Report of the River Master of the Delaware River For the period December 1, 2001 - November 30, 2002

By Bruce E. Krejmas, Gary N. Paulachok, and William J. Carswell, Jr.

Open-File Report Report 2006-1220

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Conversion Factors and Vertical Datum

Multiply	By	To obtain
	Length	
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
square mile (mi^2)	2.590	square kilometer (km^2)
	Volume	
million gallons (Mgal)	3,785	cubic meter (m^3)
million gallons (Mgal)	1.547	cubic foot per second day (ft^3/s)-d
billion gallons (Bgal)	3.785	cubic hectometer (hm^3)
cubic foot per second-day (ft^3/s)-d	0.002447	cubic hectometer (hm^3)
	Flow rate	
million gallons per day (Mgal/d)	1.547	cubic foot per second (ft^3/s)
million gallons per day (Mgal/d)	0.04381	cubic meter per second (m^3/s)
billion gallons per day (Bgal/d)	43.81	cubic meter per second (m^3/s)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)

Datum: Vertical coordinate information is referenced to the North American Vertical Datum of 1988. Horizontal coordinate information is referenced to the North American Datum of 1983.

Temperature in degrees Fahrenheit (°F) may be converted to degrees Celsius (°C) as follows:
°C=(°F-32)/1.8

RIVER MASTER LETTER OF TRANSMITTAL AND SPECIAL REPORT

OFFICE OF THE DELAWARE RIVER MASTER
United States Geological Survey
415 National Center
Reston, Virginia 20192

January 24, 2007

The Honorable
John G. Roberts, Jr.
Chief Justice of the United States

The Honorable
Ruth Ann Minner
Governor of Delaware

The Honorable
Jon S. Corzine
Governor of New Jersey

The Honorable
Eliot Spitzer
Governor of New York

The Honorable
Edward G. Rendell
Governor of Pennsylvania

The Honorable
Michael R. Bloomberg
Mayor of the City of New York

No. 5, Original.—October Term, 1950
State of New Jersey, Complainant,
v.
State of New York and City of New York, Defendants,
Commonwealth of Pennsylvania and State of Delaware, Intervenors.

Dear Sirs and Madam:

For the record and in compliance with the provisions of the Amended Decree of the Supreme Court of the United States entered June 7, 1954, I am transmitting herewith the 49th Annual Report of the River Master of the Delaware River for the 12-month period from December 1, 2001, to November 30, 2002. In this report, this period is referred to as the River Master report year or the report year.

During the 2002 River Master report year, monthly precipitation in the upper Delaware River Basin ranged from 32 percent of the long-term average during July 2002 to 188 percent of the long-term average during October 2002. Total precipitation during the report year was 2.73 inches more than the long-term average. Precipitation during the December to May period, when reservoirs typically refill, was 0.44 inches less than the 61-year average. Precipitation during the report year was below normal in December, January, February, July, and August, and above normal in the other seven months.

On December 1, 2001, when the report year began, combined storage in the New York City reservoirs in the upper Delaware River Basin was 66.010 billion gallons (Bgal) or 24.4 percent of combined storage capacity. Median combined storage on December 1, computed on the basis of 34 years of record, is 171.931 Bgal. On December 1, 2001, the basin entered drought emergency and operations were conducted as prescribed by the "Interstate Water Management Recommendations of the Parties to the Decree" (Delaware River Basin Commission Resolution 83-13). Storage increased slowly and steadily throughout the winter and spring, and operations returned to normal on May 26, 2002. Storage reached its maximum level in late June then declined seasonally until mid-October. Storage increased from mid-October to the end of the year. Operations in the basin were conducted as prescribed by the Decree from May 26, 2002 to November 30, 2002.

On May 17, 2002, the Delaware River Master Advisory Committee met at Merrill Creek Reservoir in New Jersey to discuss hydrologic conditions in the basin and operational procedures for the 2002 reservoir-release season. During the report year, the following individuals served as members of the Advisory Committee:

Delaware	Dr. Robert R. Jordan
New Jersey	Bradley M. Campbell
New York	Phillip DeGaetano
New York City	Christopher O. Ward
Pennsylvania	Irene B. Brooks

The River Master informed the Advisory Committee that, on the basis of information provided by New York City, the excess-release quantity beginning June 15 was 7.381 Bgal. Based on reservoir release programs in Delaware River Basin Commission (DRBC) Docket No. D-77-20 CP (Revision No. 4), the excess-release quantity was to be used for various purposes. On the basis of hydrologic conditions in early June, the Parties to the Decree unanimously agreed to suspend that portion of the excess-release quantity that was scheduled to be released.

During the report year, the River Master and staff participated in a number of water-supply related meetings of the Delaware River Basin Commission. The Deputy Delaware River Master met periodically with representatives of the Parties to the Decree as a member of the Decree Parties Work Group and DRBC's Flow Management Technical Advisory Committee. Issues of particular interest to the River Master involved reservoir releases and streamflow in the upper Delaware River Basin.

The U.S. Geological Survey (USGS) continued the operation of its field office of the Delaware River Master at Milford, Pennsylvania. Gary N. Paulachok, Deputy Delaware River Master, continued in charge of the office, assisted by Bruce E. Krejmas, Hydrologist.

During the year, the USGS office at Milford continued the weekly distribution of a summary hydrologic report. These reports contain preliminary data on precipitation in the upper Delaware River Basin, releases and spills from New York City reservoirs to the Delaware River, diversions to the New York City water-supply system, reservoir contents, daily segregation of flow of the Delaware River at the Montague gaging station, and diversions by New Jersey. The reports were distributed to members of the Delaware River Master Advisory Committee and to other parties interested in Delaware River operations. A monthly summary of hydrologic conditions also was provided to Advisory Committee members.

The first section of this report documents Delaware River operations during the report year. During the year, the City of New York diverted 184.325 Bgal from the Delaware River Basin and released 65.892 Bgal from Pepacton, Cannonsville, and Neversink Reservoirs to the Delaware River. The River Master directed releases from these reservoirs to the Delaware River totaled 48.848 Bgal.

The second section of this report describes water quality at various monitor sites on the Delaware Estuary. It includes basic data on chemical properties and physical characteristics of the water and presents summary statistics on the data.

Throughout the year, diversions to New York City's water supply and releases designed to maintain the flow of the Delaware River at Montague were made as directed by the River Master. Diversions by New York City from its reservoirs in the Delaware River Basin did not exceed the limit stipulated by the "Interstate Water Management Recommendations of the Parties to the Decree" and the Decree. Diversions by New Jersey also were within stipulated limits.

The River Master and staff are grateful for the continued cooperation and support of the Parties to the Decree. Also, the contributions of the PPL Corporation and Mirant Corporation in informing the River Master of plans for power generation and furnishing data on reservoir releases are greatly appreciated.

A draft version of this report was furnished to the River Master Advisory Committee members for review and comment. These comments have been incorporated into this report.

Sincerely yours,

/Signed/

Stephen F. Blanchard
Delaware River Master

DELAWARE RIVER OPERATIONS

Abstract

A Decree of the United States Supreme Court in 1954 established the position of Delaware River Master within the U.S. Geological Survey. In addition, the Decree authorizes diversions of water from the Delaware River Basin and requires compensating releases from certain reservoirs, owned by New York City, to be made under the supervision and direction of the River Master. The Decree stipulates that the River Master will furnish reports to the Court, not less frequently than annually. This report is the 49th Annual Report of the River Master of the Delaware River. It covers the 2002 River Master report year, that is, the period from December 1, 2001, to November 30, 2002.

During the report year, precipitation in the upper Delaware River Basin was 2.73 in. greater than the long-term average. Combined storage in Pepacton, Cannonsville, and Neversink Reservoirs was at a record low level on December 1, 2001. Reservoir storage increased steadily from mid-winter until late June. Storage declined steadily from early July to mid-October then increased through the end of the year. Delaware River operations were conducted at reduced levels from December 1, 2001, to May 25, 2002, when drought emergency conditions prevailed, and as prescribed by the Decree from May 26, 2002, to November 30, 2002.

Diversions from the Delaware River Basin by New York City and New Jersey were in compliance with the terms of the Decree or with the reduced limits in effect during drought emergency conditions. Reservoir releases were made as directed by the River Master at rates designed to meet the flow objective for the Delaware River at Montague, New Jersey, on 101 days during the report year. Releases were made at experimental conservation rates—or rates designed to relieve thermal stress and protect the fishery and aquatic habitat in the tailwaters of the reservoirs—on all other days.

During the report year, New York City and New Jersey complied fully with the terms of the Decree, and during drought emergency conditions, with the terms of the "Interstate Water Management Recommendations of the Parties to the Decree" (DRBC Resolution 83-13), and directives and requests of the River Master.

As part of a long-term program, the quality of water in the Delaware Estuary between Trenton, New Jersey, and Reedy Island Jetty, Delaware, was monitored at various locations. Data on water temperature, specific conductance, dissolved oxygen, and pH were collected by electronic instruments at four sites, and data on water temperature and specific conductance were collected at one site. In addition, selected water-quality data were collected at 3 sites on a monthly basis and at 19 sites on a semimonthly basis.

Introduction

An Amended Decree of the United States Supreme Court, entered June 7, 1954, authorized diversions of water from the Delaware River Basin and provided for releases of water from three New York City reservoirs to the upper Delaware River. The Decree stipulated that these diversions and releases were to be made under the supervision and direction of the Delaware River Master. The Decree also stipulated that reports on Delaware River operations be made to the Court not less frequently than annually. This report documents operations from December 1, 2001, to November 30, 2002, or the 2002 River Master report year. The report also presents information on water quality in the Delaware Estuary during the report year.

Some hydrologic data presented in this report are records of streamflow and water quality for USGS data-collection stations. These records were collected, computed, and furnished by the offices of the USGS at Troy, New York; Malvern and New Cumberland, Pennsylvania; and West Trenton, New Jersey, in cooperation with the States of New York and New Jersey, the Commonwealth of Pennsylvania, and the City of New York. The locations of major streams and reservoirs, and selected streamflow-gaging stations in the Delaware River Basin are shown in figure 1.

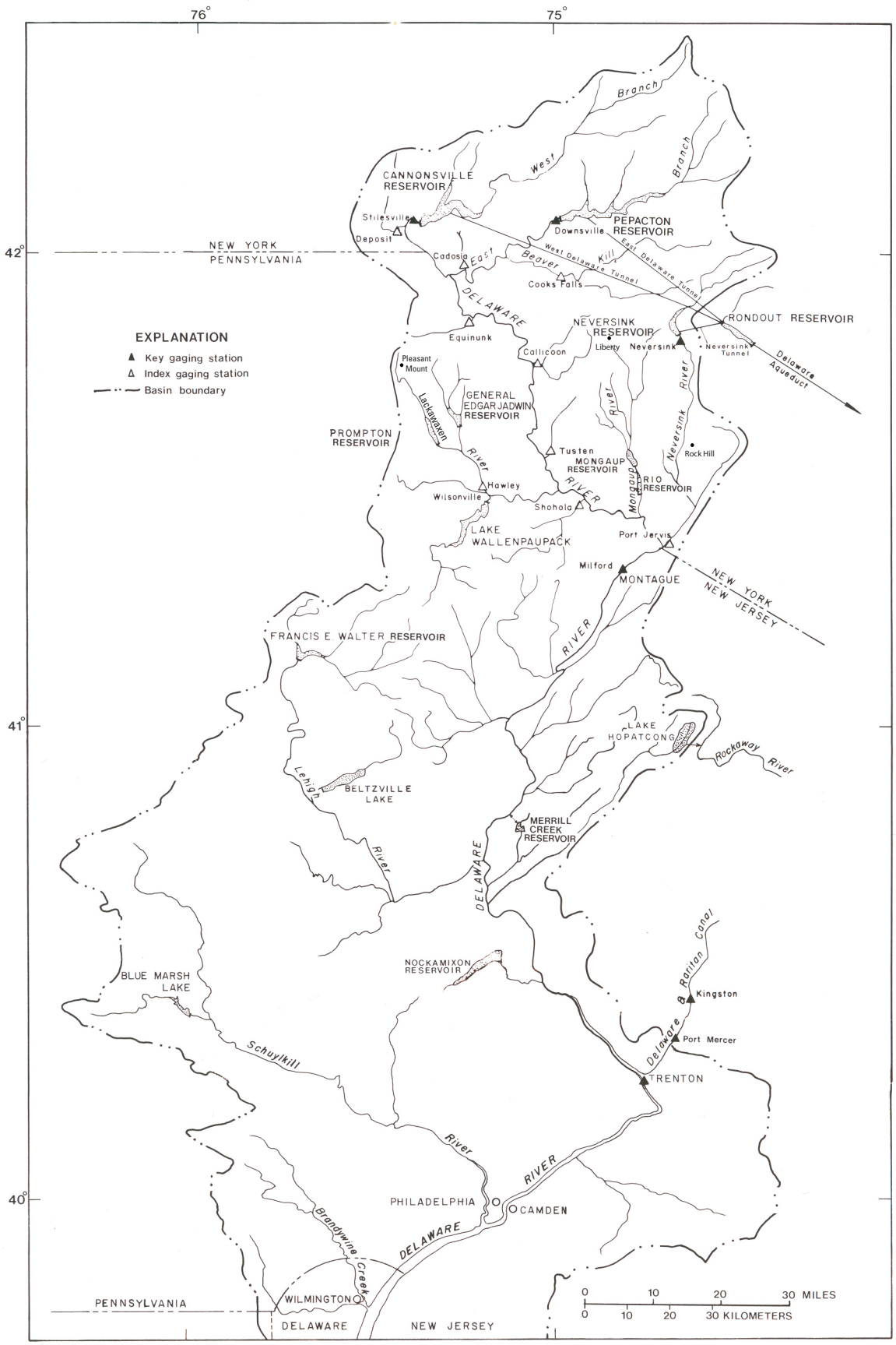

Figure 1. Delaware River Basin above Wilmington, Delaware.

Acknowledgments

The River Master's daily operation records were prepared from hydrologic data collected chiefly on a day-to-day basis. Data for these records were collected and computed by the Office of the Delaware River Master or were furnished by the following agencies and utilities: Data for Pepacton, Cannonsville, and Neversink Reservoirs by the New York City Department of Environmental Protection, Bureau of Water Supply; for Lake Wallenpaupack by the PPL Corporation; and for Rio Reservoir by Mirant Corporation. Precipitation data and quantitative precipitation forecasts were provided by the National Weather Service (NWS) office in Binghamton, New York.

Definition of Terms and Procedures

The following definitions apply to various terms and procedures used in the operations documented in this report. A table for converting inch-pound units to the International System of Units (SI) is given on page vi.

- **Capacity**.—Total usable volume in a reservoir between the point of maximum depletion and the elevation of the lowest crest of the spillway.
- **Conservation releases**.—Controlled releases from reservoirs designed to maintain specified flows in stream channels below the reservoirs.
- **Daily excess-release credits**.—Daily credits and deficits during the seasonal release period (June 15 to the following March 15) are computed as the arithmetic difference between the daily mean discharge of the Delaware River at Montague, New Jersey and 1,750 ft^3/s. The daily credit cannot exceed the 24-hour period releases from Pepacton, Cannonsville, and Neversink Reservoirs routed to Montague and made in accordance with direction, except as follows: during the seasonal period, credits also are applied for part or all of other releases from these reservoirs that contribute to the daily mean discharge at Montague between 1,750 ft^3/s and the applicable excess-release rate.
- **Directed releases**.—Controlled releases from New York City reservoirs in the upper Delaware River Basin, designed by the Delaware River Master to meet the Montague flow objective.
- **Diversions**.—The transfer of water by New York City from Pepacton, Cannonsville, and Neversink Reservoirs in the upper Delaware River Basin through the East Delaware, West Delaware, and Neversink Tunnels, respectively, to the City's water-supply system. Also, the transfer of water by New Jersey from the Delaware River through the Delaware and Raritan Canal.
- **Excess quantity**.—As defined by the Decree, the excess quantity of water is equal to 83 percent of the amount by which the estimated consumption in New York City during the year is less than the City's estimate of continuous safe yield (1,665 Mgal/d stipulated by the 1954 Decree) from all its sources of supply obtainable without pumping, except that the excess quantity shall not exceed 70 billion gallons. Each year, the seasonal period for release of the excess quantity begins on June 15. The flow objective for the period becomes effective at Montague on that date and remains in effect until the following March 15, or until the cumulative total of excess-release credits equals the seasonal quantity, whichever occurs first.
- **Index gaging stations**.—Particular sites on tributaries of the upper Delaware River where systematic observations of gage height and discharge are made. These stations are used mainly during the directed-release season to estimate inflows of surface water to the upper Delaware River.
- **Key gaging stations**.—Particular sites on the East Branch Delaware River, West Branch Delaware River, Neversink River, Delaware and Raritan Canal, and mainstem Delaware River where continuous, systematic observations of gage height and discharge are made. These stations are used on a year-round basis in River Master operations.
- **Point of maximum reservoir depletion**.—Elevation of the top of the highest outlet, sometimes referred to as minimum full-operation level.

- **Rate of flow**.—Mean discharge for a specified 24-hour period, in cubic feet per second or million gallons per day.
- **Rate of flow at Montague**.—Daily mean discharge of the Delaware River at Montague, New Jersey, computed on a calendar-day basis.
- **Reservoir-controlled releases**.—Controlled releases from reservoirs passed through outlet valves in the dams or through turbines in powerplants. These releases do not include spillway overflow at the reservoirs.
- **Storage or contents**.—Usable volume of water in a reservoir. Unless otherwise indicated, volume is computed on the basis of level pool and above the point of maximum depletion.
- **Time of day**.—Time of day is expressed in 24-hour Eastern Standard Time, which during the report year included a 23-hour day on April 7 and a 25-hour day on October 27.
- **Uncontrolled runoff at Montague**.—Runoff from the drainage area above Montague, New Jersey, excluding the drainage area above Pepacton, Cannonsville, Neversink, Wallenpaupack, and Rio Dams, but including spillway overflow at these dams.

Precipitation

Precipitation in the Delaware River Basin above Montague, New Jersey totaled 45.87 in. for the 2002 report year and was 2.73 in. more than the long-term (61-year) average. Monthly precipitation ranged from 32 percent of the long-term average in July 2002 to 188 percent of average in October 2002. Data on monthly precipitation during the report year and long-term average precipitation are presented in table 1[1]. These figures were computed from records collected at 10 geographically distributed stations by the NWS; the New York City Department of Environmental Protection, Bureau of Water Supply; and the River Master.

The seasonal period from December to May typically is when surface-water and ground-water reservoirs fill. During this period in 2001-2002, average precipitation at the 10 stations was 19.84 in., which is 98 percent of the 61-year average. During June to November, average precipitation at the 10 stations was 26.03 in., which is 114 percent of the long-term average. The maximum monthly precipitation was 8.12 in. in October 2002, measured at Pleasant Mount, Pennsylvania; the minimum monthly precipitation was 0.71 in. in July 2002, measured at Neversink, New York (locations shown on figure 1).

Operations

December to May

On December 1, 2001, low storage levels in the New York City reservoirs triggered drought emergency operations in accordance with DRBC Resolution 83-13. The Montague flow objective was reduced from 1,550 ft^3/s to 1,350 ft^3/s, effective December 4, 2001, because the salt front—the 7-day average location of the 250-milligrams-per-liter isochlor in the Delaware Estuary—was at river mile 86. For reference, river mile 0 is located at the mouth of Delaware Bay. The allowable diversions to New York City and New Jersey were 520 Mgal/d and 65 Mgal/d, respectively. The drought emergency was declared by DRBC Resolution No. 2001-32 (Appendix A).

From December 2001 to May 2002, the first half of the report year, total precipitation was 0.44 in. below average. Monthly precipitation ranged from 60 percent of the long-term average in February 2002 to 142 percent in May 2002 (table 1). Runoff in the upper basin was in the normal range during February; above normal during May; and below normal during December, January, March, and April.

[1]All numbered tables in the section "Delaware River Operations" are grouped at the end of this section, beginning on page 23.

On December 1, 2001, when the 2002 report year began, Pepacton Reservoir contained 51.280 Bgal of water in storage above the point of maximum depletion, or 36.6 percent of the 140.190 Bgal storage capacity. Cannonsville Reservoir contained 3.547 Bgal, or 3.7 percent of the 95.706 Bgal storage capacity. Neversink Reservoir contained 11.183 Bgal, or 32.0 percent of the 34.941 Bgal storage capacity. Combined storage in these reservoirs on December 1 was 66.010 Bgal, or 24.4 percent of combined capacity. Daily storage in Pepacton, Cannonsville, and Neversink Reservoirs is shown in tables 3, 4, and 5, respectively, and combined storage during the report year is illustrated in figure 2.

On December 19, 2001, the Parties to the U.S. Supreme Court Decree agreed to establish an emergency fishery protection program during drought. The provisions of the program are given in Appendix B. Hydrologic conditions precluded implementation of this program and the program concluded as planned on June 15, 2002.

On December 26, 2001, the salt front was located at river mile 82 and the Montague flow objective was reduced to 1,100 ft^3/s, effective December 30, 2001.

On April 3, 2002, the Decree Parties agreed to modify the reservoir releases programs as stipulated in DRBC Docket No. D-77-20 CP (Revision No. 4). DRBC Docket No. D-77-20 CP (Revision 5) extended and amended Docket Revision No. 4. The revisions established a temporary habitat bank for maintaining experimental flow targets on the West Branch Delaware River at Hale Eddy, New York and temporarily

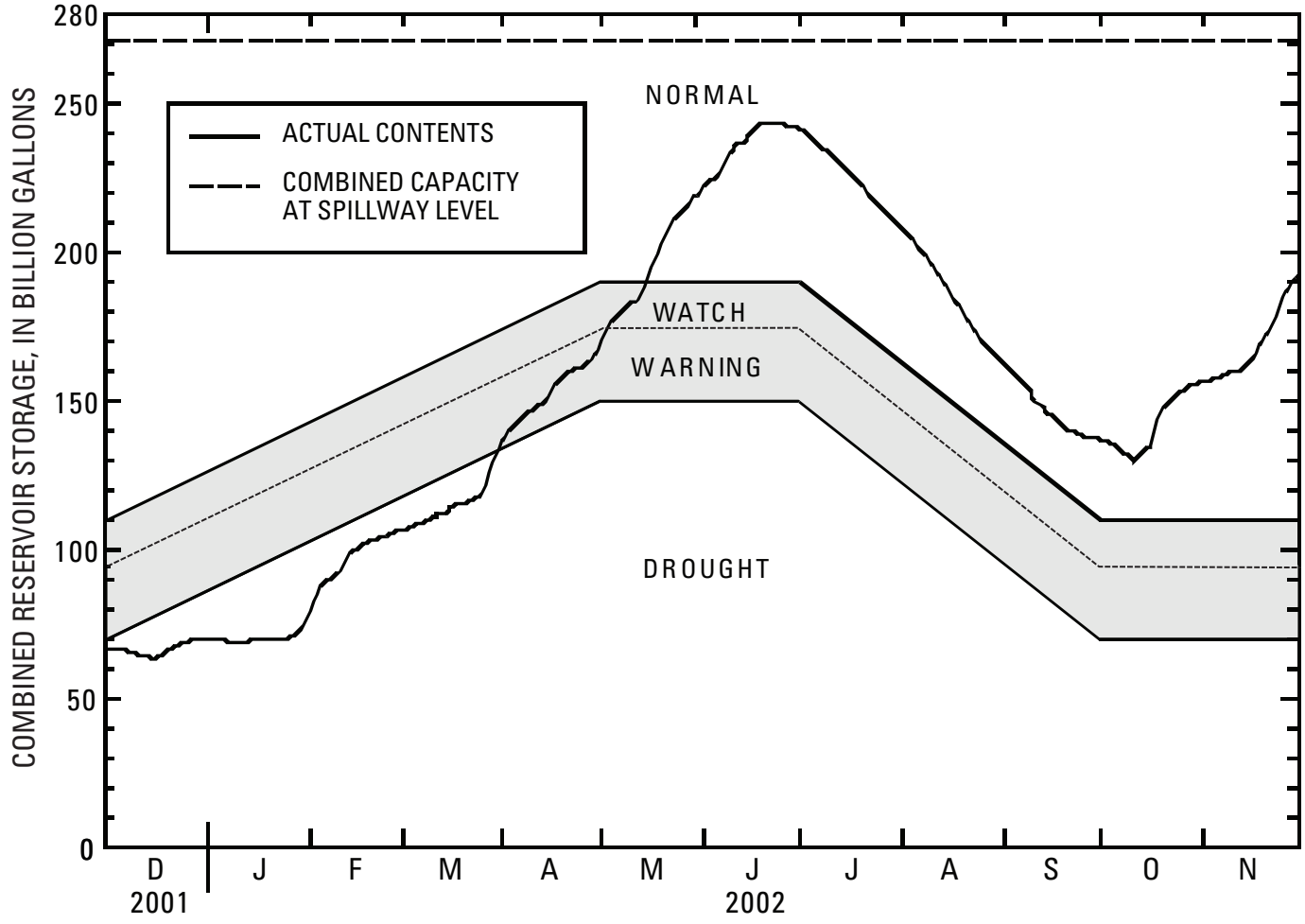

Figure 2. Operation curves and actual contents for New York City reservoirs in the Delaware River Basin, December 1, 2001, to November 30, 2002.

modified the conservation releases from Cannonsville Reservoir. Docket No. D-77-20 CP (Revision 5) is presented in Appendix C.

On May 26, 2002, combined storage in the New York City reservoirs increased to 15 Bgal above the drought watch zone and remained there for 5 consecutive days. As a result, the allowable diversions to New York City and New Jersey reverted to normal, 800 Mgal/d and 100 Mgal/d, respectively. The Montague flow objective increased to 1,750 ft^3/s, effective May 29, 2002.

From December to May, inflow to the City's reservoirs typically exceeds outflow and, consequently, the quantity of water in storage increases. The average inflow to Pepacton, Cannonsville, and Neversink Reservoirs for these 6 months during the 61-year period from December 1940 to May 2001 was 302.5 Bgal. During the corresponding 6 months of the report year, inflow to the three reservoirs totaled 237.1 Bgal. Evaporation loss is not included in the computations.

Combined storage fluctuated only slightly in December 2001 and January 2002 and remained at low levels. Precipitation in winter and spring mostly was near normal and temperatures moderated from late January into February. Combined storage increased steadily from February to May. The combined storage of the reservoirs was about 81 percent of capacity on May 31.

Combined storage in the three New York City reservoirs was 66.406 Bgal on November 30, 2001 and 219.982 Bgal on May 31, 2002, a net increase of 153.576 Bgal or 56.7 percent of capacity. The maximum combined storage from December to May was 219.982 Bgal on May 31. Typically, maximum storage in the individual reservoirs occurs on different days but, in 2002, storage in all the reservoirs was still increasing at the end of May. Maximum storage in Pepacton Reservoir during the December to May period was 109.218 Bgal on May 31; maximum storage in Cannonsville Reservoir was 83.244 Bgal on May 31; and maximum storage in Neversink Reservoir was 27.520 Bgal on May 31, 2002. None of these reservoirs spilled during the December to May period.

During the December to May period, diversions to Rondout Reservoir by New York City totaled 76.485 Bgal (420 Mgal/d). The forecasted discharge at Montague, exclusive of water released from the City reservoirs, was less than the flow objective on 10 days in December, and releases were directed. The observed daily mean discharge at Montague was less than the applicable flow objective on 13 days, but all observed flows were within 15 percent of the flow objective.

Applicable design rates for the gaging station Delaware River at Montague, New Jersey are presented in table 6.

June to November

Monthly precipitation from June to November was above average in June, September, October, and November and below average in July and August. Total precipitation during the period was 26.03 in. or 3.17 in. more than the 61-year average (table 1).

Releases were directed to meet the Montague flow objective on 91 days between June 1 and November 30, 2002, when the forecasted discharge at Montague, exclusive of water released from the New York City reservoirs, was less than the flow objective. Releases at experimental conservation rates or at rates designed to protect the fishery and aquatic habitat were made at other times during the period.

From June 1 to June 14, the Montague flow objective was 1,750 ft^3/s. The forecasted flow, exclusive of releases from Pepacton, Cannonsville, and Neversink Reservoirs, did not fall below the flow objective and no releases were directed.

The New York City Department of Environmental Protection, Bureau of Water Supply, Quality, and Protection furnished the River Master with the following data for the 2002 calendar year, as stipulated by the Decree:

1. The estimated continuous safe yield from all the City's sources, obtainable without pumping, is 1,665 Mgal/d, or a total during calendar year 2002 of 1.665 Bgal/d x 365 days = 607.725 Bgal.
2. The estimated consumption that the City must provide for, from all its sources of supply during calendar year 2002, is 591.582 + 7.250 = 598.832 Bgal.

On the basis of the Decree and the aforementioned data, the aggregate quantity of excess-release water was 83 percent of (607.725 - 598.832), or 7.381 Bgal.

Data on water consumption by the City of New York for each calendar year since 1950, from all sources of supply, are presented in table 7.

As part of the reservoir release programs described in DRBC Docket No. D-77-20 CP (Revision No. 5), about 50 percent of the annual excess-release quantity was placed in a fishery protection bank to augment releases during drought warning. The remainder of the excess-release quantity could be used to provide an increase in the Montague flow objective or could be banked in accordance with the procedures outlined in the DRBC's Lower Basin Drought Management Plan.

On June 10, 2002, the Decree Parties unanimously agreed to suspend release of one-half of the excess-release quantity for the 2002-2003 seasonal period on the basis of hydrologic conditions and below-normal storage levels in the New York City reservoirs. The agreement to suspend release of this portion of the excess-release quantity is given in Appendix D.

On June 15, 2002, the beginning of the seasonal excess-release period, the Montague flow objective remained at 1,750 ft^3/s. Storage in the New York City reservoirs declined steadily from late June to mid-October, when runoff from heavy rain caused storage to increase. Storage continued to increase steadily through the end of the report year.

On July 17, 2002, DRBC Docket No. D-77-20 CP (Revision 5) was amended to account for modifications in the authorized uses of the Habitat Bank. The amended Docket is given in Appendix E.

On November 25, 2002, the drought emergency was terminated by DRBC Resolution No. 2002-31. The Resolution is presented in Appendix F.

Between June 15 and November 30, 2002, the forecasted flow at Montague, exclusive of releases from the New York City reservoirs, was less than the flow objective on 91 days and releases were directed. On 43 days during the June 15 to November 30 period, the observed flow was less than the flow objective. On 34 of these 43 days, observed flows were within 10 percent of the flow objective. Applicable design rates for the gaging station Delaware River at Montague, New Jersey are presented in table 6.

The total discharge measured at Montague, the portion derived from uncontrolled runoff from the drainage area below the reservoirs, the portion contributed by power reservoirs, and the portion contributed by Pepacton, Cannonsville, and Neversink Reservoirs from July to October are shown in figure 3. In developing the water budget for Montague, uncontrolled runoff was computed as the residual of observed flow minus releases and spills from all reservoirs, and, therefore, was subject to errors in observations, transit times, and routing of the various components of flow. The conservation release from Rio Reservoir is included in the uncontrolled runoff component. The net effect of these uncertainties is incorporated in the derived hydrograph of uncontrolled runoff. Diversions to Rondout Reservoir from June 1 to November 30, 2002, totaled 107.840 Bgal.

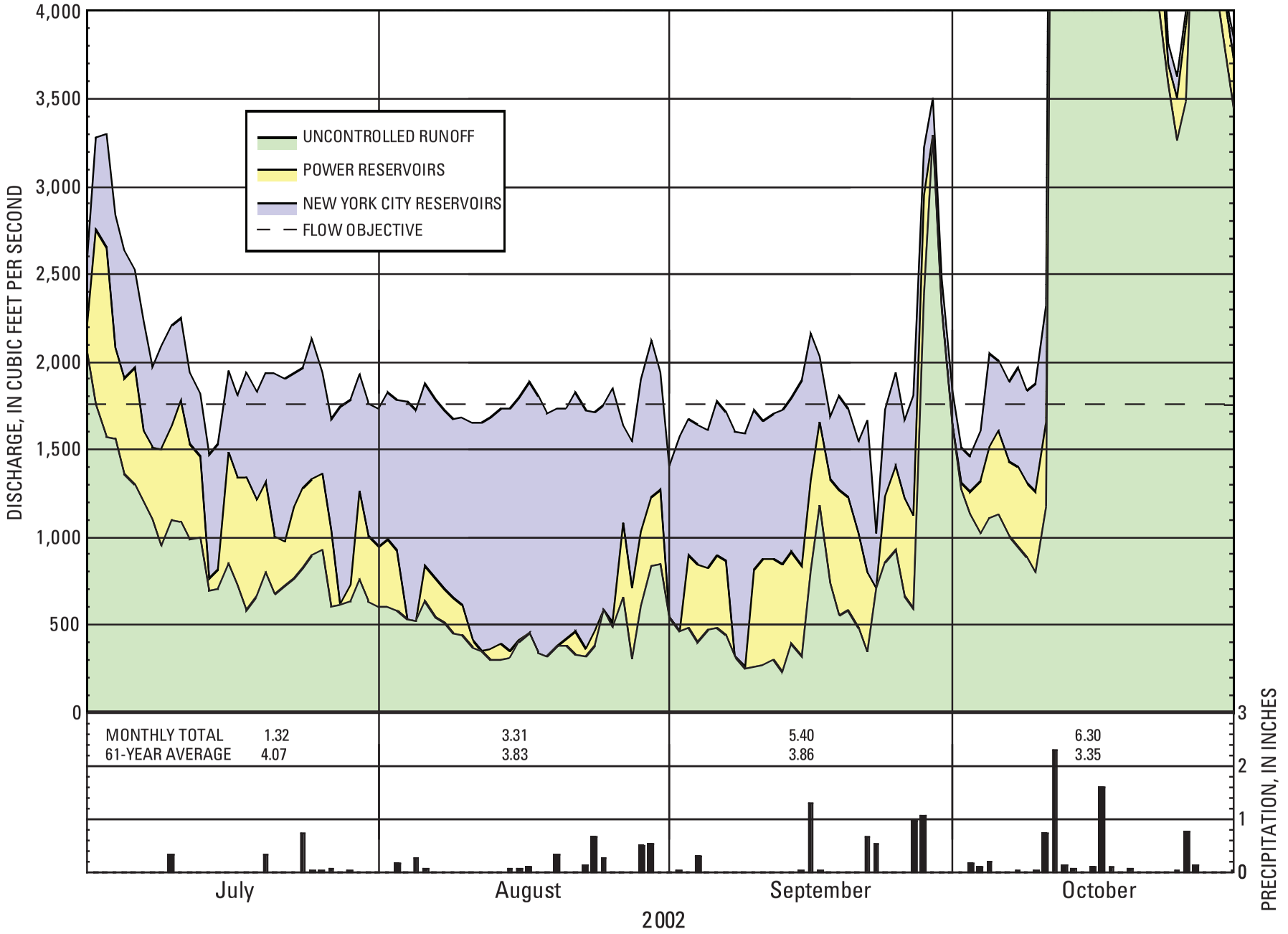

Figure 3. Components of flow, Delaware River at Montague, New Jersey, July 1 to October 31, 2002.

Summary of Operations

From December 1, 2001, to November 30, 2002, diversions from the three New York City reservoirs in the upper Delaware River Basin to Rondout Reservoir totaled 184.325 Bgal, and all releases from the three reservoirs to the Delaware River totaled 65.892 Bgal. River Master directed releases to the Delaware River from these reservoirs totaled 48.869 Bgal.

During the year, maximum storage in Pepacton Reservoir was 123.756 Bgal on June 30; 89.408 Bgal in Cannonsville Reservoir on June 19; and 31.266 Bgal in Neversink Reservoir on June 24. Maximum combined storage in the three reservoirs was 243.584 Bgal on June 24, 2002. None of the reservoirs spilled during the year.

During the year, minimum storage in Pepacton Reservoir was 45.579 Bgal (32.5 percent of capacity) on January 24, 2002; 3.547 Bgal (3.7 percent of capacity) in Cannonsville Reservoir on December 1, 2001; and 11.183 Bgal (32.0 percent of capacity) in Neversink Reservoir on December 1, 2001. Minimum combined storage in the three reservoirs was 63.348 Bgal (23.4 percent of combined capacity) on December 15, 2001.

On November 30, 2002, the end of the report year, combined storage in the three reservoirs was 192.441 Bgal or 71.1 percent of combined capacity. During the year, the net change in combined storage was +126.035 Bgal, or an increase equivalent to 46.5 percent of combined capacity.

The distribution of combined storage for the three reservoirs on the first day of the month, for the reference period June 1967 to November 2001, and for the report year, is shown in figure 4. Storage was below the median from December to October and above the median in November. Storage was below the 25th

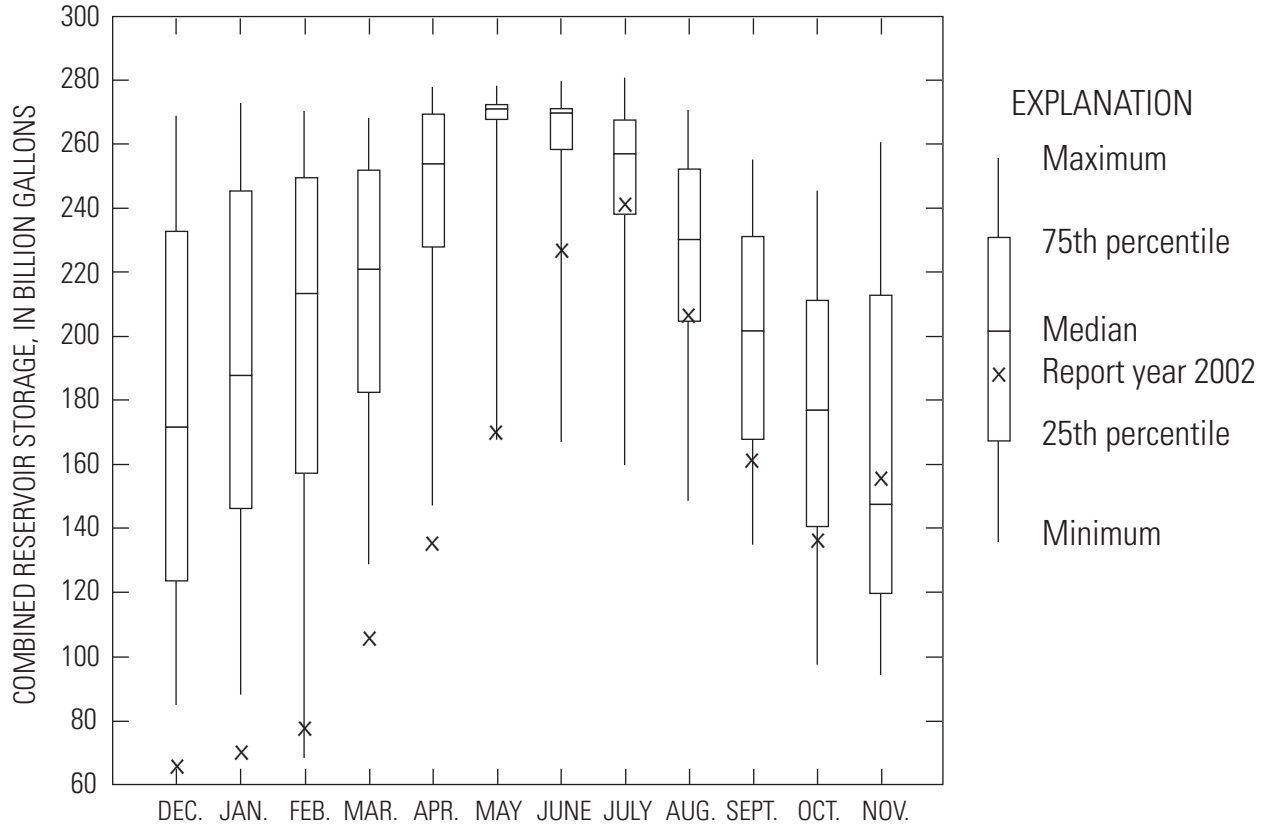

Figure 4. Combined storage in Pepacton, Cannonsville, and Neversink Reservoirs on the first day of the month, December 2001 to November 2002 (this report year), and summary statistics for the reference period, June 1967 to November 2001.

percentile in all months except July, August, and November. Record lows for the first day of the month were set in December, January, March, and April.

Supplemental Releases From Wallenpaupack Powerplant

An agreement between the PPL Corporation and New York City provides for supplemental releases from the Wallenpaupack hydroelectric powerplant if the DRBC requests compensation for water consumed at PPL's Martins Creek steam-electric generating station. Releases may be requested if the flow of the Delaware River at Trenton, New Jersey, is expected to be less than 3,000 ft^3/s for more than 3 consecutive days. No supplemental releases were requested during the report year.

Streamflow

Components of Flow, Delaware River at Montague, New Jersey

The data and computations of the various components of flow form the basic operational records used by the River Master to carry out specific responsibilities related to the Montague formula. The operational record has two parts: forecasted flow at Montague, exclusive of controlled releases from New York City's reservoirs (table 8), and segregation of components of daily mean flow at Montague (table 9).

The following components may be present in the flow of the Delaware River at Montague:

1. Controlled releases from Lake Wallenpaupack on Wallenpaupack Creek, for the production of hydroelectric power.
2. Controlled releases from Rio Reservoir on Mongaup River, for the production of hydroelectric power.
3. Runoff from the uncontrolled area above Montague, including spills from New York City reservoirs, Lake Wallenpaupack, and Rio Reservoir.
4. Controlled releases from Pepacton, Cannonsville, and Neversink Reservoirs of New York City.

The releases from New York City's reservoirs necessary to maintain the Montague objective were computed on the basis of the forecasted flow at Montague, exclusive of controlled releases from the reservoirs.

Time of Travel

Following are average times for the effective travel of water from the various sources of controlled supply to Montague. These times were used for flow routing during the 2002 report year.

Source	Hours
Pepacton Reservoir	60
Cannonsville Reservoir	48
Neversink Reservoir	33
Lake Wallenpaupack	16
Rio Reservoir	8

The travel times were computed from reservoir and powerplant operations data and historical streamflow records. The travel times generally are suitable for use in the operations of the River Master. Occasionally, however, significant exceptions are observed. For example, when a large release from Cannonsville Reservoir follows a small release, a substantial portion of the water fills the channel en route, and the

remainder may arrive at Montague, New Jersey as much as 18 hours later. During winter, the formation of ice cover, together with lower streamflow, gradually increases the resistance to flow, resulting in increased travel times. Because ice-affected travel times increase gradually over several days, and releases were not directed to meet the Montague objective during periods of ice cover, no adjustments were made to compensate for increased travel times during these periods of the report year.

Segregation of Flow At Montague

The River Master daily operations record of reservoir releases and segregation of the various components contributing to the flow of the Delaware River at Montague, New Jersey are presented in table 9. The data are arranged to conform to the downstream movement of water from the various sources to Montague. Summation of data along individual rows in the table is equivalent to routing the various flow contributions to Montague, using the aforementioned average travel times. Uncontrolled runoff was computed as a residual by subtracting the flow contributions of all other sources from the observed discharge at Montague.

Computation of Directed Releases

During the report year, the River Master used the following information for daily operations: (1) discharges computed from recorded or reported stream gage heights, for various 24-hour periods, absent real-time information on any changes in stage-discharge relations; (2) daily discharge from New York City's three reservoirs, measured with venturi meters; (3) precipitation reports for the previous 24 hours; (4) actual powerplant releases converted to daily discharges; (5) advance estimates of power demand converted to daily discharge; (6) advance estimates of uncontrolled runoff at Montague; and (7) average travel times for routing water from various sources. Although uncertainty is inherent in forecasts of future conditions, these data by necessity are used in the daily design and direction of reservoir releases.

The 60-hour travel time of water from Pepacton Reservoir to Montague is greater than the travel time of water from any other reservoir in the upper Delaware River Basin. Releases from Cannonsville and Neversink Reservoirs were timed to arrive at Montague concurrently with releases from Pepacton Reservoir. To allow for differences in travel times, daily directed releases were scheduled to begin from Pepacton Reservoir at 1200 hours, from Cannonsville Reservoir at 2400 hours, and from Neversink Reservoir at 1500 hours the following day.

Releases from the City's reservoirs required to maintain the specified flow at Montague were computed from forecasts of releases from Lake Wallenpaupack and Rio Reservoir and estimates of uncontrolled runoff at Montague. To account for the travel times from these sources to Montague, the computation requires that estimates of the following components of flow be made two or more days in advance: (1) release of water from Lake Wallenpaupack; (2) release of water from Rio Reservoir; and (3) uncontrolled runoff at Montague. The River Master operations record for computing daily directed release requirements during periods of low flow is given in table 8.

The electric utilities furnished forecasts of power generation and releases. Because the hydroelectric plants were used chiefly for meeting peak-power demands, the forecasts were subject to various modifying factors including the vagaries of weather on electricity demand. In addition, because the power companies are members of regional power pools, demand for power outside of the local service area may unexpectedly affect generation schedules. Consequently, at times, the actual use of water for power generation differed considerably from the forecasts used in the design of reservoir releases.

For computational purposes during periods of low flow, estimates of uncontrolled runoff at Montague were treated as two components: (1) current runoff and (2) forecasted increase in runoff from precipitation. Estimates of these components are given in table 8.

During ice-free conditions, current runoff was computed using a routing and recession procedure based on discharges at 0800 hours at the following USGS gaging stations:

Station Name	Drainage Area (mi^2)
Beaver Kill at Cooks Falls, New York	241
Cadosia Creek at Cadosia, New York	17.9
Oquaga Creek at Deposit, New York	67.6
Equinunk Creek at Equinunk, Pennsylvania	56.3
Callicoon Creek at Callicoon, New York	110
Tenmile River at Tusten, New York	45.6
Lackawaxen River at Hawley, Pennsylvania	290
Shohola Creek near Shohola, Pennsylvania	83.6
Neversink River at Port Jervis, New York	336

During the winter period, the advance estimate of uncontrolled runoff (current conditions) was made on the basis of flows at a reduced network of gaging stations and the recession curve for computed uncontrolled flow at Montague.

The forecasted runoff from precipitation is shown in table 8 under the heading "Weather Adjustment." Throughout the year, the NWS office in Binghamton, New York, furnished quantitative forecasts of average precipitation and air temperatures, for the drainage basin above Montague, New Jersey. During winter, runoff was estimated on the basis of the current status of snow and ice, along with forecasted precipitation and temperature. During other periods, forecasted precipitation was used to estimate runoff.

The forecasted flow at Montague, exclusive of releases from New York City's reservoirs (table 8), is computed as the sum of forecasted releases from power reservoirs, estimated uncontrolled runoff including conservation releases from Rio Reservoir, and weather adjustments. If the computed total flow was less than the flow objective at Montague, then the deficiency was made up by River Master directed releases from the City's reservoirs.

When forecasts of precipitation or powerplant releases were revised appreciably after a release was directed, the release required from the reservoirs was recomputed. Commonly, this procedure resulted in a reduced release requirement for New York City reservoirs for that day and, consequently, water was conserved. Only final figures for releases from New York City reservoirs are given in table 8.

Analysis of Forecasts

Forecasts of streamflow at Montague, developed on the basis of anticipated contributions from the components described previously (excluding releases from New York City's reservoirs), differed on most days from observed flow. Occasionally, variations in the components were partially compensating and observed flows were in good agreement with forecasted flows.

The forecasted flow of the Delaware River at Montague, exclusive of releases from New York City reservoirs, was less than the flow objective on most days from July 7 to October 13, 2002. The following tabulation compares estimates of three components of flow at Montague with actual operations during this period.

Releases and Runoff	Forecasted flow [(ft^3/s)-d]	Actual flow [(ft^3/s)-d]
Power releases		
Lake Wallenpaupack	29,282	29,141
Rio Reservoir	1,801	2,067
Runoff from uncontrolled area	74,773	88,110

From July 7 to October 13, actual releases from Lake Wallenpaupack averaged 0.5 percent less than forecasted releases, and actual releases from Rio Reservoir averaged 15 percent more than forecasted releases. Observed runoff from the uncontrolled area was about 18 percent more than forecasted runoff, but most of this difference resulted from underpredicted excessive rainfall in early October.

On any given day, the forecasted releases and actual releases can differ considerably. The ranges of actual daily releases from July 7 to October 13, 2002, are as follows: daily releases at Lake Wallenpaupack differed by 159 ft^3/s less to 186 ft^3/s more than forecasted releases, and daily releases at Rio Reservoir differed by 71 ft^3/s less to 124 ft^3/s more than forecasted releases. On the basis of observed flows at Montague, total directed releases from New York City's reservoirs during the report year were 0.7 percent less than that required for exact forecasting.

Comparison of hydrographs of forecasted daily runoff and observed daily runoff from the uncontrolled area (fig. 5) indicates that the forecasts generally were suitable for use in designing releases from New York City's reservoirs. Numerical adjustments to the designs were made when needed to compensate for errors in the forecasts, but, because of travel times, the effects of the adjustments on flows at Montague are not evident until several days after the design date.

Analysis of the quantitative precipitation forecasts shows that the total precipitation amount forecasted for the 3-day design periods is reasonably accurate, but often the actual timing of storms may be earlier or later than forecasted. The accuracy of the runoff forecasts is affected greatly by the timing of precipitation events. In addition, if the actual storm track differs from the forecasted track, the amount and timing of runoff can be substantially different than predicted.

Diversions to New York City Water Supply

The 1954 Amended Decree authorizes New York City to divert water from the Delaware River Basin at a rate not to exceed the equivalent of 800 Mgal/d. The Decree specifies that the diversion rate shall be computed as the aggregate total diversion beginning June 1 of each year divided by the number of days elapsed since the preceding May 31.

Diversions during the report year from Pepacton, Cannonsville, and Neversink Reservoirs to the New York City water-supply system (Rondout Reservoir) are given in table 10. Included is a running account of the average rates of combined diversions from the three reservoirs, computed as prescribed by the Decree

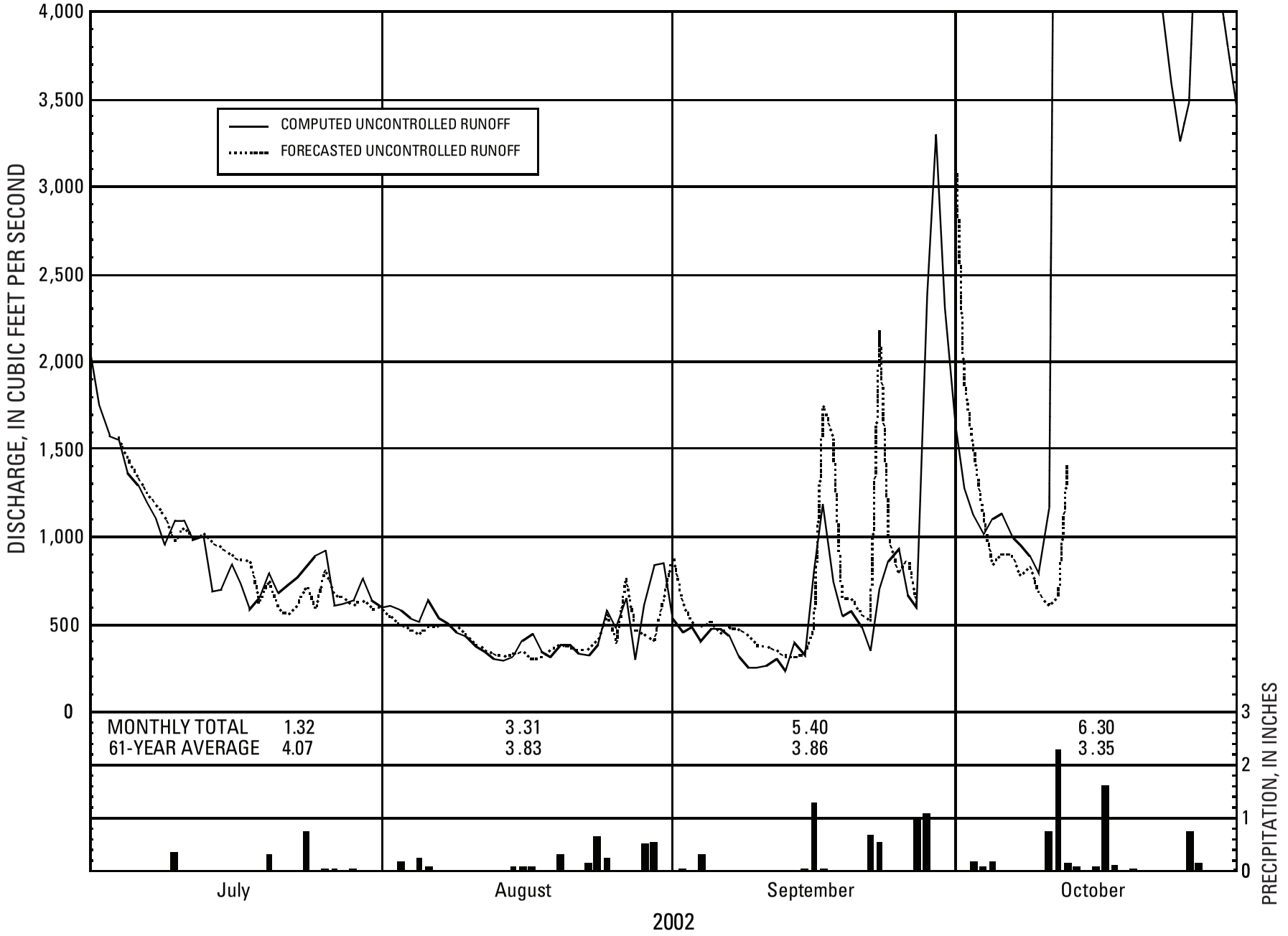

Figure 5. Uncontrolled runoff component, Delaware River at Montague, New Jersey, July 1 to October 31, 2002.

or the "Interstate Water Management Recommendations of the Parties to the Decree (DRBC Resolution 83-13)." The following tabulation shows allowable maximum diversion rates and average actual diversions for various periods during the report year.

Effective dates	Allowable diversion (Mgal/d)	Average actual diversion (Mgal/d)
December 1, 2001, to May 25, 2002	520	421
May 26 to May 31, 2002	800	390
June 1 to November 30, 2002	800	589

During the year, a total of 184.325 Bgal of water was diverted to the New York City water-supply system. The allowable diversion was 242.720 Bgal.

Storage in New York City Reservoirs

The following tabulation summarizes the "point of maximum depletion" and other pertinent levels and contents of Pepacton, Cannonsville, and Neversink Reservoirs. This information was provided by the New York City Board of Water Supply.

Level	Pepacton Reservoir		Cannonsville Reservoir		Neversink Reservoir	
	Elevation (ft)	Contents (Bgal)	Elevation (ft)	Contents (Bgal)	Elevation (ft)	Contents (Bgal)
Full pool or spillway crest	1,280.00	*140.190	1,150.00	*95.706	1,440.00	*34.941
Point of maximum depletion	1,152.00	*3.511	1,040.00	*1.020	1,319.00	*0.525
Sill of diversion tunnel	1,143.00	*4.200	+1,035.00	*1.564	1,314.00	
Sill of river outlet tunnel	1,126.50		1,020.50		1,314.00	
Dead storage		1.800		0.328		1.680

*Contents shown are quantities stored between listed elevations.

+Elevation of mouth of inlet channel of diversion works.

Storage in Pepacton, Cannonsville, and Neversink Reservoirs, above the "point of maximum depletion," or minimum full-operating level, is given in tables 3, 4, and 5.

On December 1, 2001, combined storage in the three reservoirs was 66.010 Bgal, or 24.4 percent of combined capacity. As discussed previously, storage increased moderately during winter and spring, reaching nearly 90 percent of capacity in late June. None of the three reservoirs spilled during the year. Combined storage of 243.584 Bgal was the maximum for the year on June 24, 2002. The seasonal decline in storage began in late June, later than usual. Combined storage declined to 192.441 Bgal, or 71.1 percent of combined capacity, on November 30, 2002.

Comparison of River Master Operations Data With Other Streamflow Records

River Master operations are conducted on a day-to-day basis and, by necessity, use preliminary data on streamflow. In this section, records used in River Master operations are compared to final data published for selected USGS gaging stations. Data on releases were reported in million gallons per day and converted to cubic feet per second for use in the comparisons.

Releases from New York City Reservoirs

River Master operations data on controlled releases from Pepacton, Cannonsville, and Neversink Reservoirs to the Delaware River were furnished by New York City. These data were obtained from calibrated instruments connected to venturi meters installed in the outlet conduits of the reservoirs.

The USGS gaging station on East Branch Delaware River at Downsville, New York, is 0.5 mile downstream from Downsville Dam (fig. 1). Discharge measured at this station includes releases from Pepacton Reservoir and a small amount of seepage and any runoff that enters the channel between the dam and the gaging station. The drainage area is 371 mi^2 at the dam and 372 mi^2 at the gaging station.

The following tabulation compares releases from Pepacton Reservoir (table 9), reported by New York City, to the final records for the USGS gaging station on East Branch Delaware River at Downsville, New York (table 11), for the flow objectives shown.

Flow objective (ft^3/s)	6	19	45	70	95
New York City-measured flow (ft^3/s)	6.3	18.6	46.0	69	94.4
USGS-measured flow (ft^3/s)	6.8	20.4	42.9	63.3	86.5
Percent difference*	-7.4	-8.8	+7.2	+10.0	+9.1

*Computed as $\frac{\text{(New York City-measured flow minus USGS-measured flow)}}{\text{(USGS-measured flow)}} \times 100$

The differences at all flow rates are less than or equal to 10 percent. During the report year, the River Master's office made four discharge measurements immediately below Downsville Dam. Three measurements yielded differences similar to those in the tabulation at the 6 and 19 ft^3/s flow objectives. One measurement at the 70 ft^3/s flow objective showed a difference between the flow objective and measured flow of less than 2 percent, which is significantly less than the difference shown in the tabulation. The calibration of instruments connected to the venturi meters was adjusted periodically by New York City to improve the accuracy of the recorded data.

The USGS gaging station on West Branch Delaware River at Stilesville, New York, is 1.4 miles downstream from Cannonsville Dam (fig. 1). Discharge measured at this station includes releases from Cannonsville Reservoir and runoff from 2 mi^2 of drainage area between the dam and the gaging station. The drainage area is 454 mi^2 at the dam and 456 mi^2 at the gaging station.

The following tabulation compares releases from Cannonsville Reservoir (table 9), reported by New York City, to the final records for the USGS gaging station on West Branch Delaware River at Stilesville, New York (table 12), for the flow objectives shown.

Flow objective (ft^3/s)	8	23	45	200-800	800-1300
New York City-measured flow (ft^3/s)	8.0	25.3	46.8	388	1,064
USGS-measured flow (ft^3/s)	11.0	33.1	53.1	414	1,142
Percent difference*	-27.3	-23.6	-11.9	-6.3	-6.8

*Computed as $\frac{\text{(New York City-measured flow minus USGS-measured flow)}}{\text{(USGS-measured flow)}} \times 100$

The gaging-station records are considered fair at flows greater than 100 ft^3/s and poor at flows less than 100 ft^3/s. The records include runoff from precipitation on the area between the dam and the gaging station and seepage near the base of the dam. On January 21, 1998, the seepage was measured at 3.9 ft^3/s, which was greater than rates estimated in prior years. The differences in flow between reservoir-release records and USGS gaging-station records continue to be monitored by the River Master's office, in cooperation with New York City and the USGS Water Science Center in Troy, New York. To further investigate the differences, three discharge measurements were made during the report year, just below the Cannons-

ville release outlet. By measuring flow at this location, most of the runoff contribution from the drainage area between the outlet and the gaging station is eliminated, although seepage near the base of the dam is included. The first measurement differed from New York City release records by +3.6 percent (unadjusted) for the 8 ft^3/s flow objective and no seepage was apparent at the time of the measurement. The second measurement differed from the release records by -7.1 percent (unadjusted) and +7.9 percent (adjusted) for the 23 ft^3/s flow objective. The third measurement differed from the release records by -12.7 percent (unadjusted) and -5.4 percent (adjusted) for the 45 ft^3/s flow objective.

The USGS gaging station on Neversink River at Neversink, New York, is 1,650 feet downstream from Neversink Dam (fig. 1). Discharge measured at this station includes releases from Neversink Reservoir and, during storms, a small amount of runoff that originates between the dam and the gaging station. The drainage area is 92.5 mi^2 at the dam and 92.6 mi^2 at the gaging station.

The following tabulation compares releases from Neversink Reservoir (table 9), reported by New York City, to the final records for the USGS gaging station on Neversink River at Neversink, New York (table 13), for the flow objectives shown.

Flow objective (ft^3/s)	5	15	25	53	90
New York City-measured flow (ft^3/s)	4.6	15.5	24.8	52.5	89.7
USGS-measured flow (ft^3/s)	5.0	14.8	25.6	60.6	95.4
Percent difference*	-8.0	+4.7	-3.1	-13.4	-6.0

*Computed as $\frac{\text{(New York City-measured flow minus USGS-measured flow)}}{\text{(USGS-measured flow)}} \times 100$

From October 1-23, 2002, USGS-measured flows were about two times greater than the New York City-measured flows of 25 ft^3/s. These differences may have resulted from electric power-supply problems that potentially affected the accuracy of the New York City flow-measuring instruments.

The River Master's office made three discharge measurements during the year to further investigate the differences between reservoir-release records and USGS gaging-station records. These measurements yielded differences within 6 percent of those in the tabulation at flows of 5, 15, and 25 ft^3/s.

Releases from Lake Wallenpaupack

Records of daily discharge through the Wallenpaupack powerplant were furnished by the PPL Corporation and published by the USGS as Wallenpaupack Creek at Wilsonville, Pennsylvania (table 14). These discharges represent the flow through the turbines of the powerplant and were computed on a midnight-to-midnight basis. For River Master operations, flows were computed on a 24-hour basis beginning at 0800 hours to compensate for the 16-hour travel time to Montague, New Jersey (table 9).

From December 2001 to November 2002, the River Master's record agrees with the published USGS record except for some very small differences that result mainly from differences in time frame and rounding of computations. Overall, the records agree to within 0.2 percent for the year.

Delaware River at Montague, New Jersey

The River Master's operations record for the Delaware River at Montague, New Jersey (table 9), showed 0.1 percent more discharge for the report year than the published USGS record for the gaging station (table 15). Daily values for the two records were in good agreement.

Diversion Tunnels

Records of diversions through the East Delaware, West Delaware, and Neversink Tunnels (fig. 1) were furnished by the City of New York. These records were obtained from the City's calibrated instruments connected to venturi meters installed in the tunnel conduits. The measured flows were transmitted electronically, on a 15-second interval, to the New York City Department of Environmental Protection computer at the Rondout Effluent Chamber. On 5-minute intervals, release and diversion quantities for the preceding 5-minute period were computed using the instantaneous rate-of-flow data from each instrument. These 5-minute quantities were then summed to compute daily total flows, which were reported to the River Master's office on a daily basis. On a weekly basis, the diversion figures were checked against the flow meter totalizer readings and corrected when necessary. Periodic current-meter measurements were made by the River Master's office to verify the reported diversions. The measurements were made in the outlet channels below the tunnels.

The East Delaware Tunnel is used to divert water from Pepacton Reservoir to Rondout Reservoir. Conditions in the outlet channel of the East Delaware Tunnel were unfavorable for flow measurements during the report year because of high water levels in Rondout Reservoir. Comparison of diversion data provided by New York City with gage height record for the outlet channel of the East Delaware Tunnel did not indicate any large discrepancies in diversions reported by the City.

The generating plant at the downstream end of the East Delaware Tunnel operated most days of the report year. When the powerplant was not in operation, some water leaked through the wicket gates and was not recorded on the totalizer. A current-meter measurement made in 1989 shows that the (assumed constant) rate of leakage is about 8.0 Mgal/d. Because the powerplant was not in operation for the equivalent of 172 days during the 2002 report year, the unmeasured leakage totaled about 1.4 Bgal. The record of diversions through the East Delaware Tunnel is considered essentially correct.

The West Delaware Tunnel is used to divert water from Cannonsville Reservoir to Rondout Reservoir. Inspections of the channel below the outlet, when valves were closed, revealed only negligible leakage.

A hydroelectric powerplant uses water diverted through the West Delaware Tunnel, but the plant operates only when diversions are less than 300 Mgal/d. When the powerplant is not operating, the valves on the pipelines to the plant are closed, and there is no leakage through the system. The results of the measurements and inspections made during the report year and previous years indicate that the reported record of diversions through the West Delaware Tunnel is considered essentially correct.

The Neversink Tunnel is used to divert water from Neversink Reservoir to Rondout Reservoir. The record of diversions through the Neversink Tunnel is considered essentially correct.

A hydroelectric plant uses water diverted through the Neversink Tunnel. When the powerplant is not operating and the main valve on the diversion tunnel is open, leakage develops that is not recorded on the venturi instruments. One current-meter measurement made in 1999 showed a leakage rate of 16.2 ft^3/s (10.5 Mgal/d). When the powerplant is operating, the leakage is included in the recorded flow. No leakage occurs when the main valve on the tunnel is closed.

During the 2002 report year, the powerplant operated part of the day on most days and was not operated the equivalent of 283 days. Using the leakage rate noted above and records of power-plant operation, nearly 3.0 Bgal of water was diverted but not recorded.

Diversions by New Jersey

The Amended Decree authorizes New Jersey to divert water from the Delaware River or its tributaries in New Jersey, to areas outside the Delaware River Basin, without compensating releases. These diversions may not exceed 100 Mgal/d as a monthly average, and the daily mean diversion may not exceed 120 Mgal/d. The USGS gaging station on Delaware and Raritan Canal at Port Mercer, New Jersey (fig. 1), is used as the official control point for measuring diversions by New Jersey (table 16).

The following tabulation gives the allowable diversion by New Jersey, the period it was in effect, and the maximum monthly diversion during the report year:

Effective dates	Allowable monthly average diversion (Mgal/d)	Maximum monthly average diversion (Mgal/d)	Month of maximum average diversion
Dec. 1, 2001, to May 25, 2002	65	63.3	February
May 26, 2002, to Nov. 30, 2002	100	95.0	July

The maximum daily mean diversion was 100 Mgal on July 22, August 19, and October 3, 2002. Diversions by New Jersey were within the limits prescribed by the Decree or the reduced limits of the "Interstate Water Management Recommendations of the Parties to the Decree."

Conformance of Operations Under Amended Decree of The U.S. Supreme Court Entered June 7, 1954

From December 1, 2001, to May 25, 2002, operations of the Delaware River Master were conducted as prescribed by the "Interstate Water Management Recommendations of the Parties to the Decree" (DRBC Resolution 83-13 and Extension of DRBC Docket No. D-77-20 CP (Revision No. 4), which were designed to alleviate impending or actual drought conditions in the basin. From May 26, 2002, to November 30, 2002, operations of the Delaware River Master were conducted as stipulated by the Decree.

Diversions from the Delaware River Basin to the New York City water-supply system were less than those authorized by the Decree and the "Interstate Water Management Recommendations of the Parties to the Decree." Under compensating releases of the Montague Formula, New York City released water from its reservoirs at rates designed by the River Master to maintain the applicable flow objectives at Montague, New Jersey. During the report year, New York City complied fully with the directives of the River Master.

Diversions from the Delaware River Basin by New Jersey were within limits prescribed by the Decree and the "Interstate Water Management Recommendations of the Parties to the Decree." New Jersey complied fully with all requests made by the River Master.

Table 1. Precipitation in the Delaware River Basin above Montague, New Jersey

[All values, except percentages, in inches]

Month	December 1940 to November 2001 Monthly Average	December 2001 to November 2002			
		Amount	Percent of average	Excess (+) or deficit (-)	
				Month	Cumulative
December	3.36	2.80	83	-.56	-.56
January	3.00	2.03	68	-.97	-1.53
February	2.65	1.59	60	-1.06	-2.59
March	3.35	3.59	107	+.24	-2.35
April	3.73	3.89	104	+.16	-2.19
May	4.19	5.94	142	+1.75	-.44
June	3.96	5.74	145	+1.78	+1.34
July	4.07	1.32	32	-2.75	-1.41
August	3.83	3.31	86	-.52	-1.93
September	3.86	5.40	140	+1.54	-.39
October	3.35	6.30	188	+2.95	+2.56
November	3.79	3.96	104	+.17	+2.73
12 months	43.14	45.87	106		

Table 2. Conservation release rates for New York City reservoirs in the Delaware River Basin

[All values in cubic feet per second]

Reservoir	Effective dates	Conservation release rates		
		Basic	Augmented	Experimental
Pepacton	December 1 to March 31	6	50	45
	April 1-7	6	70	45
	April 8-30	19	70	45
	May 1-31	19	70	70
	June 1 to August 31	19	70	95
	September 1-30	19	70	70
	October 1-31	19	70	45
	November 1-30	6	50	45
Cannonsville	December 1 to March 31	8	33	45
	April 1-15	8	45	45
	April 16 to May 31	23	45	45
	June 1-14	23	45	160
	June 15 to August 15	23	325	160
	August 16 to September 15	23	45	160
	September 16 to October 31	23	45	45
	November 1-30	23	33	45
Neversink	December 1 to March 31	5	25	25
	April 1-7	5	45	25
	April 8-30	15	45	25
	May 1 to September 30	15	45	53
	October 1-31	15	45	25
	November 1-30	5	25	25

Table 3. Storage in Pepacton Reservoir, New York, for year ending November 30, 2002

[Storage in millions of gallons above elevation 1,152.00 ft. Add 7,711 million gallons for total contents above sill of outlet tunnel, elevation 1,126.50 ft. Storage at spillway level is 140,190 million gallons]
(River Master daily operations record; gage reading at 0800 hours)

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	51,280	48,285	49,074	58,997	73,419	86,251	110,241	123,635	110,273	96,114	82,928	87,409
2	51,215	48,156	50,313	58,962	73,993	87,266	110,843	123,497	109,883	95,750	82,761	87,452
3	50,726	48,145	51,565	59,112	74,491	88,345	111,154	123,170	109,608	95,297	82,469	87,753
4	50,412	47,848	52,674	59,577	74,925	89,199	111,694	122,722	109,429	95,086	81,912	88,042
5	50,292	47,701	53,104	59,891	75,453	89,942	112,152	122,429	109,024	94,441	81,622	88,215
6	49,979	47,520	53,469	60,147	75,666	90,687	112,695	121,985	108,508	93,991	81,099	88,562
7	49,537	47,182	53,771	60,439	76,263	91,144	114,031	121,660	108,136	93,647	80,479	88,922
8	49,096	47,034	54,004	60,991	76,770	91,629	115,559	121,265	107,750	93,185	79,933	89,199
9	48,679	46,876	54,193	61,179	76,890	92,219	116,595	120,821	107,156	92,754	79,578	89,447
10	48,124	46,939	54,271	61,652	77,078	92,397	117,467	120,293	106,596	92,131	79,114	89,403
11	47,711	46,729	54,989	62,172	77,320	92,679	117,905	119,665	106,116	91,555	78,641	89,374
12	47,351	46,373	55,968	62,480	77,360	92,784	118,613	119,359	105,701	91,129	78,545	89,432
13	47,002	46,487	56,648	62,851	77,561	93,527	119,291	118,917	105,129	90,643	78,978	89,782
14	46,676	46,708	56,955	63,174	77,977	94,516	119,580	118,495	104,526	90,190	79,032	90,117
15	46,310	46,404	57,344	63,593	78,735	95,886	120,021	118,158	104,114	89,577	78,924	90,438
16	46,436	46,352	57,446	64,087	79,496	97,176	120,718	117,635	103,500	89,418	78,992	90,672
17	46,467	46,215	57,767	64,438	80,110	98,030	121,282	116,981	103,011	88,864	80,837	91,217
18	46,540	46,173	57,881	64,958	80,657	99,075	121,780	116,730	102,853	88,460	82,357	92,175
19	47,034	45,849	58,052	64,982	81,071	100,497	122,104	116,110	102,227	88,056	83,359	92,694
20	47,150	46,037	58,190	65,311	81,512	101,633	122,498	115,893	101,617	87,466	84,089	93,243
21	47,340	46,089	58,294	65,408	82,065	102,601	122,705	115,393	101,289	86,837	84,735	93,767
22	47,584	45,828	58,364	65,910	82,343	103,326	122,722	114,878	100,761	86,551	85,074	94,516
23	47,837	45,787	58,490	66,118	82,385	104,161	123,067	114,313	99,970	86,193	85,456	95,629
24	48,071	45,579	58,548	66,571	82,677	104,923	123,549	114,113	99,645	85,625	85,825	96,977
25	48,317	45,745	58,720	66,941	82,761	105,494	123,462	113,535	99,274	85,328	86,023	98,092
26	48,295	45,870	58,743	67,101	83,192	106,036	123,411	112,991	98,721	84,834	86,165	99,075
27	48,231	46,142	59,009	68,071	83,583	106,436	123,445	112,745	98,275	84,355	86,680	99,908
28	48,242	46,634	59,066	69,399	83,710	107,525	123,497	112,234	97,786	83,990	87,066	100,668
29	48,103	46,624		70,575	84,355	108,201	123,566	111,873	97,343	83,864	87,209	101,258
30	48,359	47,150		71,365	85,017	108,765	123,756	111,464	97,191	83,359	87,309	101,664
31	48,433	48,178		72,445		109,218		110,974	96,719		87,366	
Change	-3,482	-255	+10,888	+13,379	+12,572	+24,201	+14,538	-12,782	-14,255	-13,360	+4,007	+14,298
Equiv. Mgal/d	-112.3	-8.2	+388.9	+431.6	+419.1	+780.7	+484.6	-412.3	-459.8	-445.3	+129.3	+476.6
Equiv. ft^3/s	-174	-12.7	+602	+668	+648	+1,208	+750	-638	-711	-689	+200	+737
Change for year +49,749 Mgal						Equivalent for year +136.3 Mgal/d					Equivalent for year +211 ft^3/s	

Table 4. Storage in Cannonsville Reservoir, New York, for year ending November 30, 2002

[Storage in millions of gallons above elevation 1,040.00 ft. Add 2,584 million gallons for total contents above sill outlet tunnel, elevation 1,020.50 ft. Storage at spillway level is 95,706 million gallons]
(River Master daily operations record; gage reading at 0800 hours)

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	3,547	9,030	17,579	34,706	46,424	61,791	83,909	86,915	70,536	43,955	34,696	45,757
2	3,699	9,136	19,240	34,775	47,491	63,014	84,328	86,568	69,861	43,435	34,716	45,868
3	3,835	9,294	20,906	35,013	48,348	63,994	84,444	86,091	69,172	42,878	34,765	45,923
4	3,952	9,421	22,136	35,191	49,107	64,682	84,458	85,600	68,457	42,426	34,666	46,012
5	4,060	9,578	22,948	35,301	49,784	65,306	84,545	85,253	67,556	41,816	34,567	45,879
6	4,144	9,705	23,738	35,380	50,274	65,675	84,632	84,704	66,770	41,176	34,429	46,035
7	4,196	9,827	24,279	35,499	50,799	66,134	86,063	84,299	65,930	40,262	34,220	46,101
8	4,238	9,969	25,009	35,409	51,149	66,490	86,178	83,836	65,077	39,432	34,032	46,246
9	4,335	10,081	25,741	35,469	51,534	66,796	86,626	83,374	64,173	38,896	33,745	46,346
10	4,410	10,249	26,285	35,607	51,896	67,037	86,915	82,940	63,179	38,318	33,487	46,680
11	4,482	10,401	27,009	35,677	52,257	67,292	87,334	82,550	62,186	37,757	33,186	47,124
12	4,538	10,533	28,566	35,766	52,584	67,397	87,320	82,102	61,218	37,123	33,378	47,402
13	4,614	10,701	29,533	35,855	52,840	67,834	87,378	81,495	60,475	36,608	34,181	47,958
14	4,693	10,767	30,340	35,914	53,284	69,000	87,421	80,932	59,340	36,073	34,785	48,759
15	4,806	10,916	30,942	36,033	53,774	70,709	87,666	80,488	58,314	35,518	35,221	49,387
16	4,912	11,020	31,434	36,122	54,626	71,953	88,086	80,101	57,289	35,251	35,578	50,029
17	5,062	11,170	31,971	36,152	55,433	72,960	88,724	79,548	56,202	34,904	37,311	50,811
18	5,315	11,291	32,398	36,231	56,068	73,967	89,241	79,078	55,127	34,557	39,463	52,024
19	5,760	11,383	32,759	36,291	56,678	75,749	89,408	78,567	54,217	34,320	40,777	53,202
20	6,186	11,475	32,935	36,370	57,118	77,075	89,393	77,890	53,237	34,072	41,806	54,206
21	6,574	11,584	33,111	36,459	57,496	78,166	89,210	77,282	52,164	33,725	42,605	55,201
22	6,870	11,694	33,408	36,608	57,765	79,037	89,043	76,730	51,184	33,616	43,288	56,324
23	7,153	11,831	33,556	36,707	57,911	79,783	88,769	76,150	50,251	33,973	43,900	57,606
24	7,431	11,952	33,794	36,816	58,107	80,322	88,769	75,500	49,352	34,101	44,367	59,206
25	7,715	12,223	33,973	36,855	58,253	80,778	88,480	75,086	48,436	34,091	44,556	60,524
26	7,985	12,776	34,220	37,014	58,546	81,148	88,115	74,409	48,003	33,903	44,734	61,511
27	8,202	13,282	34,399	38,391	58,790	81,409	87,826	73,569	47,258	33,963	45,078	62,505
28	8,350	13,725	34,656	41,060	58,986	81,813	87,508	72,828	46,602	34,220	45,334	63,332
29	8,552	14,241		42,668	59,645	82,651	87,435	72,245	45,834	34,448	45,501	64,096
30	8,765	14,910		44,033	60,659	82,955	87,204	71,755	45,401	34,607	45,623	64,835
31	8,913	16,384		45,212		83,244		71,225	44,711		45,746	
Change	+5,441	+7,471	+18,272	+10,556	+15,447	+22,585	+3,960	-15,979	-26,514	-10,104	+11,139	+19,089
Equiv. Mgal/d	+175.5	+241.0	+652.6	+340.5	+514.9	+728.5	+132.0	-515.5	-855.3	-336.8	+359.3	+636.3
Equiv. ft^3/s	+272	+373	+1,010	+527	+797	+1,127	+204	-797	-1,323	-521	+556	+984
Change for year +61,363 Mgal					Equivalent for year +168.1 Mgal/d						Equivalent for year +260 ft^3/s	

Table 5. Storage in Neversink Reservoir, New York, for year ending November 30, 2002

[Storage in millions of gallons above elevation 1,319.00 ft. Add 525 million gallons for total contents above sill of outlet tunnel, elevation 1,314.00 ft. Storage at spillway level is 34,941 million gallons]
(River Master daily operations record; gage reading at 0800 hours)

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	11,183	12,470	11,958	12,798	16,070	21,363	27,862	30,630	26,384	21,680	19,003	22,901
2	11,360	12,363	12,150	12,866	16,401	21,477	28,040	30,451	26,190	21,641	18,903	22,973
3	11,479	12,277	12,260	12,883	16,661	21,908	28,127	30,350	26,068	21,588	18,740	23,040
4	11,548	12,235	12,323	13,034	16,927	22,221	28,233	30,200	26,030	21,603	18,664	23,107
5	11,631	12,110	12,323	13,084	17,137	22,455	28,373	30,068	25,921	21,561	18,625	23,167
6	11,704	12,116	12,272	13,096	17,302	22,678	28,557	29,946	25,620	21,511	18,625	23,282
7	11,762	12,071	12,145	13,114	17,491	22,859	28,977	29,814	25,570	21,496	18,593	23,445
8	11,798	12,082	12,085	13,117	17,646	23,044	29,351	29,638	25,437	21,355	18,504	23,545
9	11,837	12,051	11,994	13,135	17,795	23,211	29,571	29,527	25,271	21,150	18,412	23,513
10	11,888	11,955	11,907	13,158	17,942	23,302	29,756	29,338	25,073	20,919	18,345	23,437
11	11,921	11,941	11,949	13,349	18,063	23,326	29,919	29,231	24,936	20,773	18,179	23,350
12	11,963	11,896	12,051	13,436	18,186	23,358	30,064	29,114	24,797	20,622	18,363	23,314
13	12,031	11,952	12,031	13,475	18,317	23,441	30,128	28,884	24,507	20,544	19,147	23,358
14	12,090	11,988	11,963	13,421	18,501	23,983	30,241	28,760	24,209	20,443	19,464	23,385
15	12,232	12,026	11,935	13,559	18,803	24,397	30,369	28,685	24,003	20,309	19,580	23,413
16	12,263	12,076	11,983	13,598	19,224	24,645	30,570	28,539	23,757	20,272	19,730	23,405
17	12,275	12,113	12,015	13,680	19,405	24,912	30,799	28,337	23,549	20,213	20,517	23,521
18	12,352	12,153	12,009	13,783	19,558	25,142	30,928	28,093	23,441	20,124	20,946	23,947
19	12,537	12,195	11,998	13,828	19,639	25,542	31,039	27,896	23,334	19,954	21,218	24,169
20	12,614	12,135	12,023	13,850	19,836	25,800	31,053	27,675	23,135	19,840	21,386	24,271
21	12,696	12,085	12,037	13,899	19,961	26,009	31,122	27,602	22,929	19,690	21,550	24,413
22	12,701	12,031	12,170	13,984	20,109	26,202	31,202	27,524	22,669	19,544	21,699	24,417
23	12,701	11,972	12,277	13,988	20,198	26,372	31,202	27,288	22,529	19,428	21,803	24,674
24	12,722	11,930	12,380	14,003	20,164	26,515	31,266	26,979	22,334	19,293	21,896	24,969
25	12,730	11,916	12,467	14,006	20,127	26,693	31,211	26,974	22,186	19,202	21,992	25,189
26	12,758	11,874	12,554	14,012	20,098	26,846	31,127	26,945	22,101	19,054	22,108	25,379
27	12,752	11,840	12,640	14,299	20,231	26,970	31,039	26,881	21,973	18,928	22,361	25,525
28	12,687	11,815	12,707	14,734	20,379	27,094	30,928	26,838	21,811	19,122	22,513	25,699
29	12,722	11,773		14,968	20,859	27,227	30,813	26,808	21,660	19,174	22,630	25,825
30	12,611	11,804		15,238	21,196	27,356	30,758	26,680	21,707	19,086	22,721	25,942
31	12,557	11,966		15,690		27,520		26,545	21,660		22,807	
Change	+1,538	-591	+741	+2,983	+5,506	+6,324	+3,238	-4,213	-4,885	-2,574	+3,721	+3,135
Equiv. Mgal/d	+49.6	-19.1	+26.5	+96.2	+183.5	+204.0	+107.9	-135.9	-157.6	-85.8	+120.0	+104.5
Equiv. ft^3/s	+76.8	-29.5	+40.9	+149	+284	+316	+167	-210	-244	-133	+186	+162

Change for year +14,923 Mgal — Equivalent for year +40.9 Mgal/d — Equivalent for year +63.2 ft^3/s

Table 6. Design rates for Delaware River at Montague, New Jersey, gaging station, December 1, 2001, to November 30, 2002

[Rates in cubic feet per second]

Effective dates	Montague Design Rate
December 1, 2001 to December 3, 2001	1,550
December 4, 2001 to December 29, 2001	1,350
December 30, 2001 to May 28, 2002	1,100
May 29, 2002 to November 30, 2002	1,750

Table 7. Consumption of water by New York City, 1950 to 2002
Data furnished by New York City, Department of Environmental Protection, Bureau of Water Supply

[Mgal/d, million gallons per day; Bgal, billion gallons]

Year	Average daily consumption			Annual Consumption (Bgal)
	City Proper (Mgal/d)	Outside Communities (Mgal/d)	Total (Mgal/d)	
1950	953.3	29.1	982.4	358.576
51	1,041.9	28.1	1,070.0	390.550
52	1,087.0	32.7	1,119.7	409.810
53	1,093.9	44.6	1,138.5	415.552
54	1,063.4	46.3	1,109.7	405.040
1955	1,109.9	45.3	1,155.2	421.648
56	1,111.3	48.9	1,160.2	424.633
57	1,169.0	57.2	1,226.2	447.563
58	1,152.9	49.6	1,202.5	438.912
59	1,204.3	60.3	1,264.6	461.579
1960	1,199.4	58.9	1,258.3	460.529
61	1,221.0	64.0	1,285.0	469.022
62	1,207.6	68.8	1,276.4	465.896
63	1,218.0	76.7	1,294.7	472.582
64	1,189.2	79.4	1,268.6	464.295
1965	1,052.1	71.2	1,123.3	409.995
66	1,044.9	73.2	1,118.1	408.128
67	1,135.3	71.0	1,206.3	440.302
68	1,242.0	78.2	1,320.2	483.175
69	1,328.7	80.1	1,408.8	514.229
1970	1,400.3	90.4	1,490.7	544.116
71	1,423.6	87.9	1,511.5	551.695
72	1,412.4	83.0	1,495.4	547.340
73	1,448.9	95.4	1,544.3	563.681
74	1,441.8	96.3	1,538.1	561.409
1975	1,415.0	92.1	1,507.1	550.093
76	1,435.0	95.8	1,530.8	560.264
77	1,483.0	104.7	1,587.7	579.510
78	1,479.4	103.0	1,582.4	577.566
79	1,513.0	104.6	1,617.6	590.426
1980	1,506.3	110.1	1,616.3	591.582
81	1,309.5	100.0	1,409.5	514.475
82	1,383.0	104.8	1,487.8	543.060
83	1,424.2	112.6	1,536.8	561.010
84	1,465.2	113.9	1,579.1	577.963
1985	1,325.4	106.5	1,431.9	522.656
86	1,351.1	115.2	1,466.3	535.200
87	1,447.1	119.8	1,566.9	571.885
88	1,484.3	125.6	1,609.9	589.090
89	1,402.0	113.4	1,515.4	553.158
1990	1,424.4	122.4	1,546.8	564.577
91	1,469.9	123.6	1,593.5	581.628
92	1,368.7	113.9	1,482.6	542.632
93	1,368.9	118.8	1,487.7	543.011
94	1,357.8	119.2	1,477.0	539.105
1995	1,326.1	123.1	1,449.2	528.958
96	1,283.5	120.2	1,403.7	512.351
97	1,201.3	123.5	1,324.8	483.552
98	1,220.0	124.7	1,344.7	490.816
99	1,237.2	128.6	1,365.8	498.517
2000	1,240.4	124.9	1,365.3	499.700
01	1,184.0	128.4	1,312.4	479.026
02	1,135.6	121.1	1,256.7	458.696

Table 8. New York City reservoir release design data (River Master daily operation record)

[ft³/s, cubic feet per second; (ft³/s)-d, cubic feet per second days; Col., Column]

Advance estimate of discharge of Delaware River at Montague, New Jersey exclusive of New York City reservoir releases										Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft³/s)	Indicated deficiency	Balancing adjustment (ft³/s)	Directed release (ft³/s)	Adjusted directed release		Actual deficiency		Cumulative difference (ft³/s)-d	Balancing adjustment (ft³/s)
	Lake Wallenpaupack (ft³/s)	Rio Reservoir (ft³/s)	Current condition (ft³/s)	Weather adjustment (ft³/s)						Daily (ft³/s)	Cumulative (ft³/s)-d	Daily (ft³/s)	Cumulative (ft³/s)-d		
2001	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
MONTAGUE DESIGN RATE = 1,550 (ft³/s) DECEMBER 1, 2001 to DECEMBER 3, 2001															
Nov. 28	0	0	890	136	Dec. 1	1,026	524	-3	521	520	24,976	560	25,036	-60	+6
29	0	0	882	123	2	1,005	545	-18	527	509	25,485	0	25,036	449	-45
30	0	0	904	241	3	1,145	405	-7	398	402	25,887	0	25,036	851	-50
MONTAGUE DESIGN RATE = 1,350 (ft³/s) DECEMBER 4, 2001 to DECEMBER 29, 2001 The estimated discharge at Montague was greater than the Montague design rate from December 4, 2001 to December 5, 2001															
Dec. 3	0	0	1,536	0	6	1,536	0	-	0	0	0	55	55	-55	+6
4	32	0	1,355	29	7	1,416	0	-	0	0	0	143	198	-198	+20
5	65	0	1,172	33	8	1,270	80	0	80	80	80	30	228	-148	+15
6	0	0	1,054	15	9	1,069	281	0	281	280	360	320	548	-188	+19
7	0	0	972	258	10	1,230	120	+6	126	126	486	216	764	-278	+28
8	0	0	900	536	11	1,436	0	+20	0	0	486	224	988	-502	+50
9	0	0	994	1	12	995	355	+15	370	369	855	489	1,477	-622	+50
10	200	0	1,049	44	13	1,293	57	+19	76	76	931	51	1,528	-597	+50
11	120	85	977	142	14	1,324	26	+28	54	55	986	174	1,702	-716	+50
12	129	0	947	256	15	1,332	18	+50	68	69	1,055	0	1,702	-647	+50
The estimated discharge at Montague was greater than the Montague design rate from December 16, 2001 to December 29, 2001. MONTAGUE DESIGN RATE = 1,100 ft³/s DECEMBER 30, 2001 to MAY 28, 2002 The estimated discharge at Montague was greater than the Montague design rate from December 30, 2001 to May 28, 2002.															

Col. 1 - Furnished by power company.
Col. 2 - Furnished by power company.
Col. 3 - Computed from index stations.
Col. 4 - Computed increase in runoff based on quantitative precipitation forecasts.
Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = Design rate - Col. 5, when positive; otherwise Col. 6 = 0.
Col. 7 = Col. 14 (4 days earlier).
Col. 8 = Design rate - Col. 5 + Col. 7, when positive; otherwise Col. 8 = 0.
Col. 9 = Col. 7 from Table 9.
Col. 10 = Summation of Col. 9.
Col. 11 = Design rate - (Col. 9 + Col. 10 from Table 9), when positive; otherwise Col. 11 = 0.
Col. 12 = Summation of Col. 11.
Col. 13 = Col. 10 - Col. 12.
Col. 14 = Col. 13 divided by -10, limited to ±50.

Table 8. New York City reservoir release design data—continued
(River Master daily operation record)

[ft³/s, cubic feet per second; (ft³/s)-d, cubic feet per second days; Col., Column]

Advance estimate of discharge of Delaware River at Montague, New Jersey exclusive of New York City reservoir releases										Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft³/s)	Indicated deficiency	Balancing adjustment (ft³/s)	Directed release (ft³/s)	Adjusted directed release		Actual deficiency		Cumulative difference (ft³/s)-d	Balancing adjustment (ft³/s)
	Lake Wallenpaupack (ft³/s)	Rio Reservoir (ft³/s)	Current condition (ft³/s)	Weather adjustment (ft³/s)						Daily (ft³/s)	Cumulative (ft³/s)-d	Daily (ft³/s)	Cumulative (ft³/s)-d		
2002	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
MONTAGUE DESIGN RATE = 1,750 (ft³/s) May 29, 2002 to November 30, 2002															
The estimated discharge at Montague was greater than the Montague design rate from May 29, 2002 to July 6, 2002.															
July 4	381	0	1,250	0	July 7	1,631	119	0	119	119	119	147	147	-28	+3
5	381	0	1,182	0	8	1,563	187	0	187	187	306	244	391	-85	+8
6	470	0	1,037	73	9	1,580	170	0	170	170	476	246	637	-161	+16
7	470	0	964	9	10	1,443	307	0	307	307	783	122	759	24	-2
8	470	0	900	153	11	1,523	227	+3	230	230	1,013	0	759	254	-25
9	470	0	898	83	12	1,451	299	+8	307	307	1,320	215	974	346	-35
10	470	0	1,018	0	13	1,488	262	+16	278	278	1,598	285	1,259	339	-34
11	0	71	967	0	14	1,038	712	-2	710	709	2,307	989	2,248	59	-6
12	0	71	940	0	15	1,011	739	-25	714	713	3,020	933	3,181	-161	+16
13	608	71	882	14	16	1,575	175	-35	140	140	3,160	266	3,447	-287	+29
14	608	71	844	22	17	1,545	205	-34	171	171	3,331	414	3,861	-530	+50
15	608	223	862	0	18	1,693	57	-6	51	51	3,382	409	4,270	-888	+50
16	608	0	596	30	19	1,234	516	+16	532	532	3,914	540	4,810	-896	+50
17	608	0	563	188	20	1,359	391	+29	420	420	4,334	437	5,247	-913	+50
18	288	0	554	36	21	878	872	+50	922	922	5,256	742	5,989	-733	+50
19	288	32	523	31	22	874	876	+50	926	924	6,180	774	6,763	-583	+50
20	417	32	593	13	23	1,055	695	+50	745	745	6,925	578	7,341	-416	+42
21	417	32	565	150	24	1,164	586	+50	636	636	7,561	472	7,813	-252	+25
22	417	0	539	43	25	999	751	+50	801	802	8,363	422	8,235	128	-13
23	417	0	512	297	26	1,226	524	+50	574	574	8,937	394	8,629	308	-31
24	417	71	661	5	27	1,154	596	+42	638	636	9,573	716	9,345	228	-23
25	0	0	618	31	28	649	1,101	+25	1,126	1,125	10,698	1,135	10,480	218	-22
26	0	71	597	12	29	680	1,070	-13	1,057	1,058	11,756	1,028	11,508	248	-25
27	353	71	561	77	30	1,062	688	-31	657	661	12,417	491	11,999	418	-42
28	353	71	551	35	31	1,010	740	-23	717	717	13,134	745	12,744	390	-39

Col. 1 - Furnished by power company.
Col. 2 - Furnished by power company.
Col. 3 - Computed from index stations.
Col. 4 - Computed increase in runoff based on quantitative precipitation forecasts.
Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = Design rate - Col. 5, when positive; otherwise Col. 6 = 0.
Col. 7 = Col. 14 (4 days earlier).
Col. 8 = Design rate - Col. 5 + Col. 7, when positive; otherwise Col. 8 = 0.
Col. 9 = Col. 7 from Table 9.
Col. 10 = Summation of Col. 9.
Col. 11 = Design rate - (Col. 9 + Col. 10 from Table 9), when positive; otherwise Col. 11 = 0.
Col. 12 = Summation of Col. 11.
Col. 13 = Col. 10 - Col. 12.
Col. 14 = Col. 13 divided by -10, limited to ±50.

Table 8. New York City reservoir release design data—continued (River Master daily operation record)

[ft³/s, cubic feet per second; (ft³/s)-d, cubic feet per second days; Col., Column]

Advance estimate of discharge of Delaware River at Montague, New Jersey exclusive of New York City reservoir releases										Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft³/s)	Indicated deficiency	Balancing adjustment (ft³/s)	Directed release (ft³/s)	Adjusted directed release		Actual deficiency		Cumulative difference (ft³/s)-d	Balancing adjustment (ft³/s)
	Lake Wallenpaupack (ft³/s)	Rio Reservoir (ft³/s)	Current condition (ft³/s)	Weather adjustment (ft³/s)						Daily (ft³/s)	Cumulative (ft³/s)-d	Daily (ft³/s)	Cumulative (ft³/s)-d		
2002	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
July 29	353	0	552	44	Aug. 1	949	801	-22	779	780	13,914	800	13,544	370	-37
30	353	0	527	15	2	895	855	-25	830	831	14,745	761	14,305	440	-44
31	353	0	490	9	3	852	898	-42	856	855	15,600	825	15,130	470	-47
Aug. 1	0	0	450	24	4	474	1,276	-39	1,237	1,236	16,836	1,216	16,346	490	-49
2	0	71	434	5	5	510	1,240	-37	1,203	1,203	18,039	1,233	17,579	460	-46
3	193	0	454	27	6	674	1,076	-44	1,032	1,033	19,072	913	18,492	580	-50
4	193	0	429	61	7	683	1,067	-47	1,020	1,020	20,092	990	19,482	610	-50
5	193	0	461	33	8	687	1,063	-49	1,014	1,013	21,105	1,043	20,525	580	-50
6	193	0	491	0	9	684	1,066	-46	1,020	1,018	22,123	1,098	21,623	500	-50
7	193	0	438	0	10	631	1,119	-50	1,069	1,067	23,190	1,137	22,760	430	-43
8	0	71	390	0	11	461	1,289	-50	1,239	1,238	24,428	1,338	24,098	330	-33
9	0	43	352	0	12	395	1,355	-50	1,305	1,304	25,732	1,404	25,502	230	-23
10	0	43	324	5	13	372	1,378	-50	1,328	1,326	27,058	1,396	26,898	160	-16
11	0	43	318	0	14	361	1,389	-43	1,346	1,345	28,403	1,365	28,263	140	-14
12	0	0	327	2	15	329	1,421	-33	1,388	1,384	29,787	1,406	29,669	118	-12
13	0	0	333	12	16	345	1,405	-23	1,382	1,379	31,166	1,339	31,008	158	-16
14	0	0	281	19	17	300	1,450	-16	1,434	1,434	32,600	1,304	32,312	288	-29
15	0	0	302	6	18	308	1,442	-14	1,428	1,428	34,028	1,407	33,719	309	-31
16	0	0	327	25	19	352	1,398	-12	1,386	1,384	35,412	1,434	35,153	259	-26
17	0	0	348	36	20	384	1,366	-16	1,350	1,351	36,763	1,371	36,524	239	-24
18	45	0	322	47	21	414	1,336	-29	1,307	1,306	38,069	1,326	37,850	219	-22
19	0	0	326	29	22	355	1,395	-31	1,364	1,363	39,432	1,293	39,143	289	-29
20	0	0	359	0	23	359	1,391	-26	1,365	1,364	40,796	1,394	40,537	259	-26
21	0	71	377	27	24	475	1,275	-24	1,251	1,252	42,048	1,292	41,829	219	-22
22	0	0	331	221	25	552	1,198	-22	1,176	1,172	43,220	1,172	43,001	219	-22
23	0	0	337	51	26	388	1,362	-29	1,333	1,333	44,553	1,243	44,244	309	-31
24	417	0	410	348	27	1,175	575	-26	549	549	45,102	678	44,922	180	-18
25	417	0	470	0	28	887	863	-22	841	840	45,942	1,050	45,972	-30	+3
26	417	0	440	0	29	857	893	-22	871	869	46,811	729	46,701	110	-11
27	417	0	394	12	30	823	927	-31	896	897	47,708	527	47,228	480	-48
28	417	0	363	276	31	1,056	694	-18	676	676	48,384	486	47,714	670	-50

Col. 1 - Furnished by power company.
Col. 2 - Furnished by power company.
Col. 3 - Computed from index stations.
Col. 4 - Computed increase in runoff based on quantitative precipitation forecasts.
Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = Design rate - Col. 5, when positive; otherwise Col. 6 = 0.
Col. 7 = Col. 14 (4 days earlier).
Col. 8 = Design rate - Col. 5 + Col. 7, when positive; otherwise Col. 8 = 0.
Col. 9 = Col. 7 from Table 9.
Col. 10 = Summation of Col. 9.
Col. 11 = Design rate - (Col. 9 + Col. 10 from Table 9), when positive; otherwise Col. 11 = 0.
Col. 12 = Summation of Col. 11.
Col. 13 = Col. 10 - Col. 12.
Col. 14 = Col. 13 divided by -10, limited to ±50.

Table 8. New York City reservoir release design data—continued
(River Master daily operation record)

[ft³/s, cubic feet per second; (ft³/s)-d, cubic feet per second days; Col., Column]

Advance estimate of discharge of Delaware River at Montague, New Jersey exclusive of New York City reservoir releases										Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft³/s)	Indicated deficiency	Balancing adjustment (ft³/s)	Directed release (ft³/s)	Adjusted directed release		Actual deficiency		Cumulative difference (ft³/s)-d	Balancing adjustment (ft³/s)
	Lake Wallenpaupack (ft³/s)	Rio Reservoir (ft³/s)	Current condition (ft³/s)	Weather adjustment (ft³/s)						Daily (ft³/s)	Cumulative (ft³/s)-d	Daily (ft³/s)	Cumulative (ft³/s)-d		
2002	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
Aug. 29	0	0	388	503	Sept. 1	891	859	+3	862	860	49,244	1,210	48,924	320	-32
30	0	0	615	10	2	625	1,125	-11	1,114	1,115	50,359	1,295	50,219	140	-14
31	417	0	511	0	3	928	822	-48	774	774	51,133	854	51,073	60	-6
Sept. 1	417	0	485	0	4	902	848	-50	798	796	51,929	906	51,979	-50	+5
2	417	0	460	55	5	932	818	-32	786	786	52,715	926	52,905	-190	+19
3	417	0	430	17	6	864	886	-14	872	873	53,588	853	53,758	-170	+17
4	417	0	480	0	7	897	853	-6	847	850	54,438	890	54,648	-210	+21
5	0	0	476	0	8	476	1,274	+5	1,279	1,280	55,718	1,430	56,078	-360	+36
6	0	0	432	0	9	432	1,318	+19	1,337	1,337	57,055	1,497	57,575	-520	+50
7	483	0	378	0	10	861	889	+17	906	905	57,960	935	58,510	-550	+50
8	611	0	364	8	11	983	767	+21	788	786	58,746	876	59,386	-640	+50
9	611	0	347	6	12	964	786	+36	822	822	59,568	872	60,258	-690	+50
10	611	0	317	1	13	929	821	+50	871	873	60,441	903	61,161	-720	+50
11	611	0	308	6	14	925	825	+50	875	874	61,315	834	61,995	-680	+50
12	418	0	293	33	15	744	1,006	+50	1,056	1,056	62,371	916	62,911	-540	+50
13	418	71	283	186	16	958	792	+50	842	842	63,213	432	63,343	-130	+13
14	615	0	274	1,476	17	2,365	0	+50	0	0	63,213	94	63,437	-224	+22
15	615	0	264	1,309	18	2,188	0	+50	0	0	63,213	419	63,856	-643	+50
16	615	0	632	22	19	1,269	481	+50	531	531	63,744	481	64,337	-593	+50
17	615	0	642	4	20	1,261	489	+13	502	502	64,246	522	64,859	-613	+50
18	615	71	558	0	21	1,244	506	+22	528	529	64,775	739	65,598	-823	+50
19	421	0	474	38	22	933	817	+50	867	870	65,645	960	66,558	-913	+50
20	0	0	416	1,752	23	2,168	0	+50	0	0	65,645	1,052	67,610	-1,965	+50
21	323	0	379	606	24	1,308	442	+50	492	493	66,138	523	68,133	-1,995	+50
22	484	0	637	149	25	1,270	480	+50	530	531	66,669	351	68,484	-1,815	+50
23	484	0	873	0	26	1,357	393	+50	443	440	67,109	530	69,014	-1,905	+50
24	484	32	604	0	27	1,120	630	+50	680	680	67,789	630	69,644	-1,855	+50

The estimated discharge at Montague was greater than the Montague design rate from September 28, 2002 to September 30, 2002.

Col. 1 - Furnished by power company.
Col. 2 - Furnished by power company.
Col. 3 - Computed from index stations.
Col. 4 - Computed increase in runoff based on quantitative precipitation forecasts.
Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = Design rate - Col. 5, when positive; otherwise Col. 6 = 0.
Col. 7 = Col. 14 (4 days earlier).
Col. 8 = Design rate - Col. 5 + Col. 7, when positive; otherwise Col. 8 = 0.
Col. 9 = Col. 7 from Table 9.
Col. 10 = Summation of Col. 9.
Col. 11 = Design rate - (Col. 9 + Col. 10 from Table 9), when positive; otherwise Col. 11 = 0.
Col. 12 = Summation of Col. 11.
Col. 13 = Col. 10 - Col. 12.
Col. 14 = Col. 13 divided by -10, limited to ±50.

Table 8. New York City reservoir release design data—continued (River Master daily operation record)

[ft³/s, cubic feet per second; (ft³/s)-d, cubic feet per second days; Col., Column]

Advance estimate of discharge of Delaware River at Montague, New Jersey exclusive of New York City reservoir releases										Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft³/s)	Indicated deficiency	Balancing adjustment (ft³/s)	Directed release (ft³/s)	Adjusted directed release		Actual deficiency		Cumulative difference (ft³/s)-d	Balancing adjustment (ft³/s)
	Lake Wallenpaupack (ft³/s)	Rio Reservoir (ft³/s)	Current condition (ft³/s)	Weather adjustment (ft³/s)						Daily (ft³/s)	Cumulative (ft³/s)-d	Daily (ft³/s)	Cumulative (ft³/s)-d		
2002	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
Sept. 28	0	0	3,300	0	Oct. 1	3,300	0	+50	0	0	67,789	111	69,755	-1,966	+50
29	0	0	1,898	0	2	1,898	0	+50	0	0	67,789	444	70,199	-2,410	+50
30	137	0	1,468	20	3	1,625	125	+50	175	175	67,964	491	70,690	-2,726	+50
Oct. 1	361	40	1,071	49	4	1,521	229	+50	279	277	68,241	427	71,117	-2,826	+50
2	384	35	802	36	5	1,257	493	+50	543	543	68,784	243	71,360	-2,576	+50
3	416	70	789	114	6	1,389	361	+50	411	413	69,197	153	71,513	-2,316	+50
4	416	35	797	100	7	1,348	402	+50	452	454	69,651	324	71,837	-2,186	+50
5	420	35	755	23	8	1,233	517	+50	567	570	70,221	350	72,187	-1,966	+50
6	420	35	760	69	9	1,284	466	+50	516	517	70,738	437	72,624	-1,886	+50
7	484	35	633	35	10	1,187	563	+50	613	611	71,349	491	73,115	-1,766	+50
8	484	35	601	9	11	1,129	621	+50	671	672	72,021	102	73,217	-1,196	+50
9	484	0	620	34	12	1,138	612	+50	662	663	72,684	0	73,217	-533	+50
10	0	0	550	852	13	1,402	348	+50	398	398	73,082	0	73,217	-135	+14

The estimated discharge at Montague was greater than the Montague design rate from October 14, 2002 to November 30, 2002.

Col. 1 - Furnished by power company.
Col. 2 - Furnished by power company.
Col. 3 - Computed from index stations.
Col. 4 - Computed increase in runoff based on quantitative precipitation forecasts.
Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = Design rate - Col. 5, when positive; otherwise Col. 6 = 0.
Col. 7 = Col. 14 (4 days earlier).
Col. 8 = Design rate - Col. 5 + Col. 7, when positive; otherwise Col. 8 = 0.
Col. 9 = Col. 7 from Table 9.
Col. 10 = Summation of Col. 9.
Col. 11 = Design rate - (Col. 9 + Col. 10 from Table 9), when positive; otherwise Col. 11 = 0.
Col. 12 = Summation of Col. 11.
Col. 13 = Col. 10 - Col. 12.
Col. 14 = Col. 13 divided by -10, limited to ±50.

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey (River Master daily operation record. No releases from the Excess Release Quantity were made during the report year.)

[Mean discharge in cubic feet per second for 24 hours; Col., Column]

Controlled Releases from New York City Reservoirs					Controlled Releases from Power Reservoirs			Segregation of Flow Delaware River at Montague, New Jersey					
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled Releases			Computed uncontrolled	Total
									New York City Reservoirs		Power-plants		
Date	Amount								Directed	Other			
2001	Col. 1	Col. 2	Col. 3	Col. 4	2001	Col. 5	Col. 6	2001	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11
Nov. 28	521	449	46	25	Nov. 30	0	0	Dec. 1	520	0	0	990	1,510
29	527	441	46	22	Dec. 1	0	0	2	509	0	0	1,571	2,080
30	398	362	31	9	2	0	0	3	402	0	0	1,878	2,280
Dec. 1	0	19	15	9	3	0	0	4	0	43	0	1,657	1,700
2	0	22	15	9	4	0	0	5	0	46	0	1,414	1,460
3	0	22	14	9	5	0	0	6	0	45	0	1,295	1,340
4	0	22	12	9	6	59	0	7	0	43	59	1,148	1,250
5	80	34	46	20	7	109	117	8	80	20	226	1,094	1,420
6	281	209	46	25	8	0	0	9	280	0	0	1,030	1,310
7	126	56	45	25	9	0	0	10	126	0	0	1,134	1,260
8	0	22	11	11	10	0	0	11	0	44	0	1,126	1,170
9	370	299	45	25	11	0	0	12	369	0	0	861	1,230
10	76	46	34	11	12	221	0	13	76	15	221	1,078	1,390
11	54	37	28	9	13	123	0	14	55	19	123	1,053	1,250
12	68	34	45	9	14	132	106	15	69	19	238	1,254	1,580
13	0	22	8	9	15	0	0	16	0	39	0	1,961	2,000
14	0	22	8	9	16	0	0	17	0	39	0	2,061	2,100
15	0	22	8	9	17	0	0	18	0	39	0	4,461	4,500
16	0	22	8	9	18	0	0	19	0	39	0	5,101	5,140
17	0	22	8	9	19	0	0	20	0	39	0	4,681	4,720
18	0	22	8	5	20	0	0	21	0	35	0	3,755	3,790
19	0	6	8	5	21	0	0	22	0	19	0	3,221	3,240
20	0	6	8	5	22	0	0	23	0	19	0	2,681	2,700
21	0	6	8	5	23	0	0	24	0	19	0	2,421	2,440
22	0	6	8	5	24	0	0	25	0	19	0	2,341	2,360
23	0	6	8	5	25	0	0	26	0	19	0	2,331	2,350
24	0	6	8	5	26	0	82	27	0	19	82	1,879	1,980
25	0	6	8	5	27	0	0	28	0	19	0	1,901	1,920
26	0	6	8	5	28	0	92	29	0	19	92	1,799	1,910
27	0	6	8	5	29	0	0	30	0	19	0	1,901	1,920
28	0	6	8	5	30	0	0	31	0	19	0	1,871	1,890
Total	2,501	2,266	607	327		644	397		2,486	714	1,041	62,949	67,190

Col. 2 - 24 hours beginning 1200 of date shown.
Col. 3 - 24 hours ending 2400 one day later.
Col. 4 - 24 hours beginning 1500 one day later.
Col. 5 - 24 hours beginning 0800 of date shown.
Col. 6 - 24 hours beginning 1600 of date shown.

Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1).
Col. 8 = Col. 2 + Col. 3 + Col. 4 - Col. 7.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 = 24 hours of calendar day shown.

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey—continued
(River Master daily operation record. No releases from the Excess Release Quantity were made during the report year.)

[Mean discharge in cubic feet per second for 24 hours; Col., Column]

Controlled Releases from New York City Reservoirs					Controlled Releases from Power Reservoirs			Segregation of Flow Delaware River at Montague, New Jersey					
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled Releases			Computed uncontrolled	Total
									New York City Reservoirs		Power-plants		
Date	Amount								Directed	Other			
2001/2002	Col. 1	Col. 2	Col. 3	Col. 4	2001/2002	Col. 5	Col. 6	2002	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11
Dec. 29	0	6	8	5	Dec. 31	0	0	Jan. 1	0	19	0	1,431	1,450
30	0	6	8	5	Jan. 1	0	0	2	0	19	0	1,351	1,370
31	0	6	8	5	2	174	0	3	0	19	174	1,447	1,640
Jan. 1	0	6	8	5	3	196	0	4	0	19	196	1,405	1,620
2	0	6	8	5	4	177	0	5	0	19	177	1,314	1,510
3	0	6	8	5	5	0	0	6	0	19	0	1,341	1,360
4	0	6	8	5	6	25	0	7	0	19	25	1,286	1,330
5	0	6	8	5	7	116	0	8	0	19	116	1,295	1,430
6	0	6	8	5	8	0	0	9	0	19	0	1,131	1,150
7	0	6	8	5	9	0	135	10	0	19	135	1,236	1,390
8	0	6	8	5	10	0	0	11	0	19	0	1,401	1,420
9	0	6	8	5	11	0	0	12	0	19	0	1,381	1,400
10	0	6	8	5	12	0	0	13	0	19	0	1,331	1,350
11	0	6	8	5	13	0	0	14	0	19	0	1,211	1,230
12	0	6	8	5	14	0	60	15	0	19	60	1,281	1,360
13	0	6	8	5	15	0	0	16	0	19	0	1,151	1,170
14	0	6	8	5	16	0	0	17	0	19	0	1,091	1,110
15	0	6	8	5	17	0	53	18	0	19	53	928	1,000
16	0	6	8	5	18	0	0	19	0	19	0	1,041	1,060
17	0	6	8	5	19	0	0	20	0	19	0	924	943
18	0	6	8	5	20	0	0	21	0	19	0	915	934
19	0	6	8	5	21	121	21	22	0	19	142	909	1,070
20	0	6	8	5	22	175	0	23	0	19	175	1,136	1,330
21	0	6	8	5	23	159	0	24	0	19	159	1,152	1,330
22	0	6	8	5	24	169	0	25	0	19	169	1,192	1,380
23	0	6	8	5	25	168	0	26	0	19	168	1,453	1,640
24	0	6	8	5	26	0	57	27	0	19	57	2,114	2,190
25	0	6	8	5	27	15	0	28	0	19	15	2,206	2,240
26	0	6	8	5	28	154	0	29	0	19	154	2,347	2,520
27	0	6	8	5	29	0	67	30	0	19	67	2,654	2,740
28	0	6	8	5	30	0	138	31	0	19	138	5,123	5,280
Total	0	186	248	155		1,649	531		0	589	2,180	46,178	48,947

Col. 2 - 24 hours beginning 1200 of date shown.
Col. 3 - 24 hours ending 2400 one day later.
Col. 4 - 24 hours beginning 1500 one day later.
Col. 5 - 24 hours beginning 0800 of date shown.
Col. 6 - 24 hours beginning 1600 of date shown.

Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1).
Col. 8 = Col. 2 + Col. 3 + Col. 4 - Col. 7.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 = 24 hours of calendar day shown.

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey—continued (River Master daily operation record. No releases from the Excess Release Quantity were made during the report year.)

[Mean discharge in cubic feet per second for 24 hours; Col., Column]

Controlled Releases from New York City Reservoirs					Controlled Releases from Power Reservoirs			Segregation of Flow Delaware River at Montague, New Jersey					
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled Releases			Computed uncontrolled	Total
									New York City Reservoirs		Power-plants		
Date	Amount								Directed	Other			
2002	Col. 1	Col. 2	Col. 3	Col. 4	2002	Col. 5	Col. 6	2002	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11
Jan. 29	0	6	8	5	Jan. 31	17	0	Feb. 1	0	19	17	6,764	6,800
30	0	6	8	5	Feb. 1	123	0	2	0	19	123	6,548	6,690
31	0	6	8	5	2	0	0	3	0	19	0	6,331	6,350
Feb. 1	0	6	9	5	3	0	0	4	0	20	0	4,980	5,000
2	0	6	9	5	4	0	32	5	0	20	32	4,308	4,360
3	0	6	9	5	5	0	103	6	0	20	103	3,627	3,750
4	0	6	9	5	6	0	46	7	0	20	46	3,244	3,310
5	0	6	9	5	7	0	0	8	0	20	0	2,570	2,590
6	0	6	9	5	8	0	0	9	0	20	0	2,330	2,350
7	0	6	9	5	9	0	0	10	0	20	0	2,160	2,180
8	0	6	9	5	10	0	103	11	0	20	103	3,237	3,360
9	0	6	9	5	11	0	0	12	0	20	0	8,310	8,330
10	0	6	9	5	12	0	0	13	0	20	0	6,430	6,450
11	0	6	9	5	13	0	0	14	0	20	0	4,930	4,950
12	0	6	9	5	14	0	0	15	0	20	0	3,920	3,940
13	0	6	9	5	15	0	0	16	0	20	0	3,690	3,710
14	0	6	9	5	16	0	0	17	0	20	0	3,290	3,310
15	0	6	9	5	17	0	0	18	0	20	0	3,050	3,070
16	0	6	9	5	18	0	0	19	0	20	0	2,720	2,740
17	0	6	9	5	19	0	0	20	0	20	0	2,470	2,490
18	0	6	8	5	20	0	67	21	0	19	67	2,384	2,470
19	0	6	20	5	21	0	0	22	0	31	0	2,679	2,710
20	0	6	8	5	22	0	0	23	0	19	0	2,971	2,990
21	0	6	8	5	23	0	0	24	0	19	0	2,691	2,710
22	0	6	8	5	24	0	0	25	0	19	0	2,421	2,440
23	0	6	8	5	25	0	32	26	0	19	32	2,279	2,330
24	0	6	8	5	26	0	99	27	0	19	99	2,202	2,320
25	0	6	8	5	27	0	0	28	0	19	0	2,271	2,290
Total	0	168	253	140		140	482		0	561	622	104,807	105,990

Col. 2 - 24 hours beginning 1200 of date shown.
Col. 3 - 24 hours ending 2400 one day later.
Col. 4 - 24 hours beginning 1500 one day later.
Col. 5 - 24 hours beginning 0800 of date shown.
Col. 6 - 24 hours beginning 1600 of date shown.

Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1).
Col. 8 = Col. 2 + Col. 3 + Col. 4 - Col. 7.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 = 24 hours of calendar day shown.

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey—continued
(River Master daily operation record. No releases from the Excess Release Quantity were made during the report year.)

[Mean discharge in cubic feet per second for 24 hours; Col., Column]

Controlled Releases from New York City Reservoirs					Controlled Releases from Power Reservoirs			Segregation of Flow Delaware River at Montague, New Jersey					
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled Releases			Computed uncontrolled	Total
									New York City Reservoirs		Power-plants		
Date	Amount								Directed	Other			
2002	Col. 1	Col. 2	Col. 3	Col. 4	2002	Col. 5	Col. 6	2002	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11
Feb. 26	0	6	8	5	Feb. 28	59	0	Mar. 1	0	19	59	2,172	2,250
27	0	6	9	5	Mar. 1	111	0	2	0	20	111	1,949	2,080
28	0	6	6	5	2	0	0	3	0	17	0	2,173	2,190
Mar. 1	0	6	8	5	3	0	0	4	0	19	0	2,731	2,750
2	0	6	8	5	4	0	0	5	0	19	0	3,091	3,110
3	0	6	8	5	5	0	0	6	0	19	0	2,581	2,600
4	0	6	8	5	6	0	0	7	0	19	0	2,411	2,430
5	0	6	8	5	7	0	0	8	0	19	0	2,291	2,310
6	0	6	8	5	8	0	0	9	0	19	0	2,161	2,180
7	0	6	8	5	9	0	0	10	0	19	0	2,271	2,290
8	0	6	8	5	10	0	0	11	0	19	0	2,511	2,530
9	0	6	8	5	11	0	0	12	0	19	0	2,661	2,680
10	0	6	8	5	12	0	0	13	0	19	0	2,401	2,420
11	0	6	8	5	13	17	0	14	0	19	17	2,344	2,380
12	0	6	8	5	14	0	0	15	0	19	0	2,331	2,350
13	0	6	8	5	15	0	99	16	0	19	99	2,272	2,390
14	0	6	8	5	16	0	0	17	0	19	0	2,451	2,470
15	0	6	8	5	17	20	0	18	0	19	20	2,631	2,670
16	0	6	8	5	18	0	0	19	0	19	0	2,511	2,530
17	0	6	8	5	19	0	18	20	0	19	18	2,573	2,610
18	0	6	8	5	20	0	99	21	0	19	99	2,952	3,070
19	0	6	8	5	21	0	0	22	0	19	0	3,701	3,720
20	0	8	8	5	22	0	0	23	0	21	0	3,839	3,860
21	0	8	8	5	23	0	0	24	0	21	0	3,389	3,410
22	0	8	8	5	24	0	131	25	0	21	131	3,218	3,370
23	0	8	8	5	25	0	0	26	0	21	0	3,469	3,490
24	0	8	8	5	26	0	532	27	0	21	532	8,357	8,910
25	0	6	8	5	27	0	681	28	0	19	681	13,500	14,200
26	0	6	8	5	28	15	989	29	0	19	1,004	10,177	11,200
27	0	6	8	5	29	0	752	30	0	19	752	8,759	9,530
28	0	6	8	5	30	0	755	31	0	19	755	8,296	9,070
Total	0	196	247	155		222	4,056		0	598	4,278	118,174	123,050

Col. 2 - 24 hours beginning 1200 of date shown.
Col. 3 - 24 hours ending 2400 one day later.
Col. 4 - 24 hours beginning 1500 one day later.
Col. 5 - 24 hours beginning 0800 of date shown.
Col. 6 - 24 hours beginning 1600 of date shown.

Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1).
Col. 8 = Col. 2 + Col. 3 + Col. 4 - Col. 7.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 = 24 hours of calendar day shown.

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey—continued (River Master daily operation record. No releases from the Excess Release Quantity were made during the report year.)

[Mean discharge in cubic feet per second for 24 hours; Col., Column]

Controlled Releases from New York City Reservoirs					Controlled Releases from Power Reservoirs			Segregation of Flow Delaware River at Montague, New Jersey					
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled Releases			Computed uncontrolled	Total
									New York City Reservoirs		Power-plants		
Date	Amount								Directed	Other			
2002	Col. 1	Col. 2	Col. 3	Col. 4	2002	Col. 5	Col. 6	2002	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11
Mar. 29	0	6	8	5	Mar. 31	0	762	Apr. 1	0	19	762	7,799	8,580
30	0	6	8	5	Apr. 1	35	766	2	0	19	801	7,340	8,160
31	0	6	8	5	2	409	248	3	0	19	657	6,144	6,820
Apr. 1	0	6	8	5	3	402	184	4	0	19	586	5,635	6,240
2	0	6	8	5	4	391	525	5	0	19	916	4,875	5,810
3	0	6	8	5	5	349	262	6	0	19	611	4,250	4,880
4	0	6	8	5	6	0	170	7	0	19	170	3,901	4,090
5	0	6	8	5	7	41	124	8	0	19	165	3,636	3,820
6	0	6	8	8	8	482	255	9	0	22	737	3,271	4,030
7	0	8	8	15	9	526	220	10	0	31	746	3,283	4,060
8	0	19	8	15	10	498	248	11	0	42	746	3,152	3,940
9	0	19	8	15	11	533	287	12	0	42	820	2,928	3,790
10	0	19	8	15	12	453	181	13	0	42	634	2,604	3,280
11	0	19	8	15	13	0	0	14	0	42	0	2,778	2,820
12	0	19	8	15	14	0	163	15	0	42	163	4,065	4,270
13	0	19	8	15	15	330	184	16	0	42	514	5,934	6,490
14	0	19	8	15	16	341	422	17	0	42	763	5,255	6,060
15	0	19	19	15	17	370	539	18	0	53	909	4,458	5,420
16	0	19	23	15	18	406	550	19	0	57	956	3,937	4,950
17	0	19	23	15	19	391	0	20	0	57	391	3,852	4,300
18	0	19	25	15	20	0	92	21	0	59	92	3,529	3,680
19	0	19	25	15	21	3	53	22	0	59	56	3,285	3,400
20	0	19	25	15	22	600	60	23	0	59	660	3,071	3,790
21	0	19	25	15	23	718	0	24	0	59	718	2,823	3,600
22	0	19	25	15	24	651	103	25	0	59	754	2,687	3,500
23	0	19	25	15	25	694	301	26	0	59	995	3,176	4,230
24	0	19	25	15	26	573	518	27	0	59	1,091	3,390	4,540
25	0	19	25	15	27	0	553	28	0	59	553	3,748	4,360
26	0	19	25	15	28	367	557	29	0	59	924	11,217	12,200
27	0	19	25	15	29	1,697	532	30	0	59	2,229	11,912	14,200
Total	0	442	451	363		11,260	8,859		0	1,256	20,119	137,935	159,310

Col. 2 - 24 hours beginning 1200 of date shown.
Col. 3 - 24 hours ending 2400 one day later.
Col. 4 - 24 hours beginning 1500 one day later.
Col. 5 - 24 hours beginning 0800 of date shown.
Col. 6 - 24 hours beginning 1600 of date shown.

Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1).
Col. 8 = Col. 2 + Col. 3 + Col. 4 - Col. 7.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 = 24 hours of calendar day shown.

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey—continued
(River Master daily operation record. No releases from the Excess Release Quantity were made during the report year.)

[Mean discharge in cubic feet per second for 24 hours; Col., Column]

Controlled Releases from New York City Reservoirs					Controlled Releases from Power Reservoirs			Segregation of Flow Delaware River at Montague, New Jersey					
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled Releases			Computed uncontrolled	Total
									New York City Reservoirs		Power-plants		
Date	Amount								Directed	Other			
2002	Col. 1	Col. 2	Col. 3	Col. 4	2002	Col. 5	Col. 6	2002	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11
Apr. 28	0	19	25	15	Apr. 30	1,694	525	May 1	0	59	2,219	9,822	12,100
29	0	19	25	15	May 1	1,721	496	2	0	59	2,217	8,624	10,900
30	0	19	25	15	2	1,696	560	3	0	59	2,256	9,885	12,200
May 1	0	19	25	15	3	569	355	4	0	59	924	8,357	9,340
2	0	19	25	15	4	0	447	5	0	59	447	6,954	7,460
3	0	19	25	15	5	0	482	6	0	59	482	5,959	6,500
4	0	19	25	15	6	450	255	7	0	59	705	5,066	5,830
5	0	19	25	15	7	438	170	8	0	59	608	4,573	5,240
6	0	19	25	15	8	358	465	9	0	59	823	4,138	5,020
7	0	19	25	15	9	402	259	10	0	59	661	4,290	5,010
8	0	19	25	15	10	468	142	11	0	59	610	3,921	4,590
9	0	19	25	15	11	0	301	12	0	59	301	3,580	3,940
10	0	19	25	15	12	0	465	13	0	59	465	6,446	6,970
11	0	19	25	15	13	1,176	1,489	14	0	59	2,665	21,076	23,800
12	0	19	25	15	14	1,686	1,539	15	0	59	3,225	17,216	20,500
13	0	19	25	15	15	1,721	1,131	16	0	59	2,852	11,789	14,700
14	0	19	25	15	16	1,721	255	17	0	59	1,976	9,265	11,300
15	0	19	25	15	17	1,425	454	18	0	59	1,879	9,562	11,500
16	0	19	25	15	18	1,106	1,043	19	0	59	2,149	15,192	17,400
17	0	19	25	15	19	1,651	1,078	20	0	59	2,729	10,712	13,500
18	0	19	25	15	20	559	1,071	21	0	59	1,630	8,711	10,400
19	0	19	26	15	21	436	862	22	0	60	1,298	7,302	8,660
20	0	19	26	15	22	427	426	23	0	60	853	6,437	7,350
21	0	19	26	15	23	522	390	24	0	60	912	5,778	6,750
22	0	19	26	15	24	1,421	305	25	0	60	1,726	4,624	6,410
23	0	19	26	15	25	0	220	26	0	60	220	4,470	4,750
24	0	19	26	15	26	0	369	27	0	60	369	4,111	4,540
25	0	19	26	15	27	22	397	28	0	60	419	4,131	4,610
26	0	19	26	15	28	1,182	787	29	0	60	1,969	10,071	12,100
27	0	19	26	15	29	1,715	1,241	30	0	60	2,956	7,584	10,600
28	0	19	26	15	30	1,721	390	31	0	60	2,111	6,119	8,290
Total	0	589	785	465		26,287	18,369		0	1,839	44,656	245,765	292,260

Col. 2 - 24 hours beginning 1200 of date shown.
Col. 3 - 24 hours ending 2400 one day later.
Col. 4 - 24 hours beginning 1500 one day later.
Col. 5 - 24 hours beginning 0800 of date shown.
Col. 6 - 24 hours beginning 1600 of date shown.
Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1).
Col. 8 = Col. 2 + Col. 3 + Col. 4 - Col. 7.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 = 24 hours of calendar day shown.

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey—continued (River Master daily operation record. No releases from the Excess Release Quantity were made during the report year.)

[Mean discharge in cubic feet per second for 24 hours; Col., Column]

Controlled Releases from New York City Reservoirs					Controlled Releases from Power Reservoirs			Segregation of Flow Delaware River at Montague, New Jersey					
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled Releases			Computed uncontrolled	Total
									New York City Reservoirs		Power-plants		
Date	Amount								Directed	Other			
2001	Col. 1	Col. 2	Col. 3	Col. 4	2001	Col. 5	Col. 6	2001	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11
May 29	0	19	26	15	May 31	1,052	298	June 1	0	60	1,350	7,070	8,480
30	0	19	26	15	June 1	0	408	2	0	60	408	8,112	8,580
31	0	19	26	15	2	111	252	3	0	60	363	5,957	6,380
June 1	0	19	26	15	3	723	294	4	0	60	1,017	4,443	5,520
2	0	19	26	15	4	646	344	5	0	60	990	3,930	4,980
3	0	19	26	15	5	713	362	6	0	60	1,075	5,395	6,530
4	0	19	26	15	6	1,078	979	7	0	60	2,057	16,283	18,400
5	0	19	26	15	7	891	1,170	8	0	60	2,061	16,679	18,800
6	0	19	26	15	8	0	663	9	0	60	663	10,977	11,700
7	0	19	26	15	9	71	582	10	0	60	653	8,557	9,270
8	0	19	26	17	10	1,721	507	11	0	62	2,228	6,310	8,600
9	0	19	26	15	11	1,383	301	12	0	60	1,684	5,286	7,030
10	0	20	104	26	12	965	525	13	0	150	1,490	4,800	6,440
11	0	32	158	53	13	934	504	14	0	243	1,438	4,659	6,340
12	0	93	114	53	14	697	791	15	0	260	1,488	7,052	8,800
13	0	94	45	53	15	0	1,135	16	0	192	1,135	8,673	10,000
14	0	94	45	53	16	80	1,110	17	0	192	1,190	7,938	9,320
15	0	94	45	53	17	703	539	18	0	192	1,242	6,336	7,770
16	0	94	45	53	18	649	472	19	0	192	1,121	5,407	6,720
17	0	94	45	53	19	566	482	20	0	192	1,048	4,730	5,970
18	0	96	46	53	20	488	457	21	0	195	945	4,080	5,220
19	0	94	113	56	21	549	266	22	0	263	815	3,422	4,500
20	0	94	181	74	22	0	213	23	0	349	213	3,118	3,680
21	0	94	201	74	23	280	230	24	0	369	510	2,911	3,790
22	0	94	203	74	24	628	245	25	0	371	873	2,826	4,070
23	0	94	203	70	25	537	53	26	0	367	590	3,053	4,010
24	0	94	217	90	26	640	53	27	0	401	693	3,226	4,320
25	0	113	258	90	27	505	53	28	0	461	558	3,111	4,130
26	0	114	300	71	28	496	71	29	0	485	567	2,678	3,730
27	0	99	249	70	29	0	0	30	0	418	0	2,322	2,740
Total	0	1,829	2,884	1,301		17,106	13,359		0	6,014	30,465	179,341	215,820

Col. 2 - 24 hours beginning 1200 of date shown.
Col. 3 - 24 hours ending 2400 one day later.
Col. 4 - 24 hours beginning 1500 one day later.
Col. 5 - 24 hours beginning 0800 of date shown.
Col. 6 - 24 hours beginning 1600 of date shown.

Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1).
Col. 8 = Col. 2 + Col. 3 + Col. 4 - Col. 7.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 = 24 hours of calendar day shown.

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey—continued
(River Master daily operation record. No releases from the Excess Release Quantity were made during the report year.)

[Mean discharge in cubic feet per second for 24 hours; Col., Column]

Controlled Releases from New York City Reservoirs					Controlled Releases from Power Reservoirs			Segregation of Flow Delaware River at Montague, New Jersey					
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled Releases			Computed uncontrolled	Total
									New York City Reservoirs		Power-plants		
Date	Amount								Directed	Other			
2002	Col. 1	Col. 2	Col. 3	Col. 4	2002	Col. 5	Col. 6	2002	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11
June 28	0	94	198	85	June 30	0	138	July 1	0	377	138	2,055	2,570
29	0	108	300	114	July 1	604	404	2	0	522	1,008	1,750	3,280
30	0	125	398	121	2	620	461	3	0	644	1,081	1,575	3,300
July 1	0	130	503	118	3	487	35	4	0	751	522	1,557	2,830
2	0	130	504	87	4	498	50	5	0	721	548	1,361	2,630
3	0	130	350	70	5	655	18	6	0	550	673	1,297	2,520
4	119	110	447	70	6	408	0	7	119	508	408	1,195	2,230
5	187	94	302	68	7	409	0	8	187	277	409	1,097	1,970
6	170	94	402	90	8	495	60	9	170	416	555	949	2,090
7	307	94	401	87	9	515	18	10	307	275	533	1,095	2,210
8	230	102	302	68	10	656	32	11	230	242	688	1,090	2,250
9	307	97	255	53	11	551	0	12	308	97	551	984	1,940
10	278	94	198	53	12	466	0	13	278	67	466	999	1,810
11	710	94	562	53	13	0	71	14	709	0	71	690	1,470
12	714	94	549	70	14	83	35	15	713	0	118	699	1,530
13	140	94	302	70	15	641	0	16	140	326	641	843	1,950
14	171	94	300	70	16	509	103	17	171	293	612	724	1,800
15	51	108	401	90	17	593	167	18	51	548	760	581	1,940
16	532	127	393	90	18	532	18	19	532	78	550	660	1,820
17	420	125	402	90	19	520	0	20	420	197	520	793	1,930
18	922	125	727	70	20	334	0	21	922	0	334	674	1,930
19	926	108	746	70	21	251	0	22	924	0	251	725	1,900
20	745	94	574	90	22	407	0	23	745	13	407	765	1,930
21	636	110	492	90	23	453	0	24	636	56	453	825	1,970
22	801	110	622	70	24	435	0	25	802	0	435	893	2,130
23	574	99	422	53	25	433	0	26	574	0	433	923	1,930
24	638	94	489	53	26	360	71	27	636	0	431	603	1,670
25	1,126	94	961	70	27	0	0	28	1,125	0	0	615	1,740
26	1,057	102	866	90	28	0	89	29	1,058	0	89	633	1,780
27	657	110	461	90	29	390	113	30	661	0	503	756	1,920
28	717	110	517	90	30	336	35	31	717	38	371	634	1,760
Total	13,135	3,294	14,384	2,453		12,641	1,918		13,135	6,996	14,559	30,040	64,730

Col. 2 - 24 hours beginning 1200 of date shown.
Col. 3 - 24 hours ending 2400 one day later.
Col. 4 - 24 hours beginning 1500 one day later.
Col. 5 - 24 hours beginning 0800 of date shown.
Col. 6 - 24 hours beginning 1600 of date shown.

Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1).
Col. 8 = Col. 2 + Col. 3 + Col. 4 - Col. 7.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 = 24 hours of calendar day shown.

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey—continued (River Master daily operation record. No releases from the Excess Release Quantity were made during the report year.)

[Mean discharge in cubic feet per second for 24 hours; Col., Column]

Controlled Releases from New York City Reservoirs					Controlled Releases from Power Reservoirs			Segregation of Flow Delaware River at Montague, New Jersey					
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled Releases			Computed uncontrolled	Total
									New York City Reservoirs		Powerplants		
Date	Amount								Directed	Other			
2002	Col. 1	Col. 2	Col. 3	Col. 4	2002	Col. 5	Col. 6	2002	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11
July 29	779	110	580	90	July 31	351	0	Aug. 1	780	0	351	599	1,730
30	830	110	611	110	Aug. 1	387	0	2	831	0	387	602	1,820
31	856	139	591	125	2	342	0	3	855	0	342	583	1,780
Aug. 1	1,237	159	967	110	3	0	0	4	1,236	0	0	534	1,770
2	1,203	131	1,002	70	4	0	0	5	1,203	0	0	517	1,720
3	1,032	114	843	76	5	205	0	6	1,033	0	205	632	1,870
4	1,020	110	800	110	6	220	0	7	1,020	0	220	540	1,780
5	1,014	110	849	54	7	199	0	8	1,013	0	199	508	1,720
6	1,020	94	873	51	8	199	0	9	1,018	0	199	453	1,670
7	1,069	94	920	53	9	175	0	10	1,067	0	175	438	1,680
8	1,239	94	1,091	53	10	0	43	11	1,238	0	43	369	1,650
9	1,305	94	1,120	90	11	0	0	12	1,304	0	0	346	1,650
10	1,328	102	1,114	110	12	0	53	13	1,326	0	53	301	1,680
11	1,346	124	1,094	127	13	0	89	14	1,345	0	89	296	1,730
12	1,388	158	1,101	125	14	0	35	15	1,384	0	35	311	1,730
13	1,382	159	1,095	125	15	9	0	16	1,379	0	9	402	1,790
14	1,434	159	1,165	110	16	0	0	17	1,434	0	0	446	1,880
15	1,428	139	1,228	90	17	0	0	18	1,428	29	0	343	1,800
16	1,386	110	1,204	70	18	0	0	19	1,384	0	0	316	1,700
17	1,350	110	1,188	53	19	0	0	20	1,351	0	0	379	1,730
18	1,307	94	1,159	53	20	42	0	21	1,306	0	42	382	1,730
19	1,364	94	1,216	53	21	0	124	22	1,363	0	124	333	1,820
20	1,365	94	1,200	70	22	0	35	23	1,364	0	35	321	1,720
21	1,251	110	1,072	70	23	0	74	24	1,252	0	74	384	1,710
22	1,176	110	995	67	24	0	0	25	1,172	0	0	578	1,750
23	1,333	97	1,183	53	25	0	28	26	1,333	0	28	479	1,840
24	549	94	413	51	26	421	0	27	549	9	421	651	1,630
25	841	94	693	53	27	405	0	28	840	0	405	295	1,540
26	871	94	722	53	28	419	0	29	869	0	419	602	1,890
27	896	94	750	53	29	386	0	30	897	0	386	837	2,120
28	676	94	529	53	30	420	0	31	676	0	420	844	1,940
Total	35,275	3,489	29,368	2,431		4,180	481		35,250	38	4,661	14,621	54,570

Col. 2 - 24 hours beginning 1200 of date shown.
Col. 3 - 24 hours ending 2400 one day later.
Col. 4 - 24 hours beginning 1500 one day later.
Col. 5 - 24 hours beginning 0800 of date shown.
Col. 6 - 24 hours beginning 1600 of date shown.

Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1).
Col. 8 = Col. 2 + Col. 3 + Col. 4 - Col. 7.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 = 24 hours of calendar day shown.

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey—continued
(River Master daily operation record. No releases from the Excess Release Quantity were made during the report year.)

[Mean discharge in cubic feet per second for 24 hours; Col., Column]

Controlled Releases from New York City Reservoirs					Controlled Releases from Power Reservoirs			Segregation of Flow Delaware River at Montague, New Jersey					
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled Releases			Computed uncontrolled	Total
									New York City Reservoirs		Power-plants		
Date	Amount								Directed	Other			
2002	Col. 1	Col. 2	Col. 3	Col. 4	2002	Col. 5	Col. 6	2002	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11
Aug. 29	862	94	713	53	Aug. 31	0	0	Sept. 1	860	0	0	540	1,400
30	1,114	94	968	53	Sept. 1	0	0	2	1,115	0	0	455	1,570
31	774	94	627	53	2	414	0	3	774	0	414	482	1,670
Sept. 1	798	94	631	71	3	445	0	4	796	0	445	399	1,640
2	786	94	639	53	4	353	0	5	786	0	353	471	1,610
3	872	70	750	53	5	418	0	6	873	0	418	479	1,770
4	847	70	727	53	6	421	0	7	850	0	421	439	1,710
5	1,279	70	1,157	53	7	0	0	8	1,280	0	0	320	1,600
6	1,337	70	1,176	91	8	4	0	9	1,337	0	4	249	1,590
7	906	110	685	110	9	561	0	10	905	0	561	254	1,720
8	788	130	566	90	10	609	0	11	786	0	609	265	1,660
9	822	130	622	70	11	577	0	12	822	0	577	301	1,700
10	871	130	690	53	12	619	0	13	873	0	619	228	1,720
11	875	71	750	53	13	526	0	14	874	0	526	390	1,790
12	1,056	70	933	53	14	512	0	15	1,056	0	512	322	1,890
13	842	70	719	53	15	516	0	16	842	0	516	802	2,160
14	0	70	251	53	16	477	0	17	0	374	477	1,179	2,030
15	0	70	226	53	17	545	53	18	0	349	598	733	1,680
16	531	70	408	53	18	616	103	19	531	0	719	550	1,800
17	502	70	379	53	19	613	35	20	502	0	648	580	1,730
18	528	70	405	54	20	456	71	21	529	0	527	484	1,540
19	867	70	747	53	21	451	0	22	870	0	451	339	1,660
20	0	70	201	51	22	0	0	23	0	322	0	698	1,020
21	492	70	370	53	23	373	0	24	493	0	373	854	1,720
22	530	70	408	53	24	475	0	25	531	0	475	924	1,930
23	443	70	317	53	25	469	85	26	440	0	554	666	1,660
24	680	70	557	53	26	429	96	27	680	0	525	595	1,800
25	0	70	153	53	27	499	67	28	0	276	566	2,378	3,220
26	0	70	87	53	28	0	0	29	0	210	0	3,290	3,500
27	0	70	45	53	29	0	0	30	0	168	0	2,302	2,470
Total	19,402	2,441	16,907	1,756		11,378	510		19,405	1,699	11,888	21,968	54,960

Col. 2 - 24 hours beginning 1200 of date shown.
Col. 3 - 24 hours ending 2400 one day later.
Col. 4 - 24 hours beginning 1500 one day later.
Col. 5 - 24 hours beginning 0800 of date shown.
Col. 6 - 24 hours beginning 1600 of date shown.

Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1).
Col. 8 = Col. 2 + Col. 3 + Col. 4 - Col. 7.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 = 24 hours of calendar day shown.

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey—continued (River Master daily operation record. No releases from the Excess Release Quantity were made during the report year.)

[Mean discharge in cubic feet per second for 24 hours; Col., Column]

Controlled Releases from New York City Reservoirs					Controlled Releases from Power Reservoirs			Segregation of Flow Delaware River at Montague, New Jersey					
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled Releases			Computed uncontrolled	Total
									New York City Reservoirs		Power-plants		
Date	Amount								Directed	Other			
2002	Col. 1	Col. 2	Col. 3	Col. 4	2002	Col. 5	Col. 6	2002	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11
Sept. 28	0	70	68	53	Sept. 30	0	0	Oct. 1	0	191	0	1,639	1,830
29	0	70	91	43	Oct. 1	36	0	2	0	204	36	1,270	1,510
30	175	65	111	25	2	133	0	3	175	26	133	1,126	1,460
Oct. 1	279	45	207	25	3	277	35	4	277	0	312	1,011	1,600
2	543	45	473	25	4	367	35	5	543	0	402	1,105	2,050
3	411	45	343	25	5	416	53	6	413	0	469	1,128	2,010
4	452	45	384	25	6	416	7	7	454	0	423	1,003	1,880
5	567	45	500	25	7	415	35	8	570	0	450	950	1,970
6	516	45	447	25	8	395	32	9	517	0	427	886	1,830
7	613	45	541	25	9	434	35	10	611	0	469	790	1,870
8	671	45	602	25	10	453	32	11	672	0	485	1,163	2,320
9	662	45	593	25	11	464	0	12	663	0	464	6,903	8,030
10	398	45	328	25	12	0	0	13	398	0	0	12,102	12,500
11	0	45	46	25	13	0	0	14	0	116	0	8,784	8,900
12	0	45	46	25	14	0	106	15	0	116	106	6,098	6,320
13	0	45	46	25	15	0	383	16	0	116	383	5,031	5,530
14	0	45	46	25	16	0	546	17	0	116	546	18,338	19,000
15	0	46	46	25	17	0	553	18	0	117	553	16,330	17,000
16	0	45	45	25	18	0	649	19	0	115	649	10,236	11,000
17	0	45	46	25	19	0	660	20	0	116	660	7,494	8,270
18	0	46	48	25	20	0	440	21	0	119	440	6,061	6,620
19	0	46	46	25	21	0	443	22	0	117	443	4,910	5,470
20	0	46	46	25	22	0	482	23	0	117	482	4,091	4,690
21	0	46	48	25	23	0	106	24	0	119	106	3,585	3,810
22	0	46	48	25	24	0	245	25	0	119	245	3,256	3,620
23	0	45	48	25	25	11	422	26	0	118	433	3,479	4,030
24	0	45	48	25	26	41	436	27	0	118	477	5,845	6,440
25	0	45	46	26	27	0	326	28	0	117	326	5,137	5,580
26	0	48	50	25	28	0	284	29	0	123	284	4,253	4,660
27	0	46	46	25	29	0	280	30	0	117	280	3,783	4,180
28	0	46	46	25	30	0	280	31	0	117	280	3,443	3,840
Total	5,287	1,476	5,529	822		3,858	6,905		5,293	2,534	10,763	151,230	169,820

Col. 2 - 24 hours beginning 1200 of date shown.
Col. 3 - 24 hours ending 2400 one day later.
Col. 4 - 24 hours beginning 1500 one day later.
Col. 5 - 24 hours beginning 0800 of date shown.
Col. 6 - 24 hours beginning 1600 of date shown.

Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1).
Col. 8 = Col. 2 + Col. 3 + Col. 4 - Col. 7.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 = 24 hours of calendar day shown.

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey—continued
(River Master daily operation record. No releases from the Excess Release Quantity were made during the report year.)

[Mean discharge in cubic feet per second for 24 hours; Col., Column]

Controlled Releases from New York City Reservoirs					Controlled Releases from Power Reservoirs			Segregation of Flow Delaware River at Montague, New Jersey					
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled Releases			Computed uncontrolled	Total
									New York City Reservoirs		Power-plants		
Date	Amount								Directed	Other			
2002	Col. 1	Col. 2	Col. 3	Col. 4	2002	Col. 5	Col. 6	2002	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11
Oct. 29	0	46	46	25	Oct. 31	0	312	Nov. 1	0	117	312	3,141	3,570
30	0	46	46	25	Nov. 1	0	411	2	0	117	411	2,952	3,480
31	0	46	46	25	2	0	426	3	0	117	426	2,767	3,310
Nov. 1	0	46	46	25	3	0	301	4	0	117	301	2,602	3,020
2	0	46	46	25	4	4	234	5	0	117	238	2,455	2,810
3	0	46	46	25	5	2	14	6	0	117	16	2,827	2,960
4	0	48	56	25	6	0	348	7	0	129	348	3,873	4,350
5	0	48	56	25	7	52	85	8	0	129	137	3,954	4,220
6	0	46	45	25	8	131	362	9	0	116	493	3,181	3,790
7	0	46	46	25	9	0	0	10	0	117	0	3,063	3,180
8	0	46	46	25	10	0	50	11	0	117	50	2,933	3,100
9	0	46	46	25	11	0	174	12	0	117	174	2,899	3,190
10	0	46	46	25	12	0	142	13	0	117	142	4,221	4,480
11	0	46	46	25	13	30	124	14	0	117	154	5,469	5,740
12	0	46	46	25	14	0	0	15	0	117	0	4,873	4,990
13	0	46	46	25	15	0	426	16	0	117	426	4,317	4,860
14	0	46	46	25	16	0	284	17	0	117	284	8,079	8,480
15	0	46	46	25	17	0	560	18	0	117	560	14,423	15,100
16	0	46	45	25	18	247	911	19	0	116	1,158	12,926	14,200
17	0	46	46	25	19	174	975	20	0	117	1,149	10,134	11,400
18	0	46	46	25	20	203	965	21	0	117	1,168	8,715	10,000
19	0	46	45	25	21	174	851	22	0	116	1,025	8,389	9,530
20	0	46	45	25	22	202	851	23	0	116	1,053	9,531	10,700
21	0	46	45	25	23	135	851	24	0	116	986	9,598	10,700
22	0	46	46	25	24	275	567	25	0	117	842	8,281	9,240
23	0	46	46	25	25	524	422	26	0	117	946	6,997	8,060
24	0	46	46	25	26	527	426	27	0	117	953	6,300	7,370
25	0	46	46	25	27	510	426	28	0	117	936	5,627	6,680
26	0	46	46	25	28	248	53	29	0	117	301	5,242	5,660
27	0	46	46	25	29	221	53	30	0	117	274	4,779	5,170
Total	0	1,384	1,395	750		3,659	11,604		0	3,529	15,263	174,548	193,340

Col. 2 - 24 hours beginning 1200 of date shown.
Col. 3 - 24 hours ending 2400 one day later.
Col. 4 - 24 hours beginning 1500 one day later.
Col. 5 - 24 hours beginning 0800 of date shown.
Col. 6 - 24 hours beginning 1600 of date shown.

Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1).
Col. 8 = Col. 2 + Col. 3 + Col. 4 - Col. 7.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 = 24 hours of calendar day shown.

Table 10. Diversions to New York City water supply
Million gallons per day for 24 hour period beginning 0800 local time
(River Master daily operation record)

Date 2001	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average Dec. 1, 2001 to date	Date 2002	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average Dec. 1, 2001 to date
Dec. 1	497	0	0	497	Jan. 1	345	0	156	390
2	497	0	0	497	2	343	0	146	393
3	497	0	0	497	3	350	0	137	396
4	495	0	0	497	4	316	0	160	398
5	497	0	0	497	5	295	0	91	398
6	497	0	0	497	6	311	0	91	398
7	496	0	0	497	7	301	0	93	398
8	495	0	0	496	8	294	0	79	397
9	495	0	0	496	9	301	0	143	398
10	495	0	0	496	10	301	0	105	398
11	497	0	0	496	11	407	0	104	401
12	497	0	0	496	12	0	0	0	392
13	498	0	0	496	13	19	0	0	383
14	497	0	0	496	14	282	0	0	381
15	0	0	91	469	15	286	0	0	379
16	18	0	88	447	16	278	0	0	377
17	280	0	95	442	17	286	0	0	375
18	280	0	81	438	18	278	0	0	373
19	290	0	107	436	19	0	0	96	367
20	281	0	109	434	20	0	0	95	362
21	259	0	125	431	21	279	0	110	363
22	0	0	96	416	22	288	0	104	363
23	18	0	100	403	23	236	0	90	362
24	275	0	93	402	24	307	0	93	363
25	279	0	97	400	25	298	0	87	364
26	273	0	94	399	26	0	0	103	359
27	278	0	137	400	27	0	0	107	355
28	260	0	81	398	28	269	0	102	355
29	0	0	147	389	29	280	0	82	355
30	54	0	149	383	30	234	0	54	354
31	342	0	148	386	31	324	199	160	359
Total	10,137	0	1,838			7,508	199	2,588	

Table 10. Diversions to New York City water supply—continued
Million gallons per day for 24 hour period beginning 0800 local time
(River Master daily operation record)

Date 2002	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average Dec. 1, 2001 to date	Date 2002	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average Dec. 1, 2001 to date
Feb. 1	298	201	110	363	Mar. 1	283	288	0	420
2	0	13	93	359	2	174	147	86	420
3	37	0	92	356	3	0	290	86	419
4	234	200	162	359	4	57	290	99	420
5	301	200	181	364	5	57	290	103	420
6	263	201	255	369	6	30	290	102	420
7	303	18	191	371	7	169	290	106	421
8	305	0	178	373	8	95	289	86	422
9	304	0	193	375	9	0	298	140	422
10	301	0	193	376	10	34	298	100	422
11	181	199	161	379	11	133	298	97	423
12	299	200	207	383	12	154	299	101	424
13	337	200	192	388	13	113	299	105	425
14	355	201	155	392	14	0	299	130	425
15	327	200	100	395	15	0	299	55	425
16	302	200	97	398	16	0	299	97	424
17	306	200	107	400	17	36	299	117	425
18	302	200	107	403	18	233	299	103	427
19	309	275	70	406	19	230	299	99	429
20	314	299	85	410	20	185	299	102	430
21	293	264	0	411	21	52	299	94	430
22	203	268	0	412	22	120	298	113	431
23	192	268	0	413	23	0	298	95	431
24	217	259	0	413	24	58	299	105	431
25	280	229	0	414	25	177	298	106	432
26	280	230	0	416	26	176	299	136	434
27	278	230	0	417	27	151	299	101	435
28	280	282	0	418	28	0	298	67	434
					29	0	285	92	434
					30	0	204	0	432
					31	36	200	0	430
Total	7,401	5,037	2,929			2,753	8,836	2,823	

Table 10. Diversions to New York City water supply—continued
Million gallons per day for 24 hour period beginning 0800 local time
(River Master daily operation record)

Date 2002	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average Dec. 1, 2001 to date	Date 2002	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average Dec. 1, 2001 or May 26, 2002 to date
Apr. 1	281	200	0	431	May 1	0	0	161	435
2	280	199	0	431	2	0	230	0	434
3	279	200	0	431	3	0	272	0	433
4	282	200	0	432	4	0	268	0	432
5	243	200	0	432	5	0	267	0	431
6	0	153	0	430	6	0	250	0	430
7	36	209	0	428	7	0	284	0	429
8	282	210	0	429	8	0	298	0	428
9	301	209	0	429	9	174	298	86	429
10	278	210	0	430	10	293	297	97	430
11	282	209	0	430	11	0	296	98	430
12	224	209	0	430	12	20	296	100	430
13	0	271	51	429	13	159	296	35	430
14	38	271	49	429	14	0	296	0	430
15	282	272	0	430	15	0	297	0	429
16	282	252	49	431	16	0	297	0	428
17	286	227	80	432	17	0	297	0	427
18	273	293	112	434	18	0	297	0	426
19	249	299	8	435	19	0	297	0	426
20	0	301	5	434	20	0	297	0	425
21	24	301	0	433	21	0	296	0	424
22	148	300	42	433	22	0	296	0	423
23	126	301	130	434	23	0	296	0	423
24	125	299	180	436	24	0	297	0	422
25	282	298	264	438	25	0	297	0	421
26	39	197	0	437	26	0	297	0	297
27	255	279	0	438	27	0	297	0	297
28	251	282	0	438	28	0	297	0	297
29	302	282	0	439	29	0	471	0	340
30	0	1	127	437	30	0	489	0	370
					31	0	489	0	390
Total	5,730	7,134	1,097			646	9,252	577	

Table 10. Diversions to New York City water supply—continued
Million gallons per day for 24 hour period beginning 0800 local time
(River Master daily operation record)

Date 2002	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2002 to date	Date 2002	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2002 to date
June 1	0	490	0	490	July 1	282	297	150	519
2	0	490	0	490	2	281	297	119	524
3	0	490	0	490	3	284	297	151	530
4	0	490	0	490	4	453	297	96	540
5	0	490	0	490	5	453	297	120	549
6	0	491	0	490	6	453	296	117	558
7	0	491	0	490	7	452	296	121	566
8	0	491	0	490	8	453	297	153	575
9	0	492	0	491	9	454	297	180	584
10	0	492	0	491	10	453	297	48	590
11	0	493	0	491	11	453	297	127	597
12	0	493	0	491	12	453	298	208	605
13	0	493	0	491	13	453	298	130	612
14	0	395	0	484	14	453	298	50	616
15	0	298	0	472	15	454	298	145	622
16	0	298	0	461	16	453	298	159	629
17	0	298	0	451	17	454	297	228	636
18	0	423	0	450	18	454	297	160	642
19	0	494	0	452	19	453	253	213	647
20	0	494	0	454	20	453	298	95	651
21	127	494	0	462	21	453	298	55	654
22	0	494	79	467	22	454	298	242	661
23	22	494	10	470	23	452	298	259	667
24	212	494	117	485	24	452	274	0	669
25	168	494	148	498	25	452	297	11	670
26	175	494	121	509	26	451	288	27	672
27	19	494	121	513	27	451	297	0	673
28	261	304	114	519	28	451	297	0	675
29	0	297	94	515	29	454	297	69	677
30	18	298	96	512	30	451	297	96	680
					31	452	297	94	682
Total	1,002	13,443	900			13,524	9,138	3,623	

Table 10. Diversions to New York City water supply—continued
Million gallons per day for 24 hour period beginning 0800 local time
(River Master daily operation record)

Date 2002	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2002 to date	Date 2002	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2002 to date
Aug. 1	452	297	145	686	Sept. 1	450	198	0	728
2	139	91	35	679	2	450	197	0	727
3	131	96	0	672	3	450	197	0	727
4	450	298	96	675	4	450	197	0	726
5	452	298	239	680	5	450	197	0	725
6	451	297	0	681	6	449	198	0	724
7	451	297	97	683	7	449	198	52	724
8	455	298	147	686	8	449	198	186	725
9	453	297	168	689	9	449	197	163	726
10	453	297	96	692	10	450	196	136	726
11	453	298	96	694	11	450	195	51	726
12	452	298	194	697	12	449	45	54	724
13	450	298	205	701	13	449	14	56	722
14	450	298	179	704	14	449	196	105	723
15	450	297	175	707	15	450	197	106	723
16	452	297	183	709	16	500	197	84	724
17	452	297	61	711	17	354	108	91	722
18	452	297	82	712	18	502	0	122	721
19	452	299	182	715	19	501	0	115	720
20	451	298	177	718	20	501	0	134	719
21	450	298	207	721	21	501	0	102	718
22	452	297	146	723	22	502	0	98	717
23	450	297	150	725	23	503	0	103	716
24	449	297	95	726	24	500	0	87	715
25	450	297	95	727	25	501	0	114	714
26	450	297	115	729	26	501	0	100	713
27	449	296	110	730	27	500	0	108	713
28	450	296	116	732	28	500	0	107	712
29	450	204	0	731	29	500	0	107	711
30	450	197	0	730	30	500	0	110	710
31	450	197	0	729					
Total	13,351	8,516	3,591			14,109	2,925	2,491	

Table 10. Diversions to New York City water supply—continued
Million gallons per day for 24 hour period beginning 0800 local time
(River Master daily operation record)

Date 2002	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2002 to date	Date 2002	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2002 to date
Oct. 1	500	0	107	709	Nov. 1	225	296	0	645
2	500	0	164	709	2	0	296	0	642
3	499	0	71	708	3	0	296	0	640
4	500	0	80	707	4	0	296	0	638
5	500	0	42	705	5	0	297	0	636
6	500	0	71	704	6	0	296	0	634
7	500	0	106	704	7	0	296	0	632
8	500	0	74	703	8	0	296	124	630
9	500	0	95	702	9	300	0	173	629
10	500	0	162	701	10	300	0	188	628
11	500	0	134	701	11	300	0	151	627
12	500	0	88	700	12	321	0	146	626
13	500	0	87	699	13	300	0	157	625
14	500	0	88	698	14	300	0	116	624
15	160	0	0	694	15	300	0	110	623
16	0	0	0	689	16	300	0	169	622
17	0	0	0	684	17	283	0	144	621
18	0	0	0	680	18	300	0	138	620
19	0	0	0	675	19	303	0	170	619
20	0	0	0	670	20	300	0	84	618
21	0	0	0	665	21	305	0	218	617
22	0	0	0	661	22	305	0	181	616
23	0	0	0	656	23	0	0	0	613
24	113	269	0	654	24	0	0	0	609
25	263	296	0	654	25	0	0	0	606
26	0	308	0	651	26	0	0	0	602
27	0	296	0	649	27	0	0	0	599
28	224	296	0	648	28	0	0	0	596
29	229	296	0	647	29	0	0	0	593
30	224	296	0	646	30	0	0	0	589
31	213	296	0	645					
Total	8,425	2,353	1,369			4,442	2,369	2,269	

Table 11. Daily mean discharge, East Branch Delaware River at Downsville, New York (station number 01417000) for year ending November 30, 2002 (U.S. Geological Survey published record)

[All values except total in cubic feet per second, ft^3/s; total in cubic feet per second days, (ft^3/s)-d]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	195	7.3	6.2	6.5	7.1	19	21	121	139	82	51	43
2	39	7.3	6.0	6.6	7.0	20	21	121	137	82	46	43
3	39	7.3	6.1	7.0	7.0	20	21	121	118	70	45	43
4	39	7.3	6.1	6.7	6.9	20	21	112	103	59	45	43
5	38	7.3	6.1	6.7	6.8	20	21	95	102	62	44	43
6	113	7.5	6.1	6.8	6.5	20	22	87	93	63	44	43
7	145	7.5	6.1	6.8	6.5	20	22	87	87	83	44	43
8	37	7.3	6.1	6.8	15	20	21	87	87	112	44	43
9	161	7.3	6.1	6.8	20	20	21	99	87	120	44	43
10	192	7.0	6.5	6.9	20	20	21	90	87	119	44	43
11	42	6.5	7.2	6.8	20	20	31	90	102	90	45	43
12	42	6.5	6.7	6.8	20	20	73	89	137	60	45	44
13	36	6.4	6.7	6.8	20	20	89	87	145	62	45	43
14	30	6.3	6.5	6.8	20	20	90	87	144	63	45	42
15	30	6.3	6.5	6.8	21	20	90	95	135	63	45	42
16	30	6.3	6.5	7.0	19	20	90	111	110	63	44	42
17	31	6.3	6.5	6.8	21	20	90	119	95	63	43	43
18	31	6.3	6.5	6.9	21	21	90	119	88	63	43	42
19	22	6.3	6.5	7.0	20	21	92	111	82	63	43	41
20	8.1	6.3	6.6	7.1	20	21	90	95	84	63	43	44
21	7.9	6.1	6.8	7.1	20	21	90	97	92	63	42	41
22	7.8	5.8	6.7	7.0	20	21	90	103	98	65	42	41
23	7.8	5.8	6.6	7.0	20	21	90	98	93	65	43	41
24	7.8	6.0	6.5	7.1	20	21	90	86	83	65	43	41
25	7.8	5.9	6.5	6.8	20	21	98	87	80	65	43	41
26	7.7	5.8	6.5	7.0	19	21	109	87	80	65	43	41
27	7.6	5.8	6.7	7.3	19	21	103	102	81	65	43	40
28	7.5	5.8	6.6	7.0	20	21	90	101	82	65	43	40
29	7.4	5.8		7.0	19	21	94	101	82	64	43	40
30	7.3	6.2		7.0	19	21	111	100	82	63	43	40
31	7.3	6.1		7.0		21		117	82		43	
Total	1,384	202	180	214	501	633	2,002	3,102	3,097	2,150	1,363	1,262
Mean	44.6	6.51	6.45	6.89	16.7	20.4	66.7	100	99.9	71.7	44.0	42.1

Year total 16,090 (ft^3/s)-d

Mean 44.1 ft^3/s

Table 12. Daily mean discharge, West Branch Delaware River at Stilesville, New York (station number 01425000) for year ending November 30, 2002 (U.S. Geological Survey published record)

[All values except total in cubic feet per second, ft^3/s; total in cubic feet per second days, (ft^3/s)-d]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	45	8.3	15	9.9	15	32	49	425	626	646	130	49
2	18	8.3	14	9.8	14	33	38	526	1,050	657	220	50
3	17	8.3	13	11	13	31	35	523	1,090	666	503	49
4	16	8.4	13	10	13	31	34	375	929	799	389	49
5	13	8.5	12	11	12	31	36	455	884	775	414	52
6	43	8.6	12	10	12	31	41	334	935	1,210	522	68
7	54	9.1	12	9.9	12	31	45	422	961	1,220	469	51
8	53	8.6	12	9.8	12	29	40	425	1,010	711	560	50
9	23	8.7	12	9.9	12	30	37	336	1,180	580	617	50
10	40	8.7	14	10	12	29	35	296	1,200	642	600	51
11	36	8.8	21	11	11	29	74	248	1,200	719	371	51
12	33	8.7	15	10	11	30	168	562	1,180	794	90	52
13	46	8.6	13	10	12	35	148	548	1,190	972	60	53
14	17	9.8	15	9.9	12	39	84	326	1,190	748	54	52
15	8.2	8.7	14	9.8	13	35	73	324	1,240	288	50	52
16	8.0	8.6	13	11	20	33	69	419	1,290	264	50	54
17	9.1	8.7	13	10	29	32	70	414	1,260	404	50	57
18	13	8.8	13	10	29	39	82	427	1,250	384	50	58
19	9.9	9.0	12	10	29	36	85	771	1,220	407	52	57
20	9.5	8.8	23	11	29	34	130	817	1,280	765	50	56
21	9.1	8.7	13	11	29	33	227	592	1,260	241	50	56
22	8.8	8.8	12	11	29	32	247	521	1,140	388	54	56
23	8.6	8.8	11	10	29	32	246	669	1,060	413	54	56
24	9.0	9.7	11	11	29	31	243	462	1,260	345	54	56
25	8.7	10	10	11	30	31	254	513	449	552	54	56
26	8.5	9.9	10	15	29	31	289	1,010	730	215	52	56
27	8.4	9.9	10	23	29	31	330	903	768	120	56	56
28	8.5	9.9	10	17	33	32	290	486	800	70	50	56
29	8.5	10		15	35	31	241	574	570	80	50	56
30	8.4	13		15	34	33	330	601	750	110	50	56
31	8.3	14		15		42		635	1,020		49	
Total	606	287	368	358	628	1,009	4,070	15,939	31,972	16,185	5,874	1,621
Mean	19.6	9.25	13.1	11.5	20.9	32.5	136	514	1,031	540	189	54.0

Year total 78,917 (ft^3/s)-d

Mean 216 ft^3/s

Table 13. Daily mean discharge, Neversink River at Neversink, New York (station number 01436000) for year ending November 30, 2002

[All values except total in cubic feet per second, ft^3/s; total in cubic feet per second days, (ft^3/s)-d]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	16	4.7	5.1	5.1	5.2	15	15	116	119	58	56	27
2	10	4.7	5.0	5.1	5.3	16	14	116	122	63	50	25
3	10	4.7	5.1	5.3	5.3	14	15	103	98	66	51	25
4	10	4.7	5.1	5.1	5.2	14	15	81	78	59	51	25
5	10	4.7	5.0	5.2	5.3	14	16	71	97	59	50	25
6	12	4.6	5.0	5.2	5.0	14	16	72	94	59	51	25
7	19	4.6	5.0	5.2	5.2	14	16	80	56	72	50	25
8	21	4.6	5.0	5.1	11	15	16	91	55	98	51	25
9	18	4.6	5.0	5.2	14	15	16	81	60	102	51	25
10	14	4.5	5.1	5.1	14	14	25	67	74	87	51	25
11	19	4.4	5.2	5.1	14	14	29	61	100	69	51	25
12	9.6	4.4	5.1	5.2	14	16	45	62	116	61	51	26
13	9.7	4.4	5.0	5.2	14	16	55	66	125	62	51	25
14	9.8	4.4	5.0	5.2	14	15	57	74	125	62	51	25
15	9.4	4.4	5.0	5.2	14	14	57	74	119	62	51	25
16	9.6	4.6	5.0	5.2	14	15	58	81	104	62	52	25
17	9.7	5.0	5.0	5.2	14	15	57	93	86	62	52	26
18	9.5	5.0	5.0	5.4	14	15	57	96	69	62	52	25
19	8.3	5.0	5.0	5.2	14	15	57	90	61	63	52	26
20	4.8	5.0	5.0	5.4	14	16	58	78	61	64	51	26
21	4.6	5.0	5.0	5.3	14	15	68	86	66	62	53	26
22	4.8	5.0	5.0	5.0	14	15	75	97	72	62	50	26
23	4.9	5.0	5.0	5.2	14	15	76	89	68	62	35	25
24	4.9	5.0	5.0	5.2	14	15	74	72	70	63	27	26
25	4.9	5.0	5.0	5.3	14	16	80	64	57	62	26	26
26	4.9	5.0	5.0	5.7	14	16	90	70	58	67	25	26
27	4.9	5.0	5.1	5.8	15	16	83	86	59	71	25	26
28	4.9	5.0	5.0	5.4	16	16	72	98	59	70	25	26
29	4.8	5.0		5.4	15	16	75	97	59	70	25	26
30	4.7	5.0		5.4	15	15	96	97	59	70	26	26
31	4.7	5.1		5.4		15		103	58		30	
Total	292	148	141	163	360	466	1,483	2,612	2,504	2,011	1,373	765
Mean	9.43	4.78	5.03	5.26	12.0	15.0	49.4	84.3	80.8	67.0	44.3	25.5

Year total 12,319 (ft^3/s)-d

Mean 33.8 ft^3/s

Table 14. Daily mean discharge, Wallenpaupack Creek at Wilsonville, Pennsylvania (station number 01432000) for year ending November 30, 2002 (Record furnished by PPL Corporation)

[All values except total in cubic feet per second, ft^3/s; total in cubic feet per second days, (ft^3/s)-d]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	0	0	140	170	35	1,720	0	569	387	0	0	0
2	0	174	0	0	409	1,720	0	604	342	414	133	0
3	0	196	0	0	402	1,130	696	585	0	445	313	0
4	0	177	0	0	391	0	699	405	0	353	367	4.0
5	0	0	0	0	349	0	671	555	205	418	416	2.0
6	0	0	0	0	0	448	846	410	220	421	416	0
7	168	139	0	0	0	440	1,180	383	199	0	415	0
8	0	0	0	0	476	357	69	502	199	0	395	183
9	0	0	0	0	534	402	0	499	175	494	434	0
10	0	0	0	0	510	470	1,220	666	0	539	453	0
11	0	0	0	0	514	0	1,410	537	0	653	464	0
12	221	0	0	0	496	0	1,220	507	0	580	0	0
13	123	0	0	17	0	605	853	0	0	631	0	30
14	132	0	16	0	0	1,690	1,080	0	0	512	0	0
15	0	0	0	0	330	1,720	0	630	9.0	435	0	0
16	0	0	0	0	341	1,720	0	525	0	472	0	0
17	0	0	0	20	370	1,720	671	574	0	525	0	0
18	0	0	0	0	406	813	681	529	0	626	0	247
19	0	0	0	0	391	1,720	550	620	0	635	0	174
20	0	0	0	0	0	1,030	490	334	42	533	0	203
21	0	121	0	0	0	449	611	251	0	451	0	174
22	0	175	0	0	543	427	0	407	0	0	0	202
23	0	159	0	0	664	483	211	383	0	312	0	135
24	0	169	0	0	682	1,210	619	506	0	491	0	211
25	0	168	0	0	682	275	526	433	0	492	0	524
26	0	0	0	0	672	0	626	360	421	426	52	522
27	0	0	0	0	0	0	525	0	405	531	0	583
28	0	169	0	15	0	893	577	0	419	0	0	248
29	0	0		0	1,500	1,460	0	390	386	0	0	221
30	0	0		0	1,680	1,720	0	336	420	0	0	236
31	0	0		0		1,630		351	0		0	
Total	644	1,647	156	222	12,377	26,252	16,031	12,851	3,829	11,389	3,858	3,899
Mean	20.8	53.1	5.57	7.16	413	847	534	415	124	380	124	130

Year total 93,155 (ft^3/s)-d

Mean 255 ft^3/s

Table 15. Daily mean discharge, Delaware River at Montague, New Jersey (station number 01438500) for year ending November 30, 2002 (U.S. Geological Survey published record)

[All values except total in cubic feet per second, ft^3/s; total in cubic feet per second days, (ft^3/s)-d; e, estimated]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	1,520	1,460	6,800	2,250	8,570	12,100	8,150	2,460	1,740	1,360	1,800	3,580
2	2,090	1,380	6,670	2,080	8,150	10,900	8,260	3,240	1,820	1,540	1,460	3,480
3	2,290	1,650	6,350	2,190	6,820	12,200	6,190	3,250	1,770	1,670	1,410	3,320
4	1,710	1,630	5,000	2,750	6,240	9,330	5,510	2,750	1,750	1,650	1,560	3,020
5	1,470	1,510	4,360	3,110	5,810	7,450	4,980	2,520	1,720	1,610	2,030	2,810
6	1,350	1,370	3,750	2,610	4,890	6,490	6,520	2,420	1,900	1,790	1,990	2,960
7	1,260	1,340	3,320	2,430	4,100	5,820	18,400	2,100	1,800	1,740	1,850	4,360
8	1,430	1,440	2,950	2,310	3,820	5,240	18,800	1,960	1,720	1,620	1,960	4,230
9	1,320	1,150	2,680	2,180	4,030	5,020	11,700	2,080	1,670	1,600	1,830	3,800
10	1,270	1,400	2,490	2,290	4,060	5,010	9,260	2,210	1,680	1,750	1,890	3,180
11	1,180	1,430	3,340	2,520	3,940	4,590	8,590	2,260	1,640	1,680	2,410	3,100
12	1,240	1,410	8,320	2,680	3,790	3,950	7,010	1,940	1,630	1,730	8,080	3,190
13	1,400	1,360	6,450	2,410	3,290	6,960	6,430	1,800	1,680	1,760	12,600	4,480
14	1,260	1,240	4,960	2,380	2,810	23,800	6,330	1,440	1,740	1,830	8,980	5,750
15	1,580	1,370	3,950	2,340	4,250	20,500	8,790	1,510	1,740	1,940	6,490	5,000
16	2,010	1,180	3,710	2,380	6,480	14,700	10,000	1,950	1,830	2,230	5,700	4,870
17	2,110	1,120	3,310	2,470	6,050	11,300	9,320	1,800	1,930	2,090	19,000	8,490
18	2,240	1,010	3,070	2,670	5,420	11,500	7,770	1,950	1,840	1,680	17,100	15,100
19	5,160	1,070	2,740	2,530	4,960	17,300	6,710	1,830	1,730	1,810	10,900	14,200
20	4,750	951	2,490	2,600	4,310	13,500	5,960	1,940	1,770	1,730	8,230	11,300
21	3,810	943	2,470	3,070	3,680	10,400	5,220	1,960	1,770	1,540	6,590	9,970
22	3,270	1,080	2,710	3,720	3,390	8,650	4,500	1,930	1,820	1,680	5,480	9,540
23	2,720	1,340	3,000	3,870	3,790	7,340	3,680	1,960	1,700	1,030	4,700	10,700
24	2,460	1,340	2,710	3,410	3,600	6,740	3,780	2,010	1,670	1,770	3,820	10,700
25	2,370	1,390	2,440	3,370	3,500	6,400	4,060	2,200	1,720	2,000	3,620	9,250
26	2,360	1,650	2,330	3,490	4,230	4,750	4,000	1,990	1,810	1,700	4,050	8,070
27	2,000	2,210	2,320	8,860	4,540	4,540	4,320	1,710	1,590	1,870	6,420	7,390
28	1,930	2,250	2,280	14,200	4,350	4,600	4,130	1,770	1,490	3,380	5,600	6,690
29	1,920	2,490		11,200	12,200	12,100	3,720	1,810	1,870	3,700	4,670	5,680
30	1,930	2,740		9,520	14,200	10,500	2,650	1,950	2,120	2,630	4,190	5,180
31	1,900	5,260		9,060		8,020		1,780	1,920		3,850	
Total	65,310	49,164	106,970	122,950	159,270	291,700	214,740	64,480	54,580	56,110	170,260	193,390
Mean	2,107	1,586	3,820	3,966	5,309	9,410	7,158	2,080	1,761	1,870	5,492	6,446

Year total 1,548,924 (ft^3/s)-d

Mean 4,244 ft^3/s

Table 16. Diversions by New Jersey; daily mean discharge, Delaware and Raritan Canal at Port Mercer, New Jersey (station number 01460440) for year ending November 30, 2002
(U.S. Geological Survey published record)

[All data except total in million gallons per day, Mgal/d; total in Million gallons, Mgal; e, estimated]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	e55	e59	65	63	56	53	92	93	94	e78	e95	89
2	e55	e58	65	64	61	59	92	94	91	84	e97	89
3	e54	e58	64	61	59	54	91	87	91	93	e100	91
4	e54	e57	64	60	63	63	90	94	93	96	e96	93
5	e54	e56	63	61	64	57	93	92	96	95	e95	94
6	e56	e56	63	61	65	64	91	89	99	95	94	95
7	e57	74	64	65	64	64	77	96	96	e94	97	84
8	e57	70	64	67	63	66	90	98	92	e94	96	93
9	e58	71	62	62	63	65	91	96	73	e96	95	94
10	e59	68	63	63	65	57	90	97	66	e97	98	95
11	e58	56	63	65	65	64	90	95	73	e97	e84	97
12	e57	49	62	65	67	68	91	96	78	e95	e78	95
13	e56	58	63	67	64	61	86	96	88	e96	e90	84
14	e54	59	62	66	64	60	86	98	92	e97	e94	88
15	e58	57	62	65	57	66	86	96	91	e87	94	90
16	e58	57	62	67	46	58	88	93	94	e89	94	93
17	e61	59	62	66	58	62	90	95	96	e90	92	69
18	e65	60	63	64	64	33	90	93	96	97	93	71
19	e68	55	63	63	62	54	89	93	100	99	93	89
20	e68	60	63	49	66	64	89	93	97	e97	95	93
21	e64	61	65	47	65	67	90	96	96	e97	95	95
22	e59	58	64	59	65	67	91	100	94	e98	96	93
23	e61	59	64	58	66	66	92	97	98	e93	96	89
24	e63	62	65	61	66	61	92	96	88	e93	95	92
25	e63	64	64	66	66	66	91	96	88	e90	95	94
26	e63	61	63	65	63	66	90	94	95	e89	82	96
27	e62	60	62	56	66	82	89	97	96	94	90	96
28	e61	61	63	60	51	96	89	97	94	88	90	94
29	e61	62		61	52	96	92	97	91	e95	90	94
30	e61	64		59	60	93	95	96	93	e94	89	95
31	e61	65		64		91		95	97		89	
Total	1,841	1,874	1,772	1,920	1,856	2,043	2,693	2,945	2,826	2,797	2,877	2,724
Mean	59.4	60.5	63.3	61.9	61.9	65.9	89.8	95.0	91.2	93.2	92.8	90.8

Year total 28,168 Mgal

Mean 77.2 Mgal/d

QUALITY OF WATER IN THE DELAWARE ESTUARY

Introduction

This section describes the water-quality monitoring program for the Delaware Estuary during the River Master 2002 report year, December 1, 2001, to November 30, 2002. This program is conducted by the USGS, in cooperation with the DRBC. Selected data collected for this program are presented and water-quality conditions are summarized. The DRBC and others use these data to assess water-quality conditions and track the movement of the "salt front" in the Delaware Estuary.

Water-Quality Monitoring Program

As part of a long-term program, the quality of water in the Delaware Estuary between Trenton, New Jersey, and Reedy Island Jetty, Delaware, is monitored at various locations (fig. 6). Data on water temperature, specific conductance, dissolved oxygen, and pH were collected by electronic instruments at four sites—Trenton, Benjamin Franklin Bridge (Philadelphia), Chester, and Reedy Island Jetty. Data on water temperature and specific conductance were collected in the same manner at Fort Mifflin. Water-quality monitors at these locations were operated continuously throughout the report year.

Water-quality data were collected on a monthly basis in March, June, July, and October, and on a semi-monthly basis in April, May, August, and September 2002 at 19 sites between Biles Channel and Mahon River (sample sites A-T on fig. 6). These data were collected by the State of Delaware for the DRBC. At each of these sites, water samples were collected near the center of the channel and analyzed for selected physical properties and chemical constituents including temperature, chloride, alkalinity, specific conductance, dissolved oxygen, pH, nutrients, and trace metals. These analyses consist of field measurements and laboratory determinations.

From March to October, water-quality data were obtained on a monthly basis at three additional sites in lower Delaware Bay (sites U-W on fig. 6). Water samples were analyzed for selected physical properties and chemical constituents.

Data obtained from the water-quality monitors are processed and stored in the USGS National Water Information System data base. These data are published annually by the USGS in water resources data reports for New Jersey and Pennsylvania. Water-quality data for the other sampling sites are not presented in this report but are available from DRBC and STORET, an environmental-quality database operated by the U.S. Environmental Protection Agency.

Water Quality During the 2002 Report Year

Streamflow

Streamflow has a major effect on the quality of water in the Delaware Estuary. High freshwater flows commonly result in improved water quality by limiting the upstream movement of seawater and reducing the concentration of dissolved substances. High flows also aid in maintaining lower water temperatures during warm weather and in supporting higher concentrations of dissolved oxygen. Under certain conditions, however, high streamflows can transport large quantities of nutrients to the estuary, which may result in algal blooms.

Streamflow from the Delaware River Basin above Trenton, New Jersey, is the major source of freshwater inflow to the Delaware Estuary. During the report year, monthly mean streamflow measured at the USGS gaging station Delaware River at Trenton, New Jersey, was highest during May 2002 (20,240 ft^3/s) and lowest during August (3,253 ft^3/s; table 17). Monthly mean streamflows were greater than long-term

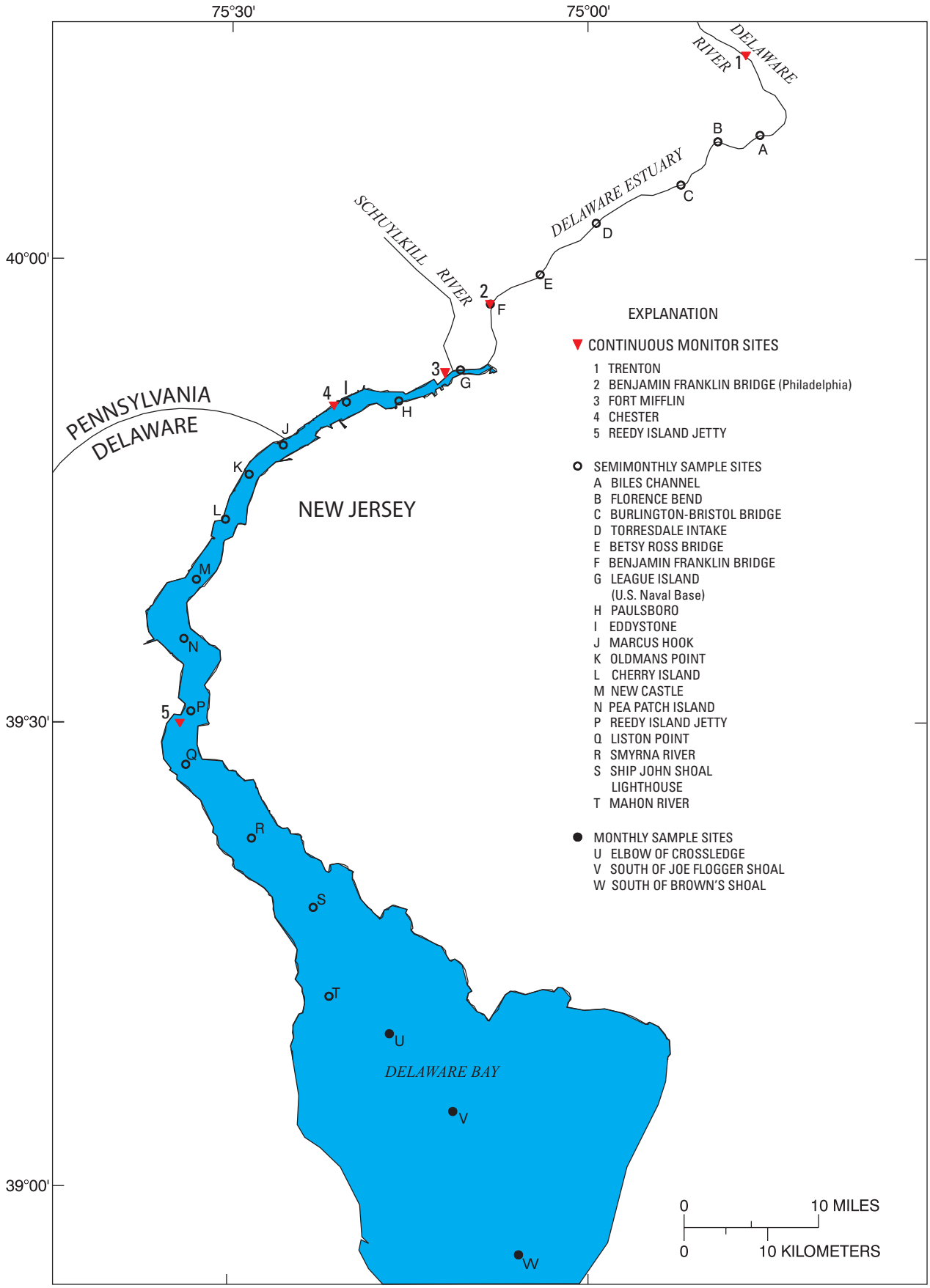

Figure 6. Location of water-quality monitoring sites on the Delaware Estuary.

mean monthly flows in May, June, October, and November and less than the long-term flows in the other 8 months. The greatest percentage flow deficiency was in January 2002, when monthly mean streamflow was about 28 percent of the long-term mean monthly flow. Long-term monthly mean streamflow was computed on the basis of data for the period from 1913 to 2001. The highest daily mean streamflow during the report year was 41,800 ft^3/s on May 15, 2002. The lowest daily mean streamflow was 2,480 ft^3/s on January 21, 2002.

Water Temperature

Water temperature has an important influence on water quality, because it affects various physical, chemical, and biological properties of water. Generally, increases in water temperature have detrimental effects on water quality by decreasing the saturation level of dissolved oxygen and increasing the biological activity of aquatic organisms. Although the primary factors that affect water temperature in the Delaware Estuary are climatic, various kinds of water use, especially powerplant cooling, also can have important effects.

At the Benjamin Franklin Bridge, Philadelphia, Pennsylvania, monthly mean water temperatures during the report year were greater than the long-term mean monthly temperatures in all months except January, May, June, and November, 2002. Long-term mean water temperatures were computed using data for the period from 1964 to 2001 (fig. 7). The maximum daily mean water temperature of 28.5˚C was recorded on August 4, 5, 20, and 21, 2002.

Specific Conductance and Chloride

Specific conductance is a measure of the capacity of water to conduct an electrical current and is a function of the types and quantities of dissolved substances in water. As concentrations of dissolved ions increase, specific conductance of the water increases. Specific conductance measurements are good indi-

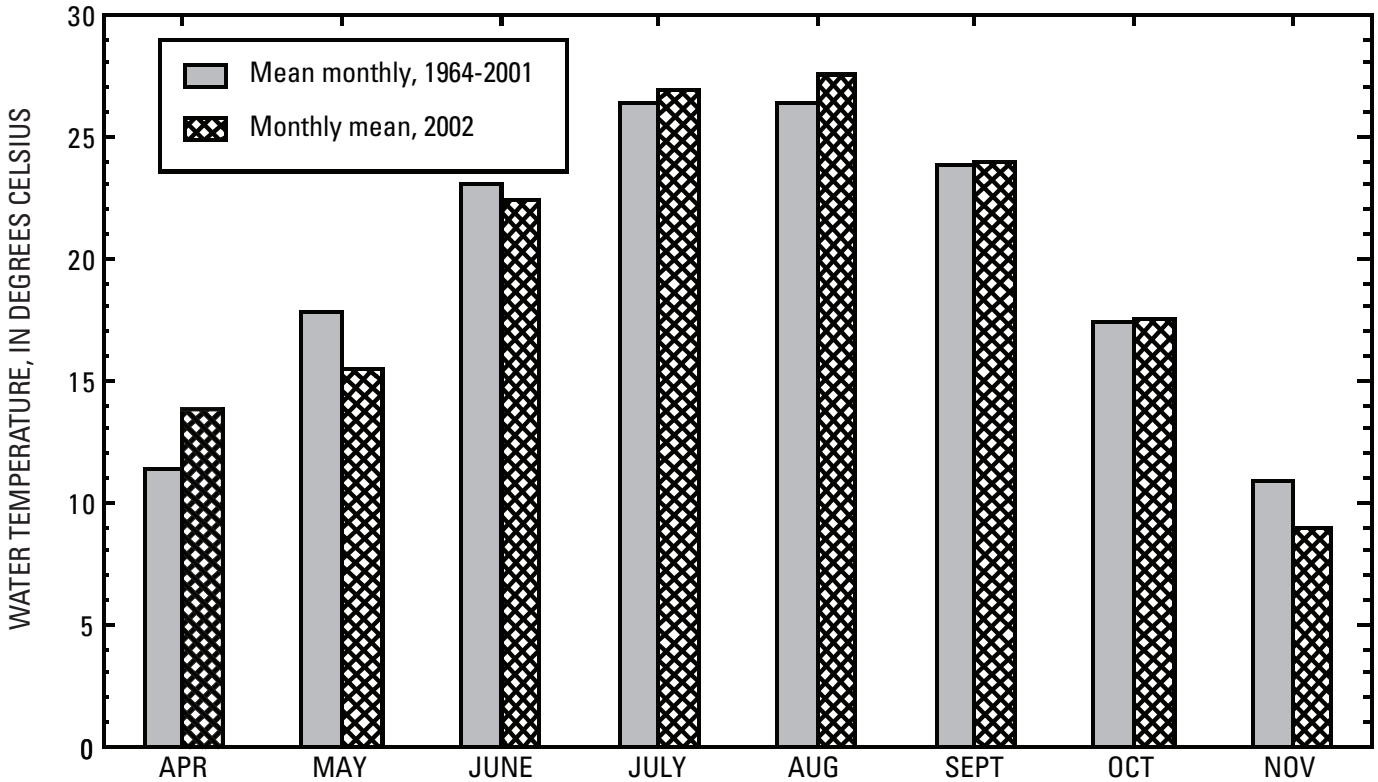

Figure 7. Water temperature in the Delaware Estuary at Benjamin Franklin Bridge at Philadelphia, Pennsylvania, April to November.

cators of dissolved solids content and total ion concentrations. Seawater and some man-made constituents can cause the specific conductance of estuary water to increase substantially. Dilution associated with high streamflows results in decreased levels of dissolved solids and lower specific conductance whereas low streamflows have the opposite effect.

The upstream movement of seawater and the accompanying increase in chloride concentrations is an important concern for water supplies obtained from the Delaware Estuary. Water with chloride concentrations greater than 250 mg/L (milligrams per liter) is considered undesirable for domestic use, and water with concentrations exceeding 50 mg/L is unsatisfactory for some industrial processes. Chloride concentrations in the estuary increase in a downstream direction, with proximity to the Atlantic Ocean.

Chloride concentration was not measured directly at the monitor sites at Fort Mifflin, Pennsylvania, and Reedy Island Jetty, Delaware. Instead, a mathematical relation between specific conductance and chloride concentration has been developed on the basis of long-term field measurements of specific conductance and laboratory analyses of chloride; this relation can be used to estimate chloride concentrations from specific conductance values. Chloride concentrations estimated from the relation are presented in tables 18 and 20. The specific conductance-chloride relation is less reliable when chloride concentrations are less than 30 mg/L, because other dissolved ions may be present in amounts large enough to affect the relation. Therefore, chloride concentrations estimated from specific conductance data are not presented when concentrations of less than 30 mg/L would result from the relation. Instead, estimated values less than 30 mg/L are reported as <30 mg/L. Chloride concentrations at Chester, Pennsylvania (table 19) were measured directly by Kimberly Clark Chester Operations and are not derived from specific conductance data.

At Fort Mifflin, the highest daily maximum chloride concentration during the report year was 310 mg/L on September 26 (table 18). Daily maximum concentrations exceeded 50 mg/L on 37 percent of the days. The lowest daily minimum chloride concentration was less than 30 mg/L on many days during the report year. Daily minimum concentrations exceeded 50 mg/L on 22 percent of the days. From March to July, the daily minimum chloride concentration was less than 30 mg/L on most days, and the highest daily maximum concentration was 80 mg/L. In September and October, daily minimum chloride concentrations ranged from less than 30 to 240 mg/L, and daily maximum concentrations ranged from less than 30 to 310 mg/L.

At Chester, the highest daily maximum chloride concentration was 1,200 mg/L on September 27, 2002 (table 19). During the report year, daily maximum concentrations exceeded 50 mg/L on 57 percent of the days. The lowest daily minimum chloride concentration was 19 mg/L on May 23. Daily minimum concentrations exceeded 50 mg/L on 54 percent of the days. Chloride concentrations were persistently high from December 1, 2001, to March 11, 2002, and from July 25 to October 18, when daily minimum concentrations exceeded 50 mg/L on all days.

At Reedy Island Jetty, the highest daily maximum chloride concentration was 8,500 mg/L on September 3, 2002 (table 20). Daily maximum chloride concentrations during the report year exceeded 1,000 mg/L on 99.7 percent of the days. The lowest daily minimum chloride concentration for the report year was 91 mg/L on May 18, 2002. Daily minimum chloride concentrations exceeded 1,000 mg/L on 77 percent of the days. From December to May, daily maximum chloride concentrations at Reedy Island Jetty ranged from 990 to 7,700 mg/L. From May to November, daily maximum chloride concentrations ranged from 1,200 to 8,500 mg/L.

Dissolved Oxygen

Dissolved oxygen in water is necessary for the respiratory processes of aquatic organisms and in chemical reactions in aquatic environments. Fish and many other clean-water species require relatively high dissolved oxygen concentrations at all times. The major source of dissolved oxygen in the Delaware Estuary is diffusion from the atmosphere, and, to a lesser extent, photosynthetic activity of aquatic plants.

The principal factors that affect dissolved oxygen concentrations in the estuary are water temperature, biochemical oxygen demand, freshwater inflow, phytoplankton, turbidity, salinity, and tidal- and wind-driven mixing.

Concentrations of dissolved oxygen at several sites on the Delaware Estuary have been measured since 1962 by the USGS. Two of these sites, Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania, and Delaware River at Chester, Pennsylvania, have nearly continuous records and are in the reach of the estuary most affected by effluent discharges. The mean and minimum daily mean dissolved oxygen concentrations from July to September at these stations during the 1965-2002 report years is shown in figure 8. An increasing trend in concentration is evident. Although concentrations have increased considerably over this 38-year period, mean concentrations can vary substantially from year to year.

Concentrations of dissolved oxygen in the Delaware Estuary generally are greatest near Trenton and decrease in a downstream direction. In an area just below the Benjamin Franklin Bridge, concentrations usually reach minimum levels. During the report year, daily mean concentrations of dissolved oxygen at the Benjamin Franklin Bridge monitor site were lowest in late August, and the lowest recorded daily mean concentration was 3.4 mg/L on August 27 (table 21). Daily mean concentrations of dissolved oxygen were consistently 6.0 mg/L or greater on most days from April 1 to June 12 and from October 14 to November 30, 2002. At Chester, daily mean dissolved oxygen concentrations were lowest during late June and early July and the lowest recorded daily mean concentration was 4.4 mg/L on June 22 (table 22).

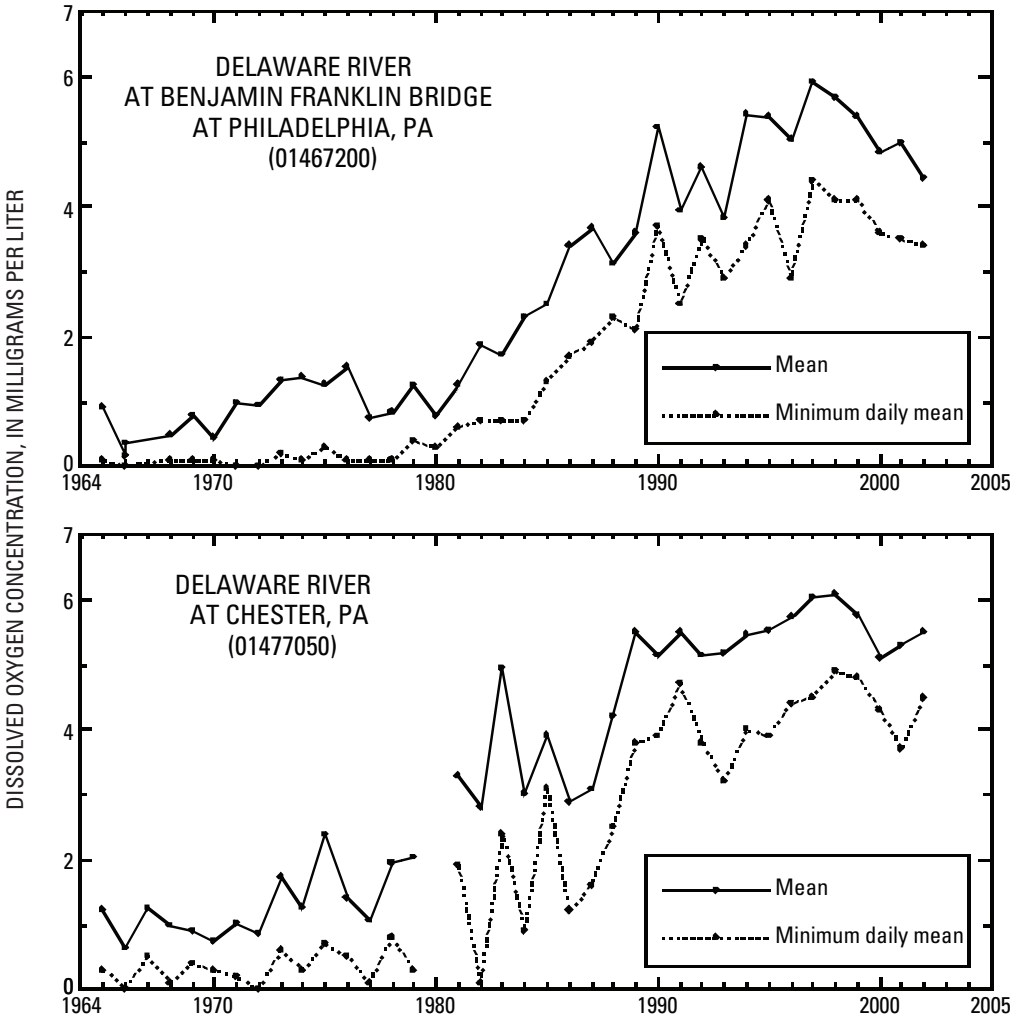

Figure 8. Mean and minimum daily mean dissolved oxygen concentrations from July to September at two monitor sites on the Delaware Estuary, 1965-2002.

Histograms of hourly dissolved oxygen concentrations at the Benjamin Franklin Bridge and Chester monitor sites during the critical summer period—July to September 2002—are presented in figure 9. Hourly concentrations at the Benjamin Franklin Bridge were 4 mg/L or less during 39 percent of this period. In comparison, in 2001, hourly concentrations decreased to levels 4 mg/L or less during 6 percent of the critical period. At Chester, hourly dissolved oxygen concentrations were 4 mg/L or less during 0.74 percent of the 2002 critical summer period. In 2001, hourly concentrations decreased to levels of 4 mg/L or less during 6 percent of the critical period. Dissolved oxygen concentrations less than 4 mg/L can have adverse, and possibly lethal, effects on fish and other aquatic organisms.

Hydrogen-Ion Activity (pH)

The pH of a solution is a measure of the effective concentration (activity) of dissolved hydrogen ions. Solutions with pH less than 7 are characterized as acidic whereas solutions with pH greater than 7 are considered basic or alkaline. The pH of uncontaminated surface water generally ranges from 6.5 to 8.5. Major factors affecting the pH of surface water include the geologic composition of the drainage basin and human inputs including wastewater discharges. In addition, photosynthetic activity, and dissolved gases including carbon dioxide, hydrogen sulfide, and ammonia can have a considerable effect on pH. During the report year, pH was measured seasonally at the Benjamin Franklin Bridge and Chester monitor sites, and continuously at the Reedy Island Jetty site. The range of median pH for these stations is as follows: Benjamin Franklin Bridge, 6.6 to 7.4; Chester, 6.7 to 7.4; and Reedy Island Jetty, 7.0 to 7.9. Generally, the pH of water in the Delaware Estuary is lowest near Trenton, New Jersey, and increases (that is, becomes more alkaline) in a downstream direction.

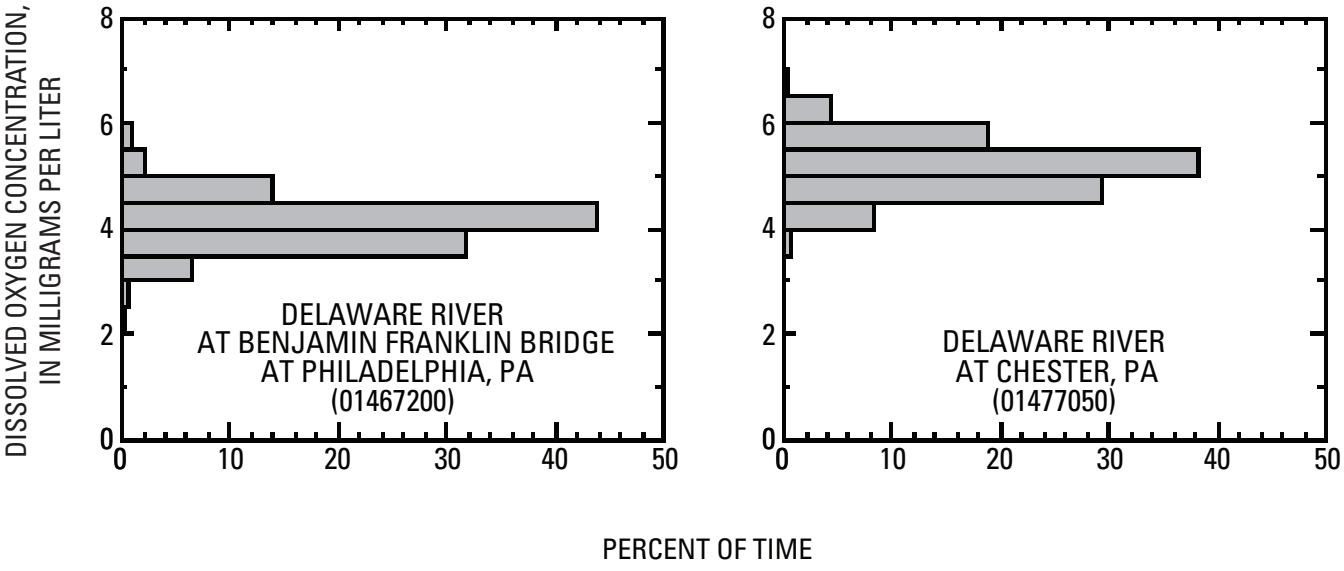

Figure 9. Distribution of hourly dissolved oxygen concentrations at two monitor sites on the Delaware Estuary, July to September 2002.

Table 17. Daily mean discharge, Delaware River at Trenton, New Jersey (station number 01463500) for year ending November 30, 2002 (U.S. Geological Survey published record)

[All values, except total, in cubic feet per second ft^3/s; total in cubic feet per second days, (ft^3/s)-d]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	3,210	3,100	6,800	4,170	15,300	26,800	15,800	6,880	3,210	4,120	5,530	10,200
2	3,810	3,160	11,500	4,110	14,800	24,000	14,800	5,900	3,080	4,680	4,430	9,390
3	4,150	2,930	10,600	5,570	13,600	26,100	14,500	5,830	3,420	3,550	3,590	8,610
4	4,650	2,930	10,400	6,940	12,300	23,800	11,700	5,930	3,330	3,320	3,160	8,130
5	4,440	2,930	8,720	6,720	11,100	19,000	10,500	5,500	3,420	3,210	3,130	7,610
6	3,750	3,160	7,540	6,630	10,600	16,300	9,880	4,920	3,390	3,050	3,230	7,750
7	3,380	3,360	6,940	6,240	9,640	14,500	17,000	4,620	3,290	2,920	3,970	8,050
8	3,260	3,150	6,480	5,610	8,660	12,900	34,400	4,260	3,180	2,990	3,530	8,810
9	3,430	2,950	5,950	5,310	7,940	11,900	28,400	3,930	3,110	2,990	3,210	8,880
10	3,890	2,950	5,450	5,140	8,080	12,000	20,100	3,790	3,010	2,910	3,350	8,790
11	3,720	2,960	5,230	5,460	8,090	11,300	16,800	3,760	2,980	2,860	4,680	8,020
12	3,390	3,410	5,480	5,580	7,940	10,600	16,300	3,790	3,200	2,890	19,300	7,950
13	3,220	3,620	10,700	5,990	7,540	10,900	15,300	3,680	3,190	2,840	24,800	10,400
14	3,190	3,490	9,940	6,130	7,080	31,300	13,000	3,420	3,100	2,900	23,900	10,800
15	3,560	3,340	8,300	5,890	7,580	41,800	14,500	3,360	2,950	3,100	17,700	12,400
16	3,720	3,230	6,960	5,560	14,300	33,300	16,100	3,000	3,050	3,630	14,700	11,500
17	3,950	3,290	6,380	5,460	15,200	25,000	16,800	3,000	3,070	4,620	22,400	20,500
18	4,540	3,110	6,040	5,810	13,700	24,700	15,900	3,210	3,140	4,850	36,300	30,200
19	5,340	2,980	5,610	7,060	11,900	30,000	15,000	3,100	3,470	3,980	29,200	34,300
20	7,120	2,810	5,240	9,030	11,200	32,100	13,200	3,660	3,500	3,380	20,200	30,500
21	8,830	2,480	4,870	12,400	10,200	26,600	11,600	3,660	3,430	3,240	16,600	25,200
22	7,560	2,550	4,820	11,000	8,980	20,900	10,100	3,810	3,050	3,290	14,100	21,300
23	6,540	2,500	4,790	10,100	8,610	17,500	9,160	3,730	3,050	3,410	12,100	21,000
24	6,080	2,890	5,050	9,870	8,640	15,500	7,990	3,790	3,070	3,140	10,200	20,900
25	5,770	4,480	5,040	9,040	8,320	13,900	7,540	4,070	3,470	2,600	8,790	20,000
26	5,370	4,550	4,650	8,440	8,150	13,200	7,260	3,880	3,400	2,740	9,430	17,700
27	5,060	4,430	4,400	9,690	8,590	10,900	7,090	3,740	3,280	4,260	11,800	16,300
28	4,680	4,510	4,310	17,800	10,800	10,200	12,600	3,530	3,170	5,200	12,800	15,500
29	3,860	4,910		22,700	17,000	11,800	9,980	3,440	3,450	5,820	12,100	14,300
30	3,550	4,960		17,900	26,600	27,200	8,230	3,490	3,620	6,580	11,300	12,900
31	3,520	5,430		15,900		21,500		3,310	3,760		11,000	
Total	140,540	106,550	188,190	263,250	332,440	627,500	421,530	125,990	100,840	109,070	380,530	447,890
Mean	4,534	3,437	6,721	8,492	11,080	20,240	14,050	4,064	3,253	3,636	12,280	14,930

Year total 3,244,320 (ft^3/s)-d

Mean 8,889 ft^3/s

Table 18. Daily maximum and minimum chloride concentrations estimated from values of specific conductance, Delaware River at Fort Mifflin, Pennsylvania (station number 01474703) for year ending November 30, 2002

[Concentrations in milligrams per liter; --, missing data; *, computed concentration less than 30 milligrams per liter; Max, maximum value; Min, minimum value; <, less than]

DAY	DEC		JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1	140	90	47	38	61	47	38	32	*	*	*	*	*	*	34	*	31	*	120	59	140	140	31	*
2	160	79	48	39	75	47	36	30	*	*	*	*	*	*	35	*	36	*	94	58	130	130	*	*
3	--	--	49	41	53	43	79	30	--	--	*	*	*	*	34	*	32	*	100	55	140	140	*	*
4	120	84	53	41	54	42	80	34	--	--	38	*	*	*	*	*	33	*	98	55	180	180	*	*
5	120	81	52	40	60	42	62	33	*	*	34	*	*	*	*	*	33	*	98	55	190	190	*	*
6	130	81	48	41	49	41	38	31	*	*	*	*	*	*	*	*	35	30	94	53	160	160	30	*
7	130	82	48	41	49	41	45	30	*	*	*	*	31	*	*	*	36	30	110	54	220	220	*	*
8	130	82	56	39	49	41	36	30	*	*	*	*	36	*	*	*	38	32	120	54	190	190	*	*
9	120	81	49	41	49	41	39	*	*	*	*	*	32	*	*	*	38	31	180	56	230	230	*	*
10	120	84	46	40	46	39	54	*	*	*	*	*	*	*	*	*	42	34	180	57	240	240	*	*
11	120	78	51	40	58	40	42	*	*	*	*	*	*	*	*	*	49	35	150	59	220	220	*	*
12	130	78	49	41	46	39	37	*	31	*	*	*	*	*	*	*	51	35	150	61	140	140	*	*
13	180	75	51	39	48	39	35	*	*	*	*	*	*	*	*	*	50	36	170	80	99	99	38	*
14	120	80	49	40	46	36	38	*	31	*	32	*	*	*	--	--	48	36	160	85	54	54	--	--
15	110	60	54	42	41	36	40	*	33	*	*	*	*	*	--	--	53	38	180	89	39	39	--	--
16	130	60	57	42	40	35	44	*	38	*	*	*	*	*	--	--	54	40	160	89	34	34	--	--
17	180	61	57	38	48	35	35	*	31	*	*	*	*	*	--	--	59	41	190	90	33	33	--	--
18	150	92	53	43	48	34	51	*	*	*	*	*	*	*	--	--	92	43	190	90	32	32	--	--
19	--	--	49	41	38	31	57	*	*	*	*	*	32	*	--	--	85	44	200	94	*	*	--	--
20	--	--	54	41	40	32	57	31	*	*	*	*	40	*	--	--	95	47	240	95	*	*	--	--
21	86	48	53	43	43	32	58	31	*	*	*	*	30	*	--	--	100	49	220	99	*	*	--	--
22	76	47	59	45	46	*	43	*	*	*	*	*	*	*	--	--	100	51	240	100	*	*	--	--
23	61	48	52	44	41	33	30	*	*	*	*	*	*	*	--	--	110	52	210	110	*	*	--	--
24	59	46	52	44	43	31	*	*	*	*	*	*	*	*	--	--	110	54	260	110	*	*	--	--
25	54	42	94	46	36	31	*	*	*	*	*	*	*	*	--	--	130	58	240	110	*	*	--	--
26	51	42	61	48	37	32	*	*	*	*	*	*	*	*	--	--	110	58	310	120	*	*	--	--
27	54	43	82	49	42	32	36	*	*	*	*	*	*	*	--	--	110	59	300	120	30	30	--	--
28	52	40	75	47	43	32	35	*	*	*	*	*	*	*	--	--	100	59	170	110	30	30	--	--
29	50	40	75	48			34	*	36	*	*	*	*	*	--	--	110	59	190	100	*	*	--	--
30	49	39	59	49			34	*	32	*	*	*	*	*	30	30	100	76	150	98	34	34	--	--
31	46	40	57	48			30	*			*	*			32	32	100	59			39	39		
Mean	100	64	56	43	47	37	44										70		180	82				
Max	180	92	94	49	75	47	80	34	38	<30	38	<30	40	<30	35	32	130	76	310	120	240	240	38	<30
Min	46	39	46	38	36	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	31	<30	94	53	<30	<30	<30	<30

Table 19. Daily maximum and minimum chloride concentrations, Delaware River at Chester, Pennsylvania (station number 01477050) for year ending November 30, 2002
(Record furnished by Kimberly Clark Chester Operations)

[Concentrations in milligrams per liter; Max, maximum value; Min, minimum value]

DAY	DEC		JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1	500	310	230	110	150	100	64	60	35	33	29	25	23	23	31	27	160	93	630	280	540	490	27	25
2	500	300	140	100	120	96	70	61	35	34	31	31	24	24	28	27	140	130	610	300	590	420	25	23
3	670	300	200	200	130	88	170	69	32	32	29	27	24	24	41	28	90	86	360	300	710	400	23	23
4	610	320	230	110	107	98	73	53	35	33	28	27	25	24	29	29	210	100	500	280	580	360	26	25
5	490	310	240	140	96	76	71	54	31	30	29	27	26	24	29	28	230	78	640	260	540	530	27	25
6	590	410	260	230	93	78	76	55	62	31	79	54	25	25	30	29	200	120	560	270	420	390	26	26
7	480	310	200	150	92	83	69	64	32	31	56	36	28	28	32	29	150	78	440	330	570	550	25	24
8	680	500	200	160	110	110	69	56	33	32	41	32	27	25	78	30	100	100	700	360	620	500	30	25
9	550	470	240	120	77	71	73	59	32	31	30	26	27	25	30	30	160	120	580	320	490	470	27	25
10	440	320	170	100	97	71	58	55	31	30	30	20	25	23	32	30	160	130	700	660	910	580	26	25
11	630	400	180	120	91	77	60	52	31	31	28	26	24	23	33	33	320	210	660	450	920	540	28	27
12	580	270	180	120	110	69	52	50	31	30	29	28	25	25	33	33	360	230	980	470	650	380	28	27
13	660	290	180	110	78	68	54	53	32	31	29	28	25	24	36	34	420	360	890	420	410	270	29	26
14	410	290	100	100	67	66	58	55	30	29	30	28	26	26	35	35	440	260	670	590	250	160	28	28
15	410	270	130	100	67	64	58	57	31	29	27	27	25	24	38	36	460	190	580	470	200	200	28	28
16	320	250	120	90	69	67	60	52	31	28	24	24	24	24	38	34	340	320	820	480	140	67	30	28
17	320	270	120	100	71	69	63	62	31	30	29	24	24	24	41	35	470	360	510	460	110	67	28	28
18	250	250	140	100	67	63	66	54	30	29	27	27	24	24	57	52	600	320	870	490	90	54	29	26
19	440	240	130	100	73	62	57	55	31	30	27	25	25	24	67	44	430	250	580	500	46	44	28	25
20	440	250	200	100	83	70	55	53	29	29	25	23	24	24	96	38	360	240	910	520	36	32	26	24
21	300	200	170	120	84	64	57	52	29	29	100	23	24	24	68	41	470	450	1,100	510	34	33	26	25
22	290	190	180	120	81	77	42	42	29	29	88	20	25	25	70	40	400	320	900	530	35	32	23	23
23	380	220	180	100	64	63	44	43	29	28	21	19	25	23	42	42	520	310	660	650	34	28	24	24
24	260	180	220	140	77	74	44	44	29	29	22	21	27	26	47	46	630	400	600	590	30	28	23	22
25	240	220	190	130	79	60	41	39	30	29	20	20	26	25	55	54	430	400	790	560	32	31	22	22
26	300	160	130	100	79	77	40	40	29	29	23	22	25	25	64	60	520	430	980	600	32	28	22	21
27	320	150	150	90	60	60	39	37	31	31	23	22	26	26	79	60	580	340	1,200	1,000	30	30	22	21
28	260	160	94	89	70	60	39	37	31	30	23	21	28	26	110	94	590	350	530	480	29	27	21	21
29	190	160	110	89			37	36	30	30	23	23	26	20	160	140	650	290	920	450	28	28	22	22
30	150	140	230	92			36	36	30	29	24	22	29	27	120	92	520	270	750	530	25	25	21	20
31	200	120	170	110			36	35			24	23			160	91	570	280			27	26		
Mean	410	270	170	120	87	74	59	51	32	30	34	26	25	24	58	46	380	250	720	470	300	220	26	24
Max	680	500	260	230	150	110	170	69	62	34	100	54	29	28	160	140	650	450	1,200	1,000	920	580	30	28
Min	150	120	94	89	60	60	36	35	29	28	20	19	23	20	28	27	90	78	360	260	25	25	21	20

Table 20. Daily maximum and minimum chloride concentrations estimated from values of specific conductance, Delaware River at Reedy Island Jetty, Delaware (station number 01482800) for year ending November 30, 2002

[Concentrations in milligrams per liter; Max, maximum value; Min, minimum value; --, missing data]

DAY	DEC		JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1	6,900	4,600	6,100	2,900	6,900	3,900	5,500	2,600	3,600	1,400	3,000	940	1,300	380	2,300	420	6,300	3,200	7,800	5,400	7,500	5,000	5,900	2,400
2	7,200	4,400	6,500	3,000	5,900	3,600	5,400	2,700	3,200	1,300	2,800	950	1,800	320	2,100	470	6,900	3,500	8,100	5,000	7,000	4,800	5,200	2,400
3	6,900	4,500	6,500	3,100	6,000	3,500	6,500	3,100	2,800	860	2,400	670	2,200	320	2,300	450	6,800	3,700	8,500	5,100	7,300	4,700	5,300	2,300
4	6,600	4,300	7,100	3,200	6,200	3,600	4,300	2,600	1,900	800	1,700	440	3,200	630	--	--	7,000	3,400	8,200	5,300	8,100	5,000	6,100	2,500
5	6,500	4,100	7,100	3,600	6,200	3,200	4,800	2,500	2,700	840	1,800	430	3,100	700	--	--	6,800	3,400	8,100	5,000	8,100	5,100	5,800	2,500
6	6,900	4,100	6,900	3,800	6,700	3,500	5,000	2,200	3,500	900	2,400	520	2,900	520	--	--	7,200	3,200	8,100	5,300	7,100	4,900	5,800	2,500
7	6,200	4,300	6,800	3,700	6,900	3,200	4,300	1,800	3,800	1,400	2,000	470	4,500	550	--	--	7,200	3,500	8,100	5,300	7,800	5,200	4,900	2,300
8	6,900	4,200	7,300	3,900	6,700	3,100	5,300	2,000	4,500	1,900	3,000	460	4,500	900	6,000	1,500	7,200	3,900	7,900	5,400	7,600	5,000	5,800	2,300
9	6,900	4,500	7,400	4,100	6,400	3,400	5,400	2,300	4,100	1,300	3,000	640	3,300	670	6,000	1,900	7,200	4,100	8,200	5,100	7,600	5,300	4,000	2,200
10	6,900	4,400	6,800	3,600	6,700	3,200	4,000	2,100	3,300	1,200	2,600	590	2,500	510	5,600	1,900	7,300	4,200	8,100	5,500	7,600	5,300	4,900	2,200
11	6,800	4,300	7,500	4,100	6,200	2,800	4,400	1,400	3,600	1,000	2,200	540	2,500	460	5,500	2,200	7,000	4,300	8,200	5,700	7,200	5,400	4,200	2,100
12	7,300	4,700	6,800	3,900	6,900	2,900	4,800	1,500	3,600	1,300	2,300	560	2,400	390	6,100	2,200	6,900	4,200	8,200	5,500	6,700	4,900	3,600	1,800
13	7,600	4,800	6,700	3,900	5,500	2,800	5,200	1,800	3,600	1,400	2,000	570	2,200	440	5,900	2,700	6,500	4,100	8,000	5,800	7,500	4,700	4,600	1,900
14	6,900	4,800	5,300	3,300	5,500	2,800	4,800	2,200	3,000	1,400	2,400	430	2,800	480	5,700	2,700	6,800	4,200	7,700	5,600	6,500	4,000	5,100	1,900
15	6,500	4,300	6,000	2,900	5,000	2,600	4,100	2,300	3,500	1,400	990	190	2,600	480	5,700	2,700	6,300	4,000	7,500	5,400	6,700	3,800	4,500	2,000
16	7,200	4,600	6,100	3,200	4,900	2,400	4,200	2,300	3,600	1,300	1,300	170	2,400	520	5,500	2,900	6,300	3,700	7,000	5,000	6,900	4,300	4,800	1,800
17	7,500	4,700	6,500	3,300	5,300	2,600	5,000	2,400	3,200	1,200	1,500	120	2,000	450	6,000	2,900	6,500	3,700	7,600	5,000	6,700	3,700	5,600	2,300
18	6,600	4,300	6,400	3,400	5,800	2,800	5,500	2,700	3,200	1,100	1,300	91	1,700	400	6,000	3,100	6,900	3,900	8,000	5,200	6,200	3,200	4,800	1,400
19	7,000	4,300	6,500	3,400	6,800	2,900	5,300	2,500	3,100	1,200	1,900	110	1,400	410	5,800	3,100	7,000	4,000	8,000	5,200	6,200	2,800	2,100	850
20	6,600	4,100	6,500	3,900	6,400	3,400	5,300	2,800	3,300	1,000	1,800	190	1,700	360	6,300	3,000	7,000	4,100	7,800	5,400	4,300	2,500	2,900	790
21	5,700	3,300	6,900	3,900	5,800	3,200	4,700	2,500	2,600	1,000	2,100	190	1,700	340	6,300	3,200	6,900	4,500	7,100	5,300	4,800	2,200	3,100	630
22	7,100	3,100	5,800	3,400	6,300	3,200	3,800	2,000	--	--	2,300	190	1,800	310	6,300	3,200	7,200	4,500	7,200	5,200	5,000	2,000	3,200	630
23	7,600	3,800	6,300	3,100	6,000	3,000	4,200	2,100	--	--	2,600	250	1,800	310	5,500	2,900	6,200	4,200	6,900	5,100	4,100	2,100	1,800	390
24	6,800	4,000	6,900	3,400	6,400	3,000	4,100	1,700	--	--	2,500	290	2,000	320	4,500	2,500	6,800	4,500	7,200	5,300	4,300	2,000	1,200	390
25	7,100	3,800	6,900	3,800	7,100	3,300	5,000	1,800	--	--	2,400	310	1,800	340	5,700	3,000	6,700	4,300	7,400	5,400	4,800	2,100	1,700	380
26	6,900	3,800	6,900	3,500	6,600	3,700	5,300	2,200	--	--	2,700	390	2,200	370	6,100	3,100	6,500	4,300	7,700	5,400	5,000	2,100	2,700	380
27	7,700	4,000	6,500	3,300	6,600	3,600	4,800	2,300	4,000	1,400	2,400	390	2,100	390	5,700	3,200	6,500	4,400	7,900	5,300	4,600	2,000	2,600	480
28	7,500	3,800	6,900	3,500	4,800	2,800	4,700	2,100	3,900	1,500	2,200	410	1,800	350	5,400	3,000	7,000	4,400	7,200	5,000	4,600	1,900	3,200	500
29	7,200	3,300	7,200	3,600			4,800	1,900	4,100	1,300	1,900	400	2,100	310	6,000	3,300	7,200	4,800	7,800	5,100	4,700	1,700	3,100	490
30	6,800	3,200	6,900	3,900			4,100	1,700	3,200	1,200	1,900	410	2,400	360	5,800	3,300	7,100	4,400	7,600	5,100	5,200	2,300	2,700	560
31	6,200	3,100	7,100	3,700			3,300	1,500			1,700	430			6,000	3,200	7,200	4,300			6,400	2,800		
Mean	6,900	4,100	6,700	3,500	6,200	3,100	4,800	2,200	3,400	1,200	2,200	410	2,400	440	5,400	2,500	6,900	4,000	7,800	5,300	6,300	3,600	4,000	1,500
Max	7,700	4,800	7,500	4,100	7,100	3,900	6,500	3,100	4,500	1,900	3,000	950	4,500	900	6,300	3,300	7,300	4,800	8,500	5,800	8,100	5,400	6,100	2,500
Min	5,700	3,100	5,300	2,900	4,800	2,400	3,300	1,400	1,900	800	990	91	1,300	310	2,100	420	6,200	3,200	6,900	5,000	4,100	1,700	1,200	380

Table 21. Daily mean dissolved oxygen concentration, Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania, (station number 01467200), April 1 to November 30, 2002 (U.S. Geological Survey published record)

[Concentrations in milligrams per liter; Max, maximum value; Min, minimum value; --, missing data]

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	10.3	7.7	7.2	4.6	4.3	4.3	4.9	9.4
2	10.3	7.9	7.0	4.5	4.3	4.3	4.9	9.6
3	10.3	8.2	6.9	4.2	4.2	4.3	4.7	9.6
4	10.1	8.6	6.8	4.0	4.0	4.4	4.6	9.7
5	10.0	8.6	6.6	4.1	3.8	4.7	4.5	9.7
6	9.9	8.4	6.2	4.4	3.7	4.8	4.8	9.6
7	9.7	8.1	5.9	4.7	4.0	4.8	4.9	9.9
8	9.7	8.1	6.0	5.0	4.2	4.8	5.1	9.9
9	9.6	8.2	6.2	5.3	4.5	4.7	5.2	10.0
10	9.5	8.1	6.2	5.1	4.5	4.5	5.2	10.0
11	9.5	8.0	6.1	5.0	4.5	4.3	5.2	9.9
12	9.4	7.9	6.0	5.2	4.5	4.4	5.2	9.7
13	9.1	7.5	5.9	5.2	4.3	4.6	5.9	9.5
14	9.1	7.0	5.6	5.0	4.3	4.9	6.3	9.5
15	8.9	7.2	5.5	4.6	4.4	4.8	6.6	9.6
16	8.8	7.8	5.5	4.5	4.4	4.7	7.1	9.7
17	8.7	8.0	6.0	4.4	4.3	4.7	7.5	9.6
18	8.5	7.4	5.9	4.2	4.3	4.7	8.2	9.6
19	8.0	8.0	6.0	4.2	4.3	4.7	8.6	10.1
20	7.5	7.8	5.9	4.0	4.2	4.7	8.9	10.3
21	7.1	7.7	5.9	3.9	4.4	4.7	9.0	10.5
22	6.7	8.0	6.0	4.0	4.4	4.8	9.1	10.5
23	6.5	8.1	6.1	4.1	4.4	4.8	9.1	10.9
24	6.4	8.0	6.0	4.2	4.3	4.9	9.1	11.0
25	6.2	8.1	5.8	4.5	3.8	5.0	9.1	11.0
26	6.0	---	5.5	4.5	3.6	5.0	8.9	10.9
27	6.0	---	5.3	4.4	3.4	5.0	8.9	10.7
28	5.9	---	4.9	4.2	3.6	4.7	9.0	10.8
29	6.0	7.7	4.8	4.1	3.8	4.9	9.0	10.9
30	6.8	7.6	4.7	4.1	3.7	4.8	9.0	11.1
31		7.4		4.2	3.8		9.2	
Mean	8.3	7.9	5.9	4.5	4.1	4.7	7.0	10.1
Max	10.3	8.6	7.2	5.3	4.5	5.0	9.2	11.1
Min	5.9	7.0	4.7	3.9	3.4	4.3	4.5	9.4

Table 22. Daily mean dissolved oxygen concentration, Delaware River at Chester, Pennsylvania (station number 01477050), April 1 to November 30, 2002 (U.S. Geological Survey published record)

[Concentrations in milligrams per liter; Max, maximum value; Min, minimum value; --, missing data]

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	9.5	---	7.3	4.6	5.0	6.4	6.1	8.4
2	9.6	---	7.4	4.7	4.9	6.4	6.0	8.6
3	9.7	---	7.4	4.6	4.9	6.4	5.8	8.8
4	9.7	---	7.4	4.5	4.7	6.3	6.0	8.7
5	9.7	---	7.4	4.5	4.7	6.1	6.1	8.7
6	9.8	---	7.1	4.8	4.9	6.1	6.0	8.7
7	9.8	---	6.9	5.0	5.3	6.1	6.2	8.9
8	9.9	---	6.7	5.2	5.4	6.0	6.3	9.0
9	10.0	---	6.2	5.3	5.5	6.0	6.2	9.0
10	10.1	---	5.8	5.3	5.5	5.8	6.2	8.9
11	9.9	---	5.6	5.4	5.5	5.8	6.5	9.0
12	9.9	---	5.6	5.5	5.4	5.9	6.4	8.9
13	9.6	---	5.5	5.5	5.2	6.1	5.8	8.8
14	9.4	---	5.7	5.3	5.2	6.1	5.7	8.7
15	9.1	---	5.6	5.2	5.3	6.2	5.9	8.7
16	8.9	---	5.5	5.2	5.3	6.2	6.5	8.7
17	8.4	---	5.5	5.3	---	6.1	6.7	9.1
18	8.5	---	5.3	5.4	---	6.2	6.8	9.5
19	8.2	---	5.1	5.2	---	6.0	7.0	9.8
20	7.8	---	4.8	5.0	5.3	6.0	7.4	9.7
21	7.5	7.7	4.5	4.9	5.4	5.9	7.5	9.5
22	7.2	7.7	4.4	5.0	5.4	5.9	7.7	9.5
23	6.9	---	4.6	5.2	5.3	6.0	7.8	9.9
24	6.8	7.6	4.7	5.2	5.3	6.0	7.9	10.2
25	6.5	7.6	4.7	5.5	5.1	6.1	8.0	10.1
26	6.5	7.5	4.6	5.5	5.1	6.3	8.3	10.1
27	6.3	7.4	4.8	5.4	5.0	6.6	8.2	10.1
28	6.2	7.2	4.7	5.1	5.3	6.4	8.0	10.2
29	6.2	7.1	4.5	5.0	5.8	6.3	8.0	10.5
30	6.3	7.1	4.5	5.0	5.7	6.2	8.2	10.6
31		7.1		5.1	5.8		8.3	
Mean	8.5	4.7	5.7	5.1	5.3	6.1	6.9	9.3
Max	10.1	7.7	7.4	5.5	5.8	6.6	8.3	10.6
Min	6.2	7.1	4.4	4.5	4.7	5.8	5.7	8.4

Appendix A

NO. 2001-32

A RESOLUTION pursuant to Articles 3.3 and 10.4 of the Delaware River Basin Compact to preserve and protect water supplies in the Delaware River Basin.

WHEREAS, on December 1, 2001, the storage criterion set forth in Commission Resolution No. 83-13 for New York City's Delaware River Basin reservoirs triggered drought operations in accordance with the schedule of releases and diversions in the Commission's drought operating plan, and

WHEREAS, in accordance with Resolution 83-13, when the storage criterion is met, it is the policy of the Commission to declare a drought emergency for purposes of imposing appropriate conservation measures, and

WHEREAS, the states of New Jersey, New York, and Pennsylvania have issued drought warnings for counties within the Delaware River Basin and have called for voluntary water conservation by all users, and

WHEREAS, the Commission's drought operating plan complements the states' drought operation by addressing the essential conservation of regional reservoir storage for purposes of water supply and flow augmentation for the Delaware River and salinity control in the Delaware Estuary, and

WHEREAS, a declaration of drought emergency by the Commission is required for the full implementation of water conserving provisions of its drought operating plan and to preserve and protect the regional water supply in the Basin; now therefore,

BE IT RESOLVED by the Delaware River Basin Commission

1. A state of drought emergency exists in the Delaware River Basin for the purposes of the conservation of regional reservoir storage under the Commission's drought operating plan.
2. The signatory states shall be responsible for the declaration of county or statewide drought emergency as they deem necessary, and shall be responsible for the implementation and enforcement of associated restrictions on non-essential water uses in these areas.
3. Water storage currently impounded by the Wallenpaupack dam of PPL Generation, LLC, and by the Mongaup reservoir system of Mirant shall be called upon to provide releases from storage to assist in meeting the flow target at Montague, New Jersey. It is the policy of the commission that these reservoirs shall be operated such as to maximize power releases during summer and early fall to meet flow objectives at Montague, and to minimize power releases during winter and spring in order to refill by June 1.
4. In accordance with the Commission's drought operating plan, the Army Corps of Engineers is hereby requested to retain storage in F.E. Walter Reservoir and provide releases of water upon the request of the Commission to assist in maintaining the Trenton flow objective.
5. The Commonwealth of Pennsylvania is hereby requested to provide releases of water from the Nockamixon Reservoir upon the request of the Commission, and in accordance with the priority of use shown in Table 1 of Section 2.5.5 of the commission water code to assist in maintaining the Trenton flow objective.
6. Upon the request of a signatory state, the Commission shall require self-supplied users of ground and surface waters in that state whose use for any purpose exceeds an average of 1 mgd during any 30-day period to prepare contingency plans for water curtailment or reduction in the event that it is necessary and submit those plans to the Commission.

7. All residents of the Basin are urged to conserve water to the maximum extent possible to preserve and protect the Basin's water supplies.

8. This resolution shall take effect immediately and shall remain in effect until terminated by action of the Commission.

BY THE COMMISSION

ADOPTED:

Appendix B

AGREEMENT

The Parties to the U.S. Supreme Court Decree hereby agree to amendment of the conditions of Delaware River Basin Commission Resolution No. 83-13 and Docket D-77-20 CP (Revision 4) for the purpose of emergency protection of tailwater fisheries, as follows:

1. Establishment of an emergency fisheries protection program designed to allow special stream releases designed by the NYSDEC within the terms specified by this Agreement. The emergency program includes the following provisions:

   a. There will be no net loss of storage in the New York City Delaware River Basin Reservoirs.

   b. The maximum use of 3,000 cfs-days (cubic feet per second-days) will be made available through reductions in releases required to meet the Montague target.

   c. The credits (computed as the directed release minus 57 cfs) from releases required for Montague targets may occur at the following rates.

When Trenton Flow Equals or Exceeds	Maximum Daily Credit Reduction
3500 cfs	100 cfs
3300 cfs	50 cfs

   d. The term of this emergency program begins immediately and continues until one of the NYC Delaware Basin reservoirs spills, or when all summer basic conservation releases are restored in accordance with Docket No. D-77-20 CP (Revision 4).

   e. When sufficient positive credits have been accumulated, special releases may be requested hereunder on any day in which the River Master either does not call for the release of water to meet the Montague target, or calls for the release of water in an amount less than the summer basic conservation levels as established in docket No. D-77-20 CP (Revision 4) (15 cfs at Neversink, 19 cfs at Pepacton, 23 cfs at Cannonsville). The special releases shall be in the amount needed to bring the total amount of water released that day up to such summer basic conservation levels, subject to the provisions of this Agreement. Special releases and credits will be suspended if the combined storage in the Delaware River Basin reservoirs falls below the mid-point of the drought zone and will remain suspended until the storage increases above that level again.

   f. The operation of this emergency program will be designed by NYSDEC upon a continuing showing of need for these extra releases, and will be coordinated with the River Master and New York City. DRBC will be informed of the River Master's directed release each day when it is computed. The River Master's office will maintain the ongoing accounting for credits and releases, embodied in this Agreement.

   g. For purposes of defining drought conditions as per the operation curves for NYC reservoirs embodied in DRBC Resolution 83-13, the usable storage in the NYC Delaware basin reservoirs shall be reduced by the cumulative unexpended credits.

   h. The parties to this Agreement will reconvene as needed by meeting or telephone call to reconsider these arrangements should any party request it.

i. This Agreement will take effect immediately and will continue until conditions described in "d" are met or modified by unanimous agreement to the Parties to the Decree or terminated by any one of these Parties, but in any case to be terminated automatically on June 15, 2002.

j. This Agreement is intended to address the unique hydrological conditions currently existing, and does not constitute a precedent binding any Party to agree to any similar program in the future.

December 19, 2001

_____

State of Delaware Date

_____

State of New Jersey Date

_____

State of New York Date

_____

Commonwealth of Pennsylvania Date

_____

City of New York Date

Appendix C

NO. 2002-6

EXTENSION OF DOCKET NO. 77-20 CP (Revision 5)

DELAWARE RIVER BASIN COMMISSION

A RESOLUTION to extend Docket No. D-77-20 CP (Revision 4) for one year to continue the experimental augmented conservation release program for the New York City Delaware Basin Reservoirs, and to amend Docket No. D-77-20 CP (Revision 4) to establish a temporary habitat bank for support of experimental flow targets for fisheries protection on the West Branch of the Delaware River at Hale Eddy, and to temporarily modify the conservation releases from Cannonsville Reservoir.

WHEREAS, Document No. 77-20 CP (Revision 4) specified the current augmented experimental release program and instituted a drought watch and a revised drought warning level for the three New York City Delaware Basin Reservoirs beginning in May 1999 and ending on April 30, 2001; and

WHEREAS, Resolution No. 2001-5 extended Docket No. 77-20 CP (Revision 4) for one calendar year ending on April 30, 2002, and

WHEREAS, Docket No. D-77 CP (Revision 4) condition h. provides for an extension of the provisions of this Docket upon agreement of all parties to the 1954 Supreme Court Decree; and

WHEREAS, the parties to the 1954 Supreme Court Decree are in the process of negotiating a permanent fisheries release program more responsive to the water conditions downstream of New York City Delaware Basin Reservoirs; and

WHEREAS, agreement on the permanent fisheries release program is not expected prior to April 30, 2002, the date at which the current program will automatically terminate; and

WHEREAS, the State of New York has proposed a revision and extension to Docket No. D-77-20 CP (Revision 4) for one calendar year ending April 30, 2003; and

WHEREAS, the requested revision and extension has been agreed to by all parties to the 1954 Supreme Court Decree;

BE IT RESOLVED by the undersigned Commissioners and Parties to the Decree:

1. The parties to the 1954 Supreme Court Decree agree that development of a viable permanent fisheries release program requires consideration of other related issues, including interbasin transfer policy, Good Faith operations, the DRBC Comprehensive Plan currently being developed, New York City participation, and procedures for computing the Excess Release Quantity.
2. Docket No. D-77-20 CP (Revision 4) is hereby extended for one year to April 30, 2003, with the following modifications.
    a. A “Habitat Bank” is established, which shall consist of 5,700 cfs-days that shall be contributed for one year only from the Excess Release Quantity (ERQ) as the ERQ is currently computed and such quantity of water as may be transferred from the Thermal Release Bank (TRB) (which shall be credited on May 1, 2002 and expires on October 31, 2002) from time to time as may be necessary. The 5,700 cfs-days from the ERQ shall be credited on June 15, 2002, and any water remaining from that quantity shall expire on March 15, 2003.
    b. Upon entry into “Drought Watch”, the remaining TRB shall be reduced by 15 percent.

c. Upon entry into "Drought Warning", the remaining TRB shall be suspended until storage in the New York City Delaware River Basin Reservoirs is 25 billion gallons (bg) above the drought watch line for 15 consecutive days.

d. The Habitat Bank shall be used only to meet the following targets in the West Branch Delaware River at Hale Eddy:

During Normal Conditions – 225 cfs
During Watch Conditions – 190 cfs
During Warning Conditions – 150 cfs

e. Upon entry into Drought Emergency, the Habitat Bank shall be suspended until storage in the New York City Delaware River Basin Reservoirs is 25 bg above the drought watch line for 15 consecutive days.

f. Conservation releases from Cannonsville Reservoir shall be:

During Normal Conditions – 45 cfs
During Drought Watch Conditions – 35 cfs
During Drought Warning Conditions – 23 cfs
During Drought Emergency Conditions – 8 – 23 cfs

g. Comparison of the difference between releases from the Habitat Bank and the conservation releases under D-77-20 CP (Revision 4) will be made and the difference debited or credited to the Habitat Bank. However, a negative balance in the Habitat Bank is not allowed.

h. All other conditions shall continue as specified in Docket No. D-77-CP (Revision 4).

i. This resolution takes effect immediately and will expire on May 1, 2003.

j. No additional water beyond that specified in this resolution will be made available.

3. These specific conservation releases are not available when coming out of the present drought emergency until storage is 25 bg above the drought watch line for 15 consecutive days.

/S/ Col. John P. Carroll
Col. John P. Carroll, Chairman pro tem

/S/ Pamela M. Bush
Pamela M. Bush, Esq., Commission Secretary

ADOPTED: April 3, 2002

Appendix D

AGREEMENT TO RESERVE THE EXCESS-RELEASE QUANTITY DURING THE 2002-2003 SEASONAL PERIOD

As a result of deficient precipitation in the upper Delaware River Basin, storage in the New York City reservoirs is below average for this time of year. Current storage in the New York City Delaware River Basin reservoirs is about 46 billion gallons above the drought watch line and about 28 billion gallons below median.

To conserve the waters of the Delaware River Basin, one-half of the excess-release quantity for the 2002-2003 seasonal period will be suspended. This action was agreed upon by the Parties to the Decree in a June 10, 2002 conference call initiated by the Delaware River Master's office. Suspension of the excess-release quantity will take effect on June 15, 2002 and will continue until March 15, 2003 unless modified by unanimous agreement of the Decree Parties.

State of Delaware	Date	State of Delaware	Date
State of New Jersey	Date	Commonwealth of Pennsylvania	Date
State of New York	Date	City of New York	Date

Appendix E

NO. 2002-21

EXTENSION OF DOCKET NO. 77-20 CP (Revision 5) (Amended)

DELAWARE RIVER BASIN COMMISSION

A RESOLUTION to extend Docket No. D-77-20 CP (Revision 4) for one year to continue the experimental augmented conservation release program for the New York City Delaware Basin Reservoirs, and to amend Docket No. D-77-20 CP (Revision 4) to establish a temporary habitat bank for support of experimental flow targets for fisheries protection on the West Branch of the Delaware River at Hale Eddy, and to temporarily modify the conservation releases from Cannonsville Reservoir.

WHEREAS, Document No. 77-20 CP (Revision 4) specified the current augmented experimental release program and instituted a drought watch and a revised drought warning level for the three New York City Delaware Basin Reservoirs beginning in May 1999 and ending on April 30, 2001; and

WHEREAS, Resolution No. 2001-5 extended Docket No. 77-20 CP (Revision 4) for one calendar year ending on April 30, 2002, and

WHEREAS, Docket No. D-77-20 CP (Revision 4) condition h. provides for an extension of the provisions of this docket upon agreement of all Parties to the 1954 Supreme Court Decree; and

WHEREAS, the Parties in the 1954 Supreme Court Decree are in the process of negotiating a permanent fisheries release program more responsive to the water conditions downstream of New York City Delaware Basin Reservoirs; and

WHEREAS, agreement on the permanent fisheries release program is not expected prior to April 30, 2002, the date at which the current program will automatically terminate; and

WHEREAS, the State of New York has proposed a revision and extension to Docket No. D-77-20 CP (Revision 4) for one calendar year ending April 30, 2003; and

WHEREAS, the requested revision and extension has been agreed to by all Parties to the 1954 Supreme Court Decree; now therefore,

BE IT RESOLVED by the undersigned Commissioners and Parties to the Decree:

1. The Parties to the 1954 Supreme Court Decree agree that development of a viable permanent fisheries release program requires consideration of other related issues, including interbasin transfer policy, Good Faith operations, the DRBC Comprehensive Plan currently being developed, New York City participation, and procedures for computing the Excess Release Quantity.
2. Docket No. D-77-20 CP (Revision 4) is hereby extended for one year to April 30, 2003, with the following modifications.
    a. A “Habitat Bank” is established, which shall consist of 5,700 cfs-days that shall be contributed for one year only from the Excess Release Quantity (ERQ) as the ERQ is currently computed and such quantity of water as may be transferred from the Thermal Release Bank (TRB) from time to time as may be necessary. The 5,700 cfs-days from the ERQ shall be credited on June 15, 2002, and any water remaining from that quantity shall expire on March 15, 2003. The 9,200 cfs-days TRB shall be credited on May 1, 2002 and expires on April 30, 2003.

b. Upon entry into "Drought Watch," the remaining TRB shall be reduced by 15 percent.

c. Upon entry into "Drought Warning," the remaining TRB shall be suspended until storage in the New York City Delaware River Basin Reservoirs is 25 billion gallons (bg) above the drought watch line for 15 consecutive days.

d. The Habitat Bank may be used to meet the following targets in the West Branch Delaware River at Hale Eddy:

During Normal Conditions – 225 cfs
During Watch Conditions – 190 cfs
During Warning Conditions – 150 cfs

In addition, the Habitat Bank may be used for augmenting flows in the West Branch Delaware River at Hale Eddy, and, contingent on the prior approval of New York City, the East Branch Delaware River at Harvard and the Neversink River at Bridgeville, during normal, drought watch and drought warning conditions. Also, the Habitat Bank may be used as needed for augmenting flows during drought warning conditions to maintain summer baseline releases as stipulated in Docket No. D-77-20 CP (Revision 4).

e. Upon entry into Drought Emergency, the Habitat Bank shall be suspended until storage in the New York City Delaware River Basin Reservoirs is 25 bg above the drought watch line for 15 consecutive days.

f. Conservation releases from Cannonsville Reservoir shall be:

During Normal conditions – 45 cfs
During Drought Watch Conditions – 35 cfs
During Drought Warning Conditions – 23 cfs
During Drought Emergency Conditions – 8 – 23 cfs

However, all thermal release charges shall be calculated using the augmented release rates stipulated in Docket No. D-77-20 CP (Revision 4).

g. Comparison of the difference between releases from the Habitat Bank and the conservation releases under D-77-20 CP (Revision 4) will be made and the difference debited or credited to the Habitat Bank. However, a negative balance in the Habitat Bank is not allowed.

h. All other conditions shall continue as specified in Docket No. D-77-20 CP (Revision 4).

i. This resolution takes effect immediately and will expire on April 30, 2003.

j. No additional water beyond that specified in this resolution will be made available.

/S/ Irene B. Brooks
Irene B. Brooks, Chairman pro tem

/S/ Pamela M. Bush
Pamela M. Bush, Esq., Commission Secretary

APPROVED: July 17, 2002

Appendix F

NO. 2002-31

A RESOLUTION to terminate the drought emergency that was declared by Resolution No. 2001-32 on December 18, 2001 and extended by Resolution No. 2002-25 on October 16, 2002.

WHEREAS, by Resolution No. 2002-25 on October 16, 2002, due to continued poor hydrologic conditions throughout the basin, the Commissioners extended through November 25, 2002 the drought emergency it declared in December 2001; and

WHEREAS, the hydrology of the Delaware River Basin has improved, due to above-normal precipitation during the months of September, October, and November. Evidence of improved conditions includes the following:

- New York City's Delaware Basin storage has increased to more than 63 percent of its useable capacity, or over 12 bg above the long-term median storage level for this time of year;
- Streamflows throughout the basin have returned to normal and in some areas above-normal for the past two months;
- Lower basin reservoir water supply storage, including storage in Beltzville, Blue Marsh and Nockamixon reservoirs, has reached full capacity; and
- There is no longer a foreseeable need for drought storage in F.E. Walter Reservoir to achieve the Trenton flow objective; and

WHEREAS, the State of Delaware and the City of New York have terminated their respective drought emergencies; and

WHEREAS, Pennsylvania has terminated its drought emergency in all but two of the counties within the basin, and New Jersey has relaxed its statewide non-essential water use restrictions in the northern and central portions of the state; and

WHEREAS, in spite of the improved conditions in most parts of the basin, ground water levels in the southern portion of New Jersey as well as in Chester and Delaware counties in Pennsylvania remain below normal, and state-imposed mandatory use restrictions remain in place in these locations, and

WHEREAS, during the drought watch, warning and emergency to date, the Commission directed releases totaling 11.5 billion gallons from regional reservoirs in Pennsylvania and reduced diversions by the City of New York and the State of New Jersey, thereby maintaining flows in the main stem and conserving 43 billion gallons of water in New York City's Delaware Basin water supply reservoirs; now therefore,

BE IT RESOLVED by the Delaware River Basin Commission:

1. The basinwide drought emergency declared by Resolution No. 2001-32 on December 18, 2001 and extended by Resolution No. 2002-25 on October 16, 2002 is hereby terminated.
2. The Commission appreciates the support of the public and private reservoir owners, including the U.S. Army Corps of Engineers; PPL Generation, LLC; Mirant New York/Generation, LLC; and the Commonwealth of Pennsylvania, whose partnership and cooperation were vital to managing the severe drought over the past year.

3. The commission fully supports the ongoing drought actions of the states in areas of the basin that continue to experience below-normal ground water levels.

/S/ Irene B. Brooks
Irene B. Brooks, Chairman pro tem

/S/ Pamela M. Bush
Pamela M. Bush, Esq., Commission Secretary

ADOPTED: November 25, 2002