DELAWARE RIVER BASIN COMMISSION
REGULATED FLOW ADVISORY COMMITTEE
January 25, 2011

MEETING SUMMARY

The January 25, 2011 meeting of the Regulated Flow Advisory Committee (RFAC) began at approximately 10:00 a.m. at the Commission offices in West Trenton, NJ. 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.

Approval of the minutes from the December 14, 2010 RFAC meeting

Stefanie Baxter asked for comments on the draft minutes of the December 14 meeting. Gary Paulachok asked that the term "glacial waste deposits" (page 8, fourth paragraph) be changed to "glacial deposits." The meeting minutes were approved with this single amendment.

The Root Cause

Garth Pettinger, a member of Trout Unlimited (TU), NY Council, gave a presentation on the management of the NYC Delaware basin reservoirs. He stated that this presentation provides the technical background for the letter that three TU councils (NJ, NY and PA) sent in July 2010 to the US Secretary of the Interior and the US EPA Administrator, requesting their intervention in the management of the Upper Delaware River. He said TU has identified over-drafting of the NYC Delaware reservoirs as the root cause of major problems for the Upper Delaware River for more than 40 years.

Garth reviewed the NYC water supply system and its three subsystems (Delaware, Catskill and Croton). He presented definitions for area yield and safe yield and discussed how the safe yield of the NYC reservoirs changed with the 1960's drought of record. The system-wide safe yield decreased from 1,665 mgd to 1,290 mgd; the Delaware-basin safe yield decreased from 800 mgd to 480 mgd. He argued that NYC diversions in excess of its safe yield are not sustainable and defined such diversions as over-drafting. He also argued that over-drafting is not necessary now, because NYC water demand has significantly decreased over the last 30 years.

Garth discussed the excess release quantity (ERQ); the 1954 US Supreme Court Decree requires NYC to annually release this unused water from its three Delaware-basin reservoirs. He took issue with the way the ERQ has been calculated over the years, indicating that the excess water available usually exceeds the amount released. He said the same comments apply to the interim ERQ (IERQ) defined in the FFMP. Garth said withholding and not releasing the unused water has negative impacts: higher water levels in the reservoirs, reduced flood mitigation capability, and the frequent creation of artificial drought conditions in the rivers below the dams. Garth concluded that in order to ensure a fair and equitable apportionment of the limited resources provided by the reservoirs, the federal government should intercede and enforce the provisions of the US Supreme Court Decree. Without such intervention the rivers, residents, and down-basin states will continue to be placed at unnecessary risk.

Mary Ellen Noble asked if this presentation would be posted online. Bob Tudor said the presentation would be posted on the DRBC website. Gary Paulachok indicated that the NYC water consumption figures cited by Garth did not include the consumption from the outside communities located along the aqueduct. NYC is mandated to provide them with water if the

communities request it. Typically consumption from the outside communities adds about ten percent of the within-city consumption. Garth said his figures were taken from NYC's website and Gary replied that these figures correspond to the within-city consumption only. Gary said the River Master's office keeps a record of NYC's total water consumption (and its two components) and publishes the data on their annual reports. He said he would post a spreadsheet with the figures for the years 1954-2009 on the River Master's website. Joe Miri stated that from New Jersey's perspective, except for the discrepancies on water consumption figures regarding outside communities, the rest of Mr. Pettinger's points, including those on over-drafting and withholding, were correct.

Elaine Reichart mentioned a news article about New Rochelle connecting into the Delaware system and asked if there was trend of more communities planning to connect to it. Thom Murphy said because New Rochelle is located below Kensico reservoir, it gets blended water from the Catskill and Delaware aqueducts. He added that New Rochelle already has connections to the Catskill and Croton systems, so the new connection is for redundancy. Jeff Zimmerman asked about conservation requirements for the outside communities along the aqueduct route. Thom replied that these communities are required to have conservation plans during drought conditions that are similar to NYC's plans. Thom explained that under law, the outside communities are entitled to the same water rates as NYC residents. However, higher consumption costs them more than their entitlement rate. If their consumption is below their entitlement amount, the rate is $1,000 per mg (this covers all operating costs above the City line); if consumption exceeds the entitlement, the rate is $3,000 per mg (in-City rate).

A proposal for improving the FFMP in May 2011

Peter Kolesar presented a proposal that he developed in collaboration with Jim Serio, building on work that they presented in 2007. He said their goal today is to convince the Decree Parties and the DRBC to adopt an improved version of the FFMP when the current implementation expires in May 2011. He urged the Decree Parties and the DRBC to give serious consideration to the release recommendations made in the joint PA/NY fisheries white paper of January 2010, which were developed to provide more cold water habitat for trout.

Peter said there is a need to act now, because continuing the current FFMP implementation, or worse, reverting to Revision 1 (rev1) releases, will needlessly punish the ecology and down-river stakeholders. He said the FFMP can be improved by building on the knowledge and experience assembled in the last five years, which include: the research underlying the design of the FFMP; the knowledge of the impact of releases on the river's ecology derived from the USGS habitat model; the extensive research done by, and on behalf of, the joint PA/NY fisheries task force; the OST framework developed by NYC DEP; the DRBC flood analysis model; the updating of the Delaware OASIS model inflows to 2006; and the on-river experience with the FFMP since 2007.

Peter said improved release policies require making realistic forecasts of the NYC diversions and key releases to the diversion predictions. This requires constructing release tables that efficiently and equitably use the water that is predicted to be available. This approach builds on the existing FFMP framework and has the flexibility to quickly and automatically adapt to changing conditions. He said the current proposal builds on and is consistent with their previous "augmented adaptive release" proposal (January 2008), the joint PA/NY fisheries white paper and the extensive research done in support of that initiative (January 2010), the NYC DEP OST white paper and its concept of incorporating timely data and forecasts into water allocation decision making (March 2010). Peter said the reservoir releases in their proposal are designed to provide equitable, efficient and sustainable use of Delaware River water from the perspectives of all

stakeholders, while being able to handle actual, as well as worst-case scenarios of water usage and availability.

Peter argued that an improved FFMP has to correct what he views as the current FFMP's critical flaw: assuming that NYC will divert 765 mgd every day, when recent diversions have averaged about 500 mgd. He said overstating diversions by 40-percent and designing releases accordingly results in dramatically overstating the risks to NYC water supply (more drought days; reduced probability of refill) and badly shortchanging the interests of other constituencies (smaller reservoir storage voids, larger reservoir spills, reduced trout habitat). Peter argued that it is not necessary to overstate NYC diversions, because the driver of the Delaware diversions – NYC total water consumption – can be reasonably predicted. He added that NYC total water consumption has been steadily declining and follows a predictable trend and seasonal patterns. He said forecasting Delaware diversions is also feasible and graphically demonstrated some statistical methods that can be used. These methods produce estimates with probability prediction limits that reflect the variability and uncertainty about actual NYC reservoir operations. Peter said such statistical forecasts can and should be adjusted by water managers when significantly impactful events occur or are anticipated.

Peter said a simple path to improving the FFMP is to follow the release recommendations from the joint PA/NY fisheries white paper, which he defined as an off-the-shelf, implementation-ready, improved version of the FFMP. These recommendations have been extensively evaluated and shown to provide substantial benefits over current and past practices, with minimal additional risks. He then presented a table comparing the normal-operations releases (L2) of three plans: the current FFMP, the joint fisheries white paper, and a draft OST-100 table provided by NYC DEP. Both alternatives proposals appear superior to the current FFMP. He reported on model runs done for a range of possible NYC diversions, which show that the joint PA/NY fisheries white paper proposal is risk neutral at NYC diversions below 675 mgd. Peter then presented a table that compares four release programs (rev1, FFMP, OST-100 and joint fisheries white paper) using several metrics: June 1 storage, September 1 storage void, spill volumes, drought days, percent of years when reservoirs refill, and adult trout habitat. He concluded that the joint fisheries white paper proposal is a distinct improvement on many dimensions. Peter argued that this proposal can be implemented under the current FFMP framework and should not be held hostage to the resolution of long-term issues by the decree parties.

A question-and-answer period followed the presentation. In response to a question, Peter explained how his proposal could be implemented using eight release tables (four FFMP tables, three OST tables and one joint fisheries table); based on periodic forecasts of inflows and diversions, a release table is selected. If either conditions or forecasts change, a shift to another table can be done as needed. Tom Brand commented that the decree parties are trying to resolve issues of sustainability and safe yield. He said equity considerations in the management of Delaware waters require a balanced use of the three NYC reservoir systems (Delaware, Catskill and Croton). He said New Jersey is concerned that NYC is already taking as much water as it possibly can from the Delaware system to avoid having to build filtration plants. He said a reassessment study is needed to evaluate issues of equity and sustainability. Peter said the resolution of these issues will take some time, but improvements to reservoir releases from the Delaware reservoirs should not wait until they are resolved. He said keeping the FFMP, or worse, reverting to rev1 operations will punish the river ecosystems.

Joe Miri said New Jersey is developing a proposal for safe yield-based operations, as a way to share both the water and the risks within the system. Mark Hartle said the joint fisheries white paper did not attempt to evaluate risks and asked how risks are considered into Peter Kolesar's

proposal. Peter replied that risks could be evaluated with the OST system that NYC is developing, which will adjust operations based on forecasts. But while the forecasting tools are being developed, he said his proposal is to implement a program with higher releases without the OST technology. Thom Murphy said NYC is planning to have a few OST components ready in the next few months so that combined FFMP-OST operations can start.

Phil Chase said when the Croton system has its filtration plant completed it will provide NYC about 200 mgd and asked what would prevent NYC from still diverting the maximum 800 mgd from the Delaware to lower costs. Jeff Zimmerman replied that neither the 1954 Supreme Court Decree or the FFMP impose any constraints on NYC using more Delaware water instead of running the Croton filtration plant at its full capacity when it is completed. Thom Murphy agreed that there are no such constraints. He said economic considerations play a role in everyday operations, but they become less significant during dry periods, when preserving water quantity takes priority. Bob Tudor said he understood from Peter's presentation that both Peter and Jim Serio had some level of comfort that if OST-based operations rely on eight release tables and manage the system based on realistic demands and forecasts and assuming average NYC diversions of about 500 mgd, then the fisheries would benefit from much larger releases. Peter agreed. In response to a question, Bob Tudor stated that Peter's presentation would be posted online at DRBC's website.

Brief update from NYC on Catskill system water-quality issue

Thom Murphy gave an update on water quality conditions on NYC's Catskill system. As reported at the previous RFAC meeting in December, high turbidity has been an issue for many weeks. In response, NYC DEP has been relying relatively more on diversions from the Delaware system. Water quality in Ashokan reservoir has improved somewhat, with turbidity now at 8.6 NTU; Schoharie reservoir still has high turbidity at 26 NTU. The turbid water that cannot be diverted from Ashokan reservoir is being released through the waste channel, with typical flow rates of about 600 mgd. Thom said they plan to cease waste channel operations in about 20 days. In response to a question, Thom indicated that the Croton system is currently unavailable because of the construction work in the aqueduct, in connection to the filtration plant construction. He said NYC has not used the Croton system for a few years, but may have to use it occasionally during the summer to serve some of the outside communities that rely on NYC's water supply.

Thom said turbidity is being very closely monitored and model simulations are being done to predict flows and turbidity in the Catskill system; if turbidity increases, flows would have to be reduced. He said the Ashokan dividing weir has been closed because of lower turbidity. Thom said NYC has used a preliminary version of the OST system to estimate how current reservoir operations could affect the probability of refill for the Catskill and Delaware systems. He discussed a graphical display of probabilities estimated with OST. Thom said water quality in Ashokan reservoir is improving, but very slowly. Until further improvement occurs, operations will continue with maximized Delaware diversions: Rondout diversions at 840 mgd, with Cannonsville at 300 mgd, Pepacton at 350-400 mgd and Neversink up to 200 mgd (Rondout diversions have been maximized since the beginning of the high turbidity event in October). Thom said dependence on the Delaware system will continue until OST model runs indicate that more water can be diverted from the Catskill system without violating the turbidity limits imposed by the Filtration Avoidance Determination (FAD). If water quality does not improve, NYC will consider reverting to Alum treatment to reduce turbidity.

Elaine Reichart asked if it was possible to predict trends in turbidity and algal blooms in the NYC reservoirs. Thom replied that turbidity events are driven by storms and thus cannot be analyzed as

trends. He said he was not aware of algae issues in the Delaware reservoirs; instead the Croton reservoir is more prone to algae since it is more open and shallow. Mary Ellen Noble said there have been instances of winter algae under ice and Philadelphia has had to treat for it, which is difficult to do. Gary Paulachok added that Philadelphia Water Department has indicated in the past that the algae could be traced to summertime releases from Cannonsville reservoir. Someone commented that the cause of the quality issues related to Cannonsville releases has yet to be understood. In response to a question, Thom said his presentation would be posted online at DRBC's website.

Public Dialogue on FFMP issues

Stefanie Baxter indicated that the decree parties are working to develop a new FFMP and asked for comments on the current FFMP that could inform the process. Jeff Zimmerman said Gary Paulachok stated at the last RFAC meeting that there were 16 specific points in the FFMP language that were being looked at by the decree parties. Jeff said he asked at that time if the parties could share the 16 points so that the public could comment. He said he would like to know what the issues are and which sections, sentences and provisions are being considered to be changed. Bob Tudor replied that he would bring this up at the next decree parties meeting, proposing to post more detailed information for the public to review and comment.

Jeff Zimmerman asked if RFAC was planning to submit any recommendations either to the Commissioners or to the decree parties before a decision is made on the next FFMP. Bob Tudor said the RFAC meetings provide a forum for hearing other points of view and this could influence the decree party negotiation process. However, since most of the decree party work group members are sitting here today and are hearing directly from the public, Bob said he felt there was no need for a formal advisory motion to be voted on, although RFAC members could decide to do it differently. Jeff Zimmerman said RFAC was providing only a one-way communication, from the public to the decree parties, but with no communication coming back to the public. Stephanie Baxter said at the next RFAC meeting she would report on progress made by the decree parties on developing the new FFMP.

Elaine Reichart said from her perspective as an anti-flood advocate, the FFMP keeps people in danger and at risk from flooding. She said the recent presentations at RFAC meetings show that the FFMP and all reservoir operations since 1983 have not benefited the lower-basin states and stakeholders. She asked if the lower-basin states were abdicating their rights and equity to NYC because of water quality issues. Mary Ellen Noble stated that while the public has been bringing really good ideas to RFAC, she was concerned whether this information would be effectively relayed to the decree party principals. She asked if it would be necessary for members of the public to seek an opportunity to communicate directly with the principals and tell them what happens at RFAC meetings. Bob Tudor said work group members report out to the principals on a monthly basis and one of the reports is on progress made and what they heard at these meetings.

Peter Kolesar asked that his presentation today be considered the oral version of a proposal for the decision makers to consider. He asked if that could happen as a consequence of RFAC and if not, what he and Jim Serio should do to communicate their proposal directly to the decision makers. Gary Paulachok said the work group reports back to the principals on a monthly basis and feedback from RFAC meetings is a standing agenda item. As part of those reports, the work group can provide copies of RFAC presentations to the principals. Gary added that any individual or group could approach one of the principals with their proposals to seek their support.

Next Meeting Date

The next RFAC meeting will be on Tuesday, March 8, 2011 at 10:00 a.m.

REGULATED FLOW ADVISORY COMMITTEE (RFAC)

January 25, 2011

ATTENDANCE LIST

NAME	AFFILIATION
ANDERSON, Kelly	Philadelphia Water Department (PWD)
BAXTER, Stefanie	Delaware Geological Survey
BOUSUM, Peter	Friends of the Upper Delaware River (FUDR)
BRAND, Tom	N.J. Dept. of Environmental Protection (NJDEP)
CHASE, Phil	Upper Delaware Council (UDC)
ELLSWORTH, Alan (via phone)	National Park Service (NPS)
EVANS, Richard (via phone)	NPS
GRUBER, Hank	U.S. Army Corps of Engineers (USACE)
HAMILTON, Don (via phone)	NPS Upper Delaware Scenic and Recreational River (NPS UPDE)
HANSON, Fred (via phone)	N.Y. Department of Environmental Conservation (NYSDEC)
HARTLE, Mark	PA Fish & Boat Commission
HESSON, Molly	PWD
KEELER, Shaun (via phone)	NYSDEC
KOLESAR, Peter	Columbia University
LIAGHAT, Hoss	PA Department of Environmental Protection (PADEP)
LOVELL, Stewart	DE Department of Natural Resources and Environmental Control
McBRIDE, Norm (via phone)	NYSDEC
MIRI, Joe	NJDEP
MOLZHAN, Bob	Water Resources Association of the Delaware River Basin
MURALIDHAR, D.	Hazen and Sawyer
MURPHY, Thomas	N.Y.C. Department of Environmental Protection
MUZYNSKI, Bill	Delaware River Basin Commission (DRBC)
NOBLE, Mary Ellen	Delaware Riverkeeper Network
PAULACHOK, Gary	U.S. Geological Survey – Office of the Delaware RiverMaster

NAME	AFFILIATION
PETTINGER, Garth	Trout Unlimited
PHILLIPS, Jan	consultant
PINDAR, Chad	DRBC
QUINODOZ, Hernán	DRBC
REICHART, Elaine	Aquatic Conservation Unlimited
SCANNAPIECO, Alycia	Resident – flood concerns
SERIO, Jim	Delaware River Foundation
SHALLCROSS, Amy	DRBC
SILLDORFF, Erik	DRBC
STEVENS, Glen	USACE
TARRIER, Brenan (via phone)	NYSDEC
TUDOR, Bob	DRBC
ZIGON-RICHARDSON, Valerie	DRBC
ZIMMERMAN, Jeff	FUDR et al.