

SOUTH RIVER SCIENCE TEAM MEETING
DEQ OFFICE, HARRISONBURG, VA
AUGUST 7, 2001

AGENDA

<u>Time</u>	<u>Item</u>	<u>Responsible</u>
09:30	Introductions / Welcome	Don / Brenda
09:45	Recap of last meeting	Don / Brenda
10:00	Recap of Steering Team Conf Call	Don
10:30	Statistical analysis	John Green (by phone)
11:30	Future sampling/studies floodplain soils mud map gut analysis other	Lewis (or Brenda) Dick Jensen Don Orth (or Ralph)
12:00	Working lunch	
1:00	Historical document search	Ralph
1:30	Analytical issues	Norma Roadcap
2:00	Design of "expert panel" meeting	Ralph / Don
3:00	Action Items / Next meeting	All
3:30	Adjourn	

MEETING SUMMARY

Attendees. Listed in Attachment 1, page 5.

Introductions / Welcome. Don Kain welcomed the attendees and introduced guests and new team members. Guests included Dr. Tammy Newcomb, representing Va. Tech, and Norma Roadcap and Michelle Mouer, representing the Virginia Division of Consolidated Laboratories (DCLS). Dr. Mike Newman, Virginia Institute of Marine Science (VIMS), joined the science team for the first time at this meeting in an oversight/consultant capacity, and is expected to participate as a member of this team in the future.

Recap of last meeting. Don provided a brief recap of the June 5, 2001 science team meeting, and distributed a written summary of the meeting to each attendee.

Recap of Steering Team Conference Call. On July 16, 2001 science team members briefed the steering team on activities, accomplishments, and projected tasks and projects. The call consisted of an overview of science team activities, followed by in-depth briefings on statistical analysis of fish data, proposed cooperative work with the “panel of experts,” the food web study proposal, and community outreach efforts. Overall, the steering team was very supportive of the work completed to date and the future activities proposed by the science team. Recommendations from the steering team included informing local legislators of our findings after we have investigated the feasibility of remediation and adding another citizens group representative (Jay Gilliam) to the science team.

Statistical analysis. John Green joined the meeting by phone presented revised statistical analyses of fish data, including a review of combined “sunfish” and “redbreast” data. The combined data reinforced conclusions suggested by examining these two groups separately. John also examined fish data to see if there appeared to be downstream movement of the more highly contaminated fish samples over time. The analogy of the “rat moving through the snake” was used. Data did not indicate a significant downstream movement of highly contaminated fish over time. The South River stations below Waynesboro (Dooms, Crimora, and Grottoes) have produced the most highly contaminated fish samples since sampling began in the 1970s, and this pattern has remained consistent through the 1980s and 1990s.

John provided recommendations for future fish sampling. At least 10 individuals of each target species should be collected at each location during a sampling event and fish should not be of a narrow size range.

There was a discussion of the relationship between fish and sediment levels. It is believed that there is good correlation between the two: The most highly contaminated fish and most highly contaminated sediments are believed to be from the same portions of the river. There was also discussion regarding environmental events (floods, droughts, etc.) and their influence on available mercury, mercury transport, and levels in fish. It is unclear whether fluctuations of mercury levels in fish at a given location over time are the result of natural variation or responses to specific environmental events. Possible ways to address this might be to also look at shorter lived species or early life stages of species we are currently evaluating (example, young-of-year fish).

Action Item(s):

- DEQ, DuPont – provide John with sediment data to ensure he has a complete data set.
- John Green – Work up sediment data

Future sampling/studies.

Floodplain soils. Lewis Garrett presented a proposal to evaluate whether risks to consumers exist from eating produce grown in the South River floodplain. The consensus was that this proposal was worthwhile; however, we agreed to first review any available information from previously conducted work in this area. Possible sources of data include an earlier review (1970s?) conducted by the Virginia Department of Agriculture and Consumer Services and a floodplain study conducted by James Madison University. DEQ will try to track down this information and will provide it to Annette Guiseppi-Elie. Once those materials are located and reviewed, we will decide whether to pursue a study similar to the one proposed by Lewis.

Action Item(s):

- DEQ – locate information on previous plant and animal floodplain studies. Also, locate and review JMU floodplain study. Provide this information to Annette Guiseppi-Elie.

Mud map. Dick Jensen led a discussion about developing a “mud map” for the South River and South Fork Shenandoah River. This effort would delineate the fine-grained sediments, which are believed to be a major reservoir of mercury in the system. Although some mapping of sediments in the system has been done in the past, Dick’s proposal is to use updated electronic technology (GPS, coupled with sonar?) and develop more precise, up to date maps. Once these maps are developed, sites can be selected for intensive study, including aging of sediments and evaluating sediment transport. Dick will develop a proposed conceptual plan for sediment mapping and study, and will share it with the team by the next meeting.

Action Item(s):

- Dick Jensen – Develop conceptual plan for mud mapping project and circulate among Science Team members at or before the next meeting.

Gut analysis. Tammy Newcomb of Va. Tech introduced herself to the team and shared her knowledge of the proposed fish stomach content project, based on briefing by Don Orth. Questions posed to the team included the overall objective of the study, the number of fish species to study, the number of proposed sample locations, and whether to include organisms other than fish and their food items. The overall objective was described by team members as an effort to define and quantify the pathways for mercury moving through the aquatic food web, along with a study of bioenergetics of the system. The consensus of the team was to include smallmouth bass and redbreast in the study, and to sample at 3 sites (control, South R., and S. Fork Shenandoah R.), quarterly for a one-year study. There was discussion about including channel catfish at one or more sites, since they are commonly harvested when caught, but there was uncertainty whether channel catfish could be effectively sampled in all seasons of the year. Tammy agreed to develop and provide DuPont with a proposal by the next meeting of the Science Team.

Action Item(s):

- Tammy Newcomb – Prepare final proposal for fish gut study and submit to Ralph Stahl by next meeting of Science Team.

Historical document search. Ralph Stahl shared with team members a listing of all known studies completed to date on the South River mercury contamination issue. He asked all team members to review the list and ensure its completeness. Any reports or studies not on the list should be identified and provided to Ralph or Don. The list is attached.

Action Item(s):

- All – Review report list (included as pages 5-12 of this summary) and provide Ralph or Don a copy of any known reports not on the list.

Analytical issues. Norma Roadcap and Michell Mouer represented DCLS and responded to questions from team members. The primary question was whether data from historical studies (1970s and 1980s) are comparable with currently generated data. The consensus was that for total mercury the data are comparable. Differences in methods over time relate primarily to digestion techniques, and results should generally be comparable. A more likely source of variability in data could come from using different field preparation techniques for samples. DEQ will look into this issue and identify any differences in field techniques over the course of the study.

Action Item(s):

- DEQ – Review field methodologies and prepare comparative summary of techniques for fish, sediments, and water sampling and processing.

Design of "expert panel" meeting. Ralph led a discussion on assembling and briefing the "expert panel" to familiarize them with the resource, the history of the mercury problem, and our plans for additional study. The next meeting of the science team will be to introduce the experts to the project and begin getting their input and assistance. Individuals with whom we hope to meet include the following:

Name	Expertise	Affiliation
Dr. Gary N. Bigham	Environmental Fate / Hg	Exponent
Dr. Patrick McLaren	Sedimentologist/ Transport	GeoSea
Dr. Rob Mason	Environmental speciation / Hg/ bioaccumulation	Univ of Maryland
Mr. Ralph Turner	Hg chemistry / remedial alternatives	Canadian Oxychem
Dr. James Weiner	Hg accumulation in fish	Univ of Wisconsin

Ralph will contact these individuals to determine their availability for a 2-day meeting in October. We will target the week of October 1, and will include a river tour in the meeting. Ralph will set up a September 6 conference call to discuss the format and content for the October meeting. Ralph is also trying to set up a meeting with Mr. Guy Apicella of Lawler, Matusky, & Skelly (LMS) Engineers to discuss details of South River mercury studies conducted by LMS in the 1980s for DuPont.

Action Item(s):

- Ralph – Contact "experts" and set date for meeting. Contact Guy Apicella for discussion/meeting.
- Ralph – Set up conference call for development of meeting agenda.

Next meeting. The next meeting of the Science team will be a 2-day meeting, and will be at the DEQ Valley Regional Office. This meeting will include a gathering of "expert panel" members and will also probably include a river tour for those individuals. Stay tuned for the meeting dates.

Adjourn.

Attachment 1. List of Attendees

Name	<u>Affiliation</u>	<u>E-Mail</u>
Don Kain	DEQ	Dgkain@deq.state.va.us
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Alex Barron	DEQ	Ambarron@deq.state.va.us
Norma N. Roadcap	DCLS	Nroadcap@dgs.state.va.us
Michell Mouer	DCLS	Mmouer@dgs.state.va.us
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Stephen Reeser	DGIF	Sreeser@dgif.state.va.us
Robert Hoke	DuPont	Robert.a.hoke@usa.dupont.com
Ralph Stahl	DuPont	Ralph.g.stahl-jr@usa.dupont.com
Mike Newman	William & Mary VIMS	Newman@vims.edu
Allen Gutshall	VDH	Agutshall@vdh.state.va.us
Bill Jordan	VDH	Wjordan@vdh.state.va.us
Lewis Garrett	DuPont	G_lewis.garrett@usa.dupont.com
Tammy Newcomb	Virginia Tech	Newcombt@vt.edu
Mike Liberati	DuPont	Michael.r.liberati@usa.dupont.com
Dick Jensen	DuPont	Richard.h.jensen@usa.dupont.com
Annette Guiseppi-Elie	DuPont	Annette.guiseppi-elie@usa.dupont.com
Ted Turner	DEQ	Rtturner@deq.state.va.us
Jay Gilliam	Va. Izaak Walton SOS	Strmiwla@cfw.com
John Green (by phone)	DuPont	

CATALOG OF MERCURY REPORTS, DEQ - VALLEY REGIONAL OFFICE

<u>Report Title</u>	<u>Date</u>
DES South River Mercury Study 3.07.17 B77-013 (from 4/77 - 6/81)	
Mercury Contamination of the South River at W'boro memo to Bd. Members	June-77
1978 South/Shenandoah Rivers Mercury Data in Fish memo from Dave Paylor to D. Hill	November-78
1979 South/Shenandoah Rivers Mercury Data in Fish & Sediments memo from Dave Paylor to D. Hill	August-79
Data Summary: Mercury content of Fish & Sediments from South/South Fork Shenandoah/Shenandoah Rivers 1977-1979 Inclusive by SWCB staff	September-79
Mercury Contamination of the South, South Fork Shenandoah & Shenandoah Rivers - by SWCB	March-80
Hydrogeological Investigation to Determine Ground-Water Flow into the South River from du Pont's Waynesboro, Virginia Plant - by Leggette, Brashears & Graham, Inc.	August-80
Annual Study of the Mercury Contamination of the Fish & Sediment in the South, South Fork Shenandoah & Shenandoah Rivers - by B. Gail Todd of SWCB FSFS-Div. of Ecological Studies	September-80
Engineering Feasibility Study of Rehabilitating the South River & South Fork Shenandoah River Volumes I and II, Interim Report - by Lawler, Matusky & Skelly Engineers	March-81
Engineering Feasibility Study of Rehabilitating the South River & South Fork Shenandoah River-Draft Final Report - by Lawler Matusky & Skelly Engineers	January-82
Engineering Feasibility Study of Rehabilitating the South River & South Fork Shenandoah River Volumes I and II, Final Report - by Lawler, Matusky & Skelly Engineers	June-82
An Ecological Study of the South River to Ascertain the Extent of Long-Term Responses of Invertebrates to Mercury, Volumes I and II - by Bio Dept. of VPI&SU	November-89
Reassessment of Mercury in the South River & South Fork Shenandoah River - by Lawler, Matusky & Skelly Engineers	December-89
A Comprehensive Evaluation of the South & South Fork Shenandoah Rivers for Mercury Contamination - 1992 Water Analysis - by AMRL	November-92
A Comprehensive Evaluation of the South & South Fork Shenandoah Rivers for Mercury Contamination - 1992 Tissue Analysis - by AMRL	February-93
Analysis of Organomercury from Fish Collected in Conjunction w/the Shenandoah River Mercury Monitoring: July 1992 Collection - by AMRL	July-94
Comparisons of Total Mercury Content in Three Tissue Types from Seven Species of Fish Collected in the Shenandoah River, Va - by AMRL	July-94
A Comprehensive Evaluation of the South & South Fork Shenandoah Rivers for Mercury Contamination - 1994 Tissue Analysis - by AMRL	February-95
A Comprehensive Evaluation of the South & South Fork Shenandoah Rivers for Mercury Contamination - 1996 Tissue Analysis - by AMRL	August-96
Analysis of Organomercury from Fish Collected in Conjunction w/the Shenandoah River Mercury Monitoring - July 1994 Collection - by AMRL	August-96
Mercury Analysis Data Sheets - faxed to VRO	June-97
Analysis of Organomercury from Fish Collected in Conjunction w/the Shenandoah River Mercury Monitoring: 1992, 1994, & 1996 Collection - by AMRL	September-97
A Comprehensive Evaluation of the South & South Fork Shenandoah Rivers for Mercury Contamination: Water Analysis - by AMRL	October-97
A Comprehensive Evaluation of the South & South Fork Shenandoah Rivers for Mercury Contamination: 1997 Sediment Analysis - by AMRL	February-98
A Comprehensive Evaluation of the South & South Fork Shenandoah Rivers for Mercury Contamination: Final Report - by AMRL	June-98

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- 1977 Raw fish data, DEQ
 - 1978 Raw fish data, DEQ
 - 1979 Raw fish data, DEQ
 - 1980 Raw fish data, DEQ
 - 1981 Raw fish data, DEQ
 - 1983 Raw fish data, Dr. Hendricks
 - 1984 Raw fish data, Dr. Hendricks
 - 1985 Raw fish data, Dr. Hendricks
 - 1986 Raw fish data, Dr. Hendricks
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- *Mercury Contamination of the South, South Fork Shenandoah, and Shenandoah Rivers, Ralph W. Bolgiano, Virginia State Water Control Board, Division of Surveillance and Field Studies, Valley Regional Office, Basic Data bulletin 47, March 1980*
 - *Hydrogeological Investigation to Determine Groundwater Flow into the South River from DuPont's Waynesboro, Virginia Plant, Leggette, Brashears & Graham, Inc, consulting Groundwater Geologists, 72 Danbury Road, Wilton, CT 06897, August 1980*
 - *Mercury Contamination of the South, South Fork Shenandoah, and Shenandoah Rivers, FIRST ADDENDUM TO BASIC DATA BULLETIN 47, MARCH 1980, Ralph W. Bolgiano, Virginia State Water Control Board, Division of Surveillance and Field Studies, Valley Regional Office, Basic Data bulletin 48, March 1981*
 - *Engineering Feasibility Study of Rehabilitating the South River and South Fork Shenandoah River, Volume I of II, Interim Report, March 1981, Lawler, Matusky & Skelly Engineers*
 - *Engineering Feasibility Study of Rehabilitating the South River and South Fork of the Shenandoah Rivers, Volume II of II, Final Report, June 1982, Lawler, Matusky & Skelly Engineers*
 - *Fish Mercury Monitoring program for the Shenandoah River Basin, Albert C. Hendricks, June 21, 1983*
 - *An Ecological Study of the South River, Virginia, to Ascertain the Extent of Long-Term Responses of Periphyton and Invertebrates to Mercury, I. The Scoping Phase Final Report, April 30, 1984. Department of Biology, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061*
 - *An Ecological Study of the South River to Ascertain the Extent of Long-Term Responses of Invertebrates to Mercury, Biology Department, VPI&SU, November 27, 1989*
 - *Reassessment of Mercury in the South River and South Fork Shenandoah River, December 1989, Lawler, Matusky & Skelly, #407-008*
 - *A Comprehensive Evaluation of the South and South Fork Shenandoah Rivers for Mercury Contamination: Water Analysis, AMRL Technical Report No. 3058, Oct 1997*
 - *A Comprehensive Evaluation of the South and South Fork Shenandoah Rivers for Mercury Contamination: 1997 Sediment Analysis, AMRL Technical Report No. 3062, Jan 1998*
 - *A Comprehensive Evaluation of the South River and South Fork Shenandoah River for Mercury Contamination Final Report AMRL Technical Report No. 3079, June 1998*

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50. Wheatley B., Paradis S., Lassonde M., Giguere M.-F., & Tanguay S. (1997) Exposure patterns and long term sequelae on adults and children in two Canadian indigenous communities exposed to methyl mercury. *Water, Air and Soil Pollution* 97: 63-73.

DEQ Action Items

Statistical analysis. John Green joined the meeting by phone presented revised statistical analyses of fish data, including a review of combined “sunfish” and “redbreast” data. The combined data reinforced conclusions suggested by examining these two groups separately. John also examined fish data to see if there appeared to be downstream movement of the more highly contaminated fish samples over time. The analogy of the “rat moving through the snake” was used. Data did not indicate a significant downstream movement of highly contaminated fish over time. The South River stations below Waynesboro (Dooms, Crimora, and Grottoes) have produced the most highly contaminated fish samples since sampling began in the 1970s, and this pattern has remained consistent through the 1980s and 1990s.

John provided recommendations for future fish sampling. At least 10 individuals of each target species should be collected at each location during a sampling event and fish should not be of a narrow size range.

There was a discussion of the relationship between fish and sediment levels. It is believed that there is good correlation between the two: The most highly contaminated fish and most highly contaminated sediments are believed to be from the same portions of the river. There was also discussion regarding environmental events (floods, droughts, etc.) and their influence on available mercury, mercury transport, and levels in fish. It is unclear whether fluctuations of mercury levels in fish at a given location over time are the result of natural variation or responses to specific environmental events. Possible ways to address this might be to also look at shorter lived species or early life stages of species we are currently evaluating (example, young-of-year fish).

Action Item(s):

- DEQ, DuPont – provide John with sediment data to ensure he has a complete data set.
- John Green – Work up sediment data

Floodplain soils. Lewis Garrett presented a proposal to evaluate whether risks to consumers exist from eating produce grown in the South River floodplain. The consensus was that this proposal was worthwhile; however, we agreed to first review any available information from previously conducted work in this area. Possible sources of data include an earlier review (1970s?) conducted by the Virginia Department of Agriculture and Consumer Services and a floodplain study conducted by James Madison University. DEQ will try to track down this information and will provide it to Annette Guiseppi-Elie. Once those materials are located and reviewed, we will decide whether to pursue a study similar to the one proposed by Lewis.

Action Item(s):

- DEQ – locate information on previous plant and animal floodplain studies. Also, locate and review JMU floodplain study. Provide this information to Annette Guiseppi-Elie.

Historical document search. Ralph Stahl shared with team members a listing of all known studies completed to date on the South River mercury contamination issue. He asked all team members to review the list and ensure its completeness. Any reports or studies not on the list should be identified and provided to Ralph or Don. The list is attached.

Action Item(s):

- All – Review report list (included as pages 5-12 of this summary) and provide Ralph or Don a copy of any known reports not on the list.

Analytical issues. Norma Roadcap and Michell Mouer represented DCLS and responded to questions from team members. The primary question was whether data from historical studies (1970s and 1980s) are comparable with currently generated data. The consensus was that for total mercury the data are comparable. Differences in methods over time relate primarily to digestion techniques, and results should generally be comparable. A more likely source of variability in data could come from using different field preparation techniques for samples. DEQ will look into this issue and identify any differences in field techniques over the course of the study.

Action Item(s):

- DEQ – Review field methodologies and prepare comparative summary of techniques for fish, sediments, and water sampling and processing.