**Susquehanna River Basin Commission (SRBC)**
**Water Quality Advisory Committee (WQAC) Meeting Minutes**
U.S. Geological Survey (USGS) Office
215 Limekiln Rd
New Cumberland, PA

May 22, 2012
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 Low Flow Protection Policy (John Balay, SRBC)

John Balay, SRBC, gave a presentation on SRBC's Low Flow Protection Policy. SRBC worked on the proposed policy over the last 18 months and recommended a draft to the commissioners at SRBC's quarterly business meeting in March. The policy and supporting materials were uploaded onto SRBC's web site for a 60-day comment period that expired May 16, 2012. SRBC will be reviewing the extensive public comments received and will brief the commissioners at the June business meeting.

This policy was an attempt to update SRBC's passby flow guidance document of 2003. Passby flow is a prescribed streamflow at which a withdrawal must cease. A conservation release is a prescribed flow quantity that must be continuously maintained downstream of an impoundment. A percent exceedance flow is a flow value exceeded a certain percentage of time over a period of record. A 60$^{th}$ percent exceedance flow (P60) equals a flow value exceeded 60 percent of the time by mean daily flows in record.

The Nature Conservancy (TNC), SRBC, and the U.S. Army Corps of Engineers (USACE) collaborated under Section 729 of the Water Resources Development Act for the ecosystem flows study report in November 2010. The goal of this report was to determine ecological flow needs for the Susquehanna River Basin and its tributaries. It was a broad-brush approach to guide withdrawal approval conditions, releases from storage during low flow periods, and consumptive use mitigation.

The purpose and need for SRBC to develop a new policy to replace the existing "passby" policy (No. 2003-01) was to reflect current science and standards, address lessons learned over the past nine years, incorporate TNC ecosystem flow recommendations, and provide provisions for protection of waterbodies ranging in size from headwaters to mainstem rivers.

The low flow protection policy addresses aquatic resource classes, providing a consistent classification system across SRBC's member states. The three-class criteria are assessed using desktop analyses and provide hierarchical levels of protection. Smaller, higher quality sources

would be more protected, and siting of withdrawals on larger, more sustainable sources would be incentivized.

Class 1 streams are headwaters and exceptional quality waterbodies that generally could have rare, threatened, and/or endangered (RTE) species, wild trout, and EV/HQ classification or equivalent. Subclass 1a would be 0, 1st, 2nd, and select 3rd order streams. Class 2 streams are small rivers and medium tributary rivers, and generally have candidate RTE species, stocked trout, and a CWF/TSF classification or equivalent. Class 3 streams are medium mainstem rivers and large rivers, with a WWF classification or equivalent.

Headwaters protection is another main component of the low flow protection policy. This type of protection benefits Aquatic Resource Class 1 streams by requiring reasonable alternatives analyses and impact assessments. The headwaters protection really benefits Aquatic Resource Subclass 1A because of its extremely sensitive and exceptional quality headwaters. Withdrawals will not be approved except for public water supply or riparian uses and these uses have to demonstrate reasonable use, a benefit-impact analysis, and no reasonable alternative source.

Hydrologic analyses also are a component of the low flow protection policy. For gaged sources, flow statistics can be computed from U.S. Geological Survey (USGS) gage records. For ungaged sources, USGS reference gages can be analyzed, and regional regression tools and equations used.

The proposed policy also includes a cumulative water use assessment. This considers both the proposed withdrawal and all other existing water uses within a watershed. This assessment evaluates cumulative net withdrawals upgradient of the proposed withdrawal point, and could provide information to limit, condition, or deny a proposed withdrawal to avoid adverse impacts.

Two methods are used for the passby flow/conservation release calculation. One is the percent exceedance value method and the other is the PA-MD instream flow study (IFS) method. The percent exceedance value method is applicable to all stream types throughout the basin. Hydrologic variability is accommodated by regional reference gages and regression equations. The monthly percent exceedance values are specified per each of the three Aquatic Resource Classes for 12 months, including elevated values for the traditional dry months. The PA-MD IFS method is applicable to wild trout streams having a drainage area of less than 100 square miles.

The proposed policy includes some special cases that already exist in the older policy. There are provisions for withdrawal limits, seasonal passby flows/conservation releases, project-specific instream flow studies, agency coordination, adaptive management, and reservation of rights.

## C. SRBC Shale Gas Region Monitoring (Andrew Gavin, SRBC)

Andrew Gavin, SRBC, gave an overview of SRBC shale gas region water quality monitoring activities including the Remote Water Quality Monitoring Network (RWQMN), Aquatic Resource Survey (ARS) Research Project, Subbasin Surveys, Low Flow Monitoring Project, Interstate Streams Monitoring Program, Early Warning System, Large River Assessment Program, and Sediment and Nutrient Monitoring Program. The first two projects, RWQMN and ARS, were created in direct response to the gas industry.

The RWQMN currently has 51 stations monitoring water quality in real time. The five main parameters measured are conductance, turbidity, temperature, pH, and dissolved oxygen. Depth is also measured to track general conditions. All raw data are published to the SRBC web site.

In addition to the real-time data collection effort, staff visits each station every six to eight weeks to measure stream flow and collect aquatic biological community and habitat data. About six times each year, the following parameters are measured: acidity/alkalinity, chloride, barium, aluminum, total dissolved solids, sulfate, and total organic carbon. Also, calcium, magnesium, sodium, potassium, nitrate, phosphorus, carbonate alkalinity, bicarbonate alkalinity, carbon dioxide, bromide, lithium, strontium, gross alpha and gross beta data are collected four times each year.

SRBC recently published the first data report describing baseline conditions. The report characterizes baseline water quality conditions for the first 37 stations and draws no conclusions on any potential impacts. It provides basic statistical results, groups data results by similar setting, and analyzes variability of select parameters at select stations. It also informs the public about the future direction of data collection and analysis efforts. Future data analyses will cover the full 51-station network and also assess aquatic biology. Data reporting will occur at six month intervals.

SRBC will be adding RWQMN program stations to increase watershed coverage across Pennsylvania and New York. Additional monitoring capability will include the addition of water quality auto-samplers to better characterize fluctuating conditions at select stations, stream flow gaging for select stations in addition to existing water depth monitoring, and additional water quality and precipitation sensors.

ARSs are comprehensive field investigations conducted at proposed water withdrawal locations to inform the technical review process. Physical, chemical, and biological conditions are assessed, and select criteria determine when surveys are conducted. To date, over 100 surveys have been conducted for both surface and groundwater withdrawals. SRBC has coordinated closely with member jurisdictions. Review process guidance includes seasonal restrictions on intake installations, protective passby flow requirements (percent of average daily flow, high quality settings, and presence of RTE species, wild trout), required monitoring, reduction in requested quantity of water, and in some cases, denial or relocation of withdrawal location. Use of lesser quality waters is also incentivized.

The primary objective of ARS is to determine whether surface water withdrawals are impacting fish and/or macroinvertebrate communities. Field work is expected to be completed in summer 2012, followed by data analyses and completion of the research project in May 2013.

SRBC's long-standing subbasin survey program tracks ambient conditions over time within each of the six major subbasins, and includes a second-year follow-up study. Snapshot surveys at approximately 100 stations for Year-1 surveys are taken for water quality, macroinvertebrates, habitat, and streamflow. Year-2 surveys have a subwatershed focus depending on the location. Examples of past Year-2 reports include nutrient/sediment loading in the Cohocton River and combined sewer overflows (CSOs)/stormwater in the Lackawanna River. This year's Year-2 survey is focused on water quality and biological conditions in the lower reservoirs of the Susquehanna River.

SRBC's Low Flow Monitoring Project characterizes the influence of low stream flows on aquatic ecosystems in the basin. Annual surveys are conducted at 19 stations in three of the four major ecoregions. Data collection includes water quality, macroinvertebrates, fish, habitat, and streamflow. Continuous flow monitoring stations will be established at 17 sites.

The Interstate Monitoring Program has been collecting data since 1986 and is one of SRBC's longest running monitoring programs. Water quality, macroinvertebrate, fish, habitat, and streamflow data are collected at 40 stations along the PA/NY border, with stations grouped according to watershed size.

The Susquehanna River Basin Early Warning System (EWS) focuses on protection of Pennsylvania and New York public water supplies through source water monitoring of the Susquehanna mainstem and major tributaries. The EWS program helps minimize impacts from spills and major fluctuations in water quality through early detection. Basic water quality parameters are continuously monitored, along with organics, at select stations. The EWS provides a framework for data sharing and communication among water suppliers, and state/local agency personnel.

The Large River Assessment Program characterizes conditions on the mainstem of the Susquehanna River and its three major tributaries for both aquatic ecosystem health and drinking source water quality. Data collection was initiated in 2005. Annual surveys are taken at 23 stations, with six of them being located in the vicinity of SRBC EWS stations. Monitoring is performed for water quality, macroinvertebrates, fish, and habitat.

SRBC's Sediment and Nutrient Assessment Program (SNAP) provides monitoring data to support Chesapeake Bay restoration efforts. SNAP has been a longstanding monitoring program at SRBC. It has 27 stations; four of which were added in 2012. Sediment and nutrient water quality data are collected. Selected parameters related to shale gas activity and drinking source water quality are being added as well, which ties in with the Large River Program and the EWS program.

**D. USGS Studies to Establish Baseline Water Quality in the Marcellus Shale Development Area (Jeff Chaplin, USGS)**

Jeff Chaplin, USGS, gave a presentation on USGS studies to establish baseline water quality in the Marcellus shale development area. USGS has six continuous flow gages, 10 continuous water quality sondes, and 11 periodic sampling sites throughout Pennsylvania. For baseline water quality monitoring, USGS has several projects, including one in the Lycoming Creek Basin. Objectives of the Lycoming Creek project were to develop a water quality baseline for major ions, nutrients, trace metals, and radiochemicals in surface and groundwater, and to provide guidance for further study as natural gas exploration accelerates.

Lycoming Creek was sampled during low flow conditions to characterize base flow. USGS and PADEP sampled a broad range of constituents that are not typically reported, and sampled at low detection limits. Constituents analyzed included field parameters (temp, pH, dissolved oxygen, conductance, turbidity), major ions (Ca, Mg, Na, K, $HCO_3$, $SO_4$, Cl), trace metals (As, B, Ba, Br, Li, Sr), dissolved gasses (methane and ethane), and radiochemicals (gross alpha, gross beta).

Nine groundwater wells were sampled in November 2010, and five wells were sampled in August 2011, along with four quality assurance (QA) samples. Stream samples were collected at 31 stream sites in August 2011, along with nine QA samples. PADEP assisted USGS with sampling these wells.

Results for total dissolved solids (TDS) and chemical composition varied widely across the watershed depending on climate, geology, and topography. Methane was detected at very low concentrations in 86 percent of the samples collected. The highest concentration was 0.6 mg/L, which was far below the action level of 10 mg/L. Uranium and radium levels were low, with the highest values recorded from bedrock wells.

USGS partnered with the Altoona Water Authority (AWA) and the Blair County Conservation District (BCCD) for a Blair County baseline monitoring project. AWA serves 23,000 customers throughout 12 municipalities in Blair County. Water is supplied by seven reservoirs, as well as one well field that is only used for emergencies. Objectives for the project include the following: document existing channel characteristics, characterize stream water chemistry, and characterize composition and relative abundance of benthic macroinvertebrates and fish.

The monitoring project included 10 surface water sites (six AWA source water streams, one stream source for Tyrone Water Authority, and 3 other streams). Stream water samples were analyzed monthly for barium, strontium, chloride, bromide, sulfate and TDS. Continuous monitoring of specific conductance, water temperature, and stage was conducted at four of the 10 sites. Macroinvertebrates and fish were sampled at each site once. Surveys of channel morphology and particle-size distribution were also completed once at each site.

This project is ongoing but Jeff shared some preliminary results. TDS levels are relatively low, as are chloride, bromide, barium, and strontium levels. Data collection will

continue through April 2013. Additional major ions and trace metals will be added to the sampling in June 2012. The final report is planned for 2014.

### E. Final Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources (Jeanne Briskin, USEPA Office of Research & Development)

Jeanne Briskin, U.S. Environmental Protection Agency (USEPA), gave a presentation on USEPA's final plan to study the potential impacts of hydraulic fracturing on drinking water resources. The purpose of the study is to assess whether hydraulic fracturing can impact drinking water resources and to identify driving factors that affect the severity and frequency of any impacts. USEPA is committed to using the following: best available science; transparent, peer-reviewed process; sound quality assurance principles; independent sources of information; and consultation with others. After holding public stakeholder meetings in New York, Pennsylvania, Texas, and Colorado, and receiving reviews by federal agencies and the Science Advisory Board, USEPA released the final study plan on November 3, 2011.

USEPA considered the cycling of water used in hydraulic fracturing operations. Relatively large volumes of water are acquired and transported for the fracturing process. Water, chemicals, and sand are mixed at the well site before they are used for hydraulic fracturing. Flowback and produced water from the well are stored onsite in open pits or storage tanks. Then the wastewater may be re-used for hydraulic fracturing or be transported for treatment and/or disposal. All of the research questions posed focus on this water cycling and the potential impacts on drinking water resources from the following: large volume water withdrawals from surface and groundwater; surface spills of hydraulic fracturing fluids on or near well pads; the injection and fracturing process; surface spills on or near well pads; and inadequate treatment of hydraulic fracturing wastewater.

To answer the research questions, USEPA is gathering and analyzing existing data, and considering case studies, scenario evaluations, laboratory studies, and toxicity assessments. Well locations, construction practices, and water use are all being analyzed. USEPA sent an information request to nine hydraulic fracturing companies asking for the following: a list of chemicals found in hydraulic fracturing fluids, flowback, and produced water; standard operating procedures; frequency, severity, and causes of spills; and treatment and disposal practices. A second information request was sent to nine clients of the original nine companies, and information was requested for 350 complete well profiles.

Case study locations were selected with the assistance of outreach to stakeholders. Site selection criteria for prospective studies were based on applicability to and coverage of core research questions; geologic, geographic, and hydrologic diversity; potential human exposure; and ability to develop partnerships with stakeholders. Prospective case study locations were in the Haynesville shale in DeSoto Parish, LA, and in the Marcellus shale in Washington County, PA. The prospective studies include data collection prior to, during, and after hydraulic fracturing activities at new sites. USEPA will characterize pre- and post-fracturing conditions, improve understanding of potential impacts of hydraulic fracturing, and use a tiered study approach.

USEPA conducted five retrospective case studies (i.e., in areas where hydraulic fracturing has already occurred) in the following areas: Bakken shale, Killdeer, Dunn County, ND; Barnett shale, Wise County, TX; Marcellus shale, Bradford/Susquehanna Counties, PA; Marcellus Shale, Washington County, PA; and Raton Basin, Colorado. Retrospective studies were conducted to determine whether drinking water resources were impacted, and if so, to determine what factors may have contributed to the impacts.

USEPA is evaluating potential scenarios for water impacts. It will explore potential cumulative impacts from water withdrawals, model various failure scenarios to determine conditions under which subsurface contaminant migration may occur, and explore potential cumulative impacts from surface water disposal of treated wastewater. Laboratory work will explore reactions between hydraulic fracturing fluids and shale, determine the effectiveness of wastewater treatment using conventional wastewater treatment technologies, assess potential for treated wastewater to impact drinking water resources, and modify analytical methods, as necessary.

Toxicity assessments will focus on hydraulic fracturing fluids, wastewater, and naturally occurring substances below the surface at the well. These assessments will summarize known chemical, physical, and toxicological properties of the known fracking fluids. Where information on these properties is missing, USEPA will estimate the properties using structure-activity relationships. The agency will also screen chemicals for priority attention.

USEPA plans to provide quarterly updates on the progress of their research. A progress report is due in 2012, with the final report due in 2014. Details can be found at http://epa.gov/hfstudy/.

## F. Lunch

## G. Pennsylvania's Act 13: The Marcellus Shale Law (Kurt Klapkowski, PADEP)

Kurt Klapkowski, Pennsylvania Department of Environmental Protection (PADEP), gave a presentation on Pennsylvania's Act 13, known as the Marcellus Shale Law. Executive Order 2011-01 created the Marcellus Shale Advisory Commission (MSAC). Its goal was to outline a comprehensive plan with recommendations on the safe and responsible development of unconventional natural gas resources within Pennsylvania. Numerous recommendations were used to outline a comprehensive, strategic plan for the responsible development of natural gas drilling in PA. Environmental protection recommendations that needed to be accomplished through legislation were included in the Act. The plan was unanimously approved by the MSAC on July 15, 2011, and outlines the first major update of the Oil and Gas Act in nearly three decades.

Act 13 of 2012 consolidates the Oil and Gas Act (Act 223 of 1984) into six chapters within 58 Pa.C.S. Chapter 32, Development, includes permitting and notifications, environmental protections and enhancements, and inspections and enforcement. There are a few

new additions under permitting and notifications. Host/adjacent municipalities, surface landowner, landowners, and water purveyors whose water suppliers are within 3,000 feet from a well must be notified of a well permit. A water management plan must be approved for water withdrawn or used for drilling and well completion. There are to be no adverse impacts to water quality or quantity, and designated and existing uses of water sources are to be maintained. The well permit must be posted at the well site prior to commencing earth disturbance activities and well construction.

The old bonding requirements were $2,500 per well or a $25,000 blanket bond. There are new bond schedules for shallow wells (less than 6,000 feet) and deep wells (greater than 6,000 feet), based on the number of operating wells. The maximum blanket bond has been increased to $850,000.

Operators are required to give PADEP 24 hours' notice prior to taking the following actions: spudding (commencement of drilling), resumption of drilling (after a 30-day or longer break in drilling), cementing of all casing strings, conducting pressure tests of the production casing, stimulation of a well, and abandoning or plugging of a well.

Several well location restrictions have been instituted to provide environmental enhancements and protections. For unconventional wells, setbacks increased from 200 feet to 500 feet from buildings or water wells (unless consent given by owner or variance), are now 1,000 feet from water supply (unless authorized by water purveyor or variance), and were increased from 100 feet to 300 feet from any stream, spring, body of water, or wetland greater than one acre in size (unless waiver). Well site pads must maintain a setback of 100 feet from the edge of disturbance to any stream, spring, body of water, or wetland greater than one acre in size.

There are also restrictions on activities in floodplains. Wells are prohibited within a floodplain if the site will have a pit or impoundment within the floodplain or a tank within the floodway. Restrictions do not apply to existing well sites with a valid well permit issued under a grandfathering provision.

Under the portion of Act 13 dealing with protection of water supplies, new additions include an increase in distance and duration of rebuttable presumption: from 1,000 feet to 2,500 feet of the water supply, and from 6 months to 12 months after well completion, drilling, stimulation, or alteration. The operator must notify the landowner or water purveyor that rebuttable presumption may be void if the landowner or water purveyor refuses to allow the operator to conduct pre-drilling or pre-alteration survey. Restored or replaced water supply must meet Safe Drinking Water Standards or pre-drilling conditions if the water quality did not meet those standards. PADEP has established a toll-free number for reporting alleged cases of water contamination: 1-866-255-5158. If any case of subterranean water supply contamination is confirmed, it will be reported on PADEP's web site.

The Act also requires new containment practices. The well pad site must be designed and constructed to prevent spills. PADEP is working on a Containment Practices document and may

establish additional protective measures for storage of hazardous chemicals within 750 feet of streams, springs, or other bodies of water.

The Act also has new provisions for chemical disclosure. Within 60 days of commencement of hydraulic fracturing, the hydraulic fracturing service provider or vendor that supplies hydraulic fracturing additives shall provide the well operator with the identity of chemicals or concentration of chemicals used to hydraulically fracture the well. Within 60 days following the conclusion of hydraulic fracturing, the well operator shall complete the chemical disclosure registry form and post it on the chemical disclosure registry in a format that does not link chemicals to their respective hydraulic fracturing additive. All operators must use the registry at www.FracFocus.org. This registry was developed jointly by the Groundwater Protection Council and the Interstate Oil and Gas Compact Commission.

Owners or operators of facilities conducting natural gas operations in unconventional formations shall submit a source report to PADEP identifying and quantifying actual air contaminant emissions. Source reports must be submitted to PADEP annually by March 1 for emissions during the preceding calendar year. Under federal law, PADEP is required to submit a report on total statewide air pollution emissions to USEPA every three years. Pennsylvania's inventory is due to USEPA on December 31, 2012.

PADEP performs inspections on well pads (surface), well drilling (sub-surface), air quality, waste management, and water management (water quality). One of the new inspection requirements is that an operator may not commence drilling activities until after PADEP has conducted an inspection of the unconventional well site after the installation of erosion and sediment (E&S) control measures. The person in charge of a well site property, facility, operation, or activity subject to Chapter 32 of Act 13 must provide PADEP and its agents with access to the site and facilities for inspection purposes or to remediate or respond to a well control emergency. Inspection reports are available for public review at each PADEP district office. PADEP will also post inspection reports on its web site. The reports will include the nature and description of a violation; the operator's written response to a violation, if available; the status of the violation; and remedial steps taken by the operator or PADEP to address a violation.

PADEP may deny a permit if an applicant or any parent or subsidiary corporation is in continuing violation of Act 13, any other statute administered by PADEP, or any Plan Approval, permit, or order of PADEP. PADEP may also suspend or revoke a well permit or registration for any well in continuing violation of Act 13, the Clean Streams Law, Solid Waste Management Act, any other statute administered by PADEP, or if the likely result of a violation is an unsafe operation or environmental damage. Prior to suspension or revocation of the permit, PADEP shall provide written notice to the operator or its agent.

PADEP has increased the penalty amount for summary offenses from $300 up to $1,000 for each day a violation continues. Willful violations are subject to a penalty of up to $5,000 for each day a violation continues and up to one year imprisonment. For civil penalties, an operator can be fined up to $25,000 plus $1,000 for each day that the violation continues. Violations arising from the construction, alteration, or operation of an unconventional well shall be subject

to a penalty of $75,000 plus $5,000 for each day a violation continues. The pay period is 30 days, or an appeal must be filed with the Environmental Hearing Board.

## H. New York State's New Water Resources Law (Michael Holt, NYSDEC)

Mike Holt, New York State Department of Environmental Conservation (NYSDEC), gave a presentation on New York State's new water resources law. Governor Cuomo signed the water withdrawal law on August 15, 2011. It revises existing ECL §§15-1501, 1503, 10505, 1529, repeals and incorporates ECL §15-1601 (Great Lakes Water Withdrawal Registration) and ECL §15-1533 (Water Withdrawal Reporting), and implements requirements of the Great Lakes - St. Lawrence River Basin Water Resources Compact. The law went into effect on February 15, 2012.

This law applies to statewide permits for withdrawals over 100,000 gallons per day (gpd). Any existing agricultural withdrawal over 100,000 gpd need to be registered, but any new agricultural withdrawal needs a permit. The law also requires statewide registration of all major basin diversions over 1 million gallons per day (mgd). There are a few permit exemptions for the following: fire suppression or emergency purposes, approvals from basin commissions, non-extractive geothermal heat pumps, Long Island well permits, existing registered agricultural withdrawals, remediation sites under order or agreement, and short-term construction uses/dewatering.

NYSDEC coordinates with SRBC regarding application reviews, low flow protection, annual water use reporting, and water conservation. There also has been some discussion of a Memorandum of Understanding between the two agencies to clarify the roles of each agency.

## I. Update on Maryland's Marcellus Shale Study (Herb Sachs, MDE)

Herb Sachs, MDE, gave an update on Maryland's Marcellus shale study. Maryland has embarked on a comprehensive study before allowing any gas wells to be drilled. Governor O'Malley issued an executive order directing MDE and the Maryland Department of Natural Resources (MDNR) to write a report about the short-term, long-term, and cumulative effects of natural gas exploration in the Marcellus shale. A 14-member advisory committee was formed. The first report was issued in December 2011, and the final report will be completed in August 2014.

## J. PADEP Technical Update (Josh Lookenbill, PADEP)

Josh Lookenbill, PADEP, gave a quick technical update. PADEP's ICE database is an ArcGIS data entry interface that is used primarily to track macroinvertebrate and fish data. Trout Unlimited (TU), PA Fish & Boat Commission (PFBC), SRBC, and USGS all share these types of data. PADEP is moving ICE to a web-based application in fall 2012 and hopes that this will

allow other agencies to input their data. PADEP is also working on data entry for other types of organisms such as periphyton and mussels.

**K. Roundtable Review of Shale Gas Related Questions (Dave Heicher, SRBC):**

- **Explain or describe your agency's role in any energy development activity in the Susquehanna River Basin.**
- **Explain or describe key criteria your agency considers/raises when making a recommendation to SRBC or respective SRBC Commissioner (e.g., fed agency input to fed commissioner, state agency to their state commissioner) to approve/disapprove a withdrawal.**
- **Identify your agency's research needs related to shale gas development in the Susquehanna River Basin.**

Herb Sachs said Maryland is very fortunate to be able to learn from what other states have done with regard to energy development. Local folks are concerned about gas well development, especially regarding potential impacts on highways. Sediment control is also a major area of interest. MDE and MDNR will consider every aspect of the drilling process.

Tony Shaw said that PADEP's water quality monitoring activities are not involved directly with oil and gas; however, the baseline data collection is focusing primarily on the Marcellus formation, then pushing out to the Utica Formation. Their continuous instream monitoring network collects baseline data through sondes for one year, and then moves to another site. The goal is to share information and gain consistencies with other agencies (SRBC, USGS, etc.). PADEP works with smaller watersheds than SRBC, but would like to do a side-by-side sampling run with SRBC at some point in the future. PADEP, USGS, and SRBC are all working together to exchange information about monitoring and datasondes. PADEP and SRBC are using Aquarius, and USGS is using an Aquarius add-on.

Ed Bugliosi reported that USGS in New York is establishing three monitoring sites for conductivity and temperature, with two of the sites being located on the Susquehanna and one on the Delaware. The work is being performed in coordination with NYSDEC. USGS is also working with the New York State Energy Research Development Authority (NYSERDA) on a project to measure methane concentrations in wells. USGS also performs groundwater well sampling on a regular basis in conjunction with the 305(b) program. Jeff Chaplin from USGS New Cumberland said USGS provides scientific data through reports. USGS is conducting baseline-type monitoring work, continuous water quality work, synoptic studies, and maintenance of the gaging network. USGS also publishes technical documents (interpretative reports and techniques for water resources).

Thomas Barnard from Wilkes University said Wilkes has its own sondes, and has worked with SRBC on placement. He mentioned the Hydrologic Information System (HIS), which is a public data system where agencies can upload data. SRBC has also worked with Bucknell University, PA American Water Company, and Danville Borough on continuous monitoring.

Amy Guise, U.S. Army Corps of Engineers (USACE), said USACE's role in natural gas development is regulatory, especially for wetland fill activities and stream crossings. As the federal commissioner, USACE likes to reach out to other federal agencies and gain input on important issues. There is a newly released executive order directing 13 or more federal agencies to work collaboratively on responsible development of this resource. The group is chaired by the Domestic Policy Council in the White House. USACE works with SRBC staff on any project that is proposed within one mile of their reservoirs. Amy would like to have a map that overlays monitoring sites with USACE reservoirs. USACE is concerned about sediment bars that may form during flooding, and about seismicity, especially where it relates to flood management structures. USACE is interested in conducting a dialogue on responsible ways to do things, not just a list of what not to do. Lastly, USACE is concerned about invasive species at access points. Amy also mentioned that a federal agency coordination summit would be held this year.

Michael Helfrich, Lower Susquehanna Riverkeeper, mentioned the problem of invasive species that may become established along natural gas pipelines. It is very easy for invasive species to move in once these areas are clear-cut prior to construction. One thing that might offset this problem is planting trees. He spoke to the public relations people at Chesapeake Energy a few years ago about a 2-for-1 mitigation tree planting project (for example, if the gas company removed 5 acres of trees, they would replant 10). This would also help address stormwater and sediment issues associated with natural gas development.

Becky Dunlap, Trout Unlimited (TU), said using abandoned mine drainage (AMD) water for hydraulic fracturing would provide both economic and ecological benefits. TU would like to see 15 additional months of data collection at the mine pools on top of an inventory of current data.

Mark Hartle, Pennsylvania Fish and Boat Commission (PFBC), said that PFBC's mission is to protect fish, aquatic life, reptiles, and amphibians and provide fishing and boating opportunities. This mission, along with water quantity and quality issues, is the basis for interactions with other agencies. Act 13 provided the money for PFBC to create a section within PFBC's Division of Environmental Services to help deal with gas well permitting activities. PFBC has been working with other agencies and groups to inventory potential wild trout streams. The agency is also working with others to try to identify practices to prevent the spread of invasive species.

Lora Zimmerman, U.S. Fish and Wildlife Service (USFWS), said her agency reviews and comments on pipeline crossing projects. The only projects they review for the Susquehanna River Basin are Pennsylvania Natural Diversity Inventory (PNDI) hits for Indiana bats (an RTE species). The agency does not now have the opportunity to review a lot of permits, but it may want to do so after drilling is initiated in the Utica shale, because there are some federally listed mussel populations in the Allegheny River. Underground injection wells, including transport, could lead to issues in that area as well. Since USFWS has jurisdiction over migratory birds, habitat fragmentation around pipelines is a concern.

## L. Adjourned

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

# Attachment A

Participant List

| Name | Organization |
|---|---|
| Balay, John | SRBC |
| Barnard, Thomas | Wilkes University |
| Bugliosi, Ed | USGS |
| Campbell, Ellyn | SRBC |
| Campbell, Harry | Chesapeake Bay Foundation |
| Chaplin, Jeff | USGS |
| Cook, Scott (via webinar) | NYSDEC |
| Davis, Steve (via webinar) | NYSDEC |
| Dunlap, Rebecca | Trout Unlimited |
| Garrison, Sherm | MDNR |
| Gavin, Andrew | SRBC |
| Guise, Amy | USACE |
| Hamilton, Dave | OSM |
| Hartle, Mark | PFBC |
| Heicher, Dave | SRBC |
| Helfrich, Michael | Susq. Riverkeeper/Stewards of the Lower Susq. |
| Hoffmann, Michael (via webinar) | USEPA |
| Hollier, Hilary | SRBC |
| Holt, Michael (via webinar) | NYSDEC |
| Klapkowski, Kurt | PADEP |
| Kraemer, Steve (via webinar) | USEPA Office of Research & Development |
| Kulakowski, Tom | PFBC |
| Lauffer, Scott | Sierra Club |
| Lookenbill, Josh | PADEP |
| McFadden, Angela (via webinar) | USEPA |
| Richardson, Bill (via webinar) | USEPA |
| Sachs, Herb | MDE |
| Shaw, Tony | PADEP |
| Shenk, Tyler | SRBC |
| Shull, Dustin | PADEP |
| Sowers, Angie | USACE |
| Swartz, Paul | SRBC |
| Szabo, Lynn (via webinar) | USGS |
| Thoreau, Meghan (via webinar) | STCRPDB |
| Zimmerman, Lora (via webinar) | USFWS |