

**DELAWARE RIVER BASIN COMMISSION
REGULATED FLOW ADVISORY COMMITTEE
April 17, 2012**

MEETING SUMMARY

The April 17, 2012 Regulated Flow Advisory Committee (RFAC) meeting began at approximately 10 a.m. at the Delaware River Basin Commission (DRBC) offices in West Trenton. Ms. Stefanie Baxter of the Delaware Geological Survey chaired the meeting. Introductions were made around the room and via telephone for those attending on a conference call.

Review of minutes from the February 16 RFAC meeting

Review of the February 16, 2012 minutes was put on hold until the next RFAC meeting.

Hydrologic conditions report

Amy Shallcross reported on current hydrologic conditions. Last year precipitation exceeded normal amounts by 25” in the upper basin and 13” in the lower basin; so far this year precipitation is about half of the normal amount. Currently stream flow at many USGS gages is setting new record lows; this includes the Trenton gage that has 98 years of record. Reservoir storage is in good condition, with NYC Delaware Basin combined storage at 88% of usable storage; in the lower-basin, storage at Beltzville reservoir is at 100% of its water supply pool and storage at Blue Marsh reservoir is at 87%. The salt front is currently at river mile 72, compared to its normal position for this time of year at river mile 61. Ground water levels are in the normal range in most of the basin, except for a few county monitoring wells in Pennsylvania. The U.S. drought monitor currently lists our region as moderately dry and the state of Delaware as severely dry. Glen Erickson commented that weather patterns over the continental US are formed by the Jetstream, which usually shows a high degree of consistency as it travels over the US. However, since the current drought began in October 2011, the Jetstream has been in a highly turbulent mode. He said we may have to wait for these conditions to end before returning to more normal weather patterns.

Cannonsville Hydroelectric Project

Anthony Fiore of NYC DEP gave a presentation titled “Cannonsville Hydroelectric Project” (presentation posted on the DRBC website). He introduced Kevin Lang, who has been working on the project with NYC DEP as legal counsel. He said his presentation includes a status update, descriptions of project layout, hydropower intake and release locations, proposed operating regime, construction schedule, siphon operation during construction, entrainment and benefits of the project. Kevin Lang stated that some people provided a list of questions in advance and that the answers have been incorporated in today’s presentation.

Anthony presented some key dates related to the project. NYC filed a license application on 02/29/12 and FERC issued notice soliciting additional study requests on 03/13/12 (requests due 04/29/12). On April 9 FERC issued notice accepting the license application and requested that the City provide certain minor additional information (e.g. proof of service and publication, slightly revised maps and drawings, turbine ratings), which for the most part have been completed. FERC has not yet begun its environmental analysis of the project. FERC initially proposed the following schedule for the environmental analysis: FERC issues scoping document 1 (May 2012),

FERC conducts scoping meetings and site review (June 2012), comments due on scoping document 1 (July 2012), FERC issues scoping document 2 and IRs (only if necessary) (August 2012), FERC issues Notice of Ready for Environmental Analysis (September 2012), FERC issues Environmental Assessment (EA) (January 2013), comments due on EA (February 2013), and FERC issues final EA (only if necessary) (May 2013). FERC reserves the right to make adjustments to the schedule as necessary. Amy Shallcross asked if NYC does its own environmental analysis for the project. Anthony replied that FERC does the environmental analysis; they have access to EPA resources and a contract in place if additional expertise is needed. However, NYC did its own studies and provided them to FERC; these studies are the basis for FERC's environmental analysis. After review and input from stakeholders, FERC will determine if additional studies might be needed. Kevin Lang added that early in the pre-application process, NYC engaged the public and resource agencies (including DRBC) to find out what environmental issues should be studied. As a result, full environmental studies were done on aesthetics, construction impacts, endangered species, aquatic biology, and water flow impacts. These studies are part of the application filed with FERC; all the documents are available on the FERC website and on the NYC DEP website.

Anthony described the Cannonsville hydropower project. There will be four 4 turbines with 14 MW of generating capacity when 1,500 cfs pass through the turbines. The proposed powerhouse will be adjacent to the lower-level release works. He discussed design details of the hydropower and release works. The same intake location feeding the release works will be used to feed the Cannonsville turbines; the proposed powerhouse will be located adjacent to the existing release works, with hydropower discharges merging into a common tailrace with the existing release works. When the turbines are taken out of service for any reason, releases will be maintained via the existing release works. There will be no change in intake water temperature or supersaturation of nitrogen. Glenn Erikson asked about adding siphons to Pepacton reservoir to increase release capacity and mitigate impacts from flooding. Anthony said siphons were considered but ultimately ruled out based on dam safety concerns and other practical issues (warm-water releases; need to keep reservoir levels within 20 ft. of the spillway elevation to have enough lift to take the water out).

Anthony described the operating regime. The modeling of turbine operations for the license application is based on the current FFMP-OST. The project will be operated in accordance with the requirements of the applicable operating protocol agreed to by the parties to the 1954 Supreme Court Decree. The water available for generation at Cannonsville is the water currently available for conservation releases, directed releases, and spill-mitigation releases. The City does not propose to modify the magnitude, timing, frequency or duration of downstream flow releases as a result of hydropower operations. Glenn Erikson commented that this project is taking a public resource and NYC accrues all the benefits; he asked NYC to consider providing some real benefits and mitigating measures to some stakeholders. He said NYC could take the hydropower profits and use them to pay for operating costs of the Croton system; doing so would cancel the current financial incentive to take Delaware Basin water instead of Croton water.

Anthony went over the construction schedule. All construction-related activities (including final design and equipment/material purchasing) are estimated to take approximately 44 months from start to finish. Actual construction, including delivery, installation, turbine connection, and commissioning, is estimated to take approximately 21 months to complete. Construction is anticipated to begin in 2016. He discussed construction issues relative to conservation releases at Cannonsville. During approximately three months of the construction phase, when the penstocks for the turbines are connected to the penstock for the existing release works, the release works will be unavailable and conservation releases will be made via temporary siphons. The proposal

is to use two 200-cfs siphons; to ensure the proper operation of siphons, the Cannonsville Reservoir elevation will need to be maintained within 20 ft. of the spillway crest during this period. Siphon operation is proposed to be limited to the period between October 1 and December 31 to ensure maintenance of cold water releases. He said the proposed siphon sizing is sufficient to ensure maintenance of aquatic resources protection releases.

Anthony said a recent study concluded that entrainment is expected to be low for all species; he noted that, based on this study, NYS DEC and USFWS have agreed that additional intake protection measures are not needed. Anthony said the project is estimated to produce approximately 42,000 MWH of electricity annually. No final determinations have been made at this time regarding the ultimate disposition of any power to be produced by the project, and NYC is continuing to investigate opportunities for public-private-partnerships. Regarding project benefits, Anthony said the project is essentially a zero-variable-cost generation resource. When operating and generating electricity, it will displace generation from higher-cost, fossil-fuel-fired generation resources. Project-related electricity generation is estimated to slightly reduce wholesale electricity prices in upstate New York, with total annual estimated savings to upstate New York of approximately \$10.1 million. Project-related electricity generation is estimated to produce modest reductions in pollutant emissions from generation resources in New York (CO₂ emissions reductions of up to approximately 47,400 tons annually, equivalent to removing 8,200 passenger vehicles from the road). The local economic impact of the project will primarily be generated through employment of local residents for on-site construction-related work and through local subcontracting. The total direct, indirect and induced (i.e., multiplier effect) economic benefits of the construction is estimated to provide a one-time increase in the economic output in Delaware County of approximately \$4 million and approximately 16 full-time-equivalent local jobs per year during the construction period.

A question-and-answer period followed. Diane Tharp asked about DRBC approval of this project. Anthony responded that NYC has to submit an application to DRBC and plans to do so in the next few months, independently of the FERC approval process. Bob Tudor noted that the public gets an opportunity to comment on any decision made on a permit (DRBC docket); this is done at regular Commission meetings and for some projects DRBC sometimes holds special hearings.

A few questions dealt with FFMP releases and whether the hydropower project would afford additional releases. Kevin Lang noted that although the turbines are rated at a total capacity of 2,400-cfs, the calculation are based on using the 1,500-cfs maximum flow currently allowed under the FFMP. He said using 2,400 cfs reduces head generation and cannot get close to 14 MW; this would significantly disrupt the return on the investment. Both Kevin Lang and Thom Murphy emphasized that the needs for hydropower generation will not drive daily operations. Instead, releases are determined following existing protocols (i.e., FFMP) and then routed through the turbines. Someone asked if the assumptions made today about the hydropower operations would prevent or cause difficulty in changing the FFMP down the road. Thom Murphy said NYC would be reluctant to make future changes that would undermine a significant capital investment. Hoss Liaghat said the Decree Parties would like to preserve the flexibility for potentially increasing the release capacity, without technical limitations on doing so. Thom said there can be flexibility without affecting the economic viability of the project. Stefanie Baxter said the Decree Parties need to keep this issue in mind as they negotiate future FFMP agreements. She suggested that concerns raised today could go into the public record in the FERC comment period that closes in July.

Brief history of NYC Delaware Basin reservoirs Operating Rule Curves

Joe Miri gave a presentation on the history of the rule curves currently used to manage the three NYC Delaware Basin reservoirs (presentation posted on the DRBC website). He started with a review of the terms of the U.S. Supreme Court Decree of 1931 and the Amended Decree of 1954. He explained how the Excess Release Quantity (ERQ) would work and stated that without the ERQ, NYC could draw down the Delaware Basin reservoirs while keeping the Hudson Basin reservoirs full. He discussed the decreased safe yield of the NYC reservoir system after the 1960's drought of record.

Joe noted some issues with low conservation releases and the cold-water fisheries in the tailwaters. NYS DEC did a modeling study to seek remedy and produced a report (Proposed Alternative Releases from NYC Reservoirs in the Upper Delaware River Basin, 1974), followed by consultation with NYC, more model runs and another report (Supplemental Report on Releases from NYC Reservoirs in Upper Delaware River Basin, 1976). The 1976 report recommends higher conservation releases at the three tailwaters and proposes using a set of rule curves for staged cutbacks in operations (Joe referred to this report as the Supplemental Alternative Releases or SAR). A different set of rule curves were eventually adopted as part of the Good Faith Agreement (GFA) in 1983. The GFA ignores the safe yield reduction caused by the 1960's drought of record during normal operations, but imposes cutbacks on both NYC diversions and flow targets during drought operations. Both normal and drought operations are defined by the rule curves.

Joe indicated that without adjustment to the safe yield specified in the Decree, questions arose on how to calculate the ERQ. In principle a reduction in the safe yield would reduce the ERQ. Instead, the Decree Parties decided that the ERQ would not be adjusted to reflect the safe yield reduction caused by the 1960's drought. However, the ERQ would not be available during drought conditions. Fisheries releases also are either curtailed or terminated during periods of drought operations. Joe concluded that without reconciling the discrepancies in the assumptions and recommendations (rule curves) of the 1976 SAR study and the 1983 GFA, it is difficult to accurately explain the origins of the GFA rule curves that are still in effect.

A question-and-answer period followed. Hoss Liaghat asked if the safe yield was the basis for designing the rule curves or there was a different basis. Joe said the shape of the curve is not based on safe yield, but on a probabilistic calculation of reservoir refill. Joe noted that he was still looking for a copy of a report from the Coordinating Committee for the Reappraisal of Water Supply Resources of the Delaware River Basin and Service Area, established by DRBC Resolution 67-4 in March 1967; he thinks this report may shed some light on these issues. Jan Phillips suggested that it might be worthwhile to speak with Tim Weston, an attorney who represented Pennsylvania during the GFA negotiations. Stefanie Baxter suggested talking also to Harry Otto, who represented Delaware during the GFA negotiations.

Update on USGS Delaware River Basin WaterSMART Initiative

Bob Tudor reported on the status of this initiative. He said DRBC has a role ascertaining what the future water supply needs of the basin are and beginning to line up resources in the way to ensure that infrastructure capacity will be sufficient to meet those needs. He said Carol Collier has been drafting a strategy in terms of sustainable water future 2060. DRBC would like to leverage the work of many federal agencies to bring resources to this basin to advance that type of planning. One of these collaborations is with the USGS, but DRBC is also working with the National Weather Service and is planning on working with the Army Corps of Engineers in the future.

Bob said the USGS Delaware River Basin WaterSMART project hosted a stakeholders meeting last September. WaterSMART is a federal effort geared to help states, local governments and non-governmental organizations to secure and stretch water supplies for use by existing and future generations and to anticipate climate change, future demands, etc. WaterSMART brings federal funding for pilot studies that will sink money into some particular places, with the Delaware River Basin (DRB) being one of them (the DRB project is funded at \$500,000 per year for three years). The DRB WaterSMART project recently announced a final scope of work; status updates and information will be available on a share point site and on a web page. The work plan is focused on three major areas: (1) data management (water use and water supply); (2) ecological flows; and (3) hydrologic watershed modeling.

Bob noted that DRBC is also engaging with the Army Corps on issues related to the salt front repulsion policy, designed to protect water quality at estuary water supply intakes (City of Philadelphia intakes and NJ and DE water suppliers). A joint project between DRBC and the Corps is currently under way to refine available salinity models and being able to do different simulations based on new potential targets (issues related to changing precipitation patterns, changing sea level rise, etc.). Carol Collier noted that the Army Corps has a state collaborative effort, trying to figure how federal agencies could best provide tools and information that the states (the doers of water resource management) could use. The goal is to design a toolkit on how all the federal agencies could work together in one place. DRBC is working with the Corps to see how the Delaware could be a proof-of-concept area for the toolkit that the Corps would like to build. Bob said NOAA/NWS has \$2M appropriated country-wide this year for integrated water resources services and they have picked the Hudson, Delaware and Susquehanna basins to start work. Bob anticipates a significant public outreach component in the near future to talk about how best to bring about those services. Bob noted that the challenge for DRBC will be to get all these separate but parallel efforts to complement one another and advance planning for future water supply, flood mitigation, ecological flows and other needs.

Update on SEF Activities

Stefanie Baxter reported on Sub-Committee on Ecological Flows (SEF) activities on behalf of Mark Hartle, SEF chair, who could not attend the meeting. The report focused on the last SEF meeting, held on March 13 at the DRBC offices. Four items were discussed: (1) formation of a lower-basin SEF work group; (2) development of operational rules for enhanced thermal protection of the Upper Delaware River; (3) ecological benefits of NYC reservoir releases on each of the three tailwaters; and (4) interface between the DRB OASIS OST model and the DSS model.

A lower-basin Work Group was formed at the SEF meeting. Interested persons included Jerre Mohler (USFWS), Matt Fisher (DE), Dr. Erik Silldorff (DRBC), Dr. Eric Powell (NJ), Maya van Rossum (Delaware Riverkeeper), Dr. Hernán Quinodoz (DRBC), and Angela Padeletti (Partnership for the Delaware Estuary). The purpose of the group was defined to be three-fold: (1) identify issues that relate to lower basin ecology and flows; (2) communicate issues that are specific to estuarine species; and (3) serve as a forum for information exchange between agencies/groups such as RFAC, the Army Corps of Engineers, NOAA/NWS and the Delaware River Basin Fish & Wildlife Management Cooperative. The following issues of interest were identified: (a) hydrodynamic (ROMS) modeling can be used to predict impacts; particle tracking can be used for any planktonic larvae; (b) effects of sea level rise/salinity gradient change on biota; dredging can have an impact; both freshwater mussels and oysters would be impacted; (c) phytoplankton generation; primary productivity cycle of the Delaware Bay is unique; (d)

threatened, endangered and priority species, such as Atlantic sturgeon, American shad, freshwater mussels, and oysters; ROMS modeling may be helpful; and (e) effects of reservoir releases and reservoir operation (NYC and down basin reservoirs) on freshwater inflow into the Delaware Bay. SEF invites RFAC to identify additional topics of specific interest that the lower-basin Work Group could examine and report back to RFAC.

At the SEF meeting, Mark Hartle presented a draft set of operating rules to design Cannonsville releases to mitigate high temperatures in the Upper Delaware River. The typical thermal season was identified as May 18 to September 9. The draft operating rules for thermal releases use the following variables: (i) today's maximum water temperature at Lordville, NY, the target location; (ii) tomorrow's predicted high air temperature (target location not yet chosen; using actual data from Pleasant Mount, PA for rule testing); and (iii) today's discharge at Lordville, NY. Mark reported at the SEF meeting that testing of the draft rules using three-day benefits of -5°C , -3°C , and -1°C for summers 2006-2011 showed promising results where the occurrence of temperatures very stressful for trout ($>75^{\circ}\text{F}$) could be substantially reduced. SEF members suggested that a revised operating rule should factor in the proportion of Lordville flow that corresponds to the high-temperature flow on the East Branch downstream of the Beaverkill River. The availability of cold water in Cannonsville Reservoir was mentioned as an operational constraint. Mark noted that these rules are under development and requested feedback from anyone in attendance.

SEF discussed the relative ecological benefits of NYC releases from Cannonsville (West Branch) vs. Pepacton (East Branch) vs. Neversink Reservoir. The NYS DEC/PA Fish and Boat Commission Joint Fisheries White Paper, the Kolesar and Serio analysis and the FFMP preferentially used releases from Cannonsville to provide additional cold water fisheries benefit because higher releases also protect habitat benefit in the mainstem Upper Delaware River. Erik Silldorff indicated that an analysis of the cubic foot per second contribution per square mile of drainage area for Pepacton, Cannonsville and Neversink Reservoirs was informative because the channel was originally sized by its drainage area and this approach was used in the 1954 Supreme Court Decree. Don Hamilton suggested that SEF discuss the ecological objectives of any studies or flow management agreements. SEF also discussed the interface between the new DRB OASIS OST model and the existing Delaware River Decisions Support System (DSS), used to evaluate instream habitat metrics. Hernán Quinodoz confirmed that the NYC OASIS OST model provided to DRBC will be able to provide the same output files produced by the current DRB OASIS model and used as inputs to the DSS model.

Brief report on Decree Party work group progress

Stefanie Baxter reported on progress made by the Decree Party work group towards development of the next FFMP agreement. Back in early February DRBC was given a copy of the DRB-only OST model to begin testing; since then both Hernán and Amy have been working hard on getting the model up and running and trying to do their best with model run requests from the work group. Hernán noted that new model is built on the same OASIS platform used at DRBC for many years. He said DRBC staff is in the process of checking and analyzing the new model; it is no more complicated than the previous one was, but it is a new tool that has been tweaked in a number of ways. He noted that in the review process DRBC staff is collaborating with modelers at Hazen & Sawyer, who developed the tool for NYC.

Stefanie said the work group was tasked with coming up with alternatives to test and recommendations to make to the Principals. We did come up with five alternatives and provided them to the Decree Party principals, who had a face-to-face meeting yesterday. Stefanie noted that there has been turnover of a few principals, but this has not affected their work on the FFMP.

She said she was impressed with the diligence of the new principals to get up to speed on the issues and engage in discussions with all the relevant information. The principals are still in discussion mode, with a conference call scheduled for May 2. Although there are some contentious issues to resolve, Stefanie said she was confident the principals will come to an agreement before May 31, when the current program expires.

Garth Pettinger stated that NYC seems to be squeezing as much as it can out of the Delaware system right now and has been doing so for the last month; diversions amount to about 75% of the safe yield from the Catskill system and about 150% of the safe yield from the Delaware system. He said this was both counterproductive in terms of releases to the rivers and for ensuring refill by June 1 (taking more out of the reservoirs than what is coming in). Thom Murphy confirmed that NYC has been taking a lot of water in the past month and said this is all water-quality related. He said turbidity in the Catskill system is still recovering from Hurricane Irene; it has improved but it is still settling. At this point, NYC has to use Alum treatment, which they are also obligated to minimize as much as possible.

Someone asked why was so much water taken out of Pepacton recently. Thom Murphy replied that, as prescribed in the FFMP, NYC was attempting to bring storage levels down to the CSO curve at 90% of usable storage (10% storage void). Bob Tudor said this is a balancing act to provide some measure of spill mitigation. Glen Erikson stated that there was no scientific basis for doing that and said he did not understand the politics of doing that either. He argued that while the reservoirs provide spill mitigation just for being there, releasing extra water to create a void has been detrimental for those living downstream. Thom Murphy agreed that these are competing issues, maybe not all the time but certainly at some point the fishery objectives conflict with the spill mitigation objectives.

Glen Erikson stated that on April 11 the Delaware Watershed Conservation Coalition met with Paul Rush, Tina Johnstone, and Thom Murphy to discuss their preference for the duration of the next FFMP agreement being only one year. He said there was wide agreement among coalition members on this point. They feel it is better to wait until 2013 when the Croton treatment plant starts operations, which will make turbidity less of an issue than it is today.

Set next meeting date

No meeting date was set for the next meeting. Email will be sent when a new date is firm.

Opportunity for public comments

Sandy Bender said he was attending the RFAC meeting for the first time. He asked if a committee was looking at building development issues: water supply, storm water and sanitary water. Stefanie pointed to the WaterSMART study where development and growth issues will be factored in. Bob Tudor said WaterSMART wants to anticipate where the growth could happen and how it might affect some hydrology and land use. Bob said DRBC is not working on storm water per se, since it is more of a state and local issue in terms of impacts. He mentioned that the Common Waters Initiative is looking at the links between the landscape and the waterscape. Glenn Erikson suggested contacting Patricia Jenny at the NYC Water Trust; also the Summit Foundation in Washington, D.C. Bob pointed to the Special Protection Waters program of DRBC, which applies anti-degradation measures and no-measurable-change criteria to the 200 or so miles of the Delaware River that have been declared wild and scenic.

Stefanie Baxter announced that the vacant Deputy Delaware River Master position has been filled. The person chosen has previously worked with USGS in New Jersey and Delaware. She will attend the next RFAC meeting.

REGULATED FLOW ADVISORY COMMITTEE (RFAC)

April 17, 2012

ATTENDANCE LIST

NAME	AFFILIATION
ANDERSON, Kelly	Philadelphia Water Dept.
BAXTER, Stefanie	DE Geological Survey
BENDER, Sandy	
BOUSUM, Pete	Friends of the Upper Delaware River (FUDR)
COLLIER, Carol	DRBC
DOMBER, Steven	NJ Dept. of Environmental Protection (NJDEP), NJ Geological Survey
ERIKSON, Glenn	Wild Trout Flyrodders
IORE, Anthony	NYC Dept. of Environmental Protection (NYCDEP)
HARTMAN, Lee	Trout Unlimited
HENSON, Fred (via phone)	NYS Dept. of Environmental Conservation (NYSDEC)
HESSON, Molly	Philadelphia Water Dept.
LANG, Kevin	NYCDEP
LEWIS-COKER, Christine	U.S. Army Corps of Engineers (USACE)
LIAGHAT, Hoss	PA Dept. of Environmental Protection (PADEP)
LOVELL, Stewart	DE Dept. of Natural Resources and Environmental Control (DNREC)
MIRI, Joe	NJDEP
MURPHY, Thomas	NYCDEP
MUSZYNSKI, Bill	DRBC
NOBLE, Mary Ellen	Delaware Riverkeeper
NORRIS, Marian (via phone)	National Park Service (NPS)
PETTINGER, Garth	NYS Trout Unlimited, Delaware Committee
PHILLIPS, Jan	Consultant
PLUMMER, Dan	FUDR
QUINODOZ, Hernán	DRBC
SCANNAPIECO, Alycia	Resident – flood concerns
SHALLCROSS, Amy	DRBC

NAME	AFFILIATION
STOLLER, Ken	DRBC
TARRIER, Brenan (via phone)	NYSDEC
THARP, Diane	NorDel Conservancy
TUDOR, Bob	DRBC
WO, Jeromy	NorDel Conservancy
WALSH, Steve	DRBC
ZIGON-RICHARDSON, Valerie	DRBC