in the area roughly between the 2nd Street and Hopeman Parkway Bridges. Ted provided an outline of the scope of work.

The sampling will consist of parallel (left bank, right bank) grab samples taken in the water column at 0.1-mile intervals from a point .3 miles upstream of the 2nd Street bridge to a point 0.2 miles downstream of the Hopeman Parkway bridge. Samples will be taken using clean metals techniques, starting with the most downstream station and working upriver so as to be sampling undisturbed areas. Parameters will include total and dissolved mercury, solids, and TOC. Field parameters (pH, DO, Temp, and conductivity) will be measured continuously and be recorded electronically with a time stamp. A hand-held GPS unit will be in

use continuously, with readings recorded electronically with a time stamp. This procedure will allow exact identification of points in the river where there are changes in any field parameters. This application should help identify inputs from springs, point source discharges, etc.

DEQ staff are also hoping to deploy PIMS devices at selected sample locations to evaluate the effectiveness of the PIMS as a mercury monitoring tool and to evaluate agreement between PIMS and conventional water samples. Bob Luce suggested that we also consider retaining solids from filtrate and analyzing it for mercury. He noted a USGS evaluation technique that can determine whether the mercury is adsorbed or precipitated.

The consensus of the meeting attendees was that DEQ proceed as outlined. DEQ will prepare a more detailed scope of work and share the final plan at the next Science Team meeting.

Virginia Tech Fish Gut Study. Steve Reeser gave a brief status report on the Virginia Tech study. All is going well and on schedule. Fish collections were very successful in the spring, with targets met at all sites. Fish were collected at 7 sites on South River, 3 sites on North River, and 7 sites on the South Fork Shenandoah River.

Fish Tissue, Sediments, and Water. Bob Hoke presented bar graph comparisons between South River data for water sediments and fish (Presentation folder). He noted that very good agreement in mercury levels exists between the different media. Bob also noted that the higher values in floodplain soils appear to be downriver from, but in close proximity to, the higher sediment sites.

Sediment Sampling, Coring, Dating. Dick Jensen presented options for sediment coring, testing and dating (see Presentation folder). He outlined methods and associated samplers and equipment and gave an overview of lead 210 dating for sediments and soils. Dating of sediments may provide clues regarding sediment movement over time. Methods are time consuming and expensive, however. Bob Luce noted that USGS experts may be able to provide advice. Mike Newman commented that lead and cesium tests have become fairly routine and that costs are not prohibitive.

Floodplain Soils. Annette Guiseppi-Elie presented information on floodplain soils (see Attachment 10). Her information included a literature review of South River data and suggested that greater than 90% of the mercury in the system is contained in floodplain soils. This material does not appear to be readily available or to present a major risk, but Annette posed the question of whether additional field work should be conducted to validate that position.

Annette also presented her findings following an exhaustive literature review and discussions with several scientists. Her review focused on the Hg Study Report to Congress, Volume III (1997) and U.S. Department of Energy's 1988 empirical models for the uptake of inorganic chemicals from soil by plants. In general, studies showed that uptake of mercury by plants is small, particularly in the portions above ground. Similarly, livestock were found to accumulate little mercury from forage consumption. Soils were not believed to be a major pathway for mercury. Air deposition on leaves is believed to be the primary route for transferring mercury to plants. Moving forward with a definitive land use survey for the South River floodplain was recommended. Additional field studies to address mercury levels in soils was recommended, and the potential for uptake by plants should be considered in the future.

Hypotheses, Where to Next? Ralph Stahl presented a vision from the DuPont perspective: Mercury levels decline in the South River and South Fork Shenandoah River, and DuPont is viewed positively by the public, regulators, customers, shareholders and employees for having met its commitments to the Commonwealth of Virginia. He outlined the progress of the Science Team from its inception in November 2000 to the present, with accomplishments including fish and sediment data reviews, expert panel communication and support,

the Va. Tech fish diet study, mud mapping, ongoing interaction and collaboration for trust fund monitoring design, and the newsletter for public outreach. He also noted parallel efforts, including the Waynesboro site RFI, TMDL sampling, and EMU's *Corbicula* analysis. Finally, with input from the meeting attendees, Ralph led a discussion and prioritization of ongoing and future efforts by the Science Team. Items given the highest priority for short term action were:

- Further Investigate 2nd St. Landfill - Mike S.
- Intensive Water Column Hg Sampling (including additional sample sites, large volume filtration & particulate analysis, temp profile) - Ted T.
- Sediment Hg Profile / Dating - Nancy G., Dick, Erin
- Explore Application / Utility of SPMD - Don / Roger

Secondary priorities, or longer-term continuing efforts were also identified and included the following:

- Uptake of Hg by Crops / Plants
- Landuse Survey of South River Floodplain Areas (includes aerial photography)
- Levels of Hg in Berms / Fill Areas
- Uptake of Hg by Shellfish
- Floodplain Soils Profile

Action Items

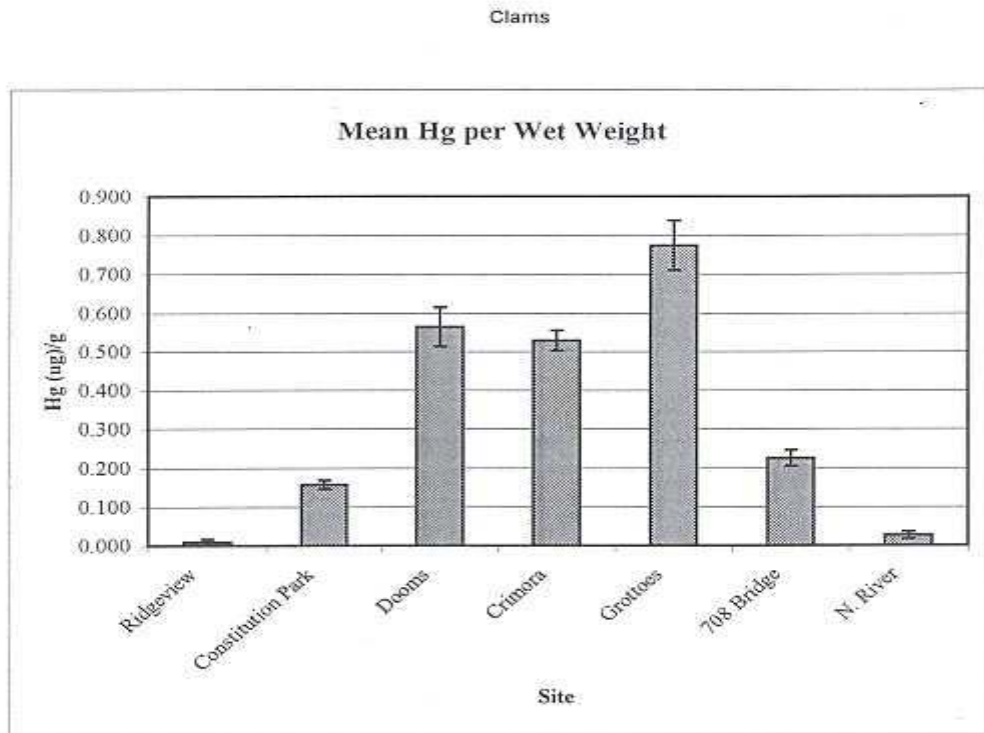
- Paul Bugas to set up conference call re. *Corbicula* with EMU, JMU, DEQ, and DuPont.
- Ralph and Don to set up Science Team / Expert Panel meeting for fall.
- Ted and Don to finalize details and timing of intensive water column survey.
- Dick to review floodplain data vs. topography.
- Annette and Dick to review historical use of land at Dept. of Forestry Station near Dooms.
- Mike Newman to ID criteria to help determine if individual intensive survey site data are statistically different from other sites.

Next Meeting. Scheduled for July 10 at DEQ, Harrisonburg. This meeting will coincide with Va. Tech's summer fish sampling for those who want to participate in or observe the sampling.

Attachment 1. List of Attendees

NAME	AFFILIATION
Ralph G. Stahl, Jr.	DuPont
Mike Liberati	DuPont
Izzy Zankos	DuPont
Brenda Kennell	DuPont
Annette Guiseppi-Elie	DuPont
Dick Jensen	DuPont
Mike Sherrier	DuPont
Nancy Grosso	DuPont
Bob Hoke	DuPont
Don Kain	DEQ
Ted Turner	DEQ
Roger Stewart	DEQ
Sandra Mueller	DEQ
Larry Mohn	VA DGIF
Steve Reeser	VA DGIF
Paul Bugas	VA DGIF
Alan Gutshall	VDH
Bill Jordan	VDH
Bob Luce	Friends of the Shenandoah
Doug Graber Neufeld	Eastern Mennonite Univ.
Michael C. Newman	VIMS

Attachment 2. *Corbicula sp.* Data (from Doug Graeber-Neufeld)



Attachment 3. PIMS Fact Sheet (Roger Stewart)



PASSIVE INTEGRATIVE MERCURY SAMPLER (PIMS)

The PIMS is an effective alternative to conventional sampling for mercury vapor and is highly suitable for long-term unattended sampling. It consists of a semi-permeable polymeric membrane containing a mercury-sequestering reagent sealed inside (Figure 1). Because mercury vapor readily permeates the membrane and is rapidly oxidized and stabilized inside the membrane, sampling intervals of weeks to months are possible. The PIMS sampling reagent is amenable to direct analysis for mercury (no chemical treatment required) by conventional methods (AA, AF, or ICP-MS) with virtually no interferences. Preliminary results indicate that the PIMS may also be applicable for water sampling in some instances [1].

Features:

- Passive sampling requires no pumps, traps, or electrical power.
- Integrative sampling for up to 90 days.
- Clean-room mercury facilities generally not required.
- Particularly useful for applications requiring unattended sampling for extended periods at remote locations.
- Sampler reagent is conveniently analyzed for mercury directly by ICP-MS, CVAFA, or CVAA without chemical treatment.
- Simple alternative for Hg vapor screening and detection; sampling precision ~ 5% RSD.
- Potentially applicable for gaseous Hg sampling in soil and water.

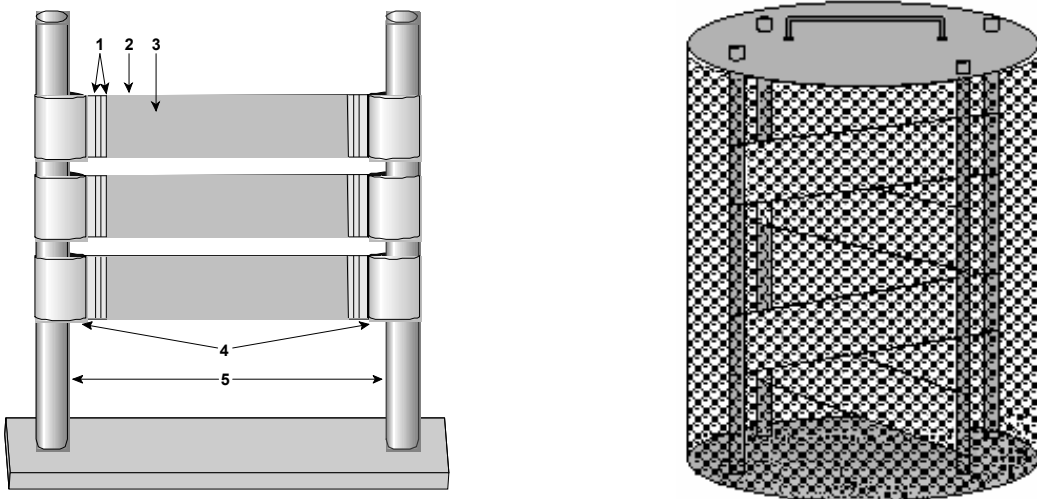


Figure 1. Free-standing PIMS deployment configuration (left) for environmental air sampling of Hg vapor. 1 = heat seals, 2 = polyethylene layflat tubing, 3 = liquid reagent inside sampler, 4 = tether loops, 5 = stainless steel rods on ringstand base. Dimensions of reagent-filled area between heat seals is 15 x 2.5 cm. Stainless steel canister configuration (right) for hanging or underwater deployment contains up to 5 individual 7.5 x 2.5 cm PIMS.

PIMS Fact Sheet, cont.

In Figure 2 below, results for air sampling of Hg by the PIMS in the vicinity of a coal-fired power plant over a 12 week interval is illustrated. Samplers retrieved after 4, 8, and 12-wk intervals were in good agreement, indicating that the sampling was linear over the entire 12-wk interval. Experimentally determined PIMS sampling constants predicted an average air concentration of Hg vapor of 25 ng/m³ over this time interval.

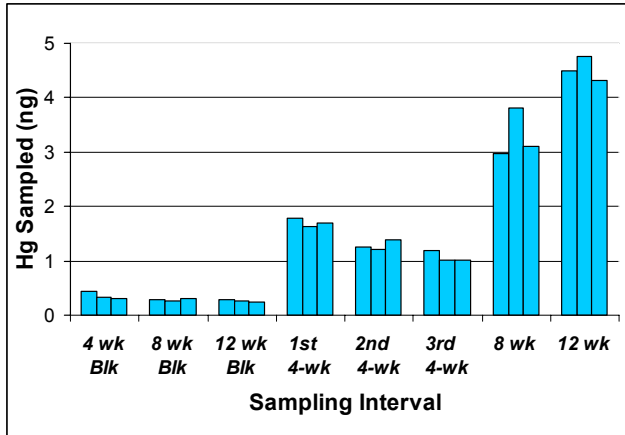


Figure 2. PIMS sampling of Hg from air near a coal-fired power plant over a 12-week period.

In a separate 4-week study, the PIMS sampling approach was compared with conventional pump-and-trap methodology at a site near a probable Hg emission source. The overall four-week mean Hg air concentration (± 1 s.d.) estimated by the PIMS was 5.2 ± 1.8 ng/m³ (n=5) as compared with 5.1 ± 2.8 ng/m³ (n=8) measured for semi-weekly one-hour pump-and-trap sampling.

References:

1. Brumbaugh, W.G.; Petty, J.D.; May, T.W.; Huckins, J.N. 2000. A passive integrative sampler for mercury vapor in air and dissolved gaseous mercury in water. *Chemosphere: Global Science Change* 2:1-9.

For more information contact:

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