DELAWARE RIVER BASIN COMMISSION
REGULATED FLOW ADVISORY COMMITTEE
June 27, 2007

MEETING SUMMARY

The DRBC Regulated Flow Advisory Committee meeting, chaired by Mark Klotz, began at 10:00 a.m. at the PPL Environmental Learning Center in Hawley, PA.

Dr. Murali said this was the first information session, and there will be another information session on July 18 at the DRBC offices. Since the last FFMP was posted on the website in February, there was a public hearing and in response the Decree Parties have made extensive revisions to the program and wanted to share some highlights. Once they have clearances from all the Decree Parties, the Flexible Flow Management Program will be posted on the DRBC website as well as changes to the water code.

Approval of Minutes from March 6, 2007 Meeting Summary
Joe Miri had one correction to page 13 of the minutes. The minutes read "conclusion to that study," and he asked to change it to "conclusions of that study." The minutes were then approved with this change.

Hydrologic Report
Rick Fromuth reported on the current hydrologic conditions in the basin. So far this year, above Montague, overall precipitation is about one inch below normal, 19.28 inches. Above Trenton is a quarter of an inch below normal. Wilmington is plus 1.5 inches. Streamflow for the month of May at the gaging station on the Delaware River at Montague, the average was 52.4% of normal and for June 1-25, it was 63.4% of normal. At Trenton, the average flow in May was 69% of normal or 9,400 cfs, and about 5,700 cfs in the first 25 days of June. In storage, the lower basin reservoirs (Beltzville, Blue Marsh, and Merrill Creek) are at full elevations. The New York City Delaware Basin reservoirs are about 8.9 bg below normal, 250.5 bg as of yesterday. Pepacton is 97.6%; they had some inflow there from a storm that was in the Beaver Kill primarily, but there was some runoff into Pepacton in the East Branch from that storm that occurred on June 19. A very severe flood resulted in the Beaver Kill watershed because of that. Cannonsville is at 87% and Neversink is at 87.1%. The total system is at 93.5% of capacity, while the normal for this time of year would be 96.8% of capacity.

Precipitation over the last 30 days: the dryer section of the basin right now is the Poconos, the upper tier of Pennsylvania and into Sullivan County, NY at about an inch to an inch and a half below normal. The lower part of the basin or mid-section from the Water Gap on down is either in the normal-to-25%-above range or the normal-to-25%-below range. The differences from normal are not much larger in the upper section of the basin over the 90-day period. The middle section of the basin has a slightly above-normal total for that time. For 180 days, the same trend holds, although the differences for that period of time are not large. The upper half of the basin, with the exception of Delaware County, New York, is in the normal-to-25%-below range and New Jersey and Southern Pennsylvania are in the normal-to-25%-above range. Delaware, which exhibits a trend really similar to the upper part of Pennsylvania, is in the 25% to 50% range below for the last 30 days, normal to 25% below in Kent and Sussex County, Delaware for 90 days, and also for the last 180 days. In general, the two ends of the basin are dryer than the middle, and neither of them is showing any kind of extreme in terms of precipitation deficit.

Streamflow conditions for the mid-Atlantic as of yesterday are somewhat reflective of the precipitation over the last 30 days. The upper part of the basin has the lower flows. Ground water

levels in the area that has been drier are below normal for this time of year. These wells are monitored by the US Geological Survey in a cooperative effort between PADEP and the USGS and published on Pennsylvania's internet drought page.

New York City storage is about 9 bg below the normal for this time of year. Directed releases started for the Montague flow target on May 24. So far about 9 bg of water has been released. The total conservation releases made are 124 bg, not including spills since the first of the year, which amount to about 100 bg. There were no spills in February, and there have been no spills in June. In May, about 1.2 bg spilled. Regarding chlorides in the estuary, the salt front is currently located at river mile 72, which is six miles below the state line between Delaware and Pennsylvania. That is about five miles above the normal location for this time of year.

A member of the audience said since the storm, the entire reservoir has looked like a big mud pie all the way from Margaretville to the dam. He asked how it works as far as turbidity levels being considered as a means of water supply, and how it gets cleared up. Tom Murphy said you have to give it time to settle. The audience member asked if they are not using that now for water supply to New York City. Mr. Murphy said not at the current turbidity levels. The audience member asked if there is a system in place that allows you to draw from different levels. Mr. Murphy said that was correct. The audience member said where the storm hit is so close to the dam that the water coming out of the bottom of the reservoir right now looks like chocolate milk. Mr. Fromuth said they were talking to the River Master, and they have asked the Park Service and the Academy of Natural Sciences for any information they have on the extent of this turbidity.

Someone from the audience asked if anyone has done any projections of what would have happened with that storm if they had dropped the water level at Cannonsville reservoir in advance. Mr. Murphy said it did not affect Cannonsville. Mr. Fromuth said there had not been any kind of thorough analysis. Pepacton had about a 7 bg void at the time that storm hit. Pepacton's watershed is 450 square miles, so it would take quite an aerial storm to cover that with five inches of rain. In terms of the total volume, it is more a function of the area that is covered. There would have been some buffering, and he does not know that the storm had a big enough aerial extent to cause the kinds of spills that you would have seen in June of last year. It was not a huge storm – it was a cell. It looks like the area of real intense precipitation is probably less than 100 square miles.

Elaine O'Neil asked how many feet Pepacton did rise from this microburst storm, and if it hit directly over Pepacton. Someone replied it was eight inches in two hours. Mr. Murphy said what should be remembered is that if Pepacton was not there, Downsville would have been wiped out. Ms. O'Neil said if that storm was a little bit larger and right over Pepacton, Downsville may not have been there. Mr. Fromuth showed that on June 19th there was an inflow to Pepacton of two and a half billion gallons. The day prior to the storm, the elevation was 1276.3 and on the 20th, 48 hours later, the elevation was 1277.2. It came up .9 feet in the two days. Two more days out, it was 1277.89 so it came up another .7 feet. The total inflow was about 4 bg, but most of it came in the first day. When you look at the hydrographs, it shows the Beaver Kill stage change which is further downstream at Cooks Falls and would have had quite a bit of the Beaver Kill runoff in it. It jumped up eight feet in about a half an hour. When you look at the hydrograph, the maximum flow was about 7,000 cfs, again this is an unregulated stream. When you look at the volume under that hydrograph because it was such a spiked peak, it is not a huge volume because the storm extent was limited. If you blow that storm up and have something like that covering 400 square miles – which is very unlikely – what would happen would be far worse. Compared to the Beaver Kill, Pepacton would have buffered the outflow. It could have still spilled, but it would have had a huge buffering effect on that flow. Further down in Fishs Eddy, the stage came up to about eight and a half feet and that did not even approach flood stage.

An audience member asked if there was any cutback on the flows out of the bottom of Pepacton during the June storm. Mr. Fromuth said Pepacton was down to a conservation release of about 100 mgd and that would have been about 150 cfs. There was nothing downstream that was flooded. The audience member said he was just amazed at how muddy the river was, but how it hardly came up at all. All the tributaries from the East Branch all the way up to Downsville were dry and running crystal clear. Dr. Murali said a lot of it happened below the East Branch.

Bill Gast said they have been monitoring conditions pretty closely over the last three weeks. They had an extremely dry May as did just about everybody in the area. Groundwater is not in the best shape. Most of the problems were pretty much along the ridge and valley heading from northeast in the Poconos down into the southwestern part of the Susquehanna Basin. He has been tracking declines in streamflows and groundwaters for the last several weeks and while a lot of them are in watch or warning stage, they are pretty much following the slopes of the criteria curves so they are not declining at a rate faster than normal. It is just that they got into a below normal situation back in May, so they are continuing to watch it pretty closely. Things could deteriorate once they hit the bottom of those curves if they continue to decline.

Steve Domber said New Jersey is in a similar situation. They are slightly below normal and reservoir levels, groundwater levels, and streamflows are beginning to drop, but that is also normal for this time of year. They are in a slightly below normal situation. They have started an internal workgroup in NJDEP to monitor it much more closely, and will take action as appropriate. Dr. Harry Otto said the Delaware Geological Survey is also monitoring streams. Things are beginning to go down, but that is normal for this time of the year. Their farmers are concerned about surface moisture because of a corn crop getting into a critical stage. They are getting some rain, but it is below normal.

Gary Paulachok said the monthly precipitation total in the upper basin for May was 1.4 inches, the second lowest since 1940, when the USGS began keeping records for the upper basin. The only other May that was dryer was May of 1959, so this May is an extremely dry month. Dr. Murali indicated that there has been a need to make habitat releases and thermal releases to maintain the target flows at Hale Eddy, Harvard, and Bridgeville. So far, they have released about 2,100 cfs-days on top of what Mr. Paulachok has been calling for to meet the Montague flow target. And this is only from June 1 through today, with 26 days into the current operation year. In less than a month, they have used about 2,100 cfs, which is about 10% of the bank. The problem with a limited bank when there is a prolonged dry pattern and high temperatures is that it will impact what is available in the habitat bank for the rest of the year.

Lee Hartman said under the Revision 7 rules there was a temperature flow target at Hankins that you used, and he asked why that has changed. Dr. Murali said that has not changed and the target remains the same, but because of the experience they had in 2005 where they used up 50% of the bank by June 10, they talked with the fisheries director at NYSDEC. The director said the bank is limited and there is no way to maintain the flows through hot temperatures at Hankins. He was looking at it closely on May 31 and June 1 (the first day there is a bank available to meet the targets) and the flow at Lordville varied from 800 to 1,000 cfs. There was about 600 cfs of water coming from the East Branch with a temperature of about 80 going into above the confluence. The West Branch was flowing in at about 400 cfs. They tried to maintain the West Branch to maintain the flow and temperature target at Hale Eddy and at Hancock above the confluence. With the East Branch running twice as high as the West Branch and without 1,000 cfs at Lordville, they had to release about 2,000 cfs from Cannonsville Reservoir to mitigate the adverse impact of the warmer water coming from the East Branch. It is pretty difficult to be releasing 2,000 cfs or about 10% of the bank per day, because in about 20 days the bank would be gone.

The way the program is structured is that you have a limited bank and once the bank is gone, there is no more water left unless they can negotiate with the Decree Parties for an additional bank. This happened in 2005: by June 10 they didn't have a bank. Revision 7 says control temperature at Hankins to the extent possible. Because of warmer conditions, he has been trying to maintain a temperature about two degrees below the target of 75 in order to maintain a temperature target of about 73 at Lordville, which would more or less correlate to about 75 at Hankins. They will call for releases as necessary to mitigate thermal conditions through Hankins. Even now, flows at Lordville have been in the 800 to 1,000 cfs range. When you have such high flows at Lordville and most of it coming from the East Branch, it is not possible to control the temperature at Hankins.

Mr. Hartman asked if they can be flexible with Revision 7 to change that temperature target. Dr. Murali said they are not changing it; they are still trying to focus on Hankins and are using Lordville as a surrogate to the Hankins gage because that gage is not there. They coordinated with USGS and others and moved the gage to Lordville which is a better location. They have a full flood gage with both flow and temperature at Lordville whereas they did not have that at Hankins. Last year they had the two gages and there is data to correlate the flows between Lordville and Hankins.

Jim Costolnick asked what the estimated release was to maintain the Lordville target. Dr. Murali responded that on May 30 the temperature at Lordville was 75.2 degrees and on May 31 it went up to 76.8 degrees. There were a couple of factors such as the water coming from the East Branch, and the temperatures being more than what was predicted. Because of these conditions, they increased from 800 to 1,000 cfs on the 30th. Despite this, because of warmer conditions, they were not able to knock out the peak and it went above. If there is less flow coming from the East Branch and more flow coming from the West Branch, they can control temperatures at Lordville and Hankins.

Proposed Alternative Flexible Flow Management Plan

Dr. Murali said the plan was originally published in February. Based on the public comments, the Decree Parties have been working to try to come up with a revised plan as soon as possible. They were hoping to have the plan wrapped up for the July 18 Commission meeting, but the process is very contentious and it is quite involved. New York State staff alone did about 200 model runs, and they are now in a position where they have a revised draft plan to be reviewed by the Decree Parties.

Bill Gast presented the concept of the Flexible Flow Management Plan. He said this is essentially the same presentation he gave in February when the plan was originally published. Minor changes were made in some areas and a few things were added. The release tables were changed considerably as a result of comments.

Mr. Gast gave a brief history of the Good Faith Agreement and the various revisions. The plan currently operational is Revision 7, and that was set to expire at the end of May 2007. They were hoping to have the new flexible program in place by then and that did not happen, so Revision 7 has been extended through September 26, which is the Commission meeting when they again hope to be able to adopt a flexible program. A couple of the revisions along the way dealt with flood mitigation. Revision 9, which was approved in September 2006, was the most recent one to address spill mitigation, and that program remains in place now and was extended through September 26 as well. Both of these programs are going to be wrapped into the new flexible flow management program when it is adopted.

A key objective of the new program is a flexible framework. They have had a lot of experience in the years since the Good Faith Agreement was approved, and temporary fixes were needed as problems arose with regard to fisheries and flooding. This time they wanted to create a new program that would have some flexibility built into it and that would be based on adaptive management principles. The effects of the program would be monitored, and on some regular basis they would consider changes or improvements based on what was learned from their experience. Of course, the program has to manage reservoir diversions and releases. They are operating under the auspices of the 1954 Decree and that is paramount to any program that is put in place. The current fisheries program is based on use of the excess release quantity which was a factor in the 1954 Decree. It recognized that when the reservoirs were completed, there would be storage in excess of what the city needed for their current demands and as their demands would grow to reach the yield of the reservoirs, the excess capacity would gradually decline. The recognition was that while that capacity existed or continued to exist, it should be released to the downbasin states so the excess release quantity was the component of the 1954 Decree that provided for extra releases beginning on June 15 each year and continuing until that excess release quantity was used. In the current fisheries program, the downbasin states agreed to provide half of that excess release quantity for bank storage that would be used for fisheries releases to help maintain the flow and temperature objectives in the tailwaters. Since the excess release quantity is not permanent and will gradually disappear, they wanted a new program that was based on a sustainable source of water. Part of that sustainable source of water are some anticipated increases in storage in one or two of the city reservoirs that will hopefully be constructed over the next ten to fifteen years. A safe supply of water to New York City and New Jersey customers is a key factor. The Decree not only provided 800 mgd to the city, it also provided 100 mgd to New Jersey customers that is diverted downstream through the Delaware-Raritan Canal. In the last few years, flood mitigation has come to the forefront so a lot more consideration has been given to flood mitigation in this program than was provided in the spill mitigation revisions to D-77-20 over the past seven or eight years. Another objective is to manage flows and temperatures for the tailwaters fisheries. It has always been a component of the fisheries program since the Good Faith Agreement. They are hoping to establish a more natural flow regime, which has always been a criticism of programs in the past. They have incorporated some ramping procedures and, by going to a conceptual process that bases releases on storage rather than daily computations of what is needed, they are going to be at least approaching what the natural flow regime would be in the river system.

Another key component of this program, and something that really was pretty much absent in any of the programs before, is to extend the considerations now downstream in the river and to account for both withdrawal and non-withdrawal uses in the main stem all the way down to the estuary and the bay including aquatic resource needs. Important to the water supply in the Philadelphia, Camden, and Trenton area is salinity repulsion in the upper reaches of the tidal part of the river. These are some of the objectives that were agreed on when they embarked on this effort a few years ago.

The elements in the FFMP really have not changed from the last time; they remain the same conceptually. There are provisions that delineate New York City and New Jersey's diversion allowances. One of the changes that actually was in the earlier FFMP is that under drought warning and drought emergency conditions, the New Jersey diversions that are in the Good Faith Agreement will be revised so that they can continue to divert 85 mgd both during drought warning and drought emergency. The Montague and Trenton flow objectives are unchanged from the Good Faith Agreement during normal conditions. However, during drought emergency conditions there is a change: since the Good Faith Agreement, the Montague flow objective has varied according to the position of the salt front in the Delaware estuary (the salt-front vernier). In the FFMP that was proposed in February and continuing with the current proposal, the salt-

front vernier has been replaced by seasonally fixed Montague flow objectives. The Trenton flow objective during drought emergencies still follows the salt-front vernier without changes.

Reservoir releases in the new program are based on storage conditions in the reservoirs on a seasonal basis. Releases for fisheries, conservation releases, and flood mitigation releases are all wrapped into one package. The spill mitigation releases in the upper levels of storage are pretty discernable, but overall it is a total package for releases now. One change that is being made in this FFMP compared to the one that was published back in February is that the program now supports an 1850-cfs Montague flow objective from June 15 to September 15 without any computation of an ERQ as was involved before. Now this objective will be fixed at 1850-cfs and it will be provided from what they are going to call an interim excess release quantity. The interim excess release quantity is a fixed computation as well. It is based on a more realistic safe yield value for the city reservoirs and it is also based on a more realistic estimate of projected system demand for the New York City system. This will be provided for the next three years through 2010. This is kind of a step in the direction that has been discussed among the Parties several times in the past. There has always been a lot of discussion about the excess release quantity and how it is computed since it is based on a safe yield number that was computed from the 30's drought, but it is not valid anymore as a result of the 60's drought experience. New York City's demands have not grown; they decreased as a result of very successful water conservation programs, so for the last twenty years or so the ERQ has been based on numbers that are not totally realistic. It was agreed that for the next three years it would be computed based on slightly more realistic numbers and it is going to be called an interim excess release quantity.

Someone from the audience asked if there are going to be more releases now or are there more releases that are not considered from Lake Wallenpaupack that are going into this system that will affect this. For example, you are raising the Montague target from 1750 to 1850 cfs but now you are getting more water; how do you consider what comes out of Wallenpaupack. Mr. Gast said the effects that the power systems have are not going to change as a result of this program. Their releases still count in the Montague flows just as they always have. The audience member then asked if these flows are going to increase now from Wallenpaupack, and Elaine O'Neil asked about the Mongaup system operated by Mirant. Mr. Gast said he doesn't know what is happening with Mirant. They do have a new license and new operating procedures and they have been incorporated into the new drought management procedures that Wallenpaupack has. The effects from those programs are not being negated or eliminated in any way by this program specifically. That water is still counted at Montague, always has been, and probably always will be. The audience member said if there is going to be more water in the system, obviously it will be counted at Montague which means you would probably get less water out of Cannonsville. Mr. Fromuth said what has changed with licensing is that the Wallenpaupack operating plan changed a couple of years ago. That allows for releases to be directed during phases of drought that are greater than they used to be. Because there is more storage, it is at the disposal of the DRBC if it wants to make releases, so there can be more water released in drought warning and drought emergency from Wallenpaupack than in the past. With this FFMP proposal, the releases during those phases of drought watch and drought emergency are fixed. Whatever Wallenpaupack releases, it will not change those releases from the reservoirs. What it will change and what it can change is the directed release to meet the Montague target. Mr. Paulachok said as far as the system in New York, the Mongaup system was recently acquired by Alliance Energy, New York and they are still getting their feet on the ground. They have not been releasing much water since they have taken over in May. They have had a few releases, but generally the system has been down more than it has been up and running. Mr. Gast said one difference that this program will see compared to the current one is that because the releases in these tables are based on storage rather than on today's specific conditions, there is probably going to be a lot more circumstances where Mr. Paulachok's directed releases are subsumed either wholly or partially within the

releases that are in the table. To the extent that the Montague directed releases would be subsumed in these new releases, Wallenpaupack and Mongaup facilities really do not have an effect like they did before.

Dr. Murali said the extra 100-cfs for the 1850-cfs target from June 15 to September 15 would be coming from Cannonsville Reservoir. Mr. Gast said this program has a provision in it for an extraordinary use of the excess release quantity like the last program did. It is just that it will now rely on the interim excess release quantity as opposed to the excess release quantity. The excess release quantity as it exists in the Decree is being used to support this interim excess quantity that is going to be in the program for the next three years.

Ms. O'Neil asked if that formula is going to be fixed for a couple of years. Mr. Gast said it will be in the resolution when it becomes public. Ms. O'Neil asked when that will be. Mr. Gast said he is not sure what the status of publication of this is right now. Pam Bush is working diligently to get the water code language worked out and get the resolution language worked out and approved by the Decree Party principals. Mr. Fromuth said there are two components. One is the FFMP document agreement among the Decree Parties, and that can be posted as soon as it is final from the Decree Parties. What Ms. Bush is preparing and going to notice officially is changes to the water code needed to establish the new program.

Dr. Miri said there is one component of the FFMP that is in the document at the behest of New Jersey, and he thinks it is safe to say they have conceptual agreement among the Parties for a comprehensive reassessment of the water operations in the Delaware Basin. They believe that such a study would provide them with a more equitable and efficient use of the basin's resources going forward. The expectation is that over the next three years, this analysis would be conducted. It would look at existing infrastructure as well as potential additions to that infrastructure. The idea would be to reexamine the existing yield calculations and existing operations so that if there is a more efficient and equitable way to operate the water facilities in the basin that an attempt is made to determine that and ultimately, if necessary, make changes in the operating plan as it is currently contained in the code and in the 1983 agreement. The request for the study is made under Section 8 of the 1983 Good Faith Agreement that provides for reexamination as time and circumstances change. They believe this is an important component. There is also an expectation that a scope of work for the analysis would be agreed to by the Parties between now and when this FFMP is adopted. New Jersey feels that without a meaningful scope of work, they would have major problems going forward with any new mode of operation. He thinks that is a significant addition to the document as it was originally proposed last February, and it is an extremely important part of the new FFMP.

Someone asked if that analysis would consider flaws in the system like leaks in the aqueduct. Dr. Miri said they have had zero discussion of the scope, but that is going to have to be ironed out. Ms. O'Neil asked who is doing the study. Dr. Miri responded that the expectation is that there would be an independent contractor, but again these issues are all currently being discussed. Ms. O'Neil asked if it is believed to be a three-year study. Dr. Miri said the hope is that it would be completed during that period. Ms. O'Neil asked what the impetus is for New York to abide by this study regarding the findings. Dr. Miri said like everything else in the document, the scope of work has to be agreed to unanimously by the Parties. The choice of the contractor, the recommendations, and the implementation of the recommendations are all going to hang on the unanimous agreement of the Parties. They are not making any seismic changes in the way the process goes, but they do have an opportunity to do a technical objective study and that is a big step. Mary Ellen Noble asked how soon they were hoping to get the scope of work done. Mr. Gast said the scope of work is going to have to be approved in order for the program to be approved in September. They are going to be working diligently through the summer to develop

the scope of work. Ms. Noble asked who pays the contractor. Mr. Gast said it is going to be equitably apportioned among the Parties. Ms. Noble asked if this was going to be entirely outside of the Commission structure. Mr. Gast said not entirely. The intent is to have it at least coordinated with flood studies that are under way as a result of the flood recommendations that the Commission just recently adopted.

Don Hamilton asked if funding was available for a study to go forward or is that still being worked out. Mr. Gast said it has to be worked out, but it looks like there is enough funding available to get it started through the current fiscal year, although the states really are not in a position to create funding for it until their next fiscal year. They think they have enough money to get it under way through next summer when the states would be able to appropriate the full funding for it.

Dave Forney asked if the River Master's office and their operations are included in this study. Mr. Gast said he is not sure what he means by their operations. All their operations do is implement the Decree. The River Master is involved in everything that the Decree Parties do, so they will be involved in developing the scope of work, maybe even helping to oversee the contract. Mr. Forney said a potential outcome of this could be a different role or responsibility that USGS would have in this. Mr. Gast said he really cannot answer that. The court set up the River Master with the role he has, and to change the River Master's role or responsibility would be something that a court would have to do.

Ms. O'Neil asked if there is a rule or requirement to have a 45-day public comment period before you adopt anything or vote on anything. Mr. Fromuth said that is different for each state, but the close of the public comment period would be August 15, so 30 days. Ms. O'Neil said she thought it had to be 45. Mr. Fromuth said he would have to check with Pam Bush on that. Ms. O'Neil said if they do not have the full FFMP, not just a chart to release to the public, she would assume legally that the 45-days start the day you publicize the full plan. Mr. Gast said that the intent is to have this published within the next couple of weeks. The intent was to have it available today, and that is why they scheduled the meeting.

Ms. Noble asked if there was any way you would expand a little bit more on what this study does. Dr. Miri said they have not even discussed the actual scope, so it would be kind of difficult to make a list. They are going to be looking at yield and operations of water facilities in the basin. Obviously, they are going to be examining the existing arrangements and see if they continue to be the best way to operate. Until you get a scope put together, it is really hard to say this is going to be included and that is excluded. Mr. Gast said the study is focused on the city reservoirs and their operations, but the intent is to look at other reservoir operations in the basin that impact the same things that the city reservoirs impact. Beltzville and Blue Marsh are supporting the Trenton flow objective, which is part of this program. To date, they have not been able to make a final list of what exactly they are going to look at. Ms. Noble said this scope of work has to be done in time for a vote on the FFMP. She asked if there is still more work to become public when the FFMP does. Mr. Gast said he does not know. The scope of work is not part of the program. The scope of work will be agreed on at the same time the program is, but the scope of work is not part of the program. Harry Otto said it is a negotiation requirement. Ms. O'Neil said you are working on the scope definitions, but the public will not know that on the day that you vote on the plan. Mr. Gast said he is sure it will be public knowledge on the day that they vote on the plan. Ms. Noble asked how many days before. Mr. Gast said he thought she asked if it was going to be made public when we published the FFMP. It won't be made public then because they are not going to have it agreed to by then, but it will be agreed to by the time they agree on the plan. Dr. Murali said they are not ready to talk about the scope. That is the reason why he kept it out of this discussion. It was mentioned that it is part of the FFMP, the requirement, but they are not

ready to talk about the details because they have not even met for the first time to talk about the scope. Hopefully, at the next RFAC meeting they will be able to talk about it.

Mr. Gast said under drought management, this plan like the last one makes "permanent" the changes in the operations curves that were introduced a number of years ago. It creates watch and warning zones compared to the old zones (warning 1 and warning 2). Again, it replaces the salt-front vernier with fixed seasonal flow objective at Montague and it increases New Jersey's warning and emergency diversion allowances to 85 mgd just like the last plan did. Conceptually, there are no changes to the tailwaters habitat protection and discharge management program, which is going to be called TailPro in the water code instead of THPDMP. It is a storage-based program rather than bank-based like the old one. We have used OASIS and the Decision Support System (DSS) heavily over the last few months to hone in and refine the releases that are in the tables. We are hoping that this will get us a more natural flow regime. There are significant changes in the spill mitigation rate at the reservoirs in this component compared to the last program both in the quantity of the releases and the time period throughout the year when they can be made and the volumes of storage at which they can be made. We have made a lot of improvements to the spill mitigation releases and the computation continues to include snowpack.

Salinity repulsion continues like before to sustain the Good Faith objective. The dwarf wedgemussel provision has not changed from the previous program. Wallenpaupack already came in with a snowpack spill mitigation program that was implemented this spring. Recreational boating continues to provide them with the possibility to consider future proposals.

Mr. Costolnick had a question about recreational boating. Mr. Gast responded that there have not been any proposals specifically from any of the parties or any outside parties with regard to the canoeing or rafting as recreational boating. They wanted to make sure in this overall comprehensive program that it would have a placeholder at least, as do several of the other provisions. There is also a placeholder for estuary and bay ecological health. There are studies that have gotten under way with regard to oysters, and they recognize that it is going to be several years until they get results that will give some meaningful information that might help to improve this program so it can provide better support for the oysters and other uses in the estuary. The warm water and migratory fishery is also a place holder. There has not been too much change to the monitoring, reporting and periodic evaluation requirements. Again, this program is designed with adaptive management principles in mind and they are anticipating annual reviews of the program, probably at the River Master's Advisory Committee meeting in the spring of each year. At that time they can review how well the program or various components of it are working and suggest and possibly make revisions to improve it. The next item is a new feature that was not in the previous program, which is the requirement for a comprehensive reassessment of the operations throughout the basin focusing on city reservoirs and other major operations in the basin including diversions in and out of the basin that have an impact on either the river in the tailwaters area or in the lower reaches of the river and into the estuary. The program will continue to be effective through May 31, 2010; that has not changed.

Mr. Douglass said New York City has done a good job of lowering how much it will take over the years, but there are also about 75 other entities that use water out of New York City's tunnels. As a part of New York State's law, they can legally take some water. Going forward, is there a chance that they are going to reassess whether other entities in New York State will continue to have the ability to withdraw water from the system? Mr. Gast responded that the assessment is going to be pretty much limited to determination of the yield of the system. They are not going to be looking at how they operate or how water is used on the other side of the system. It is limited to recalculation or redetermination or reassessment of the yield. Reservoir operations will be examined only in the Delaware basin. They do not have any authority under the Decree to tell the

city or even look at how the city operates their side of the system or what the uses are. Tom Murphy said the municipalities that draw water out of the New York aqueducts on their way down to the city have water supply agreements. In those agreements, there are requirements under drought conditions that they apply the same conservation efforts that the city is expected to apply. They do not have any authority to require them to use low flow fixtures, but they certainly do encourage it. Mr. Douglass said at one time Orange County was looking for a loop to create more places where they could provide water to the municipalities in Orange County. It never got off the ground at that point, but every so often it comes up again, and that is what you are saying would not be discussed at this point. Mr. Gast said this reassessment was subject to a lot of discussion among the workgroup and the principals. There have been a lot of meetings and conference calls of the principals over the last couple of months and focused a lot on this reassessment and what it would and would not entail. The agreement is that under the Decree, they only have a right to look at what happens on their side of the divide. The yield is in the Decree, so they have a right to examine that. In terms of operations and uses on the other side of the divide, they are not within their purview under the Decree. The State of New York can address that on its own.

The renewal provision remains the same as it was before. If in May 2010, they agree to carry the program forward, it would then renew automatically every five years unless any party provided notice at least 180 days in advance of the next renewal date that they did not want it to renew. In which case, they would enter into negotiations to determine an operating plan that they could move forward with. In the absence of an agreement on an operating plan to move forward with, it would revert back to Revision 1 of DRBC Docket No. D-77-20. Also, this FFMP rescinds all the earlier revisions to D-77-20 to the extent that they have not already expired or been rescinded in the past.

Proposed Alternative Tailwater Habitat Protection and Discharge Management Program (THPDMP)

Dr. Murali said the Decree Parties have been working diligently since the last meeting to improve the program based upon the public comments and they are primarily related to demands to improve flood mitigation and cold water fisheries. Working with the DRBC, New York State staff did more than 200 OASIS model runs that helped develop the current proposal.

The revised program calls for supplemental spill-mitigation releases to be made October through May when NYC combined storage exceeds 80%. These supplemental releases are subject to not exceeding high flows at the tailwater gages. For example, if they are approaching the flood stage at Hale Eddy, Harvard or Bridgeville, the releases would be cut down.

The Decree Parties tried to incorporate as many comments as possible in developing the revised program. The fisheries coalition and Friends of the Upper Delaware both wanted to minimize large pulse-type releases that would be harmful to fish. The fisheries coalition suggested that conservation releases be based upon storage in each reservoir. The revised program calls for higher releases when storage is high and lower releases as storage drops off. Also, the recent floods had a big impact on the upper basin, and produced a demand for improved flood mitigation. There is no significant increase in drought frequency with the revised program. The reference or baseline is the Revision 1 program because that is the last permanent program approved by the Commission in 1983. Some of the constraints used to develop the revised program were no significant increases in drought days and no significant reduction in out-of-basin diversions, as compared to the baseline program. Also, the new program should not produce minimum reservoir storage levels that are lower than the minimum values produced under the baseline programs.

The proposed program is based upon New York State and New York City pursuing efforts to increase storage at Cannonsville and Pepacton. At this time you are talking about the potential of an increase of four feet at Cannonsville and four feet at Pepacton. Both result in about 13 bg of additional storage. Feasibility studies are being conducted to determine the economic feasibility and how much they can increase storage at these two reservoirs. In the interim period before the additional storage becomes available, New York City will provide about 13 bg each year to sustain the proposed program. New York City will provide this amount of storage through a 35-mgd reduction in their allowed 800-mgd diversion. The program contemplates possible increases in New York City consumption and adjusts the total amount available for the program. If on a given year, New York City cannot make the 35 mgd available but only 20 mgd, lower reservoir releases will be afforded in accordance with alternative schedules currently in the revised program.

The releases are varied based upon the storage as well as the season. They tried to approximate the current target flows that were designed based upon the New York State DEC's IFIM studies, which called for 225 cfs at Hale Eddy, 175 cfs at Harvard, and 115 cfs at Bridgeville. They tried to design the conservation releases in such a way that during summertime, they meet these target flows. Also, the supplemental releases were subject to flood stage, and they do not want to keep making the releases when there is a potential for flooding. The goals of the program are to try to have more natural flows and fewer variations and to maintain incubation flows from October 15 through the winter. The proposal was made available to SEF, and they made the DSS evaluation, which you will hear more about at the next SEF meeting. In their opinion, based upon the DSS runs, there is significant improvement in trout habitat during the spring season for the three tailwaters. Having releases based upon reservoir storage means improved public information, as everyone knows ahead of time what the releases will be.

The spill mitigation rule curve introduced in the February 2007 proposed program has been modified for the current program. Combined storage has to meet this criterion before going into the individual reservoir rule curves. In the February program there were no spill mitigation releases in the months of April, May and June. The spill mitigation rule curve in the revised program is substantially different from what you have seen before, with releases made at lower storage levels. The curve ramps down from June 15 to October 15, then a constant 75% storage is maintained through February 15, and it ramps up from February 15 through May 1. This program operates year round and provides more quantity of releases. Dr. Murali showed a picture with the rule curves currently in effect (which define normal, watch, warning and emergency) and the new spill-mitigation rule curve added. There are L1 releases significantly higher than conservation releases during normal conditions. They are made from June 15 through May 1. L1-a releases apply when the storage exceeds 95% from September 1 through February 1; L1-b releases apply when the storage is between 90% and 95%% from September 1 through February 1; L1-c releases apply when the storage is below 90%. Dr. Murali then compared the release tables from February 2007 and now for Cannonsville. The proposal that they are trying to publish in the next few days has L1-a releases increasing from 1,000 to 1,500 cfs. They also increased the spring releases: L1-c releases increased from 180 to 225 cfs. Summer L1-c increased from 260 to 275 cfs. There is no change in the number for fall. The L2 release levels were increased for spring and summer: in spring, it was 180 and now they will provide 215 cfs; in the summer, it will increase from 250 to 260 cfs; fall and winter L2 remain unchanged. There is significant improvement in the drought releases as compared to what you saw before. The summer L3 release for the THPDMP was 165, now it is 175 cfs, the L4 improved from 100 to 130 cfs and the L5 improved from 75 to 120 cfs. So, there is significant increase in the drought releases during summertime. There was fear of a potential summer drought when they had to live with 75 cfs for an extended period of time. Compared to that, 120 cfs gives more water in the streams and allows fish to migrate to the cold water. There are similar changes in Pepacton,

although L1-a and L1-b releases remain unchanged there. The most significant changes are an increase from 45 cfs drought emergency (L5) release to 80 cfs in the summer, almost double. Drought warning (L4) went up from 70 to 85 cfs, drought watch (L3) from 95 to 100 cfs, and normal (L2) from 135 to 140 cfs; all these figures apply during the summer. In Neversink, drought emergency in the summer went up from 35 to 55 cfs; that is significant when you have so many days in drought emergency. Drought warning went up from 40 to 60 cfs, and drought watch went up from 65 to 75 cfs. These are all improvements over the THPDMP earlier proposal.

The Decree Party representatives also compared their proposal under development to CP2, an alternative proposal prepared by the fisheries coalition group. The comparison shows some improvements over the CP2 and it also shows where they could not accommodate the CP2 recommendations. For example, CP2 recommended 215 cfs in spring for the L1-C and 350 cfs during normal conditions from Cannonsville in spring. These higher releases could not be accommodated, since they would increase drought days by more than 300 days. Through the entire process of over 200 OASIS runs, the current set of release numbers were arrived at, developing the program with no significant increase in drought days (criterion set by the Decree Parties). They could not accommodate all CP2 releases, but they were able to accommodate higher releases, and this is something the fisheries have wanted. They were a little concerned about lower flows, particularly the 45 and 35 cfs during drought emergency, for a sustained period of time during drought conditions. This is more or less a compromise between what New York City wanted and what the public wanted – to provide higher spill mitigation releases to try to decrease the flooding conditions. Also, what our fisheries people wanted in the drought releases, and also the releases that the coalition recommended. Based upon that run, a table was developed. This is the 35- mgd table which is the same thing you saw before. This is how the OASIS model was set up. Dr. Murali showed that in the month of April when storage is above the red line, L1-a releases equal 1500 cfs. Below the red line, it drops directly to the L1-C level, at 110 cfs. In the month of May, the proposed program has only L1-c releases at 225 cfs (L1-a and L1-b releases do not apply in May). Because of refill necessity and the criteria in the month of May and first half of June, the city wanted to conserve water to ensure the reservoirs are full by June 1 or earlier (because of climate change, reservoir drawdown seems to be starting before June 1).

Operations under the Revision 1 (with old PPL) program had a total of 5534 drought days for the upper basin. This total was made up of 2538 drought emergency days, 1524 drought warning days and 1472 drought watch days. Revision 7 (the current program which they are operating under) had a total of 5590 drought days. That was an accommodation by the Decree Parties because it was a temporary program; three years ago the Decree Parties were willing to allow a small increase; they went up from a total of 5534 to 5590 days. Drought emergency days went up from 2538 to 2551; warning from 1524 to 1631; drought watch came down a little bit. Under the proposed program the total number of drought days drops from 5534 to 5522; drought emergency days go down from 2538 to 2331; drought warning days increased as a tradeoff. The experience from the last 20 years is that of minor, mini-droughts where the system enters drought watch for a brief period and then goes back to normal. The intent was to try to lower the number of drought watch days if possible and try to make drought emergency days as insignificant as possible. They are significant, but at least we have 220 days less than before. That also impacts the lower basin; the total days were 5652 before, now it is 5582 – 70 days lower than the previous program.

Dr. Murali wanted to show the improvements that the program is able to make. In the 1930s, the minimum storage in the Delaware system was 18 bg. In the 1960s, it was 13 bg, and in the 1980s, it was 72 bg. The program that they are proposing has slightly lower minimum storage in the 1960s than this one, but they made significant improvements in the 30s and 80s. In this

revised proposal, in 1930s drought days, the minimum storage increased from 18 to 33 bg. There are no improvements on the minimum storage for the 1960s, because most of the reservoirs were empty at some point in time. In the 1980s, the proposed program improved minimum storage from 72 to 80 bg. Thus, this program improved both drought emergency days as well as the minimum storage conditions.

The proposal also shows the lower releases that would apply if the available quantity from New York City is 20 mgd instead of 35 mgd. The spill mitigation releases (L1) are the same as those in the 35 mgd case, but all other release levels are cut back. To come from 35 mgd to 20 mgd and still keep the drought days neutral, many model runs were done to come up with the adjusted releases. At the same time, there are placeholders in the document that they are trying to develop that could make available other sources of water in this case. If some of the ERQ is available, Decree Parties would give some consideration to maintain the flows. Then again, this is contingent upon what ERQ is available and what the city would make available.

Ms. Noble asked what conditions drop the amount available from 35 to 20 mgd. Tom Murphy said it could be unforeseen circumstances – this provision is just a safety valve. If they find themselves in a position where they needed the full 800 mgd, there has to be language in the document so that they could take it. Whatever it would be, this is simply a precautionary statement in the agreement that allows New York City to revert to the 800 mgd diversion. It is a low probability case, but it needs to be in the agreement. Mr. Paulachok said there might be a circumstance where parts of their system are taken out of service, for example for maintenance, and they need the full diversion from the Delaware Basin. Jim Serio asked if they are anticipating that to happen. Mr. Murphy said there are short-term planned shut downs through now and 2010. There is no schedule for a long-term shut down of the Catskill between now and 2010. There are shorter shut downs for maintenance work. Ms. O'Neil asked for how long. Mr. Murphy replied days, maybe a week. There is no definitive schedule at this point, but they need to maintain the system and protect it so they need language in the agreement that allows them to take the water from elsewhere if necessary. Ms. O'Neil said what bothers her is that the threshold is having a fictitious 35-mgd reduction on the New York City diversion, when in fact, unless or until you shut down the Catskills aqueduct, you are really not going to take that much. In June sometimes you do, but it drops down quickly. She asked why they do not have charts for addressing a 500-mgd diversion where you could really give more of the release in that scenario which is more realistic for today, last year, the year before, possibly this year. Mr. Murphy said the idea of this program is that it is a sustainable program, and those are not sustainable numbers. Mr. Gast said the 35 mgd was an approximation of what the yield will be from the anticipated additional storage that they are hoping to build. The city agreed a couple of years ago that as long as New York State made reasonable progress towards constructing that storage, they would, in the interim for a few years, provide a quantity equivalent to that yield out of their unused allowed diversion – that is where the 35 mgd came from. Mr. Tudor said it doesn't manifest itself in these tables, but the ERQ is based on the real average consumption over the past five years. Ms. O'Neil said that is what is important. What matters is what you draw today and what you release today and that you have in terms of a safety void, and she does not see that anywhere in this proposal. Mr. Gast said you will not because this plan is based on the Decree's provisions of 800 mgd to the city. They cannot develop a long range plan that does not honor the Decree requirements.

Ms. Noble said if you fix the Delaware aqueduct leak, you could get your 35 mgd that you're talking about here in terms of the storage. She asked if the 35 mgd that they are talking about here and the amount they are leaking from the aqueduct are the same amount. Mr. Murphy said depending on the flow going through it, the maximum numbers he has heard are upwards of 30-35, but it runs around 20 depending on the flow through the tunnel. They are developing plans to repair that tunnel, and it is an enormous job to shut that down and get something in there. Ms.

Noble asked if she was right to say that they are equivalent amounts of water, roughly. Mr. Murphy said it depends. It varies anywhere from 15 to approximately 30 mgd depending on what is flowing through the tunnel. Mr. Gast said he might comment with regard to Ms. Noble's concern that while this program may not look at actual diversions by the city, the result of the reassessment might look at that. They are not really drawing any lines around where they might go with this program after they have the reassessment completed and certainly with the reassessment, they will be looking at what their diversions out of the reservoirs are. Mr. Gast said the study is probably going to come up with a revised yield and is going to look at what their demands are. They have already built into this program at least an interim recalculation of the excess release quantity. The study will probably result in a different value for the excess release quantity. If they build the use of whatever that excess release quantity is into the program, that moves forward from that time that will, by default, be incorporating part of your concern. If they take the extra step and look at the seasonal demands on the system, which is something that the release reassessment could look at. Ms. O'Neil asked if there is, or will there be after the study is completed, any legal restriction that would prevent you from coming up with a chart based on the realistic diversions of today. Mr. Gast said that is what he is saying. Ms. O'Neil said there is no restriction against that and you refuse to do that today, but after the study is completed and you come up with the fact that the yield is much lower than the theoretical yield is that these charts represent, will there be another chart or two or three that addresses the realistic diversions of the day. Mr. Gast said he will not say whether there will be or won't be. He's suggesting that there could be and there may be. Ms. O'Neil said she would like to suggest that Delaware, Pennsylvania, New Jersey have that as part of their negotiations before this September. Mr. Gast said that is the whole purpose for working on the scope of work to determine what they want to look at and what kind of results they want to look at and see out of that assessment.

Dr. Murali moved forward with the presentation, showing a table of releases for the case when only 10 mgd is available for the program. Release values at all levels except L1 are lower than values in the previous tables. Another table showed reservoir releases for the case when New York City does not have any water available for this program; if they say that they need all the 800 mgd for meeting their demands, then they do not have any water available for the program, and any additional water may only come from the ERQ if available, and that depends upon the goodwill of all the downbasin states to consider. If there is nothing available from the ERQ to supplement the zero mgd table to make a better program, then this will be the bottom line. If they do not have any agreement for future programs, they may go back to the Revision 1 program. They are pretty confident that is not going to happen, but then again, at this time they are going through contentious negotiations. They are also starting to scope the work for the reassessment study and that is going to be a pretty long process.

Flows from the proposed program were run through the DSS for instream habitat, and the DSS runs show that this program is better than Revision 7 and Revision 1, except for the fall when habitat falls a little bit below Revision 7 because the fall releases here are lower than the Revision 7 releases. The program is generally better than Revision 7 in terms of operation and sustainability, and it is also better than Revision 1. This is what they had in the program, and they hope to wrap it up and have agreement among the Decree Parties. Then they will recommend the principals to approve it and put it on the website as soon as possible. DRBC has issued a notice consisting of proposed action by DRBC, and will file notices with the states and federal agencies for publication in July. The next big challenge is to come up with the mutually acceptable scope of work for the reassessment study over the next two months.

Ms. Noble asked where you fall back to if this does not happen. Mr. Gast responded that the fall back program is Revision 1 with the new PPL drought management plan, which is in place independent of the Good Faith. However, the Decree Parties have all agreed that were this to

happen, they will try and come up with a mitigation plan for the PPL drought plan since the mitigation plan for it is imbedded in the current Revision 7. Ms. Noble asked if the plan specifies what indicators are being looked at for monitoring. Dr. Murali said the plan calls for the DEC to monitor conditions and report to the Decree Parties on April 30 of each year on how the program is functioning and what changes may be desirable. This calls for the comprehensive biological monitoring program in 2009. Before the program comes up for renewal in May 2010, they must have a comprehensive biological monitoring program that includes the biological as well as the bugs and how they grew in the last few years. Hopefully, in the three years they will have enough adequate data available to offset the effectiveness of the program so they can make recommendations and any changes to the program. Mr. Gast said section one of the proposed program listed criteria for considering revisions to the plan. They did get comments from the Nature Conservancy to actually develop and outline what the adaptive management process would be.

Don Hamilton asked if the funding for the Hankins gage had been discontinued. Dr. Murali responded that the Lordville gage costs $12,000 a year after the co-op by the USGS New York District. The Hankins gage is only $4,000 so they had to come up with more money. There was no money available in the budget for both gages at the same time, and that is why he discontinued the Hankins gage. Mr. Hamilton asked how far into the future is the Lordville gage projected to be open. Dr. Murali said he does not have any plans to discontinue the gage. The Lordville gage is permanent. Mr. Hamilton asked if that is replacing the Hankins gage as the temperature reference. Dr. Murali said there is an improvement because the Lordville gage has telemetry and is more accessible for periodic checks to make sure everything is right. This is the first gage with telemetry that is available for flow and temperatures. He is satisfied about the way the gage is working, but DEC is still doing some QA/QC based upon some comments to make sure everything is okay.

Dave Forney asked Mr. Gast if this is his last meeting. Mr. Gast said they are working on other arrangements, but have not concluded them yet. Dr. Murali said by the next RFAC meeting, a few more people besides Bill might not be here. Mr. Gast said he has already agreed to work for free for a couple days to get the scope of work underway. He might end up at the Commission meeting giving this presentation too.

Next Meeting
The next DRBC Regulated Flow Advisory Committee meeting will be scheduled at a later time.

REGULATED FLOW ADVISORY COMMITTEE
June 27, 2007

ATTENDANCE

NAME	AGENCY
COSTELNIC, Jim	Friends of the Upper Delaware River (FUDR)
DOMBER, Steven	New Jersey Department of Environmental Protection (NJDEP)
DOUGLASS, Bill	Upper Delaware Council (UDC)
FROMUTH, Rick	Delaware River Basin Commission (DRBC)
GAST, William	Pennsylvania Department of Environmental Protection (PADEP)
HAMILTON, Don	National Park Service – Upper Delaware Scenic and Recreational River (NPS UPDE)
HARTMAN, Lee	Trout Unlimited
KLOSOWSKI, Rob	New York State Department of Environmental Conservation (NYSDEC)
MERSHON, Jim	Merrill Creek Reservoir
MIRI, Joseph	NJDEP
MURALIDHAR, D.	NYSDEC
MURPHY, Tom	New York City Department of Environmental Protection (NYCDEP)
NOBLE, Mary Ellen	Delaware Riverkeeper Network
O'NIEL, Elaine	Delaware Riverside Conservancy
OTTO, Harry	Delaware Department of Natural Resouces and Environmental Control (DNREC)
PAULACHOK, Gary	United States Geological Survey – Office of the Delaware Rivermaster
QUINODOZ, Hernan	DRBC
SERIO, Jim	Delaware River Foundation
TUDOR, Robert	DRBC