

**Susquehanna River Basin Commission (SRBC)
Water Quality Advisory Committee (WQAC) Meeting Minutes**

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U.S. Geological Survey (USGS) Office
215 Limekiln Rd
New Cumberland, PA

May 25, 2011
10:00 a.m. – 3:00 p.m.

A. Introduction and Opening Remarks (Dave Heicher, SRBC)

Dave Heicher, SRBC, opened the meeting with introductions (see Participant List in Attachment A). The WQAC usually meets twice each year, in spring and fall.

B. SRBC Research Project: Aquatic Resource Surveys to Determine Potential Impacts Associated with Approved Water Withdrawals (Matthew Shank, SRBC)

Matt Shank, SRBC, gave a presentation on Aquatic Resource Surveys (ARSs). An ARS is a comprehensive field investigation conducted at a proposed water withdrawal location to inform the technical review process. There are many criteria taken into account when planning an ARS, which may be performed if:

- The application is administratively complete;
- No biological data are available for the site, they are more than three years old, or were collected more than one mile from the withdrawal point;
- Stream designation is exceptional value (EV) or high quality (HQ), and is a wild trout fishery or has a naturally reproducing trout population;
- The stream provides habitat for rare, threatened, or endangered species; or
- The stream is part of, adjacent to, or hydrologically connected to a wetland complex or headwater area.

SRBC conducts ARSs for about 80 percent of surface water withdrawal applications that are received, and is evaluating whether ARSs should be performed at proposed groundwater withdrawal sites.

Field methodology includes sampling for fish, macroinvertebrates, periphyton, invasive species, physical habitat, discharge, and water quality (lab and field).

Macroinvertebrate sampling protocols follow those used by either Pennsylvania or New York, depending on the site location. Periphyton collection follows Rapid Bioassessment Protocols (RBPs).

SRBC checks for invasive species, which can include zebra mussels, didymo, and water chestnut. The presence of invasive fish species is determined through electrofishing. Appropriate agencies are notified whenever staff finds invasive species. Staff uses nonfelt

wading boots and disinfects sampling equipment to avoid spreading invasive species from site to site.

Physical habitat assessments are performed according to slightly modified RBPs, and include instream cover, epifaunal substrate, embeddedness, velocity/depth regimes, channel alteration, sediment deposition, frequency of riffles, channel flow status, condition of banks, vegetative protective cover, and riparian vegetative zone width.

Discharge measurements are taken with a FlowTracker using standard USGS procedures. This gives a site-specific flow that can be compared to reference gages and in-house models used to determine passby flows.

Water quality measurements include field chemistry (pH, conductance, temperature, and dissolved oxygen). Laboratory chemistry includes alkalinity, acidity, total dissolved solids, total organic carbon, iron, manganese, barium, chloride, sulfates, sodium, lithium, strontium, and bromide.

ARSs assist in the determination of any seasonal restrictions on installations of intake structures that may be needed to protect native sensitive or rare species. If threatened and/or endangered species are encountered, SRBC staff works with project sponsors in an attempt to relocate intake structures away from sensitive habitats. ARSs also assist in determining the need for protective passby flows (daily or seasonal).

SRBC plans to revisit sites where withdrawals have been initiated. Staff will sample the same stream that was sampled previously, in addition to sampling upstream of the intake structure for reference data. The objective is to compare biological communities to see if they are affected by water withdrawals. Staff is working to identify good candidate stream sites for the surveys, which are currently in the planning stage.

C. USGS Research Project: Development of Ecological Flow Tool in Cooperation with SRBC, The Nature Conservancy (TNC), and the Pennsylvania Department of Environmental Protection (PADEP) (Marla Stuckey, USGS)

Marla Stuckey, USGS, gave a presentation on an ecological flow tool being developed in cooperation with SRBC, TNC, and PADEP. The objective of this project is to develop a tool that will simulate a baseline daily flow time series (period of record from 1960-2008) for any ungaged stream location within Pennsylvania. The three major components are to define a set of index gages, link ungaged stream locations to an appropriate index gage using map correlation method, and simulate baseline streamflow conditions.

An index gage is determined based on a composite of the upstream land cover/basin characteristics that can be used to represent other watersheds with similar characteristics. Initial criteria are minimal regulation/water use/mining, a limit of 15 percent of maximum urban development, and a 15-year minimum time period of record (1960-2008). The group selected

157 gages as index stream gages in Pennsylvania, New York, Maryland, West Virginia, and Ohio.

The map correlation method was used to select an appropriate index gage for ungaged sites. This method was introduced by Archfield, USGS, in Massachusetts in 2009 and is based on geostatistics. It develops a correlation map for each index gage based on cross-correlation of streamflows at the index gage and all other index gages. For any ungaged location, the index gage with the highest correlation for that particular point is selected as the best correlated index gage.

To test the map correlation method in Pennsylvania, two pilot basins (the lower Susquehanna basin and the upper Delaware basin) were selected. Marla said the group was looking for opportunities for potential improvements to the method, such as correlating flow exceedances versus logs of streamflows, basin centroid distance versus basin outlet distance, and spatial anisotropy (directional variation and correlation). They wanted to compare the map correlation results to the traditional closest gage method.

The overall objective of this project was to develop a tool that would simulate baseline daily flows. The group developed the PA Baseline Streamflow Calculator. It was based on code developed by Archfield (2009) for the Massachusetts Safe Yield Estimator. The code was converted to VB.NET. Region basin characteristics are downloaded from StreamStats or entered manually by users. The calculator uses the map correlation method to select the index gage and returns daily values for the 1960-2008 time period, the flow exceedances for the period, and a summary report. Resulting daily values must be manually adjusted for water usage. The stream gage report compares basin characteristics from reference gages and ungaged locations and lists the top five most highly correlated reference gages. The calculator is currently in the testing phase.

D. Overview of Ohio River Valley Water Sanitation Commission's (ORSANCO's) Research Program (Sam Dinkins, ORSANCO)

Sam Dinkins, ORSANCO, gave a presentation on ORSANCO research initiatives. ORSANCO is an interstate water pollution control agency whose powers are derived from a 1948 Compact signed by state governors and approved by Congress. The agency consists of representatives from eight states and the federal government. The six mainstem states are Ohio, West Virginia, Indiana, Pennsylvania, Illinois, and Kentucky, in addition to New York and Virginia.

ORSANCO's mission is to implement the Compact through direct action and coordination of state activities. Waters discharged in one state shall not injuriously affect the waters of another state. ORSANCO has 25 employees and 27 Commissioners – three for each state and three for the federal government. ORSANCO's activities are funded by its member states based on a formula that incorporates land area and population. Additional funding is provided from the federal government through a grant from USEPA under Section 106 of the Clean Water Act. ORSANCO's major programs include Water Quality Monitoring and

Assessment, Biological Studies, Pollution Control Standards, Spill Detection and Notification, Organics Detection, Public Information and Education, and Water Resources Management.

ORSANCO's Research Committee identifies research needs in the Ohio River Basin and provides guidance for research initiatives. The committee consists of a nine-member panel of commissioners, USEPA, USGS, Water Environment Research Foundation (WERF), environmental consulting firms, and university researchers. WERF participation helps to identify emerging issues that may be worthy of future funding. ORSANCO's Research Committee makes recommendations to ORSANCO's Commissioners for potential action at their business meetings.

Current areas of interest include nutrients, emerging contaminants, microbial source tracking, mercury, total dissolved solids (TDS), and biological programs. The committee's interest in nutrients includes issues associated with the hypoxic zone in the Gulf of Mexico. This zone averages 15,000 square kilometers in size, and the goal is to reduce it to 5,000 square kilometers. The Ohio River is a primary contributor to excessive nutrient loading by the Mississippi River. A task force for this issue includes five federal agencies and 12 states. See <http://water.epa.gov/type/watersheds/named/msbasin/index.cfm> for additional information.

ORSANCO is also involved with the Nutrient Trading Project led by the Electric Power Research Institute (EPRI). This project was funded by a \$1 million dollar Targeted Watershed Grant and covers the entire Ohio River Basin. It is the largest trading project ever attempted. The project web site is at www.epri.com/ohiorivertrading. Data collection for nutrient criteria began in 1999. Attempts at correlating nutrients to biological effects have been unsuccessful to date, so the current approach is to use a weight of evidence method. Draft numbers from this approach are expected in 2012.

The committee's research on emerging contaminants (ECs) considers pharmaceuticals and personal care products (PPCPs), hormones and sterols, and perfluorinated compounds (PFCs, such as Teflon). ECs are not regulated, and ORSANCO did not have any data on them from the Ohio River. The committee conducted a Phase 1 study in 2005 that found hormones in effluent mixing zones and at upstream reference locations. Fish showed possible signs of health effects, although no intersex conditions were found. Phase 2 of the study is ongoing and is a more comprehensive survey of the occurrence of ECs within the mainstem of the river. Twenty-two locations were selected for testing. The committee considered 121 PPCP compounds, as well as hormones, sterols, and PFCs. It would like to identify areas of the river with a greater risk potential to aquatic organisms. Results were documented by the number of contaminants present, levels observed, and single chemical WERF ranking that prioritizes trace organic compounds. Partners for this project include USEPA, AXYS Analytical, and Waters Inc. The committee does not have funding for Phase 3 of the project, which would use Phase 2 results to identify a gradient of EC condition and test fish health along that gradient.

Microbial source tracking is another ORSANCO research issue. Understanding sources is critical in developing effective pollution control strategies. The committee partnered with USGS and Ohio State University to help develop improved lab methods and analytical capabilities. Staff confirmed that human-specific genetic markers can be used in a complex

system to identify sources. The committee's methylmercury (MeHg) investigation attempted to characterize bioavailable MeHg (such as in water versus fish tissue) against total mercury (Hg) in water. The committee wanted to evaluate ORSANCO's Clean Metals methods/locations for future MeHg studies. Six Ohio River sites were sampled in May, July, and September 2010 using the USGS Equal Discharge Increment (EDI) Isokinetic sampling method. Analytical parameters for Hg included dissolved total Hg, particulate total Hg, dissolved MeHg, and particulate MeHg. Supplemental constituents included dissolved sulfate, total particulate nitrogen, chlorophyll-a, suspended sediment, dissolved organic carbon, total particulate carbon, particulate organic carbon, and particulate inorganic carbon.

The committee is also interested in Hg in power plant effluent. The number of Hg violations in the Ohio River has been increasing. Implementation of newer air regulations has shifted more Hg releases to water. The committee is proposing a study to evaluate impact of FGD scrubbers on mercury levels in power plant emissions.

The research committee has observed an increasing trend for some TDS constituents such as bromide and sulfates. These constituents can come from a variety of sources including mining, power plants, road salt, natural gas extraction, and/or agriculture. The committee is proposing a TDS standard to help address this issue. Increasing bromide levels create challenges for drinking water treatment plants to meet disinfection byproduct standards. There is a need to evaluate the effectiveness of treatment techniques to minimize byproduct formation.

The committee is also involved with biological research, such as developing mussel monitoring techniques and mussel bio-criteria. A fish index is in place, but effects of invasive submerged aquatic vegetation (SAV) on fish populations must be determined. The committee wants to determine current distribution of Asian carp and be able to predict future dispersals. Finally, the committee would like to quantify the effects of dams in isolating Ohio River fish populations.

E. Lunch

F. Additional Research Projects Under Consideration and/or Development by SRBC Staff (Dave Heicher, SRBC)

Dave Heicher made a presentation on research projects that are currently under consideration or development by SRBC staff. SRBC organized an in-house research team to focus on applied research that was needed to solve water resource problems in the basin, especially those pertinent to SRBC programs and activities.

The team developed a list of 25 potential research projects and prepared one-paragraph write-ups for eight of those, which are described in the handout entitled "Research Projects Considered and Evaluated by the SRBC Research Team – updated May 23, 2011." The handout was provided to the WQAC by e-mail on May 23, 2011, and was also available at the meeting. Potential projects were ranked by the team in accordance with criteria that were described on the

above handout. Two of the eight projects were approved for funding by SRBC at its December 16, 2010 meeting. Those two projects are:

- “Aquatic Resource Surveys to Determine Potential Impacts Associated with Approved Water Withdrawals” (described earlier in the meeting by Matthew Shank)
- “Evaluation of Passby Flow Reference Gage Determinations in the Susquehanna River Basin”

Both of the above projects are related to and driven by natural gas development activities, will provide sound science for SRBC’s regulatory program, and will be performed by SRBC staff.

Three other research projects were ranked highly by SRBC’s research team. These were:

- “Evaluation of Water Availability for Watersheds in the Susquehanna River Basin”
- “Guidance for the Siting of Water Withdrawals Serving the Natural Gas Industry”
- “Evaluation of Climate Change Impacts in the Susquehanna River Basin and Adaptive Management Needed for SRBC Programs”

A scope of work has been prepared for the first of the three projects cited above. The second, relating to guidance for water withdrawal siting, was not pursued due to potential advantages/disadvantages to landowners and legal issues. The third, relating to climate change, was put on hold pending completion of a study funded by the U.S. Environmental Protection Agency (USEPA’s 20-Watershed Study). The full report for that study is scheduled for completion in 2012.

G. Roundtable Discussion of WQAC Agency/Organization Research Priorities in Support of SRBC’s Comprehensive Plan

After Sam Dinkins made his presentation on ORSANCO’s research program, Paul Swartz asked the meeting participants to indicate what they liked about ORSANCO’s program and/or would like to see in the research program being developed by SRBC. A general roundtable discussion followed, and several key issues were identified as follows:

- From a “big picture” perspective, SRBC should provide leadership and coordination for water resource-related research in the Susquehanna River Basin, consistent with the SRBC mission, Comprehensive Plan, and Water Resources Program.
- Researchers in the basin could benefit by gaining a better perspective of “who is doing what.”
 - Larry Miller of the U.S. Fish and Wildlife Service suggested that the “grey literature,” such as studies required by the Federal Energy Regulatory Commission for relicensing activities, should be more widely publicized and made available. Following that suggestion, Sarah Whitney of Pennsylvania Sea Grant offered to assist SRBC in organizing that information.
 - Jim Shortle of Penn State University’s Environment and Natural Resources Institute offered to help organize a consortium of universities and agencies to coordinate research efforts and help avoid duplication of effort.
 - SRBC staff will be working with both Sarah and Jim to implement the above.
- Funding is a major issue in pursuing research in the Susquehanna River Basin. SRBC has provided funding for two of its initial research projects related to natural gas development, but additional funding is needed.

- Meeting participants agreed that SRBC should use the Priority Management Areas identified in SRBC's Comprehensive Plan and Water Resources Program as a good organizational structure for research activities.
- There is a need to involve researchers in face-to-face meetings on a continuing basis. SRBC is considering ways to do this. Some possibilities are to:
 - Organize a research committee, such as ORSANCO has.
 - Hold annual water science forums such as those held by the New England Interstate Water Pollution Control Commission. A portion of the forum could be devoted to presentations and papers, with another portion devoted to discussions that would help guide and develop research activities in the basin.
- SRBC could help coordinate and publicize research activities through the SRBC web site.

H. Open Discussion of WQAC Research Priorities

The WQAC identified the following as priorities for development of SRBC's research agenda:

- Encourage research that will provide a better understanding of water quality impacts associated with natural gas development, including:
 - Heavy infrastructure such as pipelines, roads, drilling pads, storage and handling, and other industrial activities.
 - Further analysis of water withdrawal impacts on water quality.
 - Soil erosion and fragmentation of forest habitat.
 - Stormwater impacts, including seasonal changes.
 - Additional parameters for monitoring and expansion of SRBC's Remote Water Quality Monitoring Network, including monitoring for bromide and strontium.
- Perform studies of freshwater mussels and the benefits they provide in filtering nutrients and sediment from the water column.
- Consider microbial source monitoring, and how the information provided by that activity may help guide local investments in water quality improvement.
- Consider the effects of climate change on the various types of demands for water.
- As the demand for water increases, perform research to identify new tools to help manage that increased demand.
- Consider additional climate change research and planning information, including that provided on the Maryland Department of Natural Resources' website.
- Perform studies of surface water/groundwater interactions, especially as they relate to nutrient trading.
- Identify the benefits provided by wetlands in helping to manage both water quality and quantity.
- For both planning and regulatory purposes, identify different classes of water (based on quality and source reliability), and relate these to different classes of water users to consider the next generation of water use needs.

I. Meeting Adjourned

The meeting was adjourned at approximately 3:00 p.m.

Attachment A

Participant List

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