REPORT OF THE RIVER MASTER OF THE DELAWARE RIVER

FOR THE PERIOD DECEMBER 1,1992-NOVEMBER 30, 1993

By William E. Harkness, Bruce E. Krejmas, And William J. Carswell, Jr.

With a section on WATER QUALITY

By Charles R. Wood

U. S. GEOLOGICAL SURVEY
Open File Report 96-663A

Reston, Virginia

1997

U.S. DEPARTMENT OF THE INTERIOR
BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY
Gordon P. Eaton, Director

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U.S. Geological Survey
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Reston,VA 20192
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Branch of Information Services
Box 25286
Denver, CO 80225-0286

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To Obtain
	Length	
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
	Area	
square mile (mi^2)	2.590	square kilometer
	Volume	
million gallons (Mgal)	3,785	cubic meter
million gallons (Mgal)	1.547	cubic foot per second-day
billion gallons (Bgal)	3.785	cubic hectometer
cubic foot per second-day	0.002447	cubic hectometer
	Flow	
million gallons per day (Mgal/d)	1.547	cubic foot per second
million gallons per day (Mgal/d)	0.04381	cubic meter per second
billion gallons per day (Bgal/d)	1547	cubic foot per second
cubic foot per second (ft^3/s)	0.02832	cubic meter per second

Vertical datum: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929 - - a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Section I

RIVER MASTER LETTER OF TRANSMITTAL

and

SPECIAL REPORT

— PAGE 3 FOLLOWS —

OFFICE OF THE DELAWARE RIVER MASTER
United States Geological Survey
433 National Center, Reston, Virginia 22092

February 20, 1997

The Honorable
William H. Rehnquist
Chief Justice of the United States

The Honorable
Thomas R. Carper
Governor of Delaware

The Honorable
Christine Todd Whitman
Governor of New Jersey

The Honorable
George E. Pataki
Governor of New York

The Honorable
Thomas J. Ridge
Governor of Pennsylvania

The Honorable
Rudolph W. Giuliani
Mayor of the City of New York

New Jersey v. New York et al
No. 5 Original, October Term 1950

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 fortieth Annual Report of the River Master of the Delaware River for the year December 1, 1992, to November 30, 1993.

Monthly precipitation in the upper Delaware River basin during the 1993 River Master report year ranged from 33 percent of the long-term (52-year) average during May to 165 percent during April. Total precipitation during the year was 0.05 inches below average. Precipitation during the December to May period, when reservoirs typically refill, was 103 percent of the average.

On December 1, 1992, when this report year began, combined storage in the New York City reservoirs in the upper Delaware River Basin was 177.521 billion gallons (Bgal), which is 65.5 percent of the combined storage capacity. Median storage on December 1, based on 25 years of data, is 161.018 Bgal. Operations on December 1, 1992 were being conducted as prescribed in the Decree. Storage in the New York City Delaware River Basin reservoirs increased to capacity by mid-April and all three reservoirs spilled.

Precipitation during May was extremely low, 33 percent of the long-term average, and caused the seasonal drawdown to begin approximately one month earlier than normal. By June 1, 1993, storage was below normal and remained below normal until the end of the report year. Precipitation continued to be below normal through August with the precipitation deficit during the May to August period accumulating to almost seven inches.

The Delaware River Master Advisory Committee met at Port Jervis, New York on May 25, 1993, to discuss hydrologic conditions in the basin and operational procedures for the 1993 release season. The Acting River Master informed the committee that, on the basis of information provided by New York City, the excess quantity to be released beginning June 15 was 7.381 Bgal. He stated that based on the formula contained in the Decree, this water would be released at rates designed to maintain the Montague target flow at 100 ft^3/s above the normal 1,750 ft^3/s beginning June 15, 1993. The Parties to the Decree agreed that conditions were somewhat below normal but that the excess-release quantity should be released as prescribed by the Decree.

On June 23, 1993, the Parties to the Decree, the Delaware River Basin Commission (DRBC), and the Acting River Master unanimously agreed to a request by New York State for a change in the augmented conservation release program from Pepacton and Neversink Reservoirs. Details of the three-year experimental program are included in section II of this report and a copy of the agreement is attached as Appendix A.

Combined storage in the New York City Delaware River Basin Reservoirs declined at above normal rates throughout the summer in response to below normal precipitation and above normal releases to meet the Montague target. On August 4, 1993, the Parties to the Decree, the Delaware River Basin Commission, and the Acting Delaware River Master agreed to suspend the release of the remainder of the excess-release quantity per the procedures contained in the Lower Basin drought plan (DRBC Resolution 88-22 Revised) in an effort to prevent, or at least delay, the entry into drought warning in the basin. In spite of this action, storage continued to decline and reached the drought-warning level of the operating curves on September 16, 1993. Operations were reduced to those prescribed for drought warning on September 21, 1993 and remained at that level until the end of the report year. Details of the operations are described in section II of this report.

On November 30, 1993, the end of this report year, the combined storage in the New York City reservoirs was 123.472 Bgal, 45.6 percent of capacity, and the operations in the basin were being conducted as prescribed in the "Interstate Water Management Recommendation of the Parties to the Decree" (DRBC Resolution No. 83-13).

During the report year, the Acting River Master and staff participated in meetings of the Delaware River Basin Commission to assess water-supply conditions. Upon invitation of the representatives of the Parties to the Decree, the Deputy Delaware River Master met periodically with those representatives as a member of the Flow Management Technical Advisory Committee. Discussions primarily centered on proposals for the management of releases from reservoirs in the basin and other measures designed to cope with streamflow deficiencies whenever they occur.

The U.S. Geological Survey continued the operation of its field office of the Delaware River Master at Milford, Pennsylvania. William E. Harkness, Deputy Delaware River Master, continued in charge of the office, assisted by Bruce E. Krejmas and Beverly A. Roberts. Upon the retirement of Mr. Stanley P. Sauer in March 1993, Mr. Harkness was designated Acting Delaware River Master. William J. Carswell, Jr., the USGS Regional Hydrologist at Reston, Virginia, was designated the Delaware River Master effective May 1, 1995.

During the report year, the Milford office continued the weekly distribution of summary river data. These weekly reports contained preliminary data on releases from the 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 Montague gaging station, and diversions by New Jersey. The reports were made available to the State and City representatives on the Delaware River Master Advisory Committee and to other parties interested in the Delaware River operations. A special monthly summary of past hydrologic conditions, supplemented by an "outlook" of the river flow for the forthcoming month, was made available to the representatives on the Advisory Committee.

Section II of this report describes in detail Delaware River operations during the report year. As shown on page 16, the City of New York diverted a total of 246.250 Bgal from the basin during the report year ending November 30, 1993 and released 100.345 Bgal from Pepacton, Cannonsville, and Neversink Reservoirs to the Delaware River during the same period. The River Master directed releases to the Delaware River from these reservoirs totaling 77.368 Bgal.

Section III of this report describes water quality at various sites in the Delaware River Estuary. It was prepared by Charles R. Wood, U.S. Geological Survey, Malvern, Pennsylvania and contains data showing the extent of salinity encroachment and other water-quality characteristics in the estuary.

During the report year, the following individuals served as members of the River Master Advisory Committee:

Delaware	Dr. Robert R. Jordan
New Jersey	Steven Nieswand
New York	Russell C. Mt. Pleasant Daniel J. Campbell
New York City	Albert F. Appleton
Pennsylvania	John E. McSparran William A. Gast

Throughout the year, diversions to supply water for New York City and releases designed to maintain the flow of the Delaware River at Montague were made as directed by this office. Diversions by New York City from the Delaware River basin reservoirs did not exceed the limit specified by the Decree or the limits in the several agreements among the Parties to the Decree.

The appreciation of the River Master and staff is expressed for the continued excellent cooperation of all the representatives of the Parties to the Decree. Appreciation also is extended to the Pennsylvania Power & Light Company and the Orange and Rockland Utilities, Inc. for keeping us informed of their plans for power generation and resulting releases.

A draft of this report was furnished to the Advisory Committee members for comment.

Sincerely yours,

William J. Carswell, Jr., Ph.D.
Delaware River Master

Section II

REPORT OF DELAWARE RIVER OPERATIONS

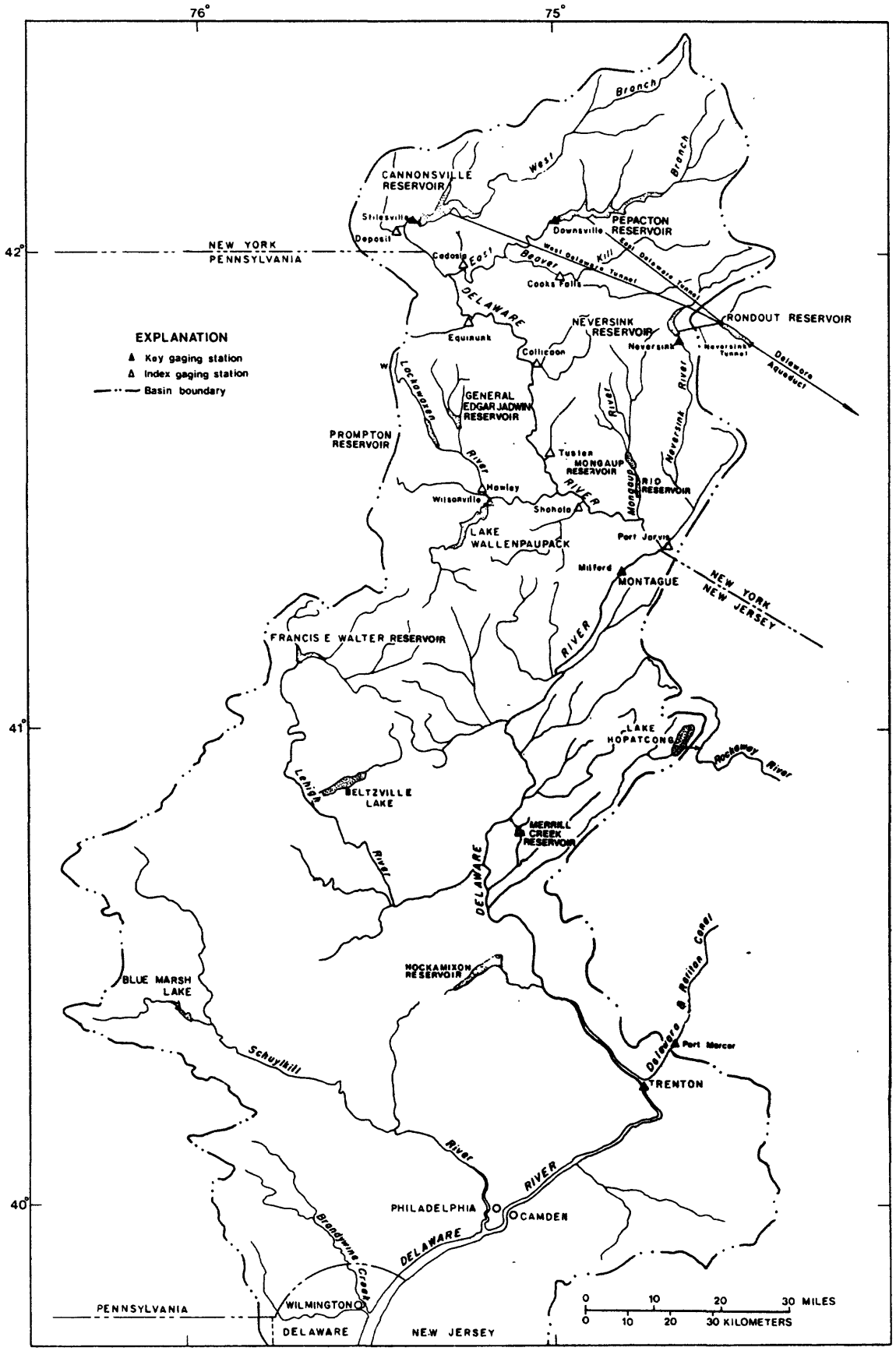

Figure 1.- Delaware River Basin upstream from Wilmington, Delaware

Section II

REPORT OF DELAWARE RIVER OPERATIONS

by William E. Harkness and Bruce E. Krejmas

ABSTRACT

A Decree of the Supreme Court of the United States in 1954 established the position of Delaware River Master. The Decree authorizes diversions of water from the Delaware River Basin (fig. 1) and requires compensating releases from certain New York City owned reservoirs to be made under the supervision and direction of the River Master. Reports to the Court, not less frequently than annually, were stipulated.

During the 1993 report year, December 1, 1992, to November 30, 1993, the monthly precipitation and runoff in the Delaware River Basin ranged from above average to below average. For the year as a whole, precipitation was 0.05 inches below average. Reservoir storage in the basin increased seasonally from December 1, 1992 through January 1993, decreased during February and March, then increased to capacity during April. Storage declined steadily from May 1 to October 31, 1993, reaching drought-warning level September 16, 1993. Operations were conducted at reduced levels designed to conserve the short water supplies caused by the drought-warning conditions in the basin from September 21 to November 30, 1993.

Diversions from the Delaware River basin by New York City and New Jersey did not exceed those authorized by the terms of the Amended Decree, or the reduced limits imposed because of the drought. Releases were made as directed by the River Master at rates designed to meet the Montague flow objective on 144 days during the year. Releases were made at the augmented conservation rates, at rates designed to relieve thermal stress and protect the fishery in the streams downstream from the reservoirs, or at other times at the basic conservation rates.

New York City and New Jersey complied fully with the terms of the Decree, the agreements reached to conserve water in the basin during the drought, and with the directives of the River Master during the year.

INTRODUCTION

The 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 certain New York City reservoirs to the Delaware River to be made under the supervision and direction of the River Master. The Decree also stipulated that reports be made to the Court not less frequently than annually. This report describes the River Master operations from December 1, 1992 to November 30, 1993.

Part of the hydrologic data presented are records of flow and water quality at U.S. Geological Survey gaging stations. These records were collected, computed, and furnished by the Offices of the U.S. Geological Survey at Albany, New York, Malvern, 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.

Definition of Terms and Procedures

The following definitions apply to various terms and procedures used in the operations described in this report. A table for converting inch-pound units to International System of Units (SI) is given on page *v*. The map of the Delaware River Basin (fig. 1) indicates the location of pertinent streams, reservoirs, and gaging stations.

Time of day. - Time of day is expressed in 24-hour eastern standard time, which included a 23-hour day April 4 and a 25-hour day October 31.

Rate of flow. - Mean discharge for any stated 24-hour period, in cubic feet per second (ft^3/s) or million gallons per day(Mgal/d).

Rate of flow at Montague. - Daily mean discharge of the Delaware River at Montague, N.J., on a calendar-day basis.

Reservoir-controlled releases. - Controlled releases from reservoirs passed through outlet valves in the dams or through turbines in powerplants. This does not include spillway overflow at the reservoirs.

Conservation releases. - Controlled releases from reservoirs designated to maintain flow in the channels downstream from the reservoirs.

Directed releases. - Controlled releases from the New York City Reservoirs in the upper Delaware River Basin designed by the Delaware River Master to meet the Montague flow objective.

Uncontrolled runoff at Montague. - Runoff from the drainage area upstream from Montague exclusive of the drainage area upstream from the Downsville, Cannonsville, Neversink, Wallenpaupack, and Rio dams but including spillway overflow at these dams.

Point of maximum reservoir depletion. - Elevation at the top of the highest outlet, sometimes referred to as minimum full-operation level.

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.

Capacity. - Total usable volume between the point of maximum depletion and the elevation of the lowest crest of the spillway.

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 its water-supply system. Also, the transfer of water by New Jersey from the Delaware River through the Delaware and Raritan Canal.

Excess quantity and seasonal period for its release. - As defined in the Decree, the excess quantity of water equals 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 1954 Decree) from all its sources of supply obtainable without pumping, except that the excess quantity should not exceed 70 billion gallons. Each year the "seasonal period" for release of the excess quantity begins on June 15. The design rate for that period becomes effective at Montague on that date and continues in effect until the following March 15, or until the cumulative total of excess-release credits becomes equal to the seasonal quantity, whichever occurs first.

Daily excess-release credits. - Daily credits and deficits during the seasonal period are equal to the algebraic difference between the daily mean discharge at Montague and 1,750 ft^3/s; however, 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, with the following exception. During the seasonal period, credits are also made for part or all of other releases from these reservoirs contributing to daily mean discharge at Montague between the excess-release rate and 1,750 ft^3/s.

Precipitation

Precipitation measured in the basin above Montague totaled 43.03 inches for the 1993 report year and was 0.05 inches below the long-term (52-year) average (table 1).[1] Monthly precipitation ranged from 33 percent of the long-term average in May, 1993 to 165 percent of the average in April, 1993. Table 1 compares the monthly precipitation during the report year with the long-term average.

These data were computed from records collected by the National Weather Service, New York City Department of Environmental Protection, Bureau of Water Supply and the River Master, at 10 stations distributed over the basin area upstream from Montague.

December to May is generally considered the normal time of year when surface- and ground-water reservoirs fill. During this period in 1992-93, average precipitation at the 10 stations was 20.76 inches, which was 103 percent of the long-term average. During June to November, average precipitation at the 10 stations was 22.27 inches, which was 97 percent of the long-term average. The maximum monthly precipitation measured at the 10 stations was 7.46 inches in September at Cadosia, New York; the minimum monthly precipitation was 0.93 inches in May at Milford, Pennsylvania.

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1. All numbered tables in Section II are grouped at the end of this section, beginning on page 31.

Acknowledgments

The River Master daily operation records were prepared by the Milford Office of the Delaware River Master from hydrologic data collected principally on a day-to-day basis. Data for these records were collected and computed by the Milford office or were furnished by agencies as follows: Data from Pepacton, Cannonsville, and Neversink Reservoirs by the New York City Department of Environmental Protection, Bureau of Water Supply; from Delaware and Raritan Canal by the New Jersey Water Supply Authority; from Lake Wallenpaupack by the Pennsylvania Power & Light Company; and from Rio Reservoir by Orange and Rockland Utilities, Inc. Precipitation data and quantitative precipitation forecasts were provided by the National Oceanic and Atmospheric Administration, National Weather Service.

OPERATIONS

December through May

Operations on December 1, 1992 were being conducted as prescribed in the Decree. The Montague flow objective was 1,860 ft^3/s and the allowable diversions to New York City and New Jersey were 800 Mgal/d and 100 Mgal/d respectively. Conservation releases from New York City reservoirs were being made at the augmented levels shown in table 2.

During the first half of the report year, total precipitation was 0.59 inches above average and monthly precipitation ranged from 165 percent of the long-term average in April to 33 percent in May (table 1). Runoff in the Upper Delaware River Basin was above normal during January and April, below normal during February and May, and within the normal range during December and March.

On December 1, 1992, Pepacton Reservoir contained 85.767 Bgal of water in storage above the point of maximum depletion, or 61.2 percent of the reservoir's storage capacity of 140.190 Bgal. Cannonsville Reservoir contained 69.331 Bgal, or 72.4 percent of the reservoir's storage capacity of 95.706 Bgal and Neversink Reservoir contained 22.423 Bgal, or 64.2 percent of the reservoir's storage capacity of 34.941 Bgal. The combined storage in the three reservoirs as of December 1 was 177.521 Bgal, or 65.5 percent of their combined capacity. Daily storages in Pepacton, Cannonsville, and Neversink Reservoirs are shown in tables 3, 4, and 5 respectively, and the combined storage is shown graphically in figure 2.

Inflow to the City's reservoirs during the December through May period generally exceeds draft rates and therefore increases storage. The average inflow to Pepacton, Cannonsville, and Neversink Reservoirs for these six months during the 52-year period, December 1940 to May 1992, was 299.0 Bgal. During the corresponding six months of the current report year, inflow to the three reservoirs totaled 358.9 Bgal. Evaporation loss was not included in the computation.

Combined storage held relatively steady during December 1992, increased seasonally during January 1993, then declined gradually during February and most of March. During the last week of March and the first two weeks of April, storage increased rapidly in response to approximately 2.5 inches of precipitation and increased temperatures which served to melt the snowpack and created significant runoff.

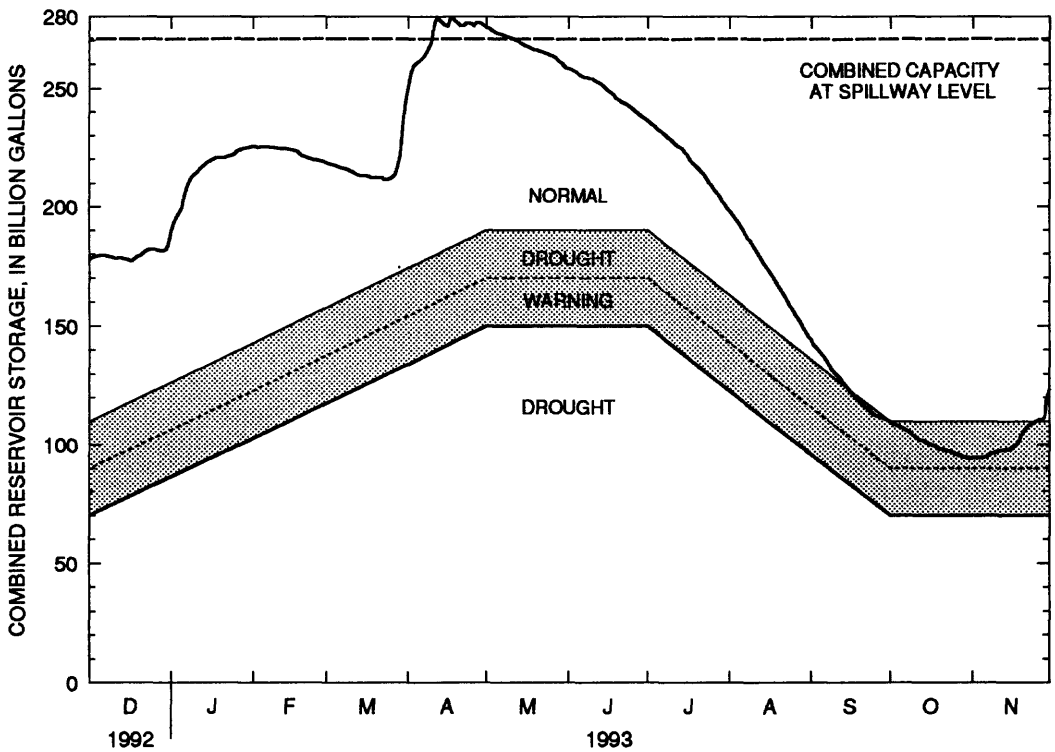

Figure 2.- Operating curves for New York City reservoirs in the Delaware River Basin compared with the actual contents of the reservoirs, December 1, 1992 to November 30, 1993 (Sources: Operating curves from Interstate Water Management Recommendations of the Parties to the U.S. Supreme Court Decree of 1954, reservoir contents from New York City Bureau of Water Supply data.)

Total storage in the three New York City reservoirs was 176.784 Bgal on November 30, 1992 and 258.750 Bgal on May 31, 1993. The maximum storage was 279.761 Bgal on April 12 (fig. 2) when all three reservoirs were spilling. Normally, maximum storage in the individual reservoirs occurs on different days. The maximum storage in Pepacton Reservoir was 143.275 Bgal on April 17, 1993, the maximum storage in Cannonsville Reservoir was 104.180 Bgal on April 2, 1993, and the maximum storage in Neversink Reservoir was 35.778 Bgal on April 17, 1993. During the December to May period, diversions to Rondout Reservoir by New York City totaled 111.324 Bgal (612 Mgal/d). The forecast discharge at Montague, exclusive of water released from the City reservoirs, fell below the design rate on 11 days, 6 days during March and 5 days during May, and releases were directed. The observed discharge at Montague fell below the design rate on three days during March and two days during May. The release of a total of 4,091 $(ft^3/s)\cdot d$ (2.64 Bgal) of water was directed during the period. New York City made releases for conservation purposes at the augmented conservation rates shown in table 2 on all other days during the period.

June through November

Monthly precipitation during the June through November period was below average in June, July and August and was above average in September, October and November. Total precipitation during the period was 22.27 inches or 0.14 inches less than the 52-year average of 22.91 inches (table 1). Runoff in the Upper Delaware River Basin was below normal in June, July and August, within the normal range in September and October, and above normal in November.

The New York City Department of Environmental Protection, Bureau of Water Supply, furnished the River Master with the following advance data for the 1993 calendar year:

1. The estimated continuous safe yield from all the City's sources, obtainable without pumping, is 1,665 Mgal/d, or a total during the calendar year 1993 of 1.665 Bgal/d x 365 days = 607.725 Bgal.
2. The estimated consumption that the City must provide from all its sources of supply during calendar year 1993 is 591.582 + 7.250 = 598.832 Bgal.

On the basis of the provisions of the Decree and the above data, the aggregate quantity of excess-release water was 83 percent of (607.725 - 598.832) or 7.381 Bgal. The Montague design rate during the excess release period beginning June 15, 1993, was computed as:

$$1{,}750\ ft^3/s + \frac{7.381\ Bgal \times 1{,}547\ (ft^3/s)/(Bgal/d)}{120\ days} = 1{,}850\ ft^3/s$$

Data on consumption of water by the City of New York for each calendar year, since 1950, are shown in table 6.

Releases were directed to satisfy the Montague design rate on 133 days between June 1 and November 30, 1993, when the forecasted discharge at Montague, exclusive of water released from the New York City reservoirs, fell below the applicable design rate (table 7). Releases at various conservation rates or at rates designed to protect the fishery were made at other times from each reservoir from June 1 to November 30. A total of 1,639 $(ft^3/s)\cdot d$ (1.059 Bgal) was released for the relief of thermal stress from June 8 through July 15.

From June 1 to June 14, the level of flow required to be maintained in the Delaware River at Montague was 1,750 ft^3/s. The forecasted flow, exclusive of releases from Pepacton, Cannonsville, and Neversink Reservoirs, was less than the design rate on ten days during the period and releases were directed.

At the Delaware River Master Advisory Committee meeting on May 25, 1993, New York State proposed a change in the augmented conservation release schedules for Pepacton and Neversink Reservoirs. The Parties to the Decree unanimously agreed to the proposal for a three-year experimental period. The experimental release rates listed in table 2 were approved by the Dela-

ware River Basin Commission, Docket No. D-77-20 CP (Revision No. 2), on June 23, 1993 and were put into effect June 24, 1993. A copy of the docket and the agreement are attached to this report as Appendix A.

On June 15, 1993 the seasonal period for the release of the excess quantity began and the Montague design rate was increased to 1,850 ft^3/s. Between June 15 and August 4, in response to below normal runoff from precipitation and above normal releases to meet the Montague design rate, the storage in the New York City reservoirs declined rapidly. On August 4, 1993, in an effort to prevent or at least delay entry into drought warning, the Parties to the Decree met at Malvern, Pennsylvania and unanimously agreed to set aside the remainder of the excess-release quantity based on procedures contained in the lower basin drought plan, DRBC Resolution No. 88-22 (Revised). The Acting River Master concurred and the Montague design rate was returned to 1,750 ft^3/s effective August 8, 1993. A total of 3.418 Bgal of the 7.381 Bgal excess-release quantity was released and the remainder, 3.963 Bgal, was put in a bank to be used if needed to meet the Trenton target at a later date.

Throughout August and September, precipitation continued to be significantly below normal, the releases required to meet the Montague design rate were very high, and storage continued to decline at above normal rates. Combined storage declined below the drought-warning level of the operation curves on September 16, 1993 and remained below that level for five days. On September 21, 1993 the Montague design rate was reduced to 1,655 ft^3/s and the allowable diversions to New York City and New Jersey were reduced to 680 Mgal/d and 85 Mgal/d respectively, as required by the "Interstate Water Management Recommendations of the Parties to the Decree" (DRBC Resolution 83-13).

On September 22, 1993, the Parties to the Decree, the DRBC and the Delaware River Master met pursuant to DRBC Resolution No. 83-13, to consider a request by New York State for an emergency fisheries protection program designed to allow special releases from the New York City Delaware River Basin reservoirs to protect the fishery during the drought-warning period. The Parties to the Decree unanimously agreed to allow New York State to request special releases totaling a maximum of 3,000 $ft^3/s{\cdot}d$ and requiring that the amount released be paid back via reductions in the releases required to meet the Montague target. A copy of the agreement is attached to this report as Appendix B. A total of 1,496 $ft^3/s{\cdot}d$ was released to protect the fishery and 1,111 $ft^3/s{\cdot}d$ was paid back via reductions in releases to meet the Montague flow objective between September 28 and November 30, 1993. The special releases and the reductions in release requirements are summarized in table 8.

Between June 15, when release of the excess quantity began, and November 30, 1993, the forecasted flow at Montague, exclusive of releases from the New York City reservoirs, was below the design rate on 122 days and releases were directed. On 17 of the days that releases were directed, the directed release was less than the deficiency because of the payback of the emergency fishery protection releases (table 8).

On 54 days during the June 15 to November 30 period, the observed flow fell below the design rate. Of those 54 days, 32 were within 10 percent of the design rate and 22 were more than 10 percent below the design rate.

The total discharge at Montague; the portion derived from uncontrolled runoff downstream from the reservoirs; the portion contributed by the power reservoirs; and the portion contributed by Pepacton, Cannonsville, and Neversink Reservoirs are shown by the hydrographs in figure 3. In analyzing the water budget at Montague, the uncontrolled runoff downstream from the reservoirs was computed as the residual of observed flow less releases from all reservoirs and therefore was subject to all the errors in observations, transit times, and routing of the several components of flow. All of these uncertainties are contained in the computed hydrograph of uncontrolled runoff.

Diversions to Rondout Reservoir June 1 to November 30 totaled 134.926 Bgal.

Summary of Operations

From December 1, 1992, to November 30, 1993, diversions to Rondout Reservoir totaled 246.250 Bgal, and all releases from the New York City reservoirs to the Delaware River totaled 100.345 Bgal.

During the year, maximum storage in Pepacton Reservoir was 143.275 Bgal, on April 17, 1993. Maximum storage in Cannonsville Reservoir was 104.180 Bgal, on April 2. Maximum storage in Neversink Reservoir was 35.778 Bgal, on April 17. The maximum combined storage in the three reservoirs during the year was 279.761 Bgal, on April 12, when all three reservoirs were spilling.

Minimum combined storage in the reservoirs during the year was 94.189 Bgal on October 31, 1993. Minimum storage in Pepacton Reservoir was 63.330 Bgal (45.2 percent of capacity) on November 14, 1993. Minimum storage in Cannonsville Reservoir was 19.310 Bgal (20.2 percent of capacity) on September 26, 1993 and minimum storage in Neversink Reservoir was 7.496 Bgal (21.5 percent of capacity) on November 27, 1993.

On November 30, 1993, combined storage in the three reservoirs was 123.472 Bgal, or 45.6 percent of their combined capacity. During the year, combined storage decreased 53.312 Bgal, or 19.7 percent of capacity.

The combined storage of the three reservoirs on the first day of the month from June 1967 to November 1993 is shown in figure 4. Storage was below the median all months except December, February, March and May and was below the 25th percentile June through November.

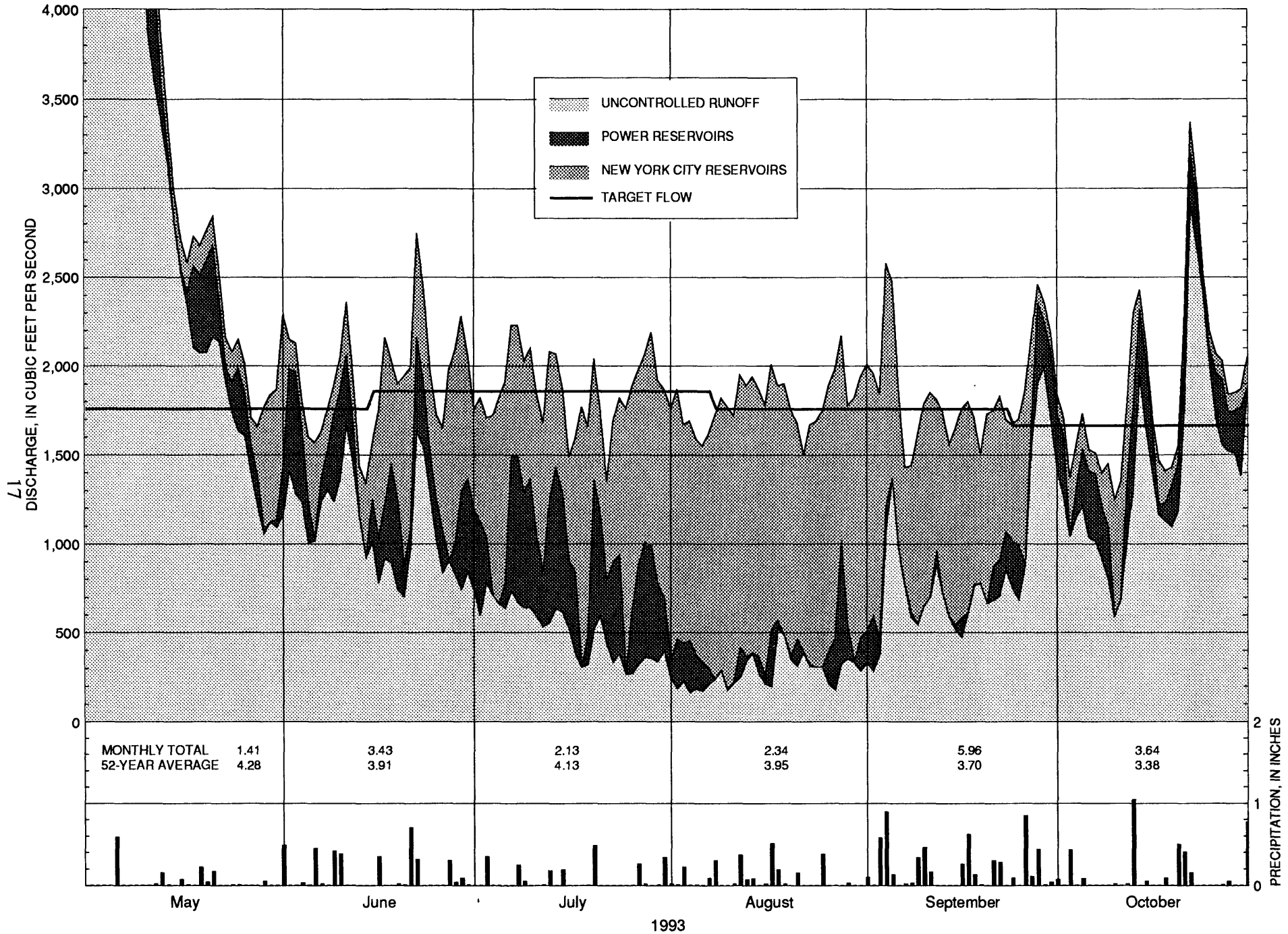

Figure 3.-Components of flow, Delaware River at Montague, N.J., May 1 to October 31, 1993.

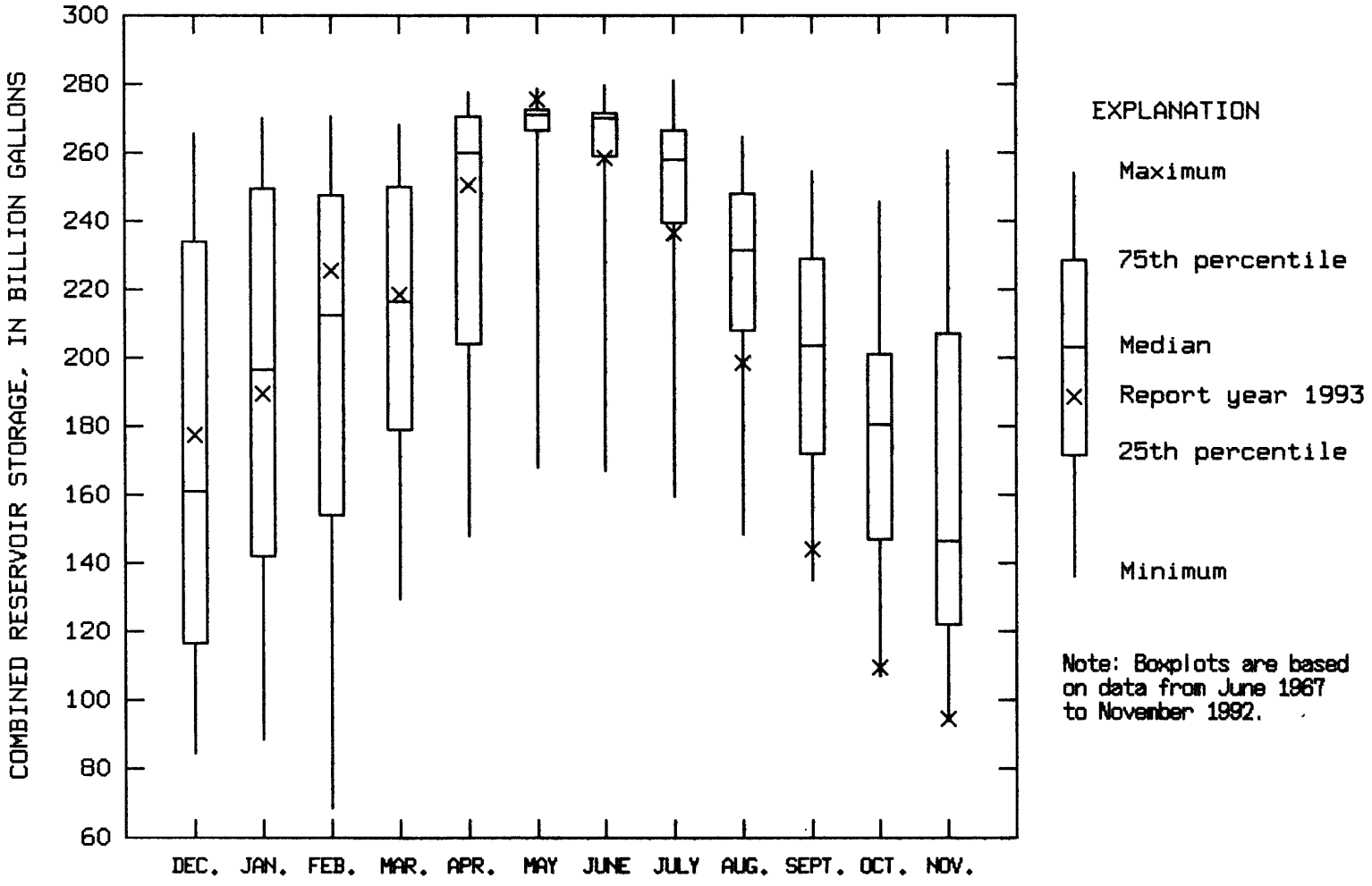

Figure 4.- Combined storage in Pepacton, Cannonsville, and Neversink Reservoirs on the first day of the month, December 1992 to November 1993, compared to June 1967 to November 1992

SUPPLEMENTARY RELEASE FROM WALLENPAUPACK POWERPLANT

An agreement between Pennsylvania Power & Light Company and New York City provides for supplementary releases from Wallenpaupack hydroelectric powerplant if the Delaware River Basin Commission requests compensation for water consumed at the company's Martins Creek steam-electric generating station. Releases may be requested if the flow of the Delaware River at Trenton, N.J. is expected to be less than 3,000 ft^3/s for more than three consecutive days. No supplementary releases were requested during the year.

COMPONENTS OF FLOW, DELAWARE RIVER AT MONTAGUE, N.J.

The data and computations of the various components of flow formed the basic operational records required to carry out the River Master's specific responsibilities with respect to the Montague Formula during the report year. The operational record has two parts: the forecasted flow at Montague, exclusive of controlled releases from New York City's reservoirs (table 9) and the segregation of the daily average flow at Montague among its various source components (table 10).

Discharge of the Delaware River at Montague was composed of the following source components:

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

The releases from the City's reservoirs necessary to maintain the applicable rate of flow at Montague was computed from the forecasted flow at Montague, exclusive of controlled releases from the City's reservoirs.

TIME OF TRANSIT

The average times for the effective transit of water from the various sources of controlled supply to Montague used for discharge routing during the 1993 report year are as follows:

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

This schedule was developed from reservoir and powerplant operations and gaging-station records of prior years and was found generally suitable. At times, noticeable exceptions occur, for example, when a large release from Cannonsville Reservoir follows a small one, a large part of the release is expended in filling the channel en route, and the remainder may appear at Montague as much as 18 hours late. During the winter, ice cover, together with the low streamflow, gradually increases the resistance to streamflow and lengthens the time of transit. However, because the increased travel time generally occurs gradually over several days and releases were not generally being directed to meet the Montague flow objective during that time, no adjustments were made to compensate for the increased travel time under ice cover.

SEGREGATION OF FLOW AT MONTAGUE

The River Master daily operation record of reservoir releases and daily segregation of flow among the various source components contributing to the flow of the Delaware River at Montague is shown in table 10. The arrangement of data conforms with the downstream movement of water from the various sources to Montague. A horizontal summation of data in the table is equivalent to routing the various contributions to Montague, using the schedule for travel time of water discussed previously. The uncontrolled runoff was computed by subtracting the contributions of the several other sources from the observed discharge at Montague.

COMPUTATION OF DIRECTED RELEASES

In the daily operations, it was necessary to utilize: (1) discharges computed from recorded or reported stream gage heights for various 24-hour periods without current information about changes in stage-discharge relations that might have occurred; (2) daily discharge from New York City's three reservoirs obtained from venturi meters; (3) rainfall reports for the previous 24 hours; (4) actual powerplant releases converted to daily discharge; (5) advance estimates of power demand converted to daily discharge; (6) advance estimates of uncontrolled runoff at Montague; and (7) average times for routing of water from the several sources. Variable errors of estimate occur in projecting data, but these data must be used in the daily design and direction of releases from the reservoirs.

The time of transit of water from Pepacton Reservoir to Montague (60 hours) was greater than the transit time of water from any other reservoir. Releases from Cannonsville and Neversink Reservoirs were timed to arrive at Montague concurrently with releases from Pepacton Reservoir. To allow for the actual differences in transit times, daily directed releases from Pepacton were scheduled to begin at 1200 hours, releases from Cannonsville were scheduled to begin at 2400 hours, and releases from Neversink were scheduled to begin at 1500 hours the following day.

Releases from the City's reservoirs required to maintain the specified flow at Montague were calculated after estimates of releases from Lake Wallenpaupack and Rio Reservoir were obtained and after a forecast was made of the uncontrolled runoff at Montague. Taking into account the time of transit from these sources to Montague, the calculation required that estimates of the following components 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 daily operation record for computing daily directed release from the City's reservoirs during the periods of low flow is shown in table 9.

The electric power companies cooperated fully in furnishing advance estimates of power-plant releases. As the hydroelectric plants were used chiefly for meeting peak-power demands of the system, advance estimates were subject to many modifying factors such as the influence of the vagaries of weather upon peak-power demand. In addition, the power companies are members of wide area power pools which may present unforeseen demands for power generation. As a result, the actual use of water for power generation was at times at considerable variance with the advance estimates that were used by the River Master's office in design computation.

For computation purposes during periods of low flow, the estimate of uncontrolled runoff at Montague was treated as two items: (1) current runoff and (2) estimated increase in runoff from precipitation. Estimated quantities for these items are shown in table 9.

During the winter period, the advance estimate of the uncontrolled runoff (current conditions) was based on flows at nearby gaging stations and on the recession curve of the computed uncontrolled flow at Montague.

During ice-free conditions, the current runoff was calculated using a routing and recession procedure based on discharges as of 0800 hours at the gaging stations listed below:

Station	Drainage area (mi^2)
Beaver Kill at Cooks Falls, N.Y.	241
Cadosia Creek at Cadosia, N.Y.	17.9
Oquaga Creek at Deposit, N.Y.	67.6
Equinunk Creek at Equinunk, Pa.	56.3
Callicoon Creek at Callicoon, N.Y.	110
Tenmile River at Tusten, N.Y.	45.6
Lackawaxen River at Hawley, Pa.	290
Shohola Creek near Shohola, Pa.	83.6
Neversink River at Port Jervis, N.Y.	336

The forecasted increase in runoff from precipitation is shown in table 9 under the heading of "Weather Adjustment." The National Weather Service Office, Mt. Holly, N.J., cooperated throughout the low-flow periods by furnishing quantitative forecasts of average precipitation over the drainage area above Montague and air temperatures for each day of the three-day design period. During the winter, runoff was estimated from the current state of snow and ice and from forecasted temperature and precipitation. During other periods, the forecasted precipitation was used to calculate runoff.

The forecasted flow at Montague, exclusive of releases from the City's reservoirs, was the sum of the forecasted releases from the power reservoirs, the estimated uncontrolled runoff under then current conditions, and the weather adjustment (table 9). If the computed flow was less than the desired flow at Montague, the expected deficiency was made up by corresponding releases from New York City reservoirs.

When revised forecasts of precipitation or powerplant releases became available, the releases required from the reservoirs were recomputed. Usually this procedure resulted in a reduced release requirement from New York City reservoirs for that day and therefore conserved water. Only the final figures are shown in table 9.

ANALYSIS OF FORECASTS

Forecasts of the flow at Montague based on the anticipated flow of the several components (exclusive of the release from New York City's reservoirs) varied somewhat from the observed flow on most days. At times, variations in the several components are partially compensating and the resulting observed flows were fairly close to the estimated flows.

The forecasted flow of the Delaware River at Montague, exclusive of the releases from the New York City reservoirs, was less than the applicable design rate on most days from May 27 to October 22, 1993. The following tabulation compares the advance estimates of the various contributions to the flow at Montague to the observed operations during this period:

	Advance estimates [$(ft^3/s)\cdot d$]	Observed operations [$(ft^3/s)\cdot d$]
Directed releases from New York City reservoirs	[a] 117,982	[b] 117,989
Power releases		
Lake Wallenpaupack	18,410	20,112
Rio Reservoir	15,907	15,870
Runoff from uncontrolled area	108,300	116,727

[a] Directed release as designed.
[b] Actual release in response to direction.

During the period, New York City released slightly more water than was directed, the power companies released 9.2 percent more water from Lake Wallenpaupack and 0.2 percent less water from Rio Reservoir than was forecast, and the observed runoff from the uncontrolled area was 7.8 percent more than the forecasted runoff.

On the basis of the observed discharges at Montague, exact forecasting of releases required from the City's reservoirs during the report year would have totaled 117,530 $(ft^3/s)\cdot d$. Directed releases totaled 119,703 $(ft^3/s)\cdot d$, or 1.8 percent more than for exact forecasting.

A comparison of the hydrographs of forecasted runoff and the actual runoff from the uncontrolled area (fig. 5), indicates that the forecasting procedures tended to underestimate runoff during high precipitation events but the forecasts were generally adequate. Adjustments were made when needed to compensate for errors in the forecast, but because of the travel time, the effect of the adjustments at Montague are not seen for several days.

Analysis of the precipitation forecasts indicate that the total precipitation forecasted for the three-day design period is often fairly accurate but the storm may occur either earlier or later in the period. The accuracy of the runoff forecasts are significantly affected by the timing of the precipitation events. In addition, if the storm track is somewhat different than was anticipated, the amount and timing of the runoff is significantly affected.

DIVERSIONS TO NEW YORK CITY WATER SUPPLY

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

Diversions from Pepacton, Cannonsville, and Neversink Reservoirs to the New York City water-supply system (Rondout Reservoir) during the report year are shown in table 11. The table includes a running account of the average rates of the combined diversions from the reservoirs, computed as prescribed by the Decree or the "Interstate Water Management Recommendations of the Parties to the Decree (DRBC Resolution 83-13)." The tabulation below shows the allowable maximum diversion rates and the actual diversions during those periods.

Effective dates	Allowable diversions (Mgal/d)	Actual diversions (Mgal/d)
June 17, 1992 to May 31, 1993	800	671
June 1 to Sept. 20, 1993	800	798
Sept. 21 to Nov. 30, 1993	680	642

During the year, a total of 246.250 Bgal of water was diverted to the New York City water supply system. The allowable diversion during the year was 294.318 Bgal.

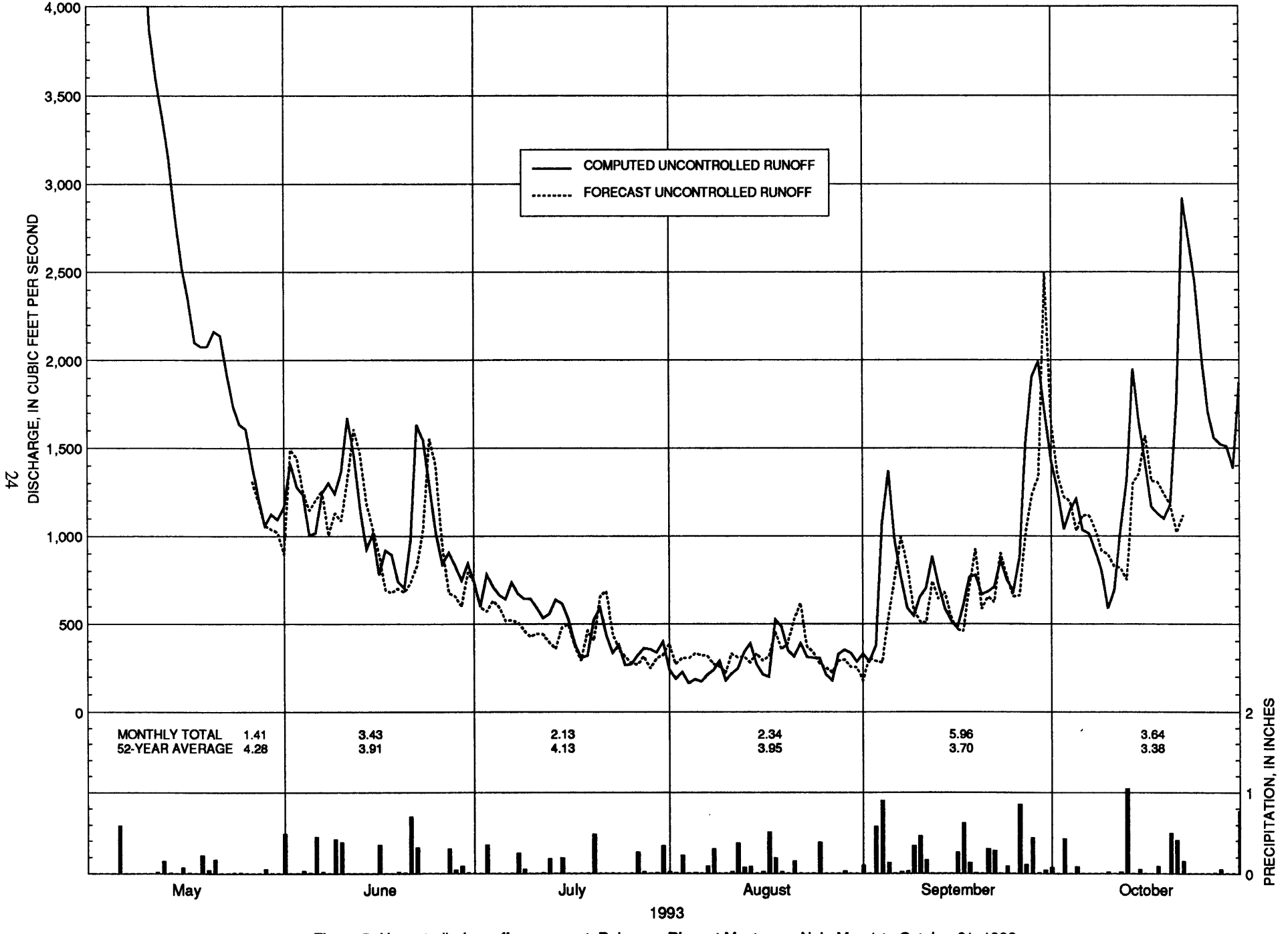

Figure 5.-Uncontrolled runoff component, Delaware River at Montague, N.J., May 1 to October 31, 1993.

STORAGE IN NEW YORK CITY RESERVOIRS

The New York City Board of Water Supply determined the "point of maximum depletion" and other pertinent reservoir levels and contents of Pepacton, Cannonsville, and Neversink Reservoirs as follows:

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		1,020.5		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.

Tables 3, 4, and 5 show storage in Pepacton, Cannonsville, and Neversink Reservoirs, respectively, above the "point of maximum depletion" or minimum full-operating level.

On December 1, 1992, combined storage in the three reservoirs was 177.521 Bgal. As discussed earlier, storage increased seasonally during December and January, declined during February and March, and increased rapidly during April, reaching capacity, and all three reservoirs spilled. The maximum storage for the year occurred on April 12, 1993, when all three reservoirs were spilling (fig. 2).

The seasonal decline in storage began in early May, about one month earlier than normal, and continued at above normal rates, reaching drought-warning level on September 16. The minimum combined storage was 94,189 Bgal on October 31, 1993. Storage began to recover during November, reaching 123,472 Bgal, 45.6 percent of capacity on November 30, 1993.

COMPARISON OF RIVER MASTER OPERATION DATA AND OTHER STREAMFLOW RECORDS

It has been explained that the River Master operations are, in effect, day-to-day operations, for which it is necessary to use preliminary records of streamflow. The following summaries show comparison of records used in the River Master operations and U.S. Geological Survey records. In the comparison of releases, the data used were reported in units of million gallons per day (Mgal/d) and converted to cubic feet per second (ft^3/s) in the summaries.

Releases from New York City Reservoirs

The River Master operations data on the controlled releases from Pepacton, Cannonsville, and Neversink Reservoirs, to the Delaware River were obtained from calibrated instruments connected to venturi meters installed in the outlet conduits.

The U.S. Geological Survey gaging station on the East Branch Delaware River at Downsville, N.Y., is 0.5 mile downstream from Pepacton Reservoir dam (fig. 1). The discharge for this station (table 12) includes releases from Pepacton Reservoir and also includes a small amount of seepage and any runoff, which enters the channel between the dam and the gage site. The drainage area at the dam is 371 mi^2 and at the gaging station is 372 mi^2.

The tabulation below lists the comparison of the releases from Pepacton Reservoir reported by New York City to the final records for the USGS gaging station on the East Branch Delaware River at Downsville, N.Y. (table 12).

Approximate rate of flow reported by NYC (ft^3/s)	6	19	50	70	100	350	400
Percent difference from gaging-station record a/	-7.5	-1.6	b/	+5.7	+9.6	+4.0	+3.5

a/ (-) indicates reported release was lower than gaging station record
b/ -15.2, Dec. 1 -8, 1992; +9.7, Dec. 10, 1992 to Mar. 31, 1993; 0, Oct. 21-27, 1993

The differences are similar to the differences observed in previous years.

The U.S. Geological Survey gaging station on the West Branch Delaware River at Stilesville, N.Y. is 1.4 miles downstream from Cannonsville Dam (fig. 1). The discharge for this station (table 13) includes releases from Cannonsville Reservoir and the runoff from 2 mi^2 of drainage area between the dam and the gage site. The drainage area at the dam is 454 mi^2, and at the gaging station is 456 mi^2.

The following tabulation compares the releases from Cannonsville Reservoir reported by New York City to the final records for the USGS gaging station on the West Branch Delaware River ar Stilesville, N.Y. (table 13).

Approximate rate of flow reported by NYC (ft^3/s)	22	27	34	48	360	530	600	875	1,330
Percent difference from gaging-station record a/	-14.6	-17.8	-15.0	-5.9	+8.4	+4.3	+2.8	+2.0	-0.8

a/ (-) indicates reported release was lower than gaging station record

The gaging-station records are considered good above 100 ft^3/s and fair below. The agreement between the data reported by New York City and the gaging station records is also good at high flows, but is only fair at low flows. The gaging-station records include the runoff from precipitation on the area between the dam and the gaging station and includes seepage that occurs near the base of the dam. On January 29, 1992, the seepage near the base of the dam was

measured and found to be 2.4 ft^3/s. This value agrees with estimates made in previous years. If the gaging-station record is adjusted for seepage, the agreement at 22 ft^3/s , 27 ft^3/s , 34 ft^3/s and 48 ft^3/s from the above table becomes -5.7, -11.4, -9.5 and -1.2 percent respectively. We are continuing to monitor the differences and are working with New York City and the USGS field office to improve the agreement.

The U.S. Geological Survey gaging station on the Neversink River at Neversink, N.Y. is 1,650 feet downstream from Neversink Dam (fig. 1). The discharge for this station (table 14) includes releases from Neversink Reservoir and, during storms, a small amount of runoff which originates between the dam and the gage site. The drainage area at the dam is 92.5 mi^2 and that at the gaging station is 92.6 mi^2.

The following tabulation shows good agreement between releases from the Neversink Reservoir, computed form the venturi meter data, and the final discharge records for the USGS gaging station on the Neversink River at Neversink, N.Y., except for very low flows (table 14).

Approximate rate of flow reported by NYC (ft^3/s)	4.6	15	24	45	52	75	100
Percent difference from gaging-station record a/	-25.8	+10.7	b/	+7.3	+1.2	+3.3	+7.0

a/ (-) indicates reported release was lower than gaging station record

b/ -3.9, Dec. 2, 1992 to Mar. 31, 1993; +9.3, Sept. 27 to Oct. 12, 1993

Releases from Lake Wallenpaupack

Records of daily discharge through the Wallenpaupack powerplant were furnished by the Pennsylvania Power & Light Company and published by the U.S. Geological Survey as Wallenpaupack Creek at Wilsonville, Pa. (table 15). 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 an 0800 hour to 0800 hour basis to compensate for the travel time to Montague (table 10).

From December 1992 through November 1993, the River Master's record agrees with the published U.S. Geological Survey record except for a slight variation due to the difference in the time frame and rounding of the computations.

Delaware River at Montague, N.J.

The River Master's operation record for the Delaware River at Montague, N.J. (table 10) indicated 0.02 percent more discharge for the year than the published U.S. Geological Survey record for the gaging station at that site (table 16), and daily records were in good agreement.

Diversion Tunnels

Records of diversions through the East Delaware, West Delaware, and Neversink Tunnels (fig. 1) were furnished to the River Master's Office by the City of New York. These records were obtained from New York City's calibrated instruments connected to venturi meters installed in the

tunnel conduits. The onsite venturi rates-of-flow were transmitted electronically to the New York City Department of Environmental Protection computer at the Rondout Effluent Chamber every 15 seconds. Every five minutes the computer system calculated the release and diversion quantities for the preceding five-minute periods based on the latest instantaneous rates-of-flow. These five-minute quantities were added to calculate the daily total flows which were reported to the River Master office daily. The diversion values were checked weekly against the flow meter totalizer readings onsite and calibrated or corrected as necessary. Current-meter measurements were made by the River Master's office to verify the reported diversions. The measurements were made in the outlet channels downstream from 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 the measurement of flows from December 31, 1992 to February 25, 1993 and March 30 to July 7, 1993, because of high water levels in Rondout Reservoir. The results of three current-meter measurements made at other times during the report year showed that on the average, the venturimeter instruments gave higher discharges by 3.1 percent for the totalizer and 2.5 percent higher for the rate-of-flow indicator.

Comparison of the data provided by New York City with discharges obtained from recorded gage-heights and the rating curve for the weir on the outlet channel from the East Delaware Tunnel indicate that the data provided by New York City were within acceptable limits.

The hydroelectric plant at the downstream end of the East Delaware Tunnel operated most days of the year. When the powerplant was not in operation, a small amount of leakage through the wicket gates was not recorded on the totalizer. The results of current-meter measurements made in previous years and observations made in 1993 indicate that the leakage has not changed substantially with time and is approximately 8.0 Mgal/d. Because the powerplant was not in operation for the equivalent of 79 days during the 1993 report year, the unmeasured leakage was approximately 630 Mgal. Based upon the measurements obtained this year and in previous years, the record of diversions through the East Delaware Tunnel was substantially correct.

The West Delaware Tunnel is used to divert water from Cannonsville Reservoir into Rondout Reservoir. Two current-meter measurements of flow in the West Delaware Tunnel outlet channel were made during the report year. Those measurements and two measurements, one made just before and one just after the end of the report year indicated that on the average the venturi instruments gave higher results, 5.3 percent for both the totalizer and the rate-of-flow indicator. Inspections of the channel downstream from the outlet, when valves were closed, showed negligible leakage.

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

The Neversink Tunnel is used to divert water from Neversink Reservoir into Rondout Reservoir. Two measurements of flow from the Neversink Tunnel were made during the report year. Those measurements and one measurement made before the beginning of the report year showed that on average, the venturi instruments were 1.4 percent higher for the totalizer and 1.2 percent higher for the rate-of-flow indicator.

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 occurs that is not recorded on the venturi instruments. Based on measurements made during previous years, the average rate of leakage was 14.0 ft^3/s (9.0 Mgal/d). When the powerplant was operating, the leakage was included in the recorded flow. When the main valve on the tunnel is closed there is no leakage.

During the 1993 report year, the power plant did not operate for part of the day most of the time and was not operated the equivalent of 177 days. Based on the above rate and on records of power plant operation, approximately 1.6 Bgal of water was diverted but unrecorded.

DIVERSIONS BY NEW JERSEY

The Amended Decree allows 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 (154.7 ft^3/s) as a monthly average, with the diversion on any day not to exceed 120 Mgal/d (185.6 ft^3/s). The U.S. Geological Survey gaging station, Delaware and Raritan Canal at Port Mercer, New Jersey (fig. 1) is used as the official location for measuring the diversions by New Jersey (table 17).

The following tabulation lists the allowable diversions by New Jersey, the periods that they were in effect, and the maximum monthly diversion during each period for the report year.

Effective dates	Allowable diversion Mgal/d	Maximum monthly average diversion (Mgal/d)
Dec. 1, 1992 to Sept. 20, 1993	100	101
Sept. 21 to Nov. 30, 1993	85	87.4

The 30-day average diversion was computed weekly throughout the year to monitor compliance with the terms of the Decree and with the reduced diversions allowed during the period of drought warning. The maximum 30-day average diversion was 101 Mgal/d during June, 1993. The maximum daily diversion was 107 Mgal on June 20, 22, 24, 25 and July 1, 1993. These computations show that the diversions by New Jersey as measured at Port Mercer exceeded the limits allowed by the Decree during June and exceeded the reduced limits in effect during the drought-warning period in November. Whereas the data indicates that the allowable diversions were exceeded, the diversions were within the accuracy of the data and the preliminary records for the gaging station indicated that they were within the allowable limit. When the records were corrected and the error was discovered, the diversions were immediately reduced to allowable levels.

CONFORMANCE OF OPERATIONS AS PROVIDED UNDER AMENDED DECREE OF THE U.S. SUPREME COURT DATED JUNE 7, 1954

Operations were conducted as prescribed by the Decree from December 1, 1992 to August 7, 1993, the "Lower Basin Drought Warning and Drought Operating Plan" (DRBC Resolution 88-22 Revised) August 8 to September 20, and the "Interstate Water Management Recommendations of the Parties to the Decree (DRBC Resolution 83-13)," which were designed to alleviate the drought-warning conditions in the basin from September 21 to November 30, 1993.

Diversions from the Delaware River Basin to the New York City water-supply system were less than those authorized by the Decree, the Interstate Water Management Recommendations of the Parties to the Decree and the agreements among 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 Montague flow objectives and complied fully with the directives of the River Master during the year.

Diversions from the Delaware River Basin by New Jersey were within the limits prescribed by the Decree, et al, except as described earlier. New Jersey also complied fully with the requests of the River Master.

Table 1. Precipitation in the Delaware River basin upstream from Montague, N.J.
[All values given in inches]

Month	December 1940 to November 1992 Monthly Average	December 1992 to November 1993			
		Amount	Percentage of average	Excess (+) or deficit (-) Month	Cumulative
December	3.38	3.48	103	+0.10	+0.10
January	2.86	2.50	87	-.36	-.26
February	2.71	2.19	81	-.52	-.78
March	3.23	5.07	157	+1.84	+1.06
April	3.71	6.11	165	+2.40	+3.46
May	4.28	1.41	33	-2.87	+.59
June	3.91	3.43	88	-.48	+.11
July	4.13	2.13	52	-2.00	-1.89
August	3.95	2.34	59	-1.61	-3.50
September	3.70	5.96	161	+2.26	-1.24
October	3.38	3.64	108	+.26	-.98
November	3.84	4.77	124	+.93	-.05
12 months	43.08	43.03	100	-.05	

Table 2. Conservation release rates for New York City reservoirs in the Delaware River Basin.
[ft^3/s, cubic feet per second]

Reservoir	Operative dates	Conservation release rates		
		Basic (ft^3/s)	Augmented (ft^3/s)	Experimental (ft^3/s)
Neversink	January 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 to December 31	5	25	25
Pepacton	January 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 to December 31	6	50	45
Cannonsville	April 1-15	8	45	45
	April 16 to June 14	23	45	45
	June 15 to August 15	23	325	325
	August 16 to October 31	23	45	45
	November 1-30	23	33	33
	December 1 to March 31	8	33	33

Table 3. Storage in Pepacton Reservoir, N.Y. for year ending November 30, 1993
(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)

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	85,767	89,403	107,252	99,831	117,484	141,839	134,246	125,367	110,338	94,171	77,360	64,413
2	85,995	91,291	106,980	99,536	121,728	141,709	133,923	124,880	109,883	93,512	76,863	64,304
3	85,995	92,442	106,484	99,290	125,036	141,635	133,689	124,500	109,575	93,081	76,408	64,050
4	85,995	93,363	106,388	99,151	126,988	141,486	133,563	124,031	108,878	92,472	76,024	63,809
5	85,895	94,501	106,116	98,905	128,849	141,079	133,240	123,566	108,411	91,909	75,652	63,641
6	85,739	97,161	105,972	98,705	130,404	141,023	133,096	123,032	107,863	91,247	75,175	63,653
7	85,611	98,583	105,701	98,337	131,773	140,838	132,880	122,619	107,412	90,569	74,609	63,761
8	85,470	99,567	105,446	98,168	133,186	140,523	132,952	122,087	106,996	89,913	74,045	63,869
9	85,087	100,342	105,209	98,045	134,714	140,246	132,665	121,643	106,548	89,359	73,458	63,869
10	84,665	100,807	104,986	97,755	136,454	140,098	132,611	121,163	106,100	88,864	72,795	63,785
11	84,397	101,226	104,764	97,618	140,449	139,877	132,398	120,599	105,589	88,330	72,162	63,689
12	84,594	101,851	104,463	97,343	142,622	139,638	132,129	120,123	105,114	87,710	71,660	63,617
13	84,411	102,445	104,224	97,161	142,491	139,418	131,951	119,665	104,669	87,095	71,300	63,438
14	83,976	103,074	103,940	96,886	142,136	139,142	131,648	119,189	104,192	86,494	70,930	63,330
15	84,032	103,500	103,625	96,795	142,062	138,848	131,416	118,681	103,762	85,867	70,485	63,366
16	83,766	103,846	103,357	96,795	141,894	138,627	131,167	118,124	103,183	85,201	70,015	63,437
17	83,569	104,288	103,042	96,689	143,275	138,259	130,812	117,669	102,806	84,594	69,650	63,437
18	83,822	104,542	102,790	96,415	143,051	137,966	130,564	117,149	102,289	83,962	69,222	63,978
19	83,990	104,494	102,367	96,370	142,491	137,638	130,316	116,663	101,851	83,359	68,769	64,631
20	84,201	104,510	101,961	96,385	142,248	137,346	129,996	116,194	101,351	82,608	68,320	65,189
21	84,580	104,383	101,633	96,340	141,968	136,981	129,660	115,776	100,838	81,981	68,008	65,519
22	84,834	104,526	101,507	96,249	142,043	136,854	129,218	115,227	100,373	81,415	67,634	65,739
23	85,087	104,558	101,289	96,023	142,322	136,726	128,884	114,761	99,877	81,016	67,299	65,848
24	85,172	104,653	100,978	96,083	142,378	136,636	128,322	114,113	99,320	80,465	66,966	65,958
25	85,215	104,939	100,869	96,144	142,174	136,417	127,952	113,634	98,736	79,823	66,633	65,958
26	85,215	105,383	100,730	96,506	142,024	136,199	127,477	113,123	98,168	79,428	66,301	65,922
27	85,201	105,828	100,389	96,932	142,435	135,982	127,146	112,695	97,480	79,059	65,958	65,848
28	85,186	106,084	100,156	98,214	142,322	135,529	126,708	112,250	96,841	78,681	65,629	65,958
29	85,215	106,452		100,915	142,192	135,167	126,254	111,808	96,174	78,289	65,201	68,731
30	85,597	106,644		106,292	142,062	134,805	125,835	111,268	95,433	77,950	64,825	69,965
31	86,751	106,964		112,563		134,480		110,811	94,710		64,607	
Change	+1,126	+20,213	-6,808	+12,407	+29,499	-7,582	-8,645	-15,024	-16,101	-16,760	-13,343	+5,358
Equiv. Mgal/d	+36.3	+652	-243.1	+400.2	+983.3	-244.6	288.2	-484.6	-519.4	-558.7	-430.4	+178.6
Equiv. ft^3/s	+56.2	+1,009	-376	+619	+1,521	-378	-446	-750	-803	-864	-666	+276
Change for year -15,660 Mgal					Equiv. for year -42.9 Mgal/d					Equiv. for year -66.4 ft^3/s		

Table 4. Storage in Cannonsville Reservoir, N.Y for year ending November 30, 1993
(Storage in millions of gallons xabove 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)

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	69,331	75,873	90,123	93,379	104,060	98,780	90,929	80,378	61,779	30,562	19,675	21,912
2	69,980	77,172	90,397	93,485	104,180	98,426	90,747	80,060	60,829	29,728	19,704	22,105
3	70,311	78,042	90,579	93,577	103,302	98,056	90,564	79,617	59,950	28,894	19,767	22,384
4	70,589	78,719	90,731	93,501	101,983	97,798	90,062	79,189	59,083	28,404	19,788	22,531
5	70,814	79,797	91,248	93,333	100,792	97,589	89,682	78,719	58,192	27,885	19,893	22,770
6	70,960	81,510	91,553	93,166	100,132	97,573	89,362	78,401	57,044	27,417	19,929	23,142
7	71,119	82,738	91,781	93,196	99,713	97,412	89,149	78,208	55,958	26,779	19,999	23,800
8	71,119	83,706	91,918	93,242	99,520	97,218	88,967	77,959	54,836	26,098	19,999	24,349
9	71,238	84,487	92,223	93,151	99,359	97,041	88,952	77,683	53,774	25,392	19,943	24,864
10	71,132	85,036	92,360	92,953	99,376	96,961	88,845	77,434	52,560	24,668	19,830	25,307
11	71,132	85,441	92,542	92,801	100,856	96,752	88,419	77,103	51,499	24,326	19,872	25,664
12	71,238	85,817	92,847	92,573	101,661	96,430	88,042	76,744	50,449	23,877	19,830	25,996
13	71,265	86,279	93,151	92,025	100,856	96,205	87,638	76,495	49,305	23,405	19,936	26,353
14	71,225	86,583	93,288	92,131	100,100	95,899	87,349	76,274	48,147	22,878	20,020	26,736
15	71,132	86,915	93,455	92,101	99,488	95,691	86,612	75,777	47,091	22,306	20,111	27,179
16	71,040	87,089	93,622	91,944	98,925	95,554	85,918	75,017	46,024	21,726	20,217	27,740
17	71,053	87,276	93,744	91,857	100,228	95,402	85,398	73,821	44,912	21,378	20,252	28,217
18	71,450	87,363	93,729	91,736	100,888	95,280	84,718	73,000	43,877	21,014	20,322	29,403
19	71,980	87,638	93,242	91,675	100,325	95,067	83,880	72,496	42,952	20,582	20,385	31,165
20	72,284	87,638	93,151	91,599	99,794	95,432	83,258	72,073	42,090	20,280	20,428	32,518
21	72,761	87,869	93,044	91,507	99,247	95,158	82,984	71,490	41,217	20,062	20,535	33,646
22	73,119	88,252	92,983	91,446	99,150	94,961	82,969	70,814	40,220	19,971	20,605	34,567
23	73,358	88,419	92,968	91,142	99,826	94,565	82,883	69,913	39,085	19,865	20,790	35,301
24	73,543	88,617	92,953	91,020	99,923	94,185	82,651	68,828	37,807	19,507	20,953	35,914
25	73,503	88,967	93,059	91,005	99,762	93,972	82,333	67,940	36,657	19,317	21,038	36,548
26	73,397	89,438	93,136	91,020	99,392	73,759	81,828	67,152	35,548	19,310	21,169	36,994
27	73,238	89,636	93,242	91,583	100,003	93,440	81,409	66,350	34,855	19,366	21,208	37,321
28	73,066	89,849	93,333	92,618	100,180	92,801	81,033	65,434	34,082	19,450	21,339	37,995
29	73,066	90,016		95,174	99,713	92,314	80,861	64,657	33,130	19,535	21,424	41,302
30	73,238	90,032		100,389	99,279	91,629	80,654	63,752	32,277	19,640	21,533	43,288
31	74,229	90,062		104,111		91,112		62,734	31,332		21,633	
Change	+5,388	+15,833	+3,271	+10,778	-4,832	-8,167	-10,458	-17,920	-31,402	-11,692	+1,993	+21,655
Equiv. Mgal/d	+173.8	+510.7	+116.8	+347.7	-161.1	-263.5	-348.6	-578.1	-1,013	-389.7	+64.3	+721.8
Equiv. ft^3/s	+269	+790	+181	+538	-249	-408	-539	-894	-1,567	-603	+99.5	+1,117
Change for year -25,553 Mgal				Equiv. for year -70.0 Mgal/d					Equiv. for year -108 ft^3/s			

Table 5. Storage in Neversink Reservoir, N.Y. for year ending November 30, 1993
(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)

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	22,423	24,287	28,018	25,362	28,808	34,858	33,125	30,607	26,329	19,253	12,710	7,994
2	22,498	24,674	27,922	25,254	29,937	34,705	33,105	30,496	26,173	18,964	12,540	8,057
3	22,575	24,879	27,813	25,142	30,744	34,533	33,043	30,387	25,984	18,764	12,355	8,021
4	22,615	25,047	27,809	25,010	31,146	34,321	32,948	30,273	25,775	18,526	12,173	7,980
5	22,646	25,396	27,749	24,944	31,368	34,267	32,876	30,123	25,608	18,320	12,009	7,933
6	22,662	27,035	27,662	24,809	31,728	34,301	32,786	30,055	25,495	18,063	11,820	7,951
7	22,642	27,528	27,576	24,678	32,094	34,281	32,767	29,851	25,279	17,823	11,650	7,980
8	22,658	27,813	27,472	24,560	32,529	34,233	32,695	29,719	25,081	17,556	11,446	7,968
9	22,628	27,927	27,382	24,507	33,053	34,184	32,605	29,589	24,973	17,322	11,257	7,926
10	22,607	28,071	27,275	24,417	33,563	34,081	32,586	29,365	24,793	17,056	11,080	8,030
11	22,630	28,145	27,215	24,364	35,643	34,072	32,519	29,204	24,593	16,779	10,886	8,040
12	22,658	28,241	27,116	24,283	35,478	33,979	32,425	29,066	24,409	16,564	10,705	7,980
13	22,650	28,342	27,068	24,209	35,214	33,896	32,363	28,888	24,209	16,318	10,584	7,885
14	22,642	28,420	27,056	24,140	35,130	33,819	32,255	28,747	24,027	16,070	10,419	7,738
15	22,603	28,469	26,885	24,120	35,095	33,751	32,208	28,623	23,858	15,778	10,261	7,722
16	22,595	28,543	26,804	24,157	35,130	33,679	32,090	28,508	23,661	15,554	10,127	7,738
17	22,568	28,535	26,732	24,218	35,778	33,601	32,000	28,373	23,469	15,329	9,962	7,705
18	22,818	28,539	26,609	24,275	35,443	33,504	31,901	28,241	23,286	15,126	9,825	7,761
19	22,940	28,508	26,490	24,315	35,299	33,494	31,766	28,114	23,076	14,926	9,682	7,821
20	23,000	28,399	26,363	24,360	35,264	33,461	31,667	28,049	22,791	14,693	9,528	7,882
21	23,080	28,351	26,257	24,397	35,080	33,480	31,592	27,909	22,513	14,473	9,441	7,906
22	23,111	28,329	26,152	24,426	35,011	33,523	31,569	27,783	22,186	14,277	9,340	7,897
23	23,155	28,342	26,060	24,441	35,140	33,601	31,494	27,649	21,904	14,080	9,185	7,837
24	23,155	28,298	25,942	24,515	35,075	33,625	31,425	27,541	21,619	13,902	9,015	7,773
25	23,123	28,329	25,809	24,641	34,981	33,591	31,322	27,404	21,359	13,665	8,774	7,696
26	23,131	28,320	25,720	24,752	34,837	33,523	31,211	27,266	21,059	13,487	8,551	7,605
27	23,052	28,294	25,600	24,912	35,130	33,466	31,104	27,111	20,773	13,331	8,328	7,496
28	23,060	28,236	25,508	25,180	35,209	33.379	30,975	27,009	20,473	13,212	8,207	7,513
29	23,076	28,207		25,678	35,150	33,321	30,864	26,842	20,150	13,087	8,097	9,788
30	23,203	28,127		26,723	35,026	33,225	30,726	26,655	19,862	12,904	8,002	10,219
31	23,533	28,071		27,887		33,158		26,515	19,540		7,949	
Change	+1,215	+4,538	-2,563	+2,379	+7,139	-1,868	-2,432	-4,211	-6,975	-6,636	-4,955	+2,270
Equiv. Mgal/d	+39.2	+146.4	-91.5	+76.7	+238.0	-60.3	-81.1	-135.8	-225.0	-221.2	-159.8	+75.7
Equv. ft^3/s	+60.6	+226	-142	+119	+368	-93.2	-125	-210	-348	-342	-247	+117

Change for year -12,099 Mgal Equiv. for year -33.1 Mgal/d Equiv. for year -51.3 ft^3/s

Table 6. Consumption of Water by New York City - 1950 to 1993
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
	City proper (Mgal/d)	Outside communities (Mgal/d)	Total (Mgal/d)	(Bgal)
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

Table 7. Design rates for the Delaware River at Montague, N.J. gaging station December 1, 1992 to November 30, 1993
[ft^3/s, cubic feet per second]

Effective dates	Montague Design Rate (ft^3/s)
December 1, 1992 to March 14, 1993	1,860
March 15 to June 14	1,750
June 15 to August 7	1,850
August 8 to September 23	1,750
September 24 to November 30	1,655

Table 8. Summary releases during the administration of the Emergency Fishery Protection Program.

[All values in cubic feet per second; Bal. Adj., Balancing adjustment from table 16; Dir., Release in response to direction; Cons., Basic conservation release]

Montague	Directed Releases				Pepacton				Cannonsville				Neversink				Cumulative	
Date	Deficiency	Bal. Adj.	Cutback	Directed	Dir.	Cons.	Fishery	Total	Dir.	Cons.	Fishery	Total	Dir.	Cons.	Fishery	Total	Fishery	Cutback
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Sept. 28	0	-2	0	0	0	19	29	48	0	23	9	32	0	15	10	25	48	0
29	0	-6	0	0	0	19	31	50	0	23	11	34	0	15	10	25	100	0
30	0	-28	0	0	0	19	29	48	0	23	11	34	0	15	10	25	150	0
Oct. 1	0	-50	0	0	0	19	29	48	0	23	11	34	0	15	10	25	200	0
2	41	-50	0	0	0	19	29	48	0	23	11	34	0	15	10	25	250	0
3	431	-50	50	331	271	0	0	271	34	0	0	34	25	0	0	25	250	50
4	352	-50	50	252	192	0	0	192	34	0	0	34	25	0	0	25	250	100
5	304	-50	50	204	144	0	0	144	34	0	0	34	25	0	0	25	250	150
6	219	-50	50	119	60	0	0	60	34	0	0	34	25	0	0	25	250	200
7	216	-46	54	116	57	0	0	57	34	0	0	34	25	0	0	25	250	254
8	294	-42	58	194	135	0	0	135	32	0	0	32	25	0	0	25	250	312
9	454	-50	50	354	295	0	0	295	34	0	0	34	23	0	0	23	250	362
10	759	-47	53	659	347	0	0	347	289	0	0	289	25	0	0	25	250	415
11	756	-38	62	656	347	0	0	347	288	0	0	288	25	0	0	25	250	477
12	552	-18	82	452	345	0	0	345	82	0	0	82	25	0	0	25	250	559
13	633	-3	97	533	340	0	0	340	164	0	0	164	25	0	0	25	250	656
14	70	+33	0	103	50	0	0	50	34	0	0	34	19	0	6	25	256	656
15	17	+50	0	67	29	0	25	54	23	0	11	34	15	0	0	15	292	656
16	0	+34	0	0	0	20	0	20	0	23	8	31	0	15	0	15	300	656
17	340	-19	81	240	189	0	0	189	34	0	0	34	17	0	8	25	308	737
18	278	-29	71	178	122	0	0	122	34	0	0	34	25	0	0	25	308	808
19	131	-36	0	95	45	0	0	45	34	0	0	34	16	0	9	25	317	808
20	193	-36	53	104	45	0	0	45	34	0	0	34	25	0	0	25	317	861
21	350	-24	76	250	190	0	0	190	34	0	0	34	25	0	0	25	317	937
22	254	-7	93	154	111	0	0	111	28	0	6	34	15	0	10	25	333	1030
23	0	+16	0	0	0	19	26	45	0	23	11	34	0	15	10	25	380	1030
24	0	+22	0	0	0	19	26	45	0	23	11	34	0	15	10	25	427	1030
25	0	-3	0	0	0	19	26	45	0	23	11	34	0	15	10	25	474	1030
26	0	-19	0	0	0	19	26	45	0	23	11	34	0	15	10	25	521	1030
27	0	-19	0	0	0	19	26	45	0	23	11	34	0	15	8	23	566	1030
28	0	-19	0	0	0	19	26	45	0	23	11	34	0	15	8	23	611	1030
29	0	-19	0	0	0	19	26	45	0	23	11	34	0	15	8	23	656	1030
30	0	-19	0	0	0	19	26	45	0	23	11	34	0	15	8	23	701	1030
31	278	-19	81	178	119	0	0	119	34	0	0	34	23	0	0	23	701	1111

Table 8. Summary releases during the administration of the Emergency Fishery Protection Program. (Continued)

[All values in cubic feet per second; Bal. Adj., Balancing adjustment from table 16; Dir., Release in response to direction; Cons., Basic conservation release]

Montague	Directed Releases				Pepacton				Cannonsville				Neversink				Cumulative	
Date	Deficiency	Bal. Adj.	Cutback	Directed	Dir.	Cons.	Fishery	Total	Dir.	Cons.	Fishery	Total	Dir.	Cons.	Fishery	Total	Fishery	Cutback
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Nov. 1	0	-19	0	0	0	19	24	43	0	23	11	34	0	15	10	25	746	1111
2	0	-19	0	0	0	19	27	46	0	23	13	36	0	12	11	23	797	1111
3	0	-19	0	0	0	17	28	45	0	23	11	34	0	5	18	23	854	1111
4	0	-36	0	0	0	6	40	46	0	23	11	34	0	5	18	23	923	1111
5	0	-36	0	0	0	6	40	46	0	23	11	34	0	5	20	25	994	1111
6	0	-36	0	0	0	6	40	46	0	23	11	34	0	5	20	25	1065	1111
7	0	-36	0	0	0	6	42	48	0	23	8	31	0	5	10	15	1125	1111
8	0	-36	0	0	0	6	16	22	0	23	3	26	0	5	10	15	1154	1111
9	0	-36	0	0	0	6	13	19	0	23	3	26	0	5	10	15	1180	1111
10	0	-36	0	0	0	6	13	19	0	23	3	26	0	5	10	15	1206	1111
11	0	-36	0	0	0	6	13	19	0	23	3	26	0	5	10	15	1232	1111
12	0	-36	0	0	0	6	13	19	0	23	3	26	0	5	10	15	1258	1111
13	0	-36	0	0	0	6	13	19	0	23	3	26	0	5	10	15	1284	1111
14	0	-36	0	0	0	6	13	19	0	23	3	26	0	5	10	15	1310	1111
15	0	-36	0	0	0	6	13	19	0	23	5	28	0	5	10	15	1338	1111
16	0	-36	0	0	0	6	13	19	0	23	5	28	0	5	10	15	1366	1111
17	0	-36	0	0	0	6	13	19	0	23	5	28	0	5	10	15	1394	1111
18	0	-36	0	0	0	6	13	19	0	23	5	28	0	5	10	15	1422	1111
19	0	-36	0	0	0	6	13	19	0	23	5	28	0	5	10	15	1450	1111
20	0	-36	0	0	0	6	13	19	0	23	5	28	0	5	10	15	1478	1111
21	0	-36	0	0	0	6	13	19	0	23	5	28	0	5	0	5	1496	1111
22	0	-36	0	0	0	6	0	6	0	28	0	28	0	5	0	5	1496	1111
23	0	-36	0	0	0	6	0	6	0	28	0	28	0	5	0	5	1496	1111
24	0	-36	0	0	0	6	0	6	0	25	0	25	0	5	0	5	1496	1111
25	0	-36	0	0	0	6	0	6	0	22	0	22	0	5	0	5	1496	1111
26	0	-36	0	0	0	6	0	6	0	22	0	22	0	5	0	5	1496	1111
27	0	-36	0	0	0	6	0	6	0	22	0	22	0	5	0	5	1496	1111
28	0	-36	0	0	0	6	0	6	0	22	0	22	0	5	0	5	1496	1111
29	0	-36	0	0	0	6	0	6	0	22	0	22	0	5	0	5	1496	1111
30	0	-36	0	0	0	6	0	6	0	22	0	22	0	5	0	5	1496	1111

Table 9. New York City Reservoir release design data
(River Master daily operation record)
[ft^3/s, cubic feet per second; $ft^3/s.d$, cubic feet per second days]

Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases										Computation of the balancing adjustment					
	Powerplant release forecasts		Uncontrolled runoff							Adjusted directed Release		Actual deficiency			
Date of advance estimate	Lake Wallenpaupack ft^3/s	Rio Reservoir ft^3/s	Current conditions ft^3/s	Weather adjustment ft^3/s	Date	Discharge ft^3/s	Indicated deficiency ft^3/s	Balancing adjustment ft^3/s	Directed release ft^3/s	Daily ft^3/s	Cumulative $(ft^3/s)\cdot d$	Daily ft^3/s	Cumulative $(ft^3/s)\cdot d$	Cumulative difference $(ft^3/s)\cdot d$	Balancing adjustment (ft^3/s)
1992/93	1	2	3	4		5	6	7	8	9	10	11	12	13	14
MONTAGUE DESIGN RATE = 1,860 ft^3/s DECEMBER 1,1992 TO MARCH 14, 1993 1,750 ft^3/s MARCH 15 TO JUNE 14															
The estimated Montague discharge was greater than the Montague design rate Dec. 1, 1992 to Mar. 1, 1993															
Feb. 27	355	0	1,500	0	Mar. 2	1,855	0	-61	0	0	40,944	170	40,501	443	-44
28	355	71	1,400	0	3	1,826	34	-61	0	0	40,944	170	40,671	273	-27
Mar. 1	355	113	1,350	0	4	1,818	42	-61	0	0	40,944	110	40,781	163	-16
2	355	71	1,320	100	5	1,846	14	-61	0	0	40,944	0	40,781	163	-16
3	355	71	1,280	111	6	1,817	43	-44	0	0	40,944	0	40,781	163	-16
4	0	0	1,230	250	7	1,480	380	-27	353	353	41,297	723	41,504	-207	+21
5	0	142	1,300	100	8	1,542	318	-16	302	302	41,599	222	41,726	-127	+13
6	355	284	1,270	0	9	1,909	0	-16	0	0	41,599	0	41,726	-127	+13
7	355	284	1,230	0	10	1,869	0	-16	0	0	41,599	0	41,726	-127	+13
8	355	213	1,220	50	11	1,838	22	+21	43	43	41,642	0	41,726	-84	+8
9	355	213	1,320	0	12	1,888	0	+13	0	0	41,642	0	41,726	-84	+8
10	237	71	1,400	0	13	1,708	152	+13	165	167	41,809	0	41,726	+83	-8
11	0	0	1,390	0	14	1,390	470	+13	483	487	42,296	47	41,773	+523	-52
12	118	0	1,450	0	15	1,568	182		182						
The estimated Montague discharge was greater than the Montague design rate Mar. 16, 1993 to May 26, 1993															
May 24	0	284	1,285	24	27	1,593	157		157						
25	0	284	1,184	7	28	1,475	275		275						
26	0	0	1,052	7	29	1,059	691		691						
27	0	0	982	57	30	1,039	711		711						
28	0	0	1,021	0	31	1,021	729		729						

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 weather forecasts.
Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = Design rate - Col. 5, when positive; otherwise Co. 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 16.
Col. 10 = Summation of Col. 9.
Col. 11 = Design rate - (Col. 9 + Col. 10 from Table 16), when positive; otherwise Col. 11 = 0.
Col. 12 = Summation of Col. 11.
Col. 13 = Col. 10 - Col. 12.
Col. 14 = Col. 13 divided by minus 10, limited to ±110.

Note:--Cols. 9-14 are used only for the computation of the balancing adjustment Dec. 1, 1992 to Mar. 14, 1993, June 15, 1993 to Nov. 30, 1993.

Table 9. New York City Reservoir release design data (Continued)
(River Master daily operation record)
[ft^3/s, cubic feet per second; $ft^3/s.d$, cubic feet per second days]

Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases										Computation of the balancing adjustment					
	Powerplant release forecasts		Uncontrolled runoff				Indicated	Balancing	Directed	Adjusted directed Release		Actual deficiency		Cumulative	Balancing
Date of advance estimate	Lake Wallenpaupack	Rio Reservoir	Current conditions	Weather adjustment	Date	Discharge	deficiency	adjustment	release	Daily	Cumulative	Daily	Cumulative	difference	adjustment
	ft^3/s	ft^3/s	ft^3/s	ft^3/s		ft^3/s	ft^3/s	ft^3/s	ft^3/s	ft^3/s	$(ft^3/s)\cdot d$	ft^3/s	$(ft^3/s)\cdot d$	$(ft^3/s)\cdot d$	(ft^3/s)
1993	1	2	3	4		5	6	7	8	9	10	11	12	13	14
May 29	0	0	889	7	June 1	896	854		854						
30	232	142	884	607	2	1,865	0		0						
31	232	142	833	609	3	1,816	0		0						
June 1	232	177	1,196	60	4	1,665	85		85						
2	232	0	1,099	47	5	1,378	372		372						
3	0	0	985	215	6	1,200	550		550						
4	0	227	911	349	7	1,487	263		263						
5	232	284	848	156	8	1,520	230		230						
6	232	284	1,130	0	9	1,646	104		104						
7	232	284	990	97	10	1,603	147		147						
8	232	284	892	427	11	1,835	0		0						
9	232	170	1,089	519	12	2,010	0		0						
10	0	0	1,466	0	13	1,466	284		284						
11	0	142	1,188	0	14	1,330	420		420						
						MONTAGUE DESIGN RATE = 1,850 ft^3/s JUNE 15 TO AUG. 7										
12	232	248	1,043	0	15	1,523	327		327	324	324	604	604	-280	+28
13	232	0	840	59	16	1,131	719		719	718	1,042	818	1,422	-380	+38
14	232	0	647	45	17	924	926		926	927	1,969	617	2,039	-70	+7
15	232	355	638	39	18	1,264	586		586	584	2,553	404	2,443	110	-11
16	232	284	701	0	19	1,217	633	+28	661	663	3,216	613	3,056	160	-16
17	0	142	653	26	20	821	1,029	+38	1,067	1,069	4,285	979	4,035	250	-25
18	0	213	653	84	21	950	900	+7	907	905	5,190	765	4,800	390	-39
19	232	213	627	202	22	1,274	576	-11	565	565	5,755	0	4,800	955	-96
20	232	213	609	432	23	1,486	364	-16	348	348	6,103	0	4,800	1,303	-100
21	232	213	1,130	422	24	1,997	0	-25	0	0	6,103	335	5,135	968	-97
22	232	213	1,402	0	25	1,847	3	-39	0	0	6,103	598	5,733	370	-37
23	232	0	947	0	26	1,179	671	-96	575	582	6,685	782	6,515	170	-17
24	0	0	674	0	27	674	1,176	-100	1,076	1,074	7,759	944	7,459	300	-30
25	0	0	634	25	28	659	1,191	-97	1,094	1,091	8,850	851	8,310	540	-54
26	232	0	575	25	29	832	1,018	-37	981	984	9,834	554	8,864	970	-97
27	232	109	628	166	30	1,135	715	-17	698	698	10,532	488	9,352	1,180	-100

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 weather forecasts.
Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = Design rate - Col. 5, when positive; otherwise Co. 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 16.
Col. 10 = Summation of Col. 9.
Col. 11 = Design rate - (Col. 9 + Col. 10 from Table 16), when positive; otherwise Col. 11 = 0.
Col. 12 = Summation of Col. 11.
Col. 13 = Col. 10 - Col. 12.
Col. 14 = Col. 13 divided by minus 10, limited to ±100.

Note:--Cols. 9-14 are used only for the computation of the balancing adjustment Dec. 1, 1992 to Mar. 14, 1993, June 15, 1993 to Nov. 30, 1993.

Table 9. New York City Reservoir release design data (Continued)
(River Master daily operation record)
[ft^3/s, cubic feet per second; $ft^3/s.d$, cubic feet per second days]

Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases										Computation of the balancing adjustment					
	Powerplant release forecasts		Uncontrolled runoff							Adjusted directed Release		Actual deficiency			
Date of advance estimate	Lake Wallenpaupack	Rio Reservoir	Current conditions	Weather adjustment	Date	Discharge	Indicated deficiency	Balancing adjustment	Directed release	Daily	Cumulative	Daily	Cumulative	Cumulative difference	Balancing adjustment
	ft^3/s	ft^3/s	ft^3/s	ft^3/s		ft^3/s	ft^3/s	ft^3/s	ft^3/s	ft^3/s	$(ft^3/s)\cdot d$	ft^3/s	$(ft^3/s)\cdot d$	$(ft^3/s)\cdot d$	(ft^3/s)
1993	1	2	3	4		5	6	7	8	9	10	11	12	13	14
June 28	232	284	598	142	July 1	1,256	594	-30	564	568	11,100	658	10,010	1,090	-100
29	232	284	593	0	2	1,109	741	-54	687	694	11,794	724	10,734	1,060	-100
30	232	284	556	15	3	1,087	763	-97	666	675	12,469	815	11,549	920	-92
July 1	0	106	506	126	4	738	1,112	-100	1,012	1,008	13,477	1,138	12,687	790	-79
2	0	0	464	132	5	596	1,254	-100	1,154	1,156	14,633	1,186	13,873	760	-76
3	0	113	518	0	6	631	1,219	-100	1,119	1,127	15,760	1,067	14,940	820	-82
4	466	284	523	0	7	1,273	577	-92	485	485	16,245	360	15,300	945	-94
5	466	284	510	0	8	1,260	590	-79	511	511	16,756	358	15,658	1,098	-100
6	466	284	463	0	9	1,213	637	-76	561	561	17,317	558	16,216	1,101	-100
7	466	284	428	0	10	1,178	672	-82	590	590	17,907	488	16,704	1,203	-100
8	233	284	446	0	11	963	887	-94	793	793	18,700	819	17,523	1,177	-100
9	233	284	441	0	12	958	892	-100	792	792	19,492	1,004	18,527	965	-96
10	466	284	394	0	13	1,144	706	-100	606	606	20,098	605	19,132	966	-97
11	466	284	359	0	14	1,109	741	-100	641	643	20,741	423	19,555	1,186	-100
12	466	284	447	33	15	1,230	620	-100	520	520	21,261	562	20,117	1,144	-100
13	466	284	451	47	16	1,248	602	-96	506	506	21,767	942	21,059	708	-71
14	466	170	332	42	17	1,010	840	-97	743	746	22,513	1,006	22,065	448	-45
15	0	0	291	0	18	291	1,559	-100	1,459	1,463	23,976	1,543	23,608	368	-37
16	0	113	463	0	19	576	1,274	-100	1,174	1,176	25,152	1,366	24,974	178	-18
17	466	233	387	19	20	1,105	745	-71	674	677	25,829	487	25,461	368	-37
18	466	106	375	280	21	1,227	623	-45	578	578	26,407	688	26,149	258	-26
19	466	106	375	313	22	1,260	590	-37	553	554	26,961	1,054	27,203	-242	+24
20	466	106	449	0	23	1,021	829	-18	811	797	27,758	957	28,160	-402	+40
21	466	106	355	0	24	927	923	-37	886	881	28,639	911	29,071	-432	+48
22	0	0	317	0	25	317	1,533	-26	1,507	1,493	30,132	1,583	30,654	-522	+52
23	237	113	277	0	26	627	1,223	+24	1,247	1,248	31,380	1,208	31,862	-482	+48
24	237	284	269	0	27	790	1,060	+40	1,100	1,092	32,472	962	32,824	-352	+35
25	237	284	249	68	28	838	1,012	+43	1,055	1,059	33,531	839	33,663	-132	+13
26	237	213	241	6	29	697	1,153	+52	1,205	1,203	34,734	863	34,526	+208	-21
27	230	213	297	10	30	750	1,100	+48	1,148	1,145	35,879	1,075	35,601	+278	-28
28	230	163	296	27	31	716	1,134	+35	1,169	1,175	37,054	1,155	36,756	+298	-30

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 weather forecasts.
Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = Design rate - Col. 5, when positive; otherwise Co. 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 16.
Col. 10 = Summation of Col. 9.
Col. 11 = Design rate - (Col. 9 + Col. 10 from Table 16), when positive; otherwise Col. 11 = 0.
Col. 12 = Summation of Col. 11.
Col. 13 = Col. 10 - Col. 12.
Col. 14 = Col. 13 divided by minus 10, limited to ±100.

Note:--Cols. 9-14 are used only for the computation of the balancing adjustment Dec. 1, 1992 to Mar. 14, 1993, June 15, 1993 to Nov. 30, 1993.

Table 9. New York City Reservoir release design data (Continued)
(River Master daily operation record)
[ft^3/s, cubic feet per second; $ft^3/s.d$, cubic feet per second days]

Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases										Computation of the balancing adjustment					
	Powerplant release forecasts		Uncontrolled runoff							Adjusted directed Release		Actual deficiency			
Date of advance estimate	Lake Wallenpaupack ft^3/s	Rio Reservoir ft^3/s	Current conditions ft^3/s	Weather adjustment ft^3/s	Date	Discharge ft^3/s	Indicated deficiency ft^3/s	Balancing adjustment ft^3/s	Directed release ft^3/s	Daily ft^3/s	Cumulative $(ft^3/s)\cdot d$	Daily ft^3/s	Cumulative $(ft^3/s)\cdot d$	Cumulative difference $(ft^3/s)\cdot d$	Balancing adjustment (ft^3/s)
1993	1	2	3	4		5	6	7	8	9	10	11	12	13	14
July 29	0	57	271	118	Aug. 1	446	1,404	+13	1,417	1,413	38,467	1,503	38,259	208	-21
30	0	142	258	13	2	413	1,437	-21	1,416	1,407	39,874	1,387	39,646	228	-23
31	0	284	289	19	3	592	1,258	-28	1,230	1,230	41,104	1,410	41,056	48	-5
Aug. 1	0	284	284	21	4	589	1,261	-30	1,231	1,235	42,339	1,395	42,451	-112	+11
2	0	284	267	64	5	615	1,235	-21	1,214	1,216	43,555	1,476	43,927	-372	+37
3	0	284	322	0	6	606	1,244	-23	1,221	1,216	44,771	1,516	45,443	-672	+67
4	0	199	284	35	7	518	1,332	-5	1,327	1,320	46,091	1,550	46,993	-902	+90
					MONTAGUE DESIGN RATE = 1,750 ft^3/s AUG. 8 TO SEPT. 23										
5	0	0	218	54	8	272	1,478	+11	1,489	1,482	47,573	1,512	48,505	-932	+93
6	0	0	168	91	9	259	1,491	+37	1,528	1,530	49,103	1,460	49,965	-862	+86
7	0	0	221	0	10	221	1,529	+67	1,596	1,590	50,693	1,570	51,535	-842	+84
8	0	0	331	0	11	331	1,419	+90	1,509	1,502	52,195	1,532	53,067	-872	+87
9	0	0	310	0	12	310	1,440	+93	1,533	1,536	53,731	1,336	54,403	-672	+67
10	0	0	286	28	13	314	1,436	+86	1,522	1,524	55,255	1,384	55,787	-532	+53
11	0	0	264	17	14	281	1,469	+84	1,553	1,552	56,807	1,362	57,149	-342	+34
12	0	0	315	17	15	332	1,418	+87	1,505	1,508	58,315	1,388	58,537	-222	+22
13	0	0	278	13	16	291	1,459	+67	1,526	1,521	59,836	1,491	60,028	-192	+19
14	0	0	298	17	17	315	1,435	+53	1,488	1,489	61,325	1,229	61,257	68	-7
15	0	0	275	182	18	457	1,293	+34	1,327	1,325	62,650	1,185	62,442	208	-21
16	0	0	277	77	19	354	1,396	+22	1,418	1,416	64,066	1,266	63,708	358	-36
17	0	0	364	26	20	390	1,360	+19	1,379	1,379	65,445	1,379	65,087	358	-36
18	0	0	433	91	21	524	1,226	-7	1,219	1,219	66,664	1,289	66,376	288	-29
19	0	0	437	182	22	619	1,131	-21	1,110	1,110	67,774	1,360	67,736	38	-4
20	0	0	353	16	23	369	1,381	-36	1,345	1,349	69,123	1,429	69,165	-42	+4
21	0	0	338	0	24	338	1,412	-36	1,376	1,383	70,506	1,443	70,608	-102	+10
22	0	0	274	0	25	274	1,476	-29	1,447	1,443	71,949	1,443	72,051	-102	+10
23	0	0	253	0	26	253	1,497	-4	1,493	1,494	73,443	1,354	73,405	38	-4
24	0	0	233	0	27	233	1,517	+4	1,521	1,514	74,957	1,284	74,689	268	-27
25	0	340	290	0	28	630	1,120	+10	1,130	1,150	76,107	730	75,419	688	-69
26	0	227	297	0	29	524	1,226	+10	1,236	1,239	77,346	1,209	76,628	718	-72
27	0	0	242	15	30	257	1,493	-4	1,489	1,485	78,831	1,415	78,043	788	-79
28	0	0	224	30	31	254	1,496	-27	1,469	1,464	80,295	1,274	79,317	978	-98

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 weather forecasts.
Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = Design rate - Col. 5, when positive; otherwise Co. 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 16.
Col. 10 = Summation of Col. 9.
Col. 11 = Design rate - (Col. 9 + Col. 10 from Table 16), when positive; otherwise Col. 11 = 0.
Col. 12 = Summation of Col. 11.
Col. 13 = Col. 10 - Col. 12.
Col. 14 = Col. 13 divided by minus 10, limited to ±100.

Note:--Cols. 9-14 are used only for the computation of the balancing adjustment Dec. 1, 1992 to Mar. 14, 1993, June 15, 1993 to Nov. 30, 1993.

Table 9. New York City Reservoir release design data (Continued)
(River Master daily operation record)
[ft^3/s, cubic feet per second; $ft^3/s.d$, cubic feet per second days]

Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases										Computation of the balancing adjustment					
	Powerplant release forecasts		Uncontrolled runoff							Adjusted directed Release		Actual deficiency			
Date of advance estimate	Lake Wallenpaupack	Rio Reservoir	Current conditions	Weather adjustment	Date	Discharge	Indicated deficiency	Balancing adjustment	Directed release	Daily	Cumulative	Daily	Cumulative	Cumulative difference	Balancing adjustment
	ft^3/s	ft^3/s	ft^3/s	ft^3/s		ft^3/s	ft^3/s	ft^3/s	ft^3/s	ft^3/s	$(ft^3/s)\cdot d$	ft^3/s	$(ft^3/s)\cdot d$	$(ft^3/s)\cdot d$	(ft^3/s)
1993	1	2	3	4		5	6	7	8	9	10	11	12	13	14
Aug. 29	0	0	179	0	Sept. 1	179	1,571	-69	1,502	1,499	81,794	1,239	80,556	1,238	-100
30	0	0	239	68	2	307	1,443	-72	1,371	1,369	83,163	1,159	81,715	1,448	-100
31	0	0	231	59	3	290	1,460	-79	1,381	1,377	84,540	1,287	83,002	1,538	-100
Sept. 1	0	0	227	52	4	279	1,471	-98	1,373	1,368	85,908	538	83,540	2,368	-100
2	0	0	218	329	5	547	1,203	-100	1,103	1,110	87,018	380	83,920	3,098	-100
3	0	0	297	463	6	760	990	-100	890	888	87,906	778	84,698	3,208	-100
4	0	0	952	40	7	992	758	-100	658	660	88,566	980	85,678	2,888	-100
5	0	0	830	0	8	830	920	-100	820	824	89,390	1,134	86,812	2,578	-100
6	0	0	583	0	9	583	1,167	-100	1,067	1,074	90,464	1,204	88,016	2,448	-100
7	0	0	481	33	10	514	1,236	-100	1,136	1,138	91,602	1,098	89,114	2,488	-100
8	0	0	435	72	11	507	1,243	-100	1,143	1,147	92,749	1,047	90,161	2,588	-100
9	0	57	545	197	12	799	951	-100	851	851	93,600	791	90,952	2,648	-100
10	0	0	595	47	13	642	1,108	-100	1,008	1,018	94,618	1,028	91,980	2,638	-100
11	0	0	681	0	14	681	1,069	-100	969	970	95,588	1,160	93,140	2,448	-100
12	0	0	541	0	15	541	1,209	-100	1,109	1,106	96,694	1,206	94,346	2,348	-100
13	0	0	447	24	16	471	1,279	-100	1,179	1,176	97,870	1,166	95,512	2,358	-100
14	0	0	383	75	17	458	1,292	-100	1,192	1,195	99,065	1,145	96,657	2,408	-100
15	0	0	368	342	18	710	1,040	-100	940	935	100,000	975	97,632	2,368	-100
16	0	0	387	539	19	926	824	-100	724	722	100,722	972	98,604	2,118	-100
17	0	0	479	107	20	586	1,164	-100	1,064	1,062	101,784	1,082	99,686	2,098	-100
18	114	0	572	82	21	768	982	-100	882	881	102,665	881	100,567	2,098	-100
19	114	0	585	38	22	737	1,013	-100	913	916	103,581	836	101,417	2,164	-100
20	114	0	521	382	23	1,017	733	-100	633	631	104,212	681	102,098	2,114	-100
MONTAGUE DESIGN RATE = 1,655 ft^3/s SEPT. 24 TO NOV. 30															
21	230	0	526	245	24	1,001	654		654	654	654	639	639	15	-2
22	230	57	609	47	25	943	712		712	710	1,364	665	1,304	60	-6
23	0	0	619	41	26	660	995		995	993	2,357	778	2,082	275	-28
24	0	160	701	324	27	1,185	470		470	476	2,833	0	2,082	751	-50
25	230	190	584	655	28	1,659	0	-2	0	0	2,833	0	2,082	751	-50
26	230	190	817	521	29	1,758	0	-6	0	0	2,833	0	2,082	751	-50
27	230	142	1,129	1,374	30	2,875	0	-28	0	0	2,833	0	2,082	751	-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 weather forecasts.
Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = Design rate - Col. 5, when positive; otherwise Co. 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 16.
Col. 10 = Summation of Col. 9.
Col. 11 = Design rate - (Col. 9 + Col. 10 from Table 16), when positive; otherwise Col. 11 = 0.
Col. 12 = Summation of Col. 11.
Col. 13 = Col. 10 - Col. 12.
Col. 14 = Col. 13 divided by minus 10, limited to ±100.

Note:--Cols. 9-14 are used only for the computation of the balancing adjustment Dec. 1, 1992 to Mar. 14, 1993, June 15, 1993 to Nov. 30, 1993.

Table 9. New York City Reservoir release design data (Continued)
(River Master daily operation record)
[ft^3/s, cubic feet per second; $ft^3/s.d$, cubic feet per second days]

Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases											Computation of the balancing adjustment					
	Powerplant release forecasts		Uncontrolled runoff								Adjusted directed Release		Actual deficiency			
Date of advance estimate	Lake Wallenpaupack	Rio Reservoir	Current conditions	Weather adjustment	Date	Discharge	Indicated deficiency	Balancing adjustment	Fishery program cutback	Directed release	Daily	Cumulative	Daily	Cumulative	Cumulative difference	Balancing adjustment
	ft^3/s	ft^3/s	ft^3/s	ft^3/s		ft^3/s	ft^3/s	ft^3/s	ft^3/s	ft^3/s	ft^3/s	(ft^3/s)-d	ft^3/s	(ft^3/s)-d	(ft^3/s)-d	(ft^3/s)
1993	1	2	3	4		5	6	7	8	9	10	11	12	13	14	15
Sept. 28	230	142	1,645	0	Oct. 1	2,017	0	-50		0	0	2,833	0	2,082	751	-50
29	230	35	1,349	0	2	1,614	41	-50		0	0	2,833	52	2,134	699	-50
30	0	0	1,206	18	3	1,224	431	-50	-50	331	330	3,163	565	2,699	464	-46
Oct. 1	0	106	1,079	118	4	1,303	352	-50	-50	252	251	3,414	296	2,995	419	-42
2	178	142	936	95	5	1,351	304	-50	-50	204	203	3,617	78	3,073	544	-50
3	178	142	1,116	0	6	1,436	219	-50	-50	119	119	3,736	194	3,267	469	-47
4	178	142	1,119	0	7	1,439	216	-46	-54	116	116	3,852	207	3,474	378	-38
5	178	142	1,041	0	8	1,361	294	-42	-58	194	192	4,044	389	3,863	181	-18
6	178	106	917	0	9	1,201	454	-50	-50	354	352	4,396	507	4,370	26	-3
7	0	0	850	46	10	896	759	-47	-53	659	661	5,057	1,013	5,383	-326	+33
8	0	71	793	35	11	899	756	-38	-62	656	660	5,717	903	6,286	-569	+50
9	178	106	754	65	12	1,103	552	-18	-82	452	452	6,169	225	6,511	-342	+34
10	178	106	723	28	13	1,035	633	-3	-97	533	529	6,698	0	6,511	187	-19
11	178	106	695	606	14	1,585	70	+33		103	103	6,801	0	6,511	290	-29
12	178	106	648	706	15	1,638	17	+50		67	67	6,868	0	6,511	357	-36
13	178	35	1,570	0	16	1,783	0	+34		0	0	6,868	1	6,512	356	-36
14	0	0	1,315	0	17	1,315	340	-19	-81	240	240	7,108	352	6,864	244	-24
15	0	71	1,257	49	18	1,377	278	-29	-71	178	181	7,289	355	7,219	70	-7
16	178	106	1,130	110	19	1,524	131	-36		95	95	7,384	329	7,548	-164	+16
17	178	106	1,068	110	20	1,462	193	-36	-53	104	104	7,488	156	7,704	-216	+22
18	178	106	1,021	0	21	1,305	350	-24	-76	250	249	7,737	0	7,704	33	-3
19	178	106	993	124	22	1,401	254	-7	-93	154	154	7,891	0	7,704	187	-19
20	178	71	1,140	511	23	1,900	0	+16		0	0	7,891	0	7,704	187	-19
21	0	0	1,443	272	24	1,715	0	+22		0	0	7,891	0	7,704	187	-19
22	0	0	2,221	0	25	2,221	0	-3		0	0	7,891	0	7,704	187	-19
23	178	0	2,025	0	26	2,203	0	-19		0	0	7,891	0	7,704	187	-19
24	178	0	1,994	0	27	2,172	0	-19		0	0	7,891	0	7,704	187	-19
25	178	0	1,689	82	28	1,949	0	-19		0	0	7,891	0	7,704	187	-19
26	178	0	1,546	3,372	29	5,096	0	-19		0	0	7,891	0	7,704	187	-19
27	178	71	1,424	21	30	1,694	0	-19		0	0	7,891	0	7,704	187	-19
28	0	0	1,324	53	31	1,377	278	-19	-81	178	176	8,067	0	7,704	363	-36

The estimated Montague discharge was greater than the Montague design rate Nov. 1 to Nov. 30

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 weather forecasts.
Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.

Col. 6 = Design rate - Col. 5, when positive; otherwise Co. 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 16.
Col. 10 = Summation of Col. 9.

Col. 11 = Summation of Col. 10.
Col. 12 = Design rate - (Col. 9 + Col. 10 from Table 16), when positive; otherwise Col. 12 = 0.
Col. 13 = Summation of Col. 12.
Col. 14 = Col. 11 - Col. 12.
Col. 15 = Col. 14 divided by minus 11, limited to ±100.

Note:--Cols. 9-14 are used only for the computation of the balancing adjustment Dec. 1, 1992 to Mar. 14, 1993, June 15, 1993 to Nov. 30, 1993.

Table 10. Controlled releases for reservoirs in the upper Delaware River basin and segregation of flow of Delaware River at Montague, N.J.
(River Master daily operation record)
[Mean discharge in cubic feet per second for 24 hours]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow Delaware River at Montague								
									Controlled releases			Computed		Excess Release Credits		
									N.Y.C. reservoirs		Power-	uncon-				
Directed		Pepacton	Cannonsville	Neversink		Lake Wallen-	Rio									
Date	Amount				Date	paupack	Reservoir	Date	Directed	Other	plants	trolled	Total	Daily	Cumul.	
1992	1	2	3	4		5	6		7	8	9	10	11	12	13	
Nov. 28		51	34	26	Nov. 30	0	372	Dec. 1		111	372	4,997	5,480	0	9,438	
29		51	32	23	Dec. 1	0	471	2		106	471	4,593	5,170	0	9,438	
30		51	32	23	2	193	376	3		106	569	4,095	4,770	0	9,438	
Dec. 1		51	32	25	3	406	336	4		108	742	3,790	4,640	0	9,438	
2		51	32	25	4	652	266	5		108	918	3,264	4,290	0	9,438	
3		51	32	23	5	0	387	6		106	387	3,207	3,700	0	9,438	
4		51	32	23	6	118	227	7		106	345	3,139	3,590	0	9,438	
5		51	32	25	7	832	326	8		108	1,158	2,814	4,080	0	9,438	
6		51	32	26	8	777	262	9		109	1,039	2,382	3,530	0	9,438	
7		51	32	26	9	783	255	10		109	1,038	2,023	3,170	0	9,438	
8		50	32	26	10	762	415	11		108	1,177	2,225	3,510	0	9,438	
9		48	32	26	11	652	713	12		106	1,365	3,209	4,680	0	9,438	
10		51	32	26	12	0	748	13		109	748	3,553	4,410	0	9,438	
11		51	32	26	13	117	627	14		109	744	3,207	4,060	0	9,438	
12		51	32	25	14	762	367	15		108	1,129	2,613	3,850	0	9,438	
13		51	32	25	15	770	255	16		108	1,025	2,627	3,760	0	9,438	
14		51	32	25	16	778	166	17		108	944	2,808	3,860	0	9,438	
15		51	32	26	17	773	230	18		109	1,003	6,378	7,490	0	9,438	
16		51	32	26	18	648	680	19		109	1,328	6,753	8,190	0	9,438	
17		51	32	23	19	0	667	20		106	667	5,947	6,720	0	9,438	
18		51	32	23	20	0	532	21		106	532	6,652	7,290	0	9,438	
19		51	32	25	21	598	443	22		108	1,041	5,741	6,890	0	9,438	
20		51	32	25	22	100	649	23		108	749	4,933	5,790	0	9,438	
21		51	32	25	23	0	677	24		108	677	4,455	5,240	0	9,438	
22		51	32	25	24	0	642	25		108	642	3,830	4,580	0	9,438	
23		51	32	25	25	0	223	26		108	223	3,069	3,400	0	9,438	
24		51	32	23	26	0	291	27		106	291	3,203	3,600	0	9,438	
25		51	32	23	27	183	351	28		106	534	3,060	3,700	0	9,438	
26		51	32	23	28	348	160	29		106	508	2,936	3,550	0	9,438	
27		51	32	23	29	219	195	30		106	414	3,480	4,000	0	9,438	
28		51	32	23	30	0	0	31		106	0	10,094	10,200	0	9,438	
Total	0	1,577	994	762		10,471	12,309		0	3,333	22,780	125,077	151,190			

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 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.

Col. 12 = Col. 11 - Col. 8 - 1,750 ft^3/s computed algebraically, but not greater than Col. 7; except that part of Col. 8 contributing to the excess-release increment of Col. 11.
Col. 13 - Season limit of cumulative credit beginning June 17, 1992 = 13,556 (ft^3/s)-d.

Table 10. Controlled releases for reservoirs in the upper Delaware River basin (Continued) and segregation of flow of Delaware River at Montague, N.J.

(River Master daily operation record)

[Mean discharge in cubic feet per second for 24 hours]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow Delaware River at Montague							
Directed		Pepacton	Cannonsville	Neversink		Lake Wallen-paupack	Rio Reservoir		Controlled releases			Computed uncon-trolled	Total	Excess Release Credits	
									N.Y.C. reservoirs		Power-plants				
Date	Amount				Date			Date	Directed	Other				Daily	Cumul.
1992/93	1	2	3	4		5	6		7	8	9	10	11	12	13
Dec. 29		51	32	23	Dec. 31	0	128	Jan. 1		106	128	16,466	16,700	0	9,438
30		51	32	25	Jan. 1	0	606	2		108	606	12,386	13,100	0	9,438
31		51	32	25	2	0	453	3		108	453	8,829	9,390	0	9,438
Jan. 1		53	32	25	3	0	496	4		110	496	8,124	8,730	0	9,438
2		53	32	25	4	765	706	5		110	1,471	10,419	12,000	0	9,438
3		53	32	25	5	738	766	6		110	1,504	16,486	18,100	0	9,438
4		53	32	26	6	856	762	7		111	1,618	11,771	13,500	0	9,438
5		51	32	26	7	872	777	8		109	1,649	9,242	11,000	0	9,438
6		53	34	26	8	824	755	9		113	1,579	7,398	9,090	0	9,438
7		53	32	25	9	0	766	10		110	766	6,404	7,280	0	9,438
8		53	34	23	10	116	734	11		110	850	5,600	6,560	0	9,438
9		53	34	23	11	875	589	12		110	1,464	4,836	6,410	0	9,438
10		53	34	25	12	863	564	13		112	1,427	5,121	6,660	0	9,438
11		53	34	23	13	871	472	14		110	1,343	5,627	7,080	0	9,438
12		53	34	25	14	864	353	15		112	1,217	5,221	6,550	0	9,438
13		53	34	25	15	760	660	16		112	1,420	4,388	5,920	0	9,438
14		53	34	25	16	569	461	17		112	1,030	3,758	4,900	0	9,438
15		48	34	25	17	115	482	18		107	597	3,806	4,510	0	9,438
16		51	34	25	18	871	376	19		110	1,247	3,143	4,500	0	9,438
17		53	34	25	19	854	528	20		112	1,382	2,776	4,270	0	9,438
18		48	34	25	20	887	426	21		107	1,313	2,510	3,930	0	9,438
19		50	34	25	21	878	333	22		109	1,211	3,090	4,410	0	9,438
20		51	34	25	22	758	362	23		110	1,120	3,980	5,210	0	9,438
21		51	34	25	23	631	411	24		110	1,042	3,748	4,900	0	9,438
22		51	34	25	24	456	348	25		110	804	4,966	5,880	0	9,438
23		51	34	25	25	869	472	26		110	1,341	4,749	6,200	0	9,438
24		51	34	25	26	873	528	27		110	1,401	4,069	5,580	0	9,438
25		51	34	25	27	873	312	28		110	1,185	3,735	5,030	0	9,438
26		53	34	25	28	878	564	29		112	1,442	3,306	4,860	0	9,438
27		51	34	25	29	628	443	30		110	1,071	3,079	4,260	0	9,438
28		51	34	25	30	756	572	31		110	1,328	2,582	4,020	0	9,438
Total	0	1,604	1,036	770		19,300	16,205		0	3,410	35,505	191,615	230,530		

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 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.

Col. 12 = Col. 11 - Col. 8 - 1,750 ft^3/s computed algebraically, but not greater than Col. 7; except that part of Col. 8 contributing to the excess-release increment of Col. 11.
Col. 13 - Season limit of cumulative credit beginning June 17, 1992 = 13,556 $(ft^3/s)\cdot d$.

Table 10. Controlled releases for reservoirs in the upper Delaware River basin (Continued)
and segregation of flow of Delaware River at Montague, N.J.
(River Master daily operation record)
[Mean discharge in cubic feet per second for 24 hours]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow Delaware River at Montague							
Directed		Pepacton	Cannonsville	Neversink		Lake Wallen-paupack	Rio Reservoir		Controlled releases			Computed uncon-trolled	Total	Excess Release Credits	
									N.Y.C. reservoirs		Power-plants				
Date	Amount				Date			Date	Directed	Other				Daily	Cumul.
1993	1	2	3	4		5	6		7	8	9	10	11	12	13
Jan. 29		51	34	23	Jan. 31	472	438	Feb. 1		108	910	2,632	3,650	0	9,438
30		51	34	23	Feb. 1	862	394	2		108	1,256	2,366	3,730	0	9,438
31		53	34	23	2	1,402	39	3		110	1,441	2,649	4,200	0	9,438
Feb. 1		51	34	23	3	875	0	4		108	875	2,517	3,500	0	9,438
2		50	34	23	4	879	0	5		107	879	2,614	3,600	0	9,438
3		51	34	23	5	765	0	6		108	765	2,627	3,500	0	9,438
4		54	34	23	6	771	0	7		111	771	2,518	3,400	0	9,438
5		54	34	23	7	408	63	8		111	471	2,218	2,800	0	9,438
6		53	34	23	8	886	319	9		110	1,205	2,085	3,400	0	9,438
7		54	34	23	9	856	258	10		111	1,114	1,875	3,100	0	9,438
8		54	34	23	10	876	223	11		111	1,099	1,790	3,000	0	9,438
9		56	34	23	11	886	325	12		113	1,211	1,876	3,200	0	9,438
10		48	34	23	12	752	167	13		105	919	1,976	3,000	0	9,438
11		53	34	23	13	763	141	14		110	904	1,956	2,970	0	9,438
12		46	34	23	14	404	0	15		103	404	1,733	2,240	0	9,438
13		50	34	23	15	884	95	16		107	979	1,904	2,990	0	9,438
14		54	34	23	16	895	181	17		111	1,076	1,893	3,080	0	9,438
15		51	34	23	17	895	127	18		108	1,022	1,840	2,970	0	9,438
16		54	34	23	18	995	25	19		111	1,020	1,569	2,700	0	9,438
17		50	34	23	19	894	135	20		107	1,029	1,764	2,900	0	9,438
18		53	34	25	20	761	0	21		112	761	1,827	2,700	0	9,438
19		51	34	25	21	466	138	22		110	604	1,626	2,340	0	9,438
20		53	34	25	22	881	138	23		112	1,019	1,769	2,900	0	9,438
21		51	34	25	23	887	39	24		110	926	1,764	2,800	0	9,438
22		54	34	25	24	944	457	25		113	1,401	1,686	3,200	0	9,438
23		53	34	25	25	894	213	26		112	1,107	1,681	2,900	0	9,438
24		53	34	25	26	770	156	27		112	926	1,662	2,700	0	9,438
25		53	34	25	27	767	0	28		112	767	1,521	2,400	0	9,438
Total	0	1,459	952	660		22,790	4,071		0	3,071	26,861	55,938	85,870		

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 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.

Col. 12 = Col. 11 - Col. 8 - 1,750 ft^3/s computed algebraically, but not greater than Col. 7; except that part of Col. 8 contributing to the excess-release increment of Col. 11.
Col. 13 - Season limit of cumulative credit beginning June 17, 1992 = 13,556 $(ft^3/s)\cdot d$.

Table 10. Controlled releases for reservoirs in the upper Delaware River basin (Continued)
and segregation of flow of Delaware River at Montague, N.J.
(River Master daily operation record)
[Mean discharge in cubic feet per second for 24 hours]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow Delaware River at Montague								
									Controlled releases			Computed		Excess Release Credits		
Directed		Pepacton	Cannonsville	Neversink		Lake Wallen-paupack	Rio Reservoir		N.Y.C. reservoirs		Power-plants	uncon-trolled	Total	Daily	Cumul.	
Date	Amount				Date			Date	Directed	Other						
1993	1	2	3	4		5	6		7	8	9	10	11	12	13	
Feb. 26	0	51	34	25	Feb. 26	286	223	Mar. 1	0	110	509	1,481	2,100	0	9,438	
27	0	51	34	25	Mar. 1	291	0	2	0	110	291	1,399	1,800	50	9,488	
28	0	51	34	25	2	353	82	3	0	110	435	1,255	1,800	50	9,538	
Mar. 1	0	51	34	25	3	357	46	4	0	110	403	1,347	1,860	110	9,648	
2	0	53	34	25	4	564	50	5	0	112	614	1,434	2,160	0	9,648	
3	0	53	34	25	5	315	0	6	0	112	315	1,653	2,080	0	9,648	
4	353	53	275	25	6	0	0	7	353	0	0	1,137	1,490	-260	9,388	
5	302	51	226	25	7	115	120	8	302	0	235	1,403	1,940	190	9,578	
6	0	53	34	25	8	351	0	9	0	112	351	1,647	2,110	0	9,578	
7	0	54	34	25	9	351	0	10	0	113	351	1,656	2,120	0	9,578	
8	43	53	34	25	10	796	184	11	43	69	980	1,688	2,780	43	9,621	
9	0	51	36	25	11	902	174	12	0	112	1,076	1,492	2,680	0	9,621	
10	165	54	88	25	12	239	223	13	167	0	462	1,511	2,140	167	9,788	
11	483	54	410	23	13	615	408	14	487	0	1,023	790	2,300	487	10,275	
12	182	53	110	23	14	1,360	475	15	186	0	1,835	2,279	4,300			
13	0	54	34	23	15	845	209	16	0	111	1,054	1,935	3,100			
14	0	56	34	23	16	509	57	17	0	113	566	1,821	2,500			
15	0	53	34	23	17	835	131	18	0	110	966	2,324	3,400			
16	0	51	34	23	18	1,033	277	19	0	108	1,310	2,382	3,800			
17	0	51	34	25	19	236	0	20	0	110	236	2,374	2,720			
18	0	54	34	25	20	0	0	21	0	113	0	2,367	2,480			
19	0	50	34	25	21	0	149	22	0	109	149	2,202	2,460			
20	0	51	34	25	22	0	67	23	0	110	67	2,173	2,350			
21	0	53	60	25	23	0	206	24	0	138	206	3,356	3,700			
22	0	53	34	25	24	0	436	25	0	112	436	5,452	6,000			
23	0	53	34	25	25	0	482	26	0	112	482	6,966	7,560			
24	0	54	34	25	26	0	436	27	0	113	436	9,651	10,200			
25	0	53	34	25	27	0	553	28	0	112	553	16,035	16,700			
26	0	51	34	25	28	0	752	29	0	110	752	32,038	32,900			
27	0	51	34	25	29	0	844	30	0	110	844	46,446	47,400			
28	0	50	34	25	30	0	872	31	0	1098	872	52,119	53,100			
Total	1,528	1,624	2,021	763		10,353	7,456		1,538	2,870	17,809	211,813	234,030			

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 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.

Col. 12 = Col. 11 - Col. 8 - 1,750 ft^3/s computed algebraically, but not greater than Col. 7; except that part of Col. 8 contributing to the excess-release increment of Col. 11.
Col. 13 - Season limit of cumulative credit beginning June 17, 1992 = 13,556 $(ft^3/s)\cdot d$.

Table 10. Controlled releases for reservoirs in the upper Delaware River basin (Continued)
and segregation of flow of Delaware River at Montague, N.J.
(River Master daily operation record)
[Mean discharge in cubic feet per second for 24 hours]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow Delaware River at Montague							
Directed		Pepacton	Cannonsville	Neversink		Lake Wallen-paupack	Rio Reservoir		Controlled releases			Computed uncon-trolled	Total	Excess Release Credits	
									N.Y.C. reservoirs		Power-plants				
Date	Amount				Date			Date	Directed	Other				Daily	Cumul.
1993	1	2	3	4		5	6		7	8	9	10	11	12	13
Mar. 29		53	34	26	Mar. 31	0	844	Apr. 1		113	844	58,843	59,800		
30		53	34	32	Apr. 1	0	844	2		119	844	58,137	59,100		
31		53	43	46	2	0	845	3		142	845	43,613	44,600		
Apr. 1		74	48	48	3	1,289	819	4		170	2,108	30,022	32,300		
2		71	48	45	4	1,456	837	5		164	2,293	21,143	23,600		
3		68	46	43	5	1,442	833	6		157	2,275	17,568	20,000		
4		68	50	43	6	1,459	823	7		161	2,282	16,157	18,600		
5		70	50	43	7	1,451	745	8		163	2,196	15,441	17,800		
6		70	50	43	8	1,345	819	9		163	2,164	15,273	17,600		
7		70	50	43	9	1,453	823	10		163	2,276	16,561	19,000		
8		70	50	43	10	1,453	830	11		163	2,283	34,354	36,800		
9		68	50	45	11	1,743	918	12		163	2,661	35,176	38,000		
10		71	50	45	12	1,795	833	13		166	2,628	25,806	28,600		
11		67	50	45	13	1,804	823	14		162	2,627	19,511	22,300		
12		67	76	43	14	1,801	819	15		186	2,620	15,294	18,100		
13		67	50	45	15	1,808	816	16		162	2,624	13,214	16,000		
14		67	50	45	16	1,797	876	17		162	2,673	30,665	33,500		
15		67	50	45	17	1,785	833	18		162	2,618	33,020	35,800		
16		67	50	45	18	1,795	858	19		162	2,653	24,185	27,000		
17		67	50	45	19	1,797	823	20		162	2,620	18,418	21,200		
18		73	50	45	20	1,797	851	21		168	2,648	14,584	17,400		
19		73	50	45	21	1,798	816	22		168	2,614	16,418	19,200		
20		73	50	45	22	1,775	833	23		168	2,608	21,924	24,700		
21		68	50	45	23	1,180	819	24		163	1,999	18,838	21,000		
22		71	50	46	24	0	809	25		167	809	16,724	17,700		
23		80	50	45	25	597	837	26		175	1,434	15,691	17,300		
24		82	50	45	26	1,143	801	27		177	1,944	24,679	26,800		
25		79	50	45	27	1,790	822	28		174	2,612	22,614	25,400		
26		68	50	45	28	1,804	826	29		163	2,630	18,007	20,800		
27		68	50	45	29	1,746	815	30		163	2,561	14,676	17,400		
Total	0	2,063	1,479	1,309		41,103	24,890		0	4,851	65,993	726,556	797,400		

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 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. Controlled releases for reservoirs in the upper Delaware River basin (Continued)
and segregation of flow of Delaware River at Montague, N.J.
(River Master daily operation record)
[Mean discharge in cubic feet per second for 24 hours]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow Delaware River at Montague							
Directed		Pepacton	Cannonsville	Neversink		Lake Wallen-paupack	Rio Reservoir		Controlled releases			Computed uncon-trolled	Total	Excess Release Credits	
									N.Y.C. reservoirs		Power-plants				
Date	Amount				Date			Date	Directed	Other				Daily	Cumul.
1993	1	2	3	4		5	6		7	8	9	10	11	12	13
Apr. 28	0	68	50	45	Apr. 30	1,054	816	May 1	0	163	1,870	11,667	13,700		
30	0	68	50	45	May 1	0	805	2	0	163	805	10,332	11,300		
31	0	68	50	45	2	0	848	3	0	163	848	8,989	10,000		
May 1	0	67	50	45	3	597	730	4	0	162	1,327	7,791	9,280		
2	0	67	50	45	4	824	709	5	0	162	1,533	6,945	8,640		
3	0	67	50	46	5	778	613	6	0	163	1,391	7,556	9,110		
4	0	67	50	45	6	814	358	7	0	162	1,172	7,026	8,360		
5	0	67	50	45	7	798	358	8	0	162	1,156	5,572	6,890		
6	0	67	50	45	8	0	333	9	0	162	333	5,055	5,550		
7	0	65	50	45	9	0	518	10	0	160	518	4,572	5,250		
8	0	65	50	45	10	821	617	11	0	160	1,438	3,872	5,470		
9	0	65	50	46	11	383	199	12	0	161	582	3,597	4,340		
10	0	68	149	48	12	6	202	13	0	265	208	3,387	3,860		
11	0	68	50	48	13	5	71	14	0	166	76	3,148	3,390		
12	0	68	50	48	14	0	0	15	0	166	0	2,814	2,980		
13	0	68	50	48	15	0	18	16	0	166	18	2,536	2,720		
14	0	68	50	48	16	0	71	17	0	166	71	2,343	2,580		
15	0	68	50	48	17	241	223	18	0	166	464	2,100	2,730		
16	0	68	50	48	18	229	209	19	0	166	438	2,076	2,680		
17	0	68	48	48	19	227	291	20	0	164	518	2,078	2,760		
18	0	68	48	48	20	231	283	21	0	164	514	2,162	2,840		
19	0	68	48	48	21	227	0	22	0	164	227	2,139	2,530		
20	0	71	48	48	22	0	74	23	0	167	74	1,919	2,160		
21	0	70	48	48	23	0	174	24	0	166	174	1,740	2,080		
22	0	68	48	48	24	0	351	25	0	164	351	1,635	2,150		
23	0	68	48	48	25	0	239	26	0	164	239	1,607	2,010		
24	157	68	50	48	26	0	145	27	157	9	145	1,399	1,710		
25	275	68	159	48	27	0	170	28	275	0	170	1,215	1,660		
26	691	68	583	48	28	0	11	29	699	0	11	1,060	1,770		
27	711	68	600	48	29	0	0	30	716	0	0	1,124	1,840		
28	729	68	617	48	30	0	43	31	733	0	43	1,094	1,870		
Total	2,563	2,098	3,394	1,454		7,235	9,479		2,580	4,366	16,714	120,550	144,210		

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 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. Controlled releases for reservoirs in the upper Delaware River basin (Continued)
and segregation of flow of Delaware River at Montague, N.J.
(River Master daily operation record)
[Mean discharge in cubic feet per second for 24 hours]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow Delaware River at Montague							
									Controlled releases			Computed		Excess Release Credits	
Directed		Pepacton	Cannonsville	Neversink		Lake Wallen-paupack	Rio Reservoir		N.Y.C. reservoirs		Power-plants	uncon-trolled	Total		
Date	Amount				Date			Date	Directed	Other				Daily	Cumul.
1993	1	2	3	4		5	6		7	8	9	10	11	12	13
May 29	854	70	735	48	May 31	0	273	June 1	853	0	273	1,164	2,290		
30	0	70	48	48	June 1	359	212	2	0	166	571	1,413	2,150		
31	0	68	48	48	2	442	245	3	0	164	687	1,279	2,130		
June 1	85	68	48	48	3	224	177	4	85	79	401	1,235	1,800		
2	372	68	257	48	4	222	0	5	373	0	222	1,005	1,600		
3	550	68	435	48	5	0	0	6	551	0	0	1,019	1,570		
4	263	68	149	48	6	0	121	7	265	0	121	1,244	1,630		
5	230	68	113	48	7	0	230	8	229	0	230	1,301	1,760		
6	104	68	48	48	8	224	262	9	104	60	486	1,240	1,890		
7	147	68	76	48	9	222	273	10	147	45	495	1,363	2,050		
8	0	68	181	48	10	227	163	11	0	297	390	1,673	2,360		
9	0	68	153	48	11	223	0	12	0	269	223	1,458	1,950		
10	284	68	167	48	12	0	0	13	283	0	0	1,157	1,440		
11	420	68	300	48	13	0	0	14	416	0	0	924	1,340		
12	327	67	203	54	14	216	18	15	324	0	234	1,012	1,570	-180	-180
13	719	67	606	45	15	224	28	16	718	0	252	780	1,750	0	-180
14	926	67	815	45	16	234	81	17	927	0	315	918	2,160	410	230
15	586	67	472	45	17	226	326	18	584	0	552	894	2,030	280	510
16	661	67	523	73	18	230	266	19	663	0	496	741	1,900	150	660
17	1,067	99	897	73	19	0	167	20	1,069	0	167	704	1,940	190	850
18	907	99	735	71	20	0	106	21	905	0	106	979	1,990	240	1,090
19	565	99	421	71	21	224	302	22	565	26	526	1,633	2,750	565	1,655
20	348	99	364	71	22	222	149	23	348	186	371	1,545	2,450	348	2,003
21	0	67	362	46	23	227	0	24	0	475	227	1,288	1,990	100	2,103
22	0	68	362	48	24	230	0	25	0	478	230	1,022	1,730	-20	2,083
23	575	73	455	54	25	228	0	26	582	0	228	840	1,650	-100	1,983
24	1,076	96	899	79	26	0	0	27	1,074	0	0	906	1,980	230	2,213
25	1,094	96	916	79	27	0	167	28	1,091	0	167	832	2,090	340	2,553
26	981	96	809	79	28	230	319	29	984	0	549	747	2,280	530	3,083
27	698	96	523	79	29	221	297	30	698	0	518	844	2,060	310	3,393
Total	13,839	2,279	12,120	1,684		4,855	4,182		13,838	2,245	9,037	33,160	58,280		

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 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.

Col. 12 = Col. 11 - Col. 8 - 1,750 ft^3/s computed algebraically, but not greater than Col. 7; except that part of Col. 8 contributing to the excess-release increment of Col. 11.
Col. 13 - Season limit of cumulative credit beginning June 15, 1993 = 11,418 $(ft^3/s)\cdot d$.

Table 10. Controlled releases for reservoirs in the upper Delaware River basin (Continued)
and segregation of flow of Delaware River at Montague, N.J.
(River Master daily operation record)
[Mean discharge in cubic feet per second for 24 hours]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow Delaware River at Montague							
									Controlled releases					Excess Release Credits	
Directed		Pepacton	Cannonsville	Neversink		Lake Wallen-paupack	Rio Reservoir		N.Y.C. reservoirs		Power-plants	Computed uncon-trolled	Total		
Date	Amount				Date			Date	Directed	Other				Daily	Cumul.
1993	1	2	3	4		5	6		7	8	9	10	11	12	13
June 28	564	96	393	79	June 30	224	230	July 1	568	0	454	738	1,760	10	3,403
29	687	96	545	53	July 1	226	301	2	694	0	527	599	1,820	70	3,473
30	666	96	526	53	2	224	28	3	675	0	252	783	1,710	-40	3,433
July 1	1,012	96	835	77	3	0	0	4	1,008	0	0	712	1,720	-30	3,403
2	1,154	96	959	101	4	0	0	5	1,156	0	0	664	1,820	70	3,473
3	1,119	118	908	101	5	50	92	6	1,127	0	142	641	1,910	160	3,633
4	485	121	520	99	6	476	277	7	485	255	753	737	2,230	225	3,858
5	511	121	518	99	7	518	301	8	511	227	819	673	2,230	253	4,111
6	561	121	518	99	8	440	209	9	561	177	649	643	2,030	103	4,214
7	590	125	514	99	9	570	148	10	590	148	718	644	2,100	202	4,416
8	793	121	577	111	10	231	209	11	793	16	440	591	1,840	90	4,506
9	792	138	585	111	11	225	87	12	792	42	312	534	1,680	-70	4,436
10	606	138	586	111	12	472	216	13	606	229	688	557	2,080	101	4537
11	641	138	425	80	13	531	259	14	643	0	790	637	2,070	320	4,857
12	520	94	419	79	14	448	223	15	520	72	671	617	1,880	100	4,957
13	506	94	418	70	15	212	170	16	506	76	382	526	1,490	-260	4,697
14	743	94	599	53	16	460	0	17	746	0	460	384	1,590	-160	4,537
15	1,459	94	1,316	53	17	0	0	18	1,463	0	0	307	1,770	20	4,557
16	1,174	94	1,105	67	18	0	163	19	1,176	0	163	321	1,660	-90	4,467
17	674	94	515	68	19	645	195	20	677	0	840	523	2,040	290	4,757
18	578	94	430	54	20	462	106	21	578	0	568	594	1,740	-10	4,747
19	553	94	407	53	21	227	135	22	554	0	362	434	1,350	-400	4,347
20	811	93	651	53	22	455	103	23	797	0	558	335	1,690	-60	4,287
21	886	93	735	53	23	464	93	24	881	0	557	382	1,820	70	4,357
22	1,507	94	1,346	53	24	0	0	25	1,493	0	0	267	1,760	10	4,367
23	1,247	94	1,074	80	25	229	142	26	1,248	0	371	271	1,890	140	4507
24	1,100	94	919	79	26	275	291	27	1,092	0	566	322	1,980	230	4,737
25	1,055	93	882	84	27	351	298	28	1,059	0	649	362	2,070	320	5,057
26	1,205	93	1,030	80	28	372	259	29	1,203	0	631	356	2,190	440	5,497
27	1,148	118	951	76	29	231	206	30	1,145	0	437	338	1,920	170	5,667
28	1,169	121	970	84	30	214	82	31	1,175	0	296	399	1,870	120	5,787
Total	26,516	3,266	22,176	2,412		9,232	4,823		26,522	1,242	14,055	15,891	57,710		

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 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. 12 = Col. 11 - Col. 8 - 1,750 ft^3/s computed algebraically, but not greater than Col. 7; except that part of Col. 8 contributing to the excess-release increment of Col. 11.
Col. 13 - Season limit of cumulative credit beginning

Table 10. Controlled releases for reservoirs in the upper Delaware River basin (Continued)
and segregation of flow of Delaware River at Montague, N.J.
(River Master daily operation record)
[Mean discharge in cubic feet per second for 24 hours]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow Delaware River at Montague							
Directed		Pepacton	Cannonsville	Neversink		Lake Wallen-paupack	Rio Reservoir		Controlled releases			Computed uncon-trolled	Total	Excess Release Credits	
									N.Y.C. reservoirs		Power-plants				
Date	Amount				Date			Date	Directed	Other				Daily	Cumul.
1993	1	2	3	4		5	6		7	8	9	10	11	12	13
July 29	1,417	121	1,239	53	July 31	0	106	Aug. 1	1,413		106	241	1,760	10	5,797
30	1,416	94	1,262	51	Aug. 1	97	177	2	1,407		274	189	1,870	120	5,917
31	1,230	93	1,086	51	2	0	213	3	1,230		213	227	1,670	-80	5,837
Aug. 1	1,231	93	1,060	82	3	0	291	4	1,235		291	164	1,690	-60	5,777
2	1,214	118	1,018	80	4	0	188	5	1,216		188	186	1,590	-160	5,617
3	1,221	121	1,044	51	5	0	160	6	1,216		160	174	1,550	-200	5,417
4	1,327	96	1,173	51	6	0	89	7	1,320		89	211	1,620	-130	5,287
5	1,489	94	1,337	51	7	0	0	8	1,482		0	238	1,720		
6	1,528	94	1,385	51	8	0	0	9	1,530		0	290	1,820		
7	1,596	94	1,445	51	9	2	0	10	1,590		2	178	1,770		
8	1,509	94	1,357	51	10	0	0	11	1,502		0	218	1,720		
9	1,533	94	1,360	82	11	167	0	12	1,536		167	247	1,950		
10	1,522	93	1,349	82	12	0	28	13	1,524		28	338	1,890		
11	1,553	93	1,377	82	13	0	0	14	1,552		0	388	1,940		
12	1,505	93	1,361	54	14	0	89	15	1,508		89	273	1,870		
13	1,526	93	1,375	53	15	0	46	16	1,521		46	213	1,780		
14	1,488	93	1,343	53	16	0	322	17	1,489		322	199	2,010		
15	1,327	93	1,179	53	17	0	39	18	1,325		39	526	1,890		
16	1,418	93	1,270	53	18	0	0	19	1,416		0	484	1,900		
17	1,379	93	1,202	84	19	0	21	20	1,379		21	350	1,750		
18	1,219	122	1,013	84	20	147	0	21	1,219		147	314	1,680		
19	1,110	94	962	54	21	0	0	22	1,110		0	390	1,500		
20	1,345	94	1,199	56	22	0	10	23	1,349		10	311	1,670		
21	1,376	94	1,233	56	23	0	0	24	1,383		0	307	1,690		
22	1,447	94	1,293	56	24	0	0	25	1,443		0	307	1,750		
23	1,493	94	1,320	80	25	0	184	26	1,494		184	212	1,890		
24	1,521	401	1,033	80	26	0	287	27	1,514		287	179	1,980		
25	1,130	402	668	80	27	327	365	28	1,150		692	328	2,170		
26	1,236	401	758	80	28	0	188	29	1,239		188	353	1,780		
27	1,489	401	1,004	80	29	0	0	30	1,485		0	335	1,820		
28	1,469	401	984	79	30	117	74	31	1,464		191	285	1,940		
Total	43,264	4,548	36,689	2,004		857	2,877		43,241	0	3,734	8,655	55,630		

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 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.

Col. 12 = Col. 11 - Col. 8 - 1,750 ft^3/s computed algebraically, but not greater than Col. 7; except that part of Col. 8 contributing to the excess-release increment of Col. 11.
Col. 13 - Season limit of cumulative credit beginning June 15, 1993 = 11,418 $(ft^3/s)\cdot d$.

Table 10. Controlled releases for reservoirs in the upper Delaware River basin (Continued)
and segregation of flow of Delaware River at Montague, N.J.
(River Master daily operation record)
[Mean discharge in cubic feet per second for 24 hours]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow Delaware River at Montague							
									Controlled releases			Computed		Excess Release Credits	
Directed		Pepacton	Cannonsville	Neversink		Lake Wallen-paupack	Rio Reservoir		N.Y.C. reservoirs		Power-plants	uncon-trolled	Total		
Date	Amount				Date			Date	Directed	Other				Daily	Cumul.
1993	1	2	3	4		5	6		7	8	9	10	11	12	13
Aug. 29	1,502	399	1,021	79	Aug. 31	0	181	Sept. 1	1,499	0	181	330	2,010		
30	1,371	399	891	79	Sept. 1	255	50	2	1,369	0	305	286	1,960		
31	1,381	399	899	79	2	0	88	3	1,377	0	88	375	1,840		
Sept. 1	1,373	398	891	79	3	140	0	4	1,368	0	140	1,072	2,580		
2	1,103	398	633	79	4	0	0	5	1,110	0	0	1,370	2,480		
3	890	398	436	54	5	0	0	6	888	0	0	972	1,860		
4	658	303	303	54	6	6	0	7	660	0	6	764	1,430		
5	820	359	412	53	7	27	0	8	824	0	27	589	1,440		
6	1,067	365	656	53	8	0	0	9	1,074	0	0	546	1,620		
7	1,136	350	735	53	9	0	0	10	1,138	0	0	652	1,790		
8	1,143	364	730	53	10	0	0	11	1,147	0	0	703	1,850		
9	851	362	436	53	11	0	74	12	851	0	74	885	1,810		
10	1,008	362	603	53	12	0	0	13	1,018	0	0	722	1,740		
11	969	362	555	53	13	0	0	14	970	0	0	590	1,560		
12	1,109	360	693	53	14	0	25	15	1,106	0	25	519	1,650		
13	1,179	360	736	80	15	0	106	16	1,176	0	106	478	1,760		
14	1,192	360	758	77	16	0	0	17	1,195	0	0	605	1,800		
15	940	359	523	53	17	9	0	18	935	0	9	766	1,710		
16	724	359	312	51	18	0	0	19	722	0	0	778	1,500		
17	1,064	357	654	51	19	0	0	20	1,062	0	0	668	1,730		
18	882	357	473	51	20	185	0	21	881	0	185	684	1,750		
19	913	356	509	51	21	204	0	22	916	0	204	710	1,830		
20	663	300	280	51	22	209	0	23	631	0	209	860	1,700		
21	654	347	282	25	23	265	0	24	654	0	265	751	1,670		
22	712	80	579	51	24	227	76	25	710	0	303	687	1,700		
23	995	345	597	51	25	0	0	26	993	0	0	877	1,870		
24	470	323	125	28	26	0	142	27	476	0	142	1,552	2,170		
25	0	48	32	25	27	339	110	28	0	105	449	1,906	2,460		
26	0	50	34	25	28	221	39	29	0	109	260	1,991	2,360		
27	0	48	34	25	29	238	138	30	0	107	376	1,707	2,190		
Total	26,739	9,627	15,822	1,622		2,325	1,029		26,750	321	3,354	25,395	55,820		

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 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. Controlled releases for reservoirs in the upper Delaware River basin (Continued) and segregation of flow of Delaware River at Montague, N.J.
(River Master daily operation record)
[Mean discharge in cubic feet per second for 24 hours]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow Delaware River at Montague							
Directed		Pepacton	Cannonsville	Neversink		Lake Wallen-paupack	Rio Reservoir		Controlled releases			Computed uncon-trolled		Excess Release Credits	
									N.Y.C. reservoirs		Power-plants				
Date	Amount				Date			Date	Directed	Other			Total	Daily	Cumul.
1993	1	2	3	4		5	6		7	8	9	10	11	12	13
Sept. 28	0	48	34	25	Sept. 30	219	92	Oct. 1	0	107	311	1,422	1,840		
29	0	48	34	25	Oct.. 1	229	113	2	0	107	342	1,261	1,710		
30	331	271	34	25	2	0	0	3	330	0	0	1,040	1,370		
Oct. 1	252	192	34	25	3	0	163	4	251	0	163	1,146	1,560		
2	204	144	34	25	4	192	124	5	203	0	316	1,211	1,730		
3	119	60	34	25	5	170	206	6	119	0	376	1,035	1,530		
4	116	57	34	25	6	170	209	7	116	0	379	1,015	1,510		
5	194	135	32	25	7	167	124	8	192	0	291	917	1,400		
6	354	295	34	23	8	165	127	9	352	0	292	806	1,450		
7	659	347	289	25	9	0	0	10	661	0	0	589	1,250		
8	656	347	288	25	10	0	0	11	660	0	0	690	1,350		
9	452	345	82	25	11	165	152	12	452	0	317	1,031	1,800		
10	533	340	164	25	12	180	277	13	529	0	457	1,314	2,300		
11	103	50	34	25	13	173	199	14	103	6	372	1,949	2,430		
12	67	54	34	15	14	167	213	15	67	36	380	1,647	2,130		
13	0	20	31	15	15	167	78	16	0	66	245	1,409	1,720		
14	240	189	34	25	16	0	56	17	240	8	56	1,166	1,470		
15	178	122	34	25	17	0	102	18	181	0	102	1,127	1,410		
16	95	45	34	25	18	168	60	19	95	9	228	1,098	1,430		
17	104	45	34	25	19	167	99	20	104	0	266	1,180	1,550		
18	250	190	34	25	20	172	86	21	249	0	258	1,763	2,270		
19	154	111	34	25	21	172	110	22	154	16	282	2,918	3,370		
20	0	45	34	25	22	170	81	23	0	104	251	2,675	3,030		
21	0	45	34	25	23	0	0	24	0	104	0	2,426	2,530		
22	0	45	34	25	24	0	71	25	0	104	71	2,025	2,200		
23	0	45	34	25	25	165	92	26	0	104	257	1,709	2,070		
24	0	45	34	23	26	158	213	27	0	102	371	1,557	2,030		
25	0	45	34	23	27	168	49	28	0	102	217	1,521	1,840		
26	0	45	34	23	28	167	71	29	0	102	238	1,510	1,850		
27	0	45	34	23	29	163	220	30	0	102	383	1,385	1,870		
28	178	119	34	23	30	0	0	31	176	0	0	1,874	2,050		
Total	5,239	3,934	1,736	743		3,834	3,387		5,234	1,179	7,221	44,416	58,050		

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 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. Controlled releases for reservoirs in the upper Delaware River basin (Continued)
and segregation of flow of Delaware River at Montague, N.J.
(River Master daily operation record)
[Mean discharge in cubic feet per second for 24 hours]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow Delaware River at Montague							
Directed		Pepacton	Cannonsville	Neversink		Lake Wallen-paupack	Rio Reservoir		Controlled releases			Computed uncon-trolled	Total	Excess Release Credits	
									N.Y.C. reservoirs		Power-plants				
Date	Amount				Date			Date	Directed	Other				Daily	Cumul.
1993	1	2	3	4		5	6		7	8	9	10	11	12	13
Oct. 29		43	34	25	Oct. 31	8	209	Nov. 1		102	217	4,861	5,180		
30		46	36	23	Nov. 1	285	223	2		105	508	6,127	6,740		
31		45	34	23	2	163	382	3		102	545	4,693	5,340		
Nov. 1		46	34	23	3	156	237	4		103	393	3,904	4,400		
2		46	34	25	4	167	284	5		105	451	3,624	4,180		
3		46	34	25	5	171	32	6		105	203	3,652	3,960		
4		48	31	15	6	0	0	7		94	0	4,196	4,290		
5		22	26	15	7	0	141	8		63	141	4,046	4,250		
6		19	26	15	8	166	106	9		60	272	3,368	3,700		
7		19	26	15	9	170	46	10		60	216	3,044	3,320		
8		19	26	15	10	163	220	11		60	383	2,777	3,220		
9		19	26	15	11	171	485	12		60	656	2,424	3,140		
10		19	26	15	12	169	460	13		60	629	2,241	2,930		
11		19	26	15	13	0	234	14		60	234	2,236	2,530		
12		19	28	15	14	0	135	15		62	135	2,863	3,060		
13		19	28	15	15	141	269	16		62	410	3,928	4,400		
14		19	28	15	16	166	326	17		62	492	3,356	3,910		
15		19	28	15	17	170	379	18		62	549	3,799	4,410		
16		19	28	15	18	166	71	19		62	237	7,261	7,560		
17		19	28	15	19	164	0	20		62	164	5,844	6,070		
18		19	28	5	20	0	0	21		52	0	5,328	5,380		
19		6	28	5	21	0	124	22		39	124	4,587	4,750		
20		6	28	5	22	163	454	23		39	617	3,744	4,400		
21		6	25	5	23	166	496	24		36	662	3,352	4,050		
22		6	22	5	24	170	433	25		33	603	2,924	3,560		
23		6	22	5	25	0	209	26		33	209	2,798	3,040		
24		6	22	5	26	0	301	27		33	301	2,526	2,860		
25		6	22	5	27	0	592	28		33	592	9,365	9,990		
26		6	22	5	28	0	801	29		33	801	33,566	34,400		
27		6	22	5	29	934	826	30		33	1,760	18,107	19,900		
Total	0	643	828	404		4,029	8,475		0	1,875	12,504	164,541	178,920		

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 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 11. 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 1992	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average June 17, 1992 to date	Date 1993	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average June 17, 1992 to date
Dec. 1	321	194	103	734	Jan. 1	350	488	97	757
2	453	296	92	735	2	331	488	100	758
3	453	296	105	736	3	302	489	102	758
4	453	296	98	736	4	384	308	74	758
5	453	297	104	737	5	356	298	98	758
6	453	297	101	738	6	338	298	81	758
7	453	297	105	738	7	378	298	81	758
8	453	297	98	739	8	356	297	137	758
9	460	297	96	740	9	296	298	98	758
10	453	297	107	740	10	337	298	145	758
11	452	297	100	741	11	0	299	95	756
12	451	297	100	742	12	0	298	96	755
13	451	297	101	742	13	0	298	97	753
14	453	297	101	743	14	0	297	96	751
15	452	297	97	743	15	9	279	95	749
16	452	297	97	744	16	0	298	109	748
17	451	298	95	744	17	0	298	84	746
18	452	298	100	745	18	302	11	148	745
19	452	298	94	746	19	302	0	149	744
20	340	298	99	745	20	300	0	145	742
21	352	465	99	746	21	298	0	149	741
22	358	484	83	747	22	261	268	147	740
23	357	484	118	748	23	312	298	146	741
24	354	484	99	749	24	298	298	144	741
25	362	484	103	750	25	0	298	143	739
26	339	484	96	751	26	0	298	146	738
27	310	484	98	752	27	6	298	148	737
28	387	484	99	753	28	13	299	144	735
29	358	485	97	754	29	11	293	144	734
30	357	485	97	755	30	0	299	147	733
31	351	486	92	756	31	0	299	142	732
Total	12,696	11,147	3,074			5,540	8,586	3,727	

Table 11. 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 1993	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average June 17, 1992 to date	Date 1993	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average June 17, 1992 to date
Feb. 1	447	10	145	731	Mar. 1	303	0	147	718
2	451	0	149	730	2	300	0	144	717
3	465	0	144	730	3	301	295	133	717
4	453	0	143	729	4	301	296	150	717
5	453	0	140	729	5	299	98	155	716
6	452	0	147	728	6	302	0	147	715
7	452	0	145	728	7	301	0	155	714
8	451	0	147	727	8	301	293	98	714
9	452	0	141	727	9	301	296	102	714
10	452	0	146	726	10	296	296	96	714
11	452	0	146	725	11	300	296	96	714
12	452	0	150	725	12	309	297	98	714
13	452	0	76	724	13	172	151	135	713
14	452	0	210	724	14	0	0	0	710
15	451	0	143	723	15	319	208	0	709
16	451	165	149	724	16	302	297	0	709
17	451	210	145	724	17	300	297	0	709
18	452	211	151	724	18	301	297	0	708
19	452	211	148	725	19	302	297	0	708
20	452	211	148	725	20	292	297	0	707
21	300	211	145	725	21	295	297	0	707
22	318	205	148	724	22	282	471	0	707
23	451	69	159	724	23	283	494	0	707
24	96	0	151	722	24	283	494	0	708
25	214	0	107	721	25	283	494	0	708
26	451	0	147	720	26	283	494	0	708
27	300	0	148	719	27	0	495	0	707
28	407	0	151	719	28	0	495	0	707
					29	283	497	9	707
					30	283	500	0	707
					31	282	500	95	708
Total	11,582	1,503	4,069			8,159	9,242	1,760	

Table 11. 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 1993	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average June 17, 1992 to date	Date 1993	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average June 17, 1992 to date
April 1	285	37	93	707	May 1	0	0	374	664
2	277	0	97	706	2	0	0	388	663
3	0	0	95	704	3	0	0	373	662
4	0	0	112	702	4	391	0	200	662
5	0	0	0	699	5	453	0	198	662
6	0	0	0	697	6	452	0	198	662
7	0	0	0	694	7	453	0	198	662
8	0	0	0	692	8	453	0	201	662
9	0	0	186	690	9	453	0	194	662
10	0	0	193	689	10	454	0	139	661
11	0	0	170	687	11	454	255	166	662
12	0	0	352	686	12	453	292	146	663
13	0	0	382	685	13	452	292	156	663
14	0	0	378	684	14	454	292	143	664
15	0	0	382	683	15	453	292	137	665
16	0	0	363	682	16	453	292	141	665
17	0	0	17	680	17	453	292	136	666
18	0	0	0	677	18	453	292	90	667
19	0	0	0	675	19	452	292	96	667
20	0	0	405	674	20	450	292	96	668
21	0	0	423	673	21	254	481	0	668
22	0	0	406	673	22	276	493	0	668
23	0	0	403	672	23	287	493	0	668
24	0	0	401	671	24	300	300	88	668
25	0	0	402	670	25	302	294	97	669
26	0	0	396	669	26	301	294	101	669
27	0	0	170	668	27	453	293	99	669
28	0	0	254	666	28	453	293	100	670
29	0	0	374	665	29	452	293	100	670
30	28	0	430	665	30	452	292	103	671
					31	300	292	103	671
Total	590	37	6,884			11,466	6,701	4,561	

Table 11. 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 1993	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average June 1, 1993 to date	Date 1993	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average June 1, 1993 to date
June 1	314	292	107	713	July 1	453	0	97	644
2	319	292	92	708	2	452	0	97	641
3	301	293	99	703	3	452	0	99	638
4	300	293	115	704	4	452	0	98	635
5	291	293	107	702	5	452	0	100	633
6	281	293	75	693	6	452	0	100	631
7	317	293	123	699	7	453	0	84	628
8	302	293	92	697	8	453	0	79	626
9	217	221	101	680	9	446	0	98	624
10	340	293	95	684	10	453	0	103	622
11	317	281	96	685	11	452	0	101	620
12	290	293	100	685	12	454	0	115	619
13	271	292	106	684	13	454	0	104	618
14	317	292	100	686	14	454	220	97	621
15	298	292	94	686	15	454	293	99	626
16	301	292	96	686	16	453	292	99	631
17	300	292	99	686	17	452	292	103	635
18	301	291	108	687	18	452	292	95	640
19	293	291	97	687	19	453	292	94	644
20	435	291	95	693	20	453	292	99	648
21	449	2	108	687	21	453	293	107	652
22	454	0	90	680	22	384	293	97	654
23	444	0	103	675	23	454	293	99	658
24	453	0	105	670	24	454	293	98	661
25	453	0	96	665	25	454	292	102	665
26	453	0	98	660	26	453	292	100	668
27	454	0	104	657	27	453	292	100	671
28	453	0	102	653	28	453	292	141	675
29	453	0	108	650	29	454	293	149	678
30	454	0	100	647	30	453	292	152	682
					31	453	292	153	686
Total	10,625	5,765	3,011			13,967	5,190	3,259	

Table 11. 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 1993	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average June 1, 1993 to date	Date 1993	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average to date June 1, 1993 or Sept. 21, 1993
Aug. 1	453	291	153	689	Sept. 1	324	293	227	782
2	453	291	148	692	2	454	293	208	784
3	455	293	152	695	3	454	292	233	786
4	455	282	145	698	4	454	292	244	788
5	454	293	86	700	5	454	290	229	790
6	454	294	190	704	6	454	290	232	792
7	453	294	195	707	7	453	291	245	794
8	453	293	102	709	8	452	293	236	796
9	454	292	160	712	9	419	275	258	797
10	454	292	153	715	10	415	149	251	797
11	453	292	162	718	11	453	149	213	797
12	453	292	151	720	12	452	148	232	798
13	453	292	154	722	13	452	147	248	798
14	453	291	163	725	14	454	145	250	799
15	453	291	160	727	15	454	182	201	799
16	452	292	200	730	16	454	173	201	799
17	452	292	193	733	17	454	173	202	800
18	452	287	207	735	18	453	114	203	799
19	452	294	254	739	19	453	104	202	799
20	453	293	251	742	20	453	29	202	798
21	453	292	276	745	21	453	0	204	657
22	453	289	276	749	22	453	0	207	658
23	455	432	267	753	23	453	0	221	664
24	454	449	250	758	24	453	0	208	663
25	426	450	270	763	25	452	0	214	664
26	454	450	257	767	26	452	0	203	662
27	454	291	327	771	27	452	0	209	662
28	454	293	274	773	28	453	0	202	661
29	454	292	260	776	29	453	0	210	661
30	454	292	287	779	30	453	0	213	662
31	453	293	245	781					
Total	14,028	9,654	6,368			13,392	4,122	6,608	

Table 11. 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 1993	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average Sept. 21, 1993 to date	Date 1993	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average Sept. 21, 1993 to date
Oct. 1	453	0	201	661	Nov. 1	430	0	148	659
2	453	0	198	660	2	454	0	150	658
3	453	0	195	659	3	454	0	150	657
4	453	0	203	659	4	453	0	150	656
5	453	0	201	659	5	454	0	147	654
6	452	0	191	658	6	454	0	147	653
7	451	0	198	657	7	454	0	149	652
8	456	0	197	657	8	453	0	147	651
9	454	0	195	657	9	454	0	0	647
10	453	0	187	656	10	454	0	93	645
11	453	0	185	655	11	454	0	147	644
12	454	0	188	654	12	453	0	182	644
13	453	0	215	655	13	453	0	225	645
14	452	0	199	655	14	453	0	205	645
15	453	0	171	654	15	453	0	147	644
16	453	0	196	653	16	453	0	149	644
17	453	0	181	653	17	453	0	149	643
18	453	0	174	652	18	453	0	147	642
19	452	0	190	651	19	453	0	155	642
20	453	0	183	651	20	454	0	148	641
21	453	0	287	654	21	454	0	152	640
22	453	0	295	657	22	454	0	202	641
23	453	0	287	659	23	453	0	199	641
24	453	0	327	663	24	452	0	196	641
25	453	0	295	665	25	452	0	202	641
26	452	0	302	668	26	452	0	199	641
27	454	0	173	667	27	452	0	199	641
28	453	0	159	665	28	453	0	198	642
29	454	0	150	664	29	453	0	192	642
30	473	0	155	663	30	453	0	186	642
31	454	0	150	661					
Total	14,065	0	6,428			13,574	0	4,870	

Table 12. Daily Mean discharge, East Branch Delaware River at Downsville, N.Y., (01417000) for the year ending November 30, 1993.
(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, $ft^3/s \cdot d$]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	60	49	46	49	63	1600	65	88	88	386	211	45
2	60	49	44	50	62	1350	66	87	97	385	151	45
3	60	48	45	49	62	1200	66	98	114	385	96	45
4	60	49	47	49	59	949	66	110	102	340	61	45
5	60	48	47	46	59	536	66	112	86	327	90	36
6	60	48	47	45	60	369	66	111	85	374	201	19
7	60	48	46	48	60	224	66	111	85	350	303	19
8	60	48	46	48	59	121	66	111	85	355	327	19
9	57	48	46	51	60	68	66	118	85	353	326	19
10	52	48	46	46	58	62	66	127	85	355	323	19
11	50	48	46	48	1250	62	66	127	85	354	186	19
12	50	49	45	48	3800	62	66	107	85	350	54	19
13	50	49	43	51	3400	62	66	86	85	346	35	19
14	49	49	47	49	2800	62	65	86	85	345	93	19
15	49	47	47	48	2170	63	65	86	85	346	136	19
16	49	45	47	44	2300	63	65	87	85	345	76	18
17	49	48	47	45	4960	63	77	87	85	347	45	19
18	49	47	43	45	4190	63	90	87	98	345	107	19
19	49	45	47	46	3100	63	90	87	101	342	135	14
20	49	47	47	42	2460	63	90	87	88	314	70	6.8
21	49	47	47	45	2020	64	78	87	87	308	46	6.8
22	49	47	47	44	2330	64	65	87	88	204	44	7.0
23	49	47	49	45	2940	64	66	87	87	200	44	6.6
24	48	47	47	46	2860	64	79	88	235	308	45	6.6
25	48	46	46	44	2580	64	87	88	389	193	45	6.6
26	48	47	48	45	2170	64	87	87	386	51	45	6.6
27	48	47	48	45	2930	64	87	96	387	51	45	6.5
28	48	47	48	44	2850	64	87	114	385	48	74	8.7
29	49	47	---	45	2440	65	88	114	385	48	73	7.6
30	49	46	---	45	1980	65	88	101	385	149	44	7.5
31	49	47	---	45	---	66	---	87	386	---	44	---
Total	1616	1472	1299	1440	56132	7813	2211	3036	4994	8604	3575	553.3
Mean	52.1	47.5	46.4	46.5	1871	252	73.7	97.9	161	287	115	18.4

Year total 92,745.3 ($ft^3/s \cdot d$) Mean 254 ft^3/s

Table 13. Daily mean discharge, West Branch Delaware River at Stilesville, N.Y., (01425000) for the year ending November 30, 1993.
(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, $ft^3/s \cdot d$]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	38	41	39	39	10700	2460	63	500	1080	901	41	43
2	38	40	39	39	10300	2070	51	809	1060	904	42	41
3	38	40	39	39	8330	1730	194	960	998	643	43	40
4	38	41	39	39	6020	1470	411	897	1040	401	42	40
5	38	46	39	197	4440	1320	161	500	1160	318	42	39
6	37	43	39	245	3650	1240	168	500	1330	372	42	32
7	37	42	39	56	3210	1120	66	502	1380	643	42	31
8	37	41	39	40	2970	987	52	499	1450	722	222	31
9	37	41	39	40	2880	874	174	560	1350	715	273	31
10	37	40	39	39	3150	778	180	574	1370	441	133	31
11	39	40	39	89	5320	749	169	583	1370	556	115	31
12	38	40	39	317	5800	419	272	419	1390	526	94	31
13	37	41	40	154	4710	303	212	401	1380	665	42	31
14	37	41	39	45	3680	221	521	401	1400	727	39	32
15	37	40	39	39	2940	156	805	578	1350	742	38	32
16	37	40	40	39	2650	120	446	1300	1200	522	38	31
17	40	39	39	41	4330	91	470	1030	1290	292	38	34
18	40	39	39	39	4820	64	867	501	1230	623	38	44
19	39	39	39	39	4100	54	720	425	1030	447	38	37
20	40	39	39	39	3330	52	404	379	967	468	39	36
21	39	39	39	39	2790	51	336	630	1220	281	40	35
22	38	40	39	61	2970	51	335	720	1260	270	39	32
23	39	40	39	48	3680	51	334	1330	1320	533	39	26
24	38	40	39	46	3720	51	411	1080	1340	579	39	26
25	38	41	39	43	3430	51	863	920	1060	179	39	25
26	37	40	39	44	3210	155	910	868	679	54	38	25
27	37	40	39	47	4130	512	802	1020	736	43	38	25
28	37	40	39	53	4020	583	512	948	1010	42	39	54
29	38	39	---	297	3460	584	359	954	1000	42	39	46
30	40	39	---	5430	2920	734	503	1230	1030	41	40	35
31	43	39	---	10300	---	113	---	1260	911	---	41	---
Total	1183	1250	1094	18022	131660	19214	11771	23278	36391	13692	1872	1027
Mean	38.2	40.3	39.1	581	4389	620	392	751	1174	456	60.4	34.2

Year total 260,454 $(ft^3/s) \cdot d$ Mean 714 ft^3/s

Table 14. Daily Mean discharge, Neversink River at Neversink, N.Y., (0143600) for the year ending November 30, 1993.
(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, $ft^3/s \cdot d$]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	26	25	25	25	39	40	45	51	51	77	23	21
2	26	26	25	25	45	40	45	59	61	76	23	21
3	26	26	25	25	45	40	45	81	79	77	22	22
4	27	26	25	25	42	41	45	94	68	68	22	23
5	25	26	25	25	41	42	45	94	51	53	22	20
6	26	26	25	25	41	40	45	94	51	53	22	14
7	26	26	25	25	41	40	45	94	51	52	22	14
8	27	26	25	25	41	40	45	94	51	52	22	14
9	27	25	25	25	41	40	45	98	50	52	23	14
10	27	25	25	25	42	41	45	104	61	52	22	14
11	27	25	25	25	2100	43	45	104	80	52	23	14
12	27	25	25	25	1340	45	45	94	80	52	23	14
13	27	25	25	25	438	45	45	76	70	52	20	14
14	27	25	24	25	269	45	50	76	52	61	15	14
15	27	25	25	25	209	45	42	58	52	77	18	14
16	27	25	25	25	553	45	42	51	52	67	23	14
17	27	25	24	25	3010	45	52	57	52	52	23	14
18	26	25	25	25	1350	45	70	64	62	51	22	14
19	26	25	24	25	825	45	69	61	80	51	23	11
20	25	25	24	25	452	45	68	52	70	51	23	6.0
21	26	25	24	25	116	45	68	51	54	51	23	6.1
22	26	25	24	25	138	45	59	51	54	41	22	6.1
23	26	25	25	25	300	45	43	51	54	33	22	6.1
24	24	25	25	26	66	45	48	61	63	51	22	6.1
25	25	25	25	26	41	45	59	78	78	43	22	6.1
26	25	25	25	26	42	45	74	78	78	27	21	6.0
27	25	25	25	26	307	45	74	80	78	24	21	6.0
28	25	25	25	26	373	45	74	77	78	23	21	7.6
29	25	25	---	27	211	44	74	75	78	23	21	6.4
30	25	25	---	27	48	45	65	70	78	23	21	6.3
31	26	25	---	27	---	45	---	51	77	---	21	---
Total	807	782	694	786	12606	1346	1616	2279	1994	1517	673	368.8
Mean	26.0	25.2	24.8	25.4	420	43.4	53.9	73.5	64.3	50.6	21.7	12.3

Year total 25,468.8 $(ft^3/s) \cdot d$ Mean 69.8 ft^3/s

Table 15. Daily Mean discharge, Wallenpaupack Creek at Wilsonville, Pa., (01432000) for the year ending November 30, 1993.
(Record furnished by Pennsylvania Power & Light Company)
[All values, except total, in cubic feet per second, ft^3/s; total in cubic feet per second days, $ft^3/s \cdot d$]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	0	0	855	291	0	0	359	226	97	255	229	293
2	130	0	1060	353	0	0	442	224	0	0	0	163
3	352	0	1220	357	866	597	224	0	0	140	0	156
4	769	765	886	451	1390	824	222	0	0	0	192	167
5	0	738	881	428	1450	778	0	50	0	0	170	171
6	0	749	771	0	1460	814	0	476	0	0	170	0
7	827	866	287	0	1450	798	0	518	0	33	167	0
8	775	937	893	346	1350	0	224	440	0	0	165	166
9	790	0	854	355	1450	0	222	570	2.0	0	0	170
10	766	0	883	797	1450	821	227	231	0	0	0	163
11	768	880	881	903	1630	383	223	225	167	0	165	171
12	0	866	866	352	1790	6.0	0	472	0	0	180	169
13	0	868	763	442	1800	5.0	0	531	0	0	173	0
14	764	864	288	1030	1800	0	216	448	0	0	167	0
15	771	871	884	1210	1810	0	224	212	0	0	167	141
16	775	569	891	525	1800	0	234	460	0	0	0	166
17	774	0	902	836	1780	241	226	0	0	9.0	0	170
18	764	867	931	998	1790	229	230	0	0	0	168	166
19	0	859	948	387	1800	227	0	645	0	0	167	164
20	0	889	884	0	1800	231	0	462	147	185	172	0
21	598	876	354	0	1800	227	224	227	0	204	172	0
22	0	871	876	0	1780	0	222	455	0	209	170	163
23	0	631	890	0	1770	0	227	464	0	265	0	166
24	0	346	884	0	0	0	230	0	0	227	0	170
25	0	867	957	0	0	0	228	229	0	0	165	0
26	0	871	871	0	1710	0	0	275	0	0	158	0
27	67	873	767	0	1220	0	0	351	327	339	168	0
28	346	879	286	0	1800	0	230	372	0	221	167	0
29	336	741	---	0	1800	0	221	231	0	238	163	816
30	0	756	---	0	1600	0	224	214	117	219	0	985
31	0	358	---	0	---	0	---	0	0	---	0	---
Total	10372	19657	22713	10061	42146	6181.0	5079	9008	857.0	2544.0	3615	4896
Mean	335	634	811	325	1405	199	169	291	27.6	84.8	117	163

Year total 137,229 $(ft^3/s) \cdot d$ Mean 376 ft^3/s

Table 16. Daily Mean discharge,Delaware River at Montague, N.J., (01438500) for the year ending November 30, 1993.
(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, $ft^3/s \cdot d$]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	5490	16700	3660	2100	59800	13500	2280	1670	1750	2010	1910	5180
2	5180	13100	3740	1800	59200	11200	2140	1720	1880	1970	1760	6770
3	4790	9420	4200	1800	44700	9980	2050	1610	1670	1840	1420	5360
4	4660	8740	3500	1870	32000	9270	1700	1600	1700	2640	1610	4410
5	4310	12000	3600	2170	23400	8630	1510	1700	1590	2530	1790	4180
6	3710	18100	3500	2090	20100	9100	1470	1780	1550	1860	1560	3970
7	3600	13500	3400	1500	18700	8350	1540	2100	1620	1430	1520	4290
8	4090	11000	2800	1940	17800	6890	1670	2090	1710	1440	1400	4250
9	3550	9120	3400	2130	17700	5540	1800	1880	1810	1610	1460	3720
10	3190	7300	3100	2130	19300	5240	1970	1950	1760	1790	1260	3320
11	3520	6580	3000	2790	37700	5460	2350	1690	1720	1850	1350	3230
12	4690	6440	3200	2690	37600	4330	1950	1530	1970	1810	1790	3150
13	4430	6670	3000	2150	28400	3850	1430	1900	1890	1730	2310	2940
14	4070	7100	2980	2300	22200	3380	1340	1900	1950	1560	2440	2530
15	3870	6570	2250	4300	18000	2980	1560	1750	1860	1650	2130	3040
16	3770	5940	3000	3100	16100	2710	1740	1390	1770	1770	1710	4400
17	3870	4920	3090	2500	34400	2570	2160	1500	2170	1800	1460	3920
18	7510	4520	2980	3400	35500	2720	2020	1700	2040	1720	1400	4380
19	8210	4520	2700	3800	26800	2670	1900	1620	2050	1500	1430	7580
20	6740	4280	2900	2740	21000	2750	1930	1990	1880	1730	1540	6090
21	7310	3940	2700	2490	17300	2830	1980	1680	1810	1760	2280	5400
22	6920	4420	2350	2470	19500	2530	2740	1300	1620	1850	3430	4750
23	5810	5230	2900	2360	24600	2160	2430	1640	1790	1710	3080	4410
24	5260	4920	2800	3700	20800	2080	1960	1800	1810	1680	2560	4060
25	4590	5900	3200	6020	17700	2140	1690	1740	1880	1700	2200	3560
26	3400	6220	2900	7570	17400	2000	1600	1880	2030	1850	2060	3040
27	3600	5600	2700	10200	27100	1700	1920	1970	2140	2180	2030	2860
28	3700	5040	2400	16700	25200	1650	2020	2040	2220	2550	1830	9960
29	3550	4880	---	32900	20600	1760	2210	2150	1790	2450	1840	34400
30	4000	4270	---	47400	17300	1840	1970	1840	1820	2270	1870	19900
31	10200	4030	---	53100	---	1860	---	1760	1940	---	2030	---
Total	151590	230970	85950	234210	797900	143670	57030	54870	57190	56240	58460	179050
Mean	4890	7451	3070	7555	26600	4635	1901	1770	1845	1875	1886	5968

Year total 2,107,130 (ft^3/s)·d

Mean 5,773 ft^3/s

Table 17. Diversions by New Jersey; daily mean discharge, in million gallons per day, of Delaware and Raritan Canal at Port Mercer, N.J. (01460440) for the year ending November 30, 1993.

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	90	87	90	87	20	98	96	107	100	98	86	98
2	90	88	94	87	72	99	98	101	99	95	85	99
3	89	89	93	87	81	98	99	103	100	97	85	94
4	90	87	91	78	83	100	98	105	100	94	85	94
5	89	70	91	63	85	98	96	106	100	98	87	95
6	89	83	94	73	90	97	99	103	100	98	87	94
7	90	85	96	76	92	94	98	105	101	96	87	90
8	92	87	94	80	90	97	98	105	100	101	87	88
9	93	90	92	81	90	98	100	105	100	98	85	89
10	95	90	91	83	90	97	101	105	92	89	87	92
11	-25	90	93	83	90	94	99	101	94	96	87	90
12	60	89	87	85	90	95	98	100	96	97	63	89
13	83	86	19	89	91	93	93	99	96	99	48	87
14	92	84	50	83	93	95	94	103	98	98	59	88
15	87	89	87	87	99	94	96	85	97	98	62	89
16	87	92	81	86	89	95	87	92	96	96	67	84
17	74	92	57	72	70	96	97	92	85	100	72	85
18	85	92	78	59	95	94	102	90	98	95	70	90
19	87	93	89	87	96	98	105	83	98	98	70	90
20	88	92	90	81	96	97	107	85	98	97	63	92
21	87	93	92	81	100	98	105	89	98	96	54	92
22	85	90	92	77	66	97	107	89	97	88	61	94
23	94	89	83	76	95	98	106	88	96	89	63	93
24	92	89	83	13	96	98	107	86	95	87	79	86
25	91	88	86	61	97	99	107	84	95	86	82	87
26	92	90	88	78	88	96	105	85	95	71	81	85
27	98	90	89	88	94	98	104	86	94	61	94	85
28	92	90	89	62	95	96	105	90	94	74	98	37
29	88	90	---	47	95	97	105	98	96	87	94	69
30	86	85	---	79	97	96	106	96	95	85	96	78
31	86	89	---	80	---	96	---	98	98	---	98	---
Total	2616	2738	2359	2349	2625	2996	3018	2964	3001	2762	2422	2623
Mean	84.4	88.3	84.2	75.8	87.5	96.6	101	95.6	96.8	92.1	78.1	87.4

Year total 32,473 Mgal

Mean 89.Mgal/d

Section III

WATER QUALITY OF THE DELAWARE RIVER ESTUARY

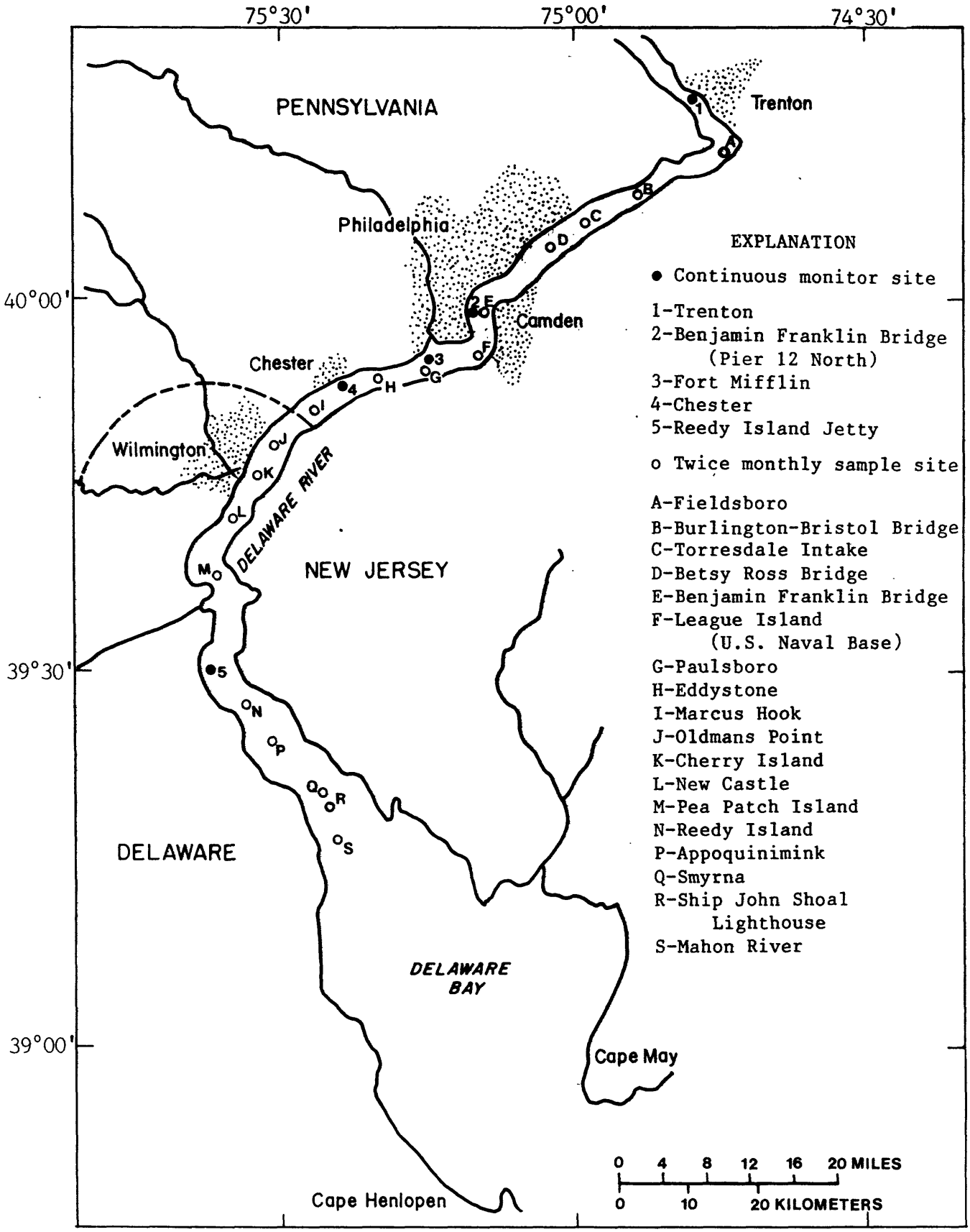

Figure 6.- Location of water quality monitoring sites in the Delaware River Estuary.

Section III

WATER QUALITY OF THE DELAWARE RIVER ESTUARY

By Charles R. Wood

INTRODUCTION

This section describes the water-quality monitoring program conducted by the U.S. Geological Survey in the Delaware Estuary during the 1993 report year. Also presented here are some of the data that were obtained by this program and a brief discussion of the significance of the data.

WATER-QUALITY MONITORING PROGRAM

Water quality of the Delaware River and Estuary was monitored between Trenton, N.J., and Reedy Island Jetty, Del. Data were acquired continuously by electronic instruments at five monitor sites: one at Trenton just upstream of the head of tidewater and four in the estuary (fig. 6). At Fort Mifflin, the water was monitored for two parameters: temperature and specific conductance. At the remaining sites, the water was monitored for four parameters: temperature, specific conductance, dissolved oxygen, and pH.

Additional data were obtained twice a month from March to November at 18 sites between Fieldsboro, N.J., and the mouth of the Mahon River (fig. 6). At each of these sites, samples of water were collected at the center of the river channel. These samples were analyzed for 28 parameters including temperature, chloride, alkalinity, specific conductance, dissolved oxygen, and pH.

Data obtained from the continuous monitoring sites were processed by computer and stored for future reference by the U.S. Geological Survey. They were also distributed regularly to cooperators and published annually by the U.S. Geological Survey in "Water Resources Data for Pennsylvania, Volume 1, Delaware River Basin." Data from the twice-a-month sites were collected by the State of Delaware for the Delaware River Basin Commission (DRBC) at 18 sites. These data are available from the DRBC and from STORET, the U.S. Environmental Protection Agency's data storage system. The above described programs were carried out in cooperation with the Delaware River Basin Commission, Delaware River Master, and other agencies of federal, state, and county governments.

ESTUARINE WATER-QUALITY DATA DURING 1993

The following is a summary and discussion of the data that were collected during the 1993 report year.

Streamflow

Streamflow is a vital factor that influences the water quality of the estuary. Increased streamflow usually results in better water quality by limiting salt-water intrusion and diluting the concentration of dissolved minerals, both of which contribute to a lower specific conductance and chloride level. Increased flow also aids in maintaining lower water temperature during warm weather and supporting higher dissolved-oxygen levels.

On the basis of streamflow records for the Delaware River at Trenton, mean monthly streamflow for the year was lowest during July (3,498 ft^3/s) and highest during April (49,120 ft^3/s) (table 18).[2] The monthly mean streamflow was above the respective monthly mean for the period of record in December, January, April, and November, and below the monthly mean for the remainder of the year.

Temperature

The significance of water temperature in regard to water quality in the estuary lies in its profound influence on various physical, chemical, and biological properties of the water. In general, increases in water temperature have deleterious effects on water quality by lowering the saturation level of dissolved oxygen and increasing biological activities. The primary factors that control water temperature in the estuary are climatic; however, various uses of the water by man can also have significant effects.

Records from Benjamin Franklin Bridge (Pier 12 North), Philadelphia, Pa., show that mean monthly temperatures for the period March to November 1993 were below normal during March, April, October, and November, and equaled or exceeded the norm during the rest of the year. The norm is based on historical temperature records from 1962 to 1992 (fig.7).

Specific Conductance and Chloride

Specific conductance is the ability of a solution to conduct electricity. It can be used as an indicator of the amount of ionized material in solution and relates approximately to dissolved-solids content.

Specific conductance values in bodies of water usually reflect the geochemistry of the drainage basin; however, pollution and the intrusion of oceanic salts can also have a considerable effect on specific conductance. Increasing streamflows reduce the concentration of dissolved solids; thus, lowering specific conductance and chloride levels. Conversely, decreasing flows have the opposite effects.

In the Delaware Estuary, the intrusion of oceanic salts is important to those who must use the estuary as a water supply. For this reason, chloride concentration is of great interest. Water with chloride concentrations in excess of 250 mg/L (milligrams per liter) is usually considered undesirable for domestic use, and water with concentrations in excess of 50 mg/L is unsatisfactory for some industrial uses.

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2. All numbered tables in Section III are grouped at the end of this section, beginning on page 76.

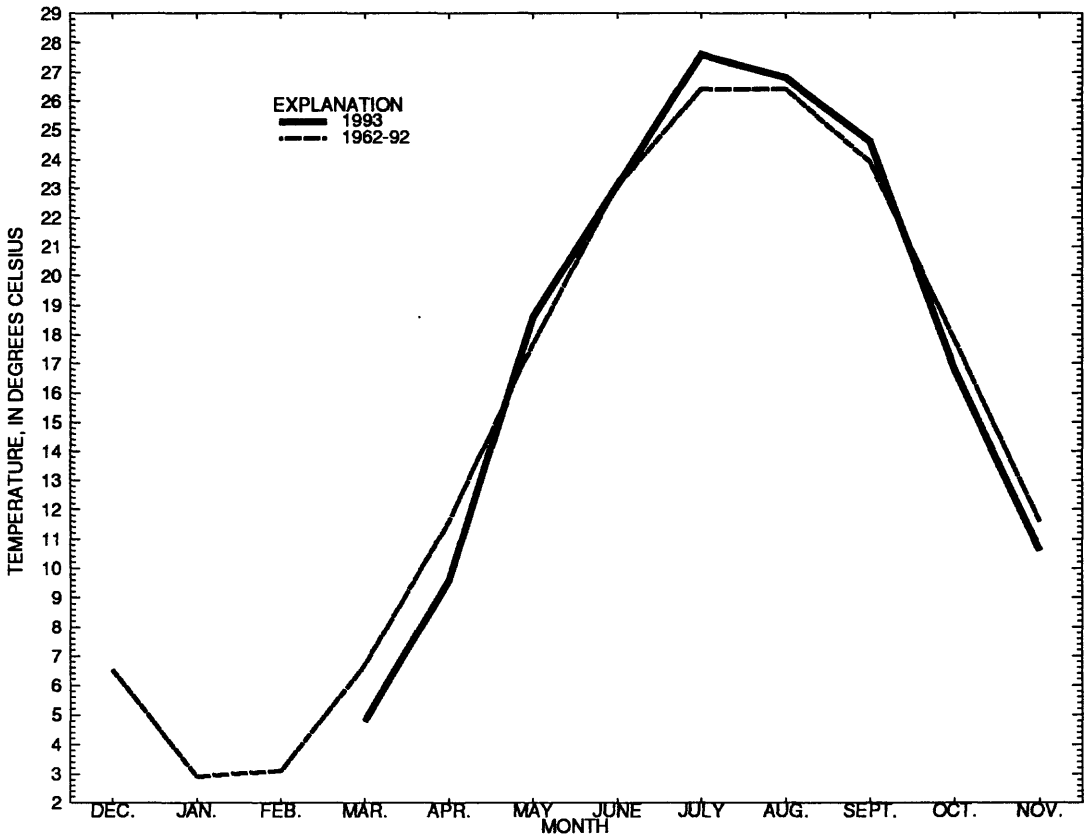

Figure 7.- Mean monthly temperatures of the Delaware River Basin at Benjamin Franklin Bridge, Philadelphia, Pennsylvania.

As sea water has a chloride concentration of approximately 19,000 mg/L, the location of a body of water in relation to the sea can influence chloride levels in that body of water. For this reason, chloride concentrations in the Delaware Estuary generally increase with distance downstream toward the Delaware Bay and Atlantic Ocean.

Chloride concentration was not measured directly at Fort Mifflin, Pa., and Reedy Island Jetty, Del., but a correlation between specific conductance and chloride concentration has been developed on the basis of analyses of water samples collected from the estuary. Chloride concentrations estimated from that correlation are presented in tables 19 and 20. The correlation is less reliable when chloride concentrations are lower than 30 mg/L because other ionized materials may be present in amounts large enough to affect the conductance-chloride correlation. Therefore, chloride concentrations derived from specific conductance are not given when chloride concentrations of less than 30 mg/L are indicated. Chloride concentrations at Chester, Pa., (table 21) were furnished by Scott Paper Company.[3]

3. The use of trade, product, or firm names in this report is for identification purposes only and does not imply endorsement by the U.S. Geological Survey.

At Fort Mifflin, the maximum daily chloride concentration for March through October equaled or exceeded 50 mg/L, 10 percent of the time (see table 19). The maximum was 120 mg/L on August 17 and 18. At Chester, the minimum daily chloride concentration equaled or exceeded 50 mg/L, 26 percent of the time. The maximum daily concentration was greater than 50 mg/L, 46 percent of the time (see table 21). The maximum daily chloride concentration was 620 mg/L on September 4. Minimum chloride concentrations at Reedy Island Jetty were less than 30 mg/L on several days. Except for a period of very low chloride concentration coinciding with a major spring runoff event in late March and April, maximum chloride concentrations typically ranged from 2,000 to 7,000 mg/L. The maximum at this site was 7,600 mg/L on July 19 and August 15, 16, and 17.

Dissolved Oxygen

Dissolved oxygen is necessary in water for the respiration of aquatic organisms. It also plays a significant role in chemical reactions in aquatic environments. The major sources of dissolved oxygen in water are diffusion from the atmosphere and photosynthesis in aquatic plants. Dissolved-oxygen concentrations are limited by temperature, salinity, and the partial pressure of atmospheric oxygen.

Dissolved-oxygen levels in the estuary tend to be highest near Trenton and tend to decrease with distance downstream to a point near or somewhat downstream from the Benjamin Franklin Bridge, where minimum values are usually reached. During the past year, daily mean dissolved-oxygen concentration at the Benjamin Franklin Bridge was below 5 mg/L from June 21 through September 29 (table 22). The minimum daily mean was 2.9 mg/L on July 17 and 18. At Chester, the daily mean dissolved-oxygen concentration was below 5 mg/L on June 26 through July 29 and September 4, 7, 9, 11, and 12 (table 23). The lowest daily mean was 3.2 mg/L on August 12, 13, and 14. The minimum hourly value was 3.5 mg/L on August 20. At Reedy Island Jetty, the minimum hourly value was 4.4 on July 9.

The frequency of hourly dissolved-oxygen concentration at Benjamin Franklin Bridge and at Chester during the critical summer period, July through September 1993 is shown in figure 8. At Chester, dissolved-oxygen concentration was equal to or below 4 mg/L, 36 percent of the time in 1993, as compared to 6 percent of the time in 1992 and never dropping that low in 1991. At Benjamin Franklin Bridge, the dissolved-oxygen concentration was equal to or below 4 mg/L, 65 percent of time in 1993, as compared with 32 percent of the time in 1992 and 51 percent of the time in 1991.

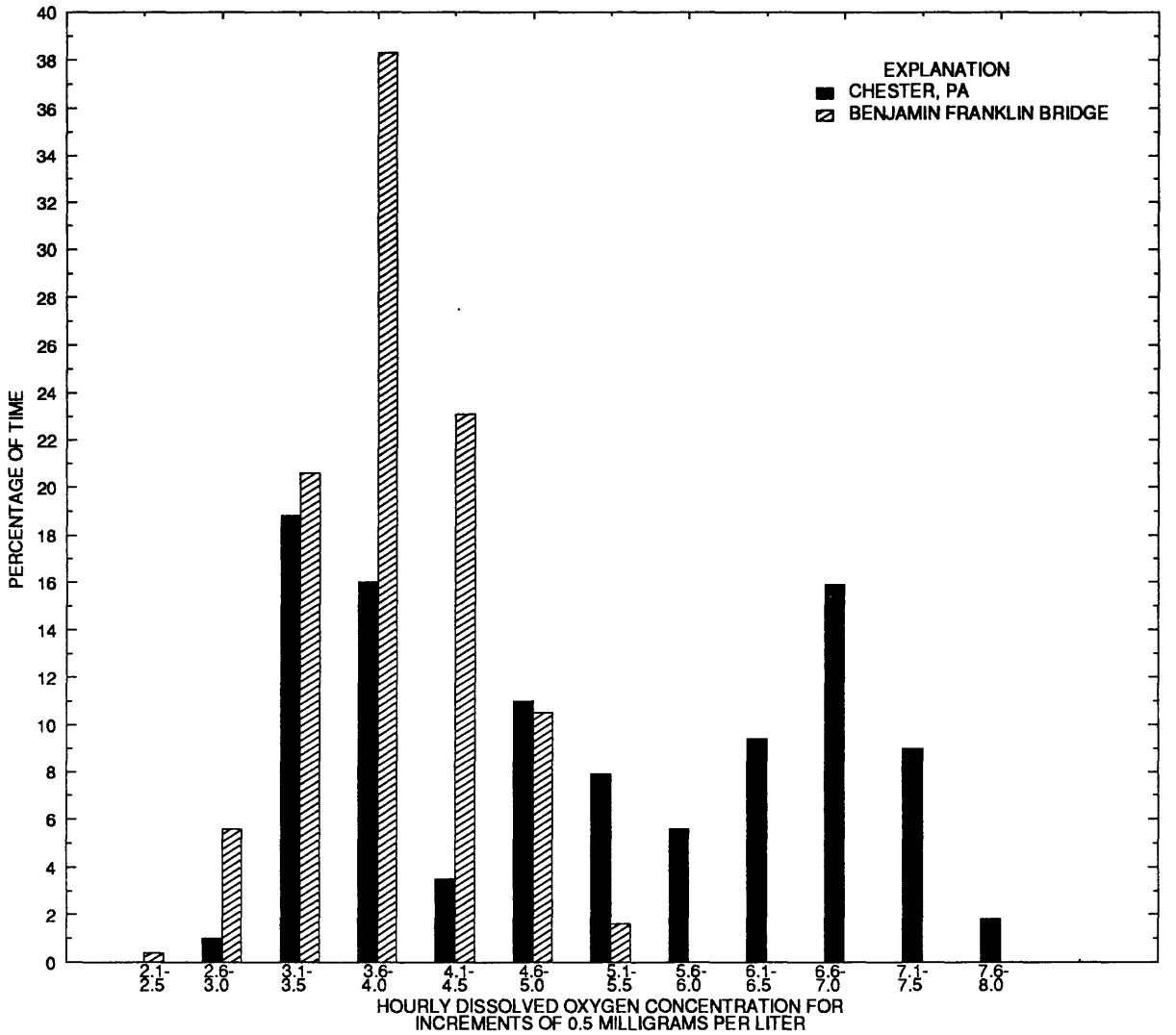

Figure 8.- Frequency of occurrence of dissolved-oxygen concentrations at two stations in the Delaware River during July, August, and September 1993.

Hydrogen-Ion Activity (pH)

Hydrogen-ion activity (pH) is fundamentally a measure of acidity or alkalinity. Values of pH below 7 indicate acidic water, whereas values above 7 indicate alkaline water. In natural waters, pH generally ranges from 6.0 to 8.5. The main factors controlling the pH of a body of water are usually the geochemistry of the drainage basin and external influences such as pollution. Photosynthetic activity can also have a considerable influence on pH values. Increased photosynthetic activity (algal bloom) produces higher pH values. All pH values at Benjamin Franklin Bridge, Chester, and Reedy Island Jetty were in a range of 6.2 to 8.1. The pH range for each station is: Reedy Island Jetty, 6.6 to 8.2; Chester, 6.6 to 7.6; Benjamin Franklin Bridge, 6.4 to 7.4. The pH in the estuary tends to be lowest near Trenton, N.J., and tends to increase downstream.

Table 18. Daily Mean discharge, Delaware River at Trenton, N.J.,(01463500) for the year ending November 30, 1993.
(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, $ft^3/s \cdot d$]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	14500	19300	9560	5350	90500	29500	5570	4440	3000	2680	6090	8600
2	13200	27200	8690	5200	107000	24500	5470	4070	2940	2760	5370	10900
3	12300	22400	7440	5210	95300	21300	5430	4270	2810	2880	5040	13400
4	11300	18000	7410	6700	73100	19100	4960	4250	2920	3160	4850	11900
5	10800	19800	8310	14600	58000	18100	4800	3840	2740	4030	4010	10400
6	10600	27100	7770	12000	45300	18300	4470	3560	2910	4260	3900	10200
7	9220	30800	7350	9620	38100	18400	4320	3590	3090	3810	3990	9550
8	8780	24900	6250	9120	34000	17100	4130	3840	3080	3560	3700	8830
9	9140	21000	6240	9370	31200	14900	4150	3930	3200	3150	3510	8410
10	8730	17900	6460	10200	31700	13000	4840	3800	3130	3530	3370	8300
11	21900	15400	6780	9370	53300	12000	4790	3530	3060	3660	3210	7540
12	21200	14100	6930	8580	66200	12000	4710	3500	3020	3650	3400	7170
13	17100	14900	8100	9050	58100	10600	4670	3240	3520	3210	7560	6860
14	14200	17500	8340	8200	49600	9460	4480	3100	3680	3050	9190	6700
15	12400	16900	7520	6430	40600	8950	3880	3580	3350	2910	7830	6380
16	12000	15500	6640	7470	34600	8120	3460	3830	3340	3070	7050	5920
17	12100	13900	11500	10300	44300	7540	3570	3390	7670	3770	6240	6970
18	17700	12600	11700	19300	57800	7130	3700	2880	9670	4160	5420	8360
19	19100	11100	9170	15900	51300	7300	4070	3610	5420	4020	4960	8310
20	19200	10800	7180	13600	41700	7230	4100	3710	4170	3760	4760	10900
21	17200	9710	6720	12200	34800	7210	5060	3200	3790	3240	5410	10500
22	16800	10400	6390	12100	34400	7100	6460	3400	3410	3280	6460	9420
23	16300	12700	6310	12900	38700	6750	5520	3000	3160	3330	7600	8450
24	14200	12700	7020	24700	39700	6020	5400	2720	2860	3390	7630	8130
25	12700	12800	6090	28200	34200	5710	4600	2950	2970	3240	6900	7590
26	10900	12900	5800	28400	31100	5510	4100	3150	3020	3910	6240	7030
27	9730	13600	6100	29800	38500	5270	3760	3120	2990	7420	5810	6270
28	8580	12300	5720	34600	45500	5010	4540	3150	3010	11700	5450	17200
29	8980	11400	---	52300	40600	4590	4590	3210	3080	8980	5170	50300
30	9840	10800	---	70300	34400	4460	4490	3300	3130	7060	4960	53500
31	11100	9900	---	78900	---	4480	---	3290	2720	---	6290	---
Total	411800	500310	209490	579970	1473600	346640	138090	108450	110860	124630	171370	353990
Mean	13280	16140	7482	18710	49120	11180	4603	3498	3576	4154	5528	11800

Year total 4,529,200 $(ft^3/s) \cdot d$ Mean 12,410 ft^3/s

Table 19. Daily maximum and minimum chloride concentrations, Delaware River at Fort Mifflin, Pa. (in milligrams per liter) December 1, 1992 to November 30, 1993

[Monitor was not in operation December 1, 1992 to February 28, 1993, and November 1993; --, missing data;*, less than 30 milligrams per liter; Max, maximum value; Min, minimum value]

	December		January		February		March		April		May		June		July		August		September		October		November	
Date	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							*	*	*	*	*	*	--	--	48	37	--	--	40	*	--	--		
2							*	*	*	*	*	*	--	--	45	35	--	--	43	32	32	*		
3							*	*	*	*	*	*	43	*	47	36	46	40	49	*	31	*		
4							*	*	*	*	*	*	47	*	46	36	53	42	33	*	30	*		
5							41	*	*	*	*	*	45	*	45	36	51	42	39	*	33	*		
6							*	*	*	*	*	*	44	*	45	37	60	43	40	33	33	*		
7							*	*	*	*	30	*	40	*	98	37	54	44	46	35	34	*		
8							*	*	*	*	31	*	38	*	--	--	52	45	49	37	33	*		
9							*	*	*	*	35	*	42	*	46	35	49	43	83	45	32	*		
10							*	*	*	*	35	*	46	*	46	37	50	43	61	45	32	30		
11							*	*	*	*	*	*	46	30	46	37	51	43	48	34	34	30		
12							*	*	*	*	*	*	43	*	45	39	51	43	44	34	--	--		
13							*	*	*	*	*	*	--	--	43	39	92	43	42	32	51	33		
14							34	*	*	*	*	*	--	--	45	40	97	75	42	*	42	32		
15							34	*	*	*	*	*	--	--	48	39	97	59	40	*	34	*		
16							38	*	*	*	*	*	--	--	46	40	91	59	39	*	31	*		
17							48	36	*	*	*	*	--	--	44	40	120	57	41	*	30	*		
18							59	38	*	*	34	*	--	--	44	39	120	51	37	*	*	*		
19							40	31	*	*	35	*	--	--	48	35	59	46	31	*	*	*		
20							41	35	*	*	33	*	--	--	47	41	54	30	*	*	30	*		
21							45	38	*	*	30	*	--	--	44	38	52	*	*	*	38	*		
22							48	39	*	*	*	*	--	--	40	36	52	37	--	--	47	*		
23							48	41	*	*	*	*	--	--	39	34	43	33	--	--	40	30		
24							43	*	*	*	*	*	--	--	39	34	43	31	--	--	38	*		
25							37	*	*	*	*	*	42	32	40	35	39	*	--	--	46	31		
26							40	33	*	*	--	--	41	34	43	36	42	*	--	--	42	30		
27							37	*	*	*	--	--	43	34	44	37	49	30	--	--	39	30		
28							31	*	*	*	--	--	44	35	41	37	49	*	--	--	42	30		
29							*	*	*	*	--	--	45	34	44	38	35	*	--	--	36	30		
30							*	*	*	*	--	--	48	35	--	--	33	*	--	--	39	*		
31							*	*			--	--			--	--	38	*			46	31		

Table 20. Daily maximum and minimum chloride concentrations, Delaware River at Reedy Island Jetty, Del. (in milligrams per liter) December 1, 1992 to November 30, 1993.

[--, missing data; *, less than 30 milligrams per liter; Max, maximum value; Min, minimum value]

	December		January		February		March		April		May		June		July		August		September		October		November	
Date	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	2,100	450	3,100	670	3,200	590	--	--	59	*	--	--	4,000	1,200	5,200	2,200	--	--	6,400	4,000	5,400	2,200	5,400	2,500
2	3,200	660	2,900	600	4,800	760	5,900	2,400	35	*	--	--	3,800	1,200	5,200	2,400	--	--	6,800	4,000	5,200	2,400	4,400	2,500
3	3,200	890	3,200	750	5,900	2,400	5,800	2,500	*	*	--	--	3,700	1,300	5,200	2,300	--	--	6,400	4,100	4,100	2,100	6,300	2,500
4	3,800	760	3,500	860	5,600	2,400	7,000	2,800	61	*	--	--	3,800	1,300	4,800	2,300	--	--	5,800	3,600	4,600	2,100	5,200	2,400
5	3,800	630	3,400	720	6,000	2,300	6,400	2,500	59	*	--	--	4,000	1,400	4,700	2,300	--	--	6,000	3,600	4,400	1,800	5,200	2,300
6	4,000	530	2,700	500	5,100	2,200	5,200	2,300	48	*	--	--	3,700	1,400	5,300	2,600	--	--	6,400	3,800	4,600	1,800	4,700	2,200
7	4,300	1,200	3,000	480	5,900	2,200	4,000	1,800	--	--	--	--	4,000	1,500	4,600	2,500	--	--	6,800	3,900	4,800	2,100	4,500	2,100
8	--	--	2,600	500	5,300	2,300	3,600	1,600	--	--	--	--	4,000	1,600	4,500	2,500	6,300	4,000	6,200	3,700	4,800	1,900	4,800	1,900
9	--	--	2,300	500	5,300	2,200	3,600	1,400	--	--	--	--	3,800	1,500	5,200	2,600	6,500	4,000	6,800	3,700	5,900	2,000	4,600	850
10	--	--	2,700	590	5,100	2,400	3,500	1,300	--	--	--	--	3,700	1,700	5,200	2,800	6,800	4,000	6,000	3,600	6,000	2,400	5,300	2,000
11	--	--	2,000	550	5,000	2,600	3,600	1,100	--	--	--	--	3,700	1,500	5,400	2,600	7,000	4,000	6,000	3,000	6,800	2,800	5,400	2,200
12	--	--	1,800	540	6,000	3,000	2,700	1,100	--	--	--	--	4,200	1,600	5,500	2,700	6,900	4,000	6,800	3,200	6,800	3,100	5,000	2,000
13	--	--	2,000	540	6,300	3,000	3,200	1,100	--	--	--	--	4,200	1,800	6,000	2,700	--	--	6,000	3,100	6,000	3,000	5,200	1,900
14	--	--	1,700	560	4,300	2,900	4,100	1,000	--	--	--	--	4,400	1,900	6,800	2,800	--	--	6,000	2,800	5,900	2,900	5,400	2,000
15	--	--	2,200	510	5,300	2,800	1,800	840	--	--	1,800	210	4,600	1,800	6,300	2,900	7,600	4,100	6,000	2,500	6,600	2,900	4,400	1,900
16	3,100	1,700	1,900	490	6,000	2,900	3,100	940	--	--	1,900	290	4,500	1,500	6,600	2,900	7,600	4,100	5,600	2,500	6,000	2,800	4,700	1,900
17	3,200	1,500	2,100	510	4,000	2,300	2,900	990	--	--	2,560	320	5,100	1,600	6,900	2,900	7,600	4,000	6,400	3,100	6,400	2,800	5,100	2,100
18	2,500	1,200	1,700	490	4,400	2,200	2,900	920	--	--	2,700	460	5,100	1,900	7,400	3,300	6,800	3,900	6,000	3,100	5,500	2,800	4,000	2,000
19	2,600	1,000	2,200	480	5,200	1,900	3,800	930	--	--	2,900	650	4,500	1,900	7,600	3,800	7,000	3,900	5,900	3,100	5,900	2,800	5,200	2,100
20	2,700	830	2,700	500	6,000	2,100	4,000	1,200	--	--	2,900	710	4,400	2,000	6,800	3,600	7,000	3,900	6,000	3,100	5,600	2,900	4,500	1,800
21	2,000	730	2,600	540	5,300	2,400	3,100	1,100	--	--	3,100	700	5,200	2,200	6,900	3,600	6,000	3,700	5,900	3,100	6,300	3,000	3,700	1,800
22	2,300	680	3,000	640	5,400	2,700	2,800	970	--	--	2,900	650	4,800	2,200	6,800	3,600	6,800	3,600	6,000	3,100	4,600	2,700	3,900	1,400
23	2,600	650	2,100	650	4,600	2,500	2,500	780	--	--	2,900	610	4,400	2,100	6,800	3,600	6,800	3,600	6,000	3,100	5,300	2,500	4,100	1,300
24	1,200	470	2,600	610	3,600	2,000	2,600	550	--	--	3,100	770	4,600	2,200	6,800	3,600	6,300	3,900	6,300	3,100	5,100	2,500	4,500	1,400
25	2,400	560	1,500	460	4,100	2,000	990	290	--	--	3,000	890	5,100	2,200	6,600	3,600	--	--	6,400	3,000	4,600	2,300	5,200	880
26	700	470	2,200	400	5,000	2,100	1,200	210	--	--	2,600	900	4,400	2,300	6,800	3,900	--	--	6,000	3,400	6,000	2,500	5,400	2,200
27	1,800	470	2,500	520	5,100	2,500	590	150	--	--	3,200	1,000	4,400	2,100	6,200	3,900	--	--	4,800	2,900	7,000	3,300	5,300	2,500
28	2,000	470	2,100	460	--	--	390	80	--	--	3,400	1,200	4,500	2,100	6,400	3,300	--	--	4,800	2,300	6,800	3,600	6,000	2,300
29	2,400	540	2,200	260			590	84	--	--	3,200	1,200	4,500	2,100	6,400	3,700	--	--	4,300	2,100	5,800	3,000	3,900	1,200
30	2,300	570	1,600	190			400	48	--	--	3,800	1,200	4,700	2,100	6,300	3,600	--	--	4,800	2,100	5,800	3,000	2,000	670
31	2,600	640	2,300	170			140	*			4,100	1,300			6,300	3,700	--	--			6,900	3,200		

Table 21. Daily maximum and minimum chloride concentrations, Delaware River at Chester, Pa. (in milligrams per liter) December 1, 1992 to November 30, 1993. Collection and analysis by Scott Paper Company[1]

[--, missing data; *, less than 30 milligrams per liter; Max, maximum value; Min, minimum value]

	December		January		February		March		April		May		June		July		August		September		October		November	
Date	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	48	*	40	*	35	30	64	58	30	*	*	*	33	*	57	44	162	92	217	170	48	40	60	31
2	*	*	34	*	37	34	62	43	*	*	*	*	58	31	65	40	296	125	247	180	50	42	46	33
3	*	*	36	*	39	34	65	52	*	*	*	*	44	*	79	47	390	122	--	--	58	40	62	38
4	51	*	31	*	35	30	66	54	30	*	*	*	32	*	72	46	285	126	620	182	45	36	55	37
5	43	*	34	*	37	32	56	52	31	*	30	*	34	*	70	45	290	115	490	110	47	42	38	32
6	32	*	30	*	37	33	57	48	33	31	*	*	44	30	73	49	320	85	520	185	50	42	37	33
7	32	*	34	*	35	30	54	42	32	*	*	*	35	30	70	48	290	120	180	110	45	40	36	32
8	30	*	31	*	44	35	62	47	*	*	*	*	35	30	67	48	250	150	362	135	52	43	64	32
9	*	*	32	*	39	34	56	38	*	*	*	*	36	32	78	64	340	92	310	126	55	45	65	32
10	36	*	30	*	42	36	58	42	30	*	*	*	37	33	70	62	230	125	210	98	52	45	64	32
11	*	*	62	*	55	32	54	42	*	*	*	*	36	30	85	54	274	140	213	92	67	42	74	37
12	30	*	46	*	58	32	62	38	36	*	*	*	36	34	82	58	270	120	278	98	82	48	58	32
13	*	*	46	*	71	52	45	34	*	*	30	*	37	35	88	57	390	168	240	92	83	40	65	34
14	35	*	44	*	57	48	52	40	*	*	*	*	38	33	110	62	360	160	150	84	50	42	55	33
15	38	*	42	*	47	40	52	40	*	*	*	*	37	33	85	55	370	95	156	88	49	40	37	33
16	43	*	32	*	47	36	58	45	*	*	*	*	38	36	95	70	280	110	140	94	78	42	40	34
17	45	*	34	*	62	52	62	40	*	*	*	*	38	36	85	60	300	85	350	110	72	43	55	34
18	35	*	40	*	62	54	58	52	*	*	*	*	41	36	155	56	210	82	180	88	48	42	58	32
19	38	*	40	*	55	48	60	52	*	*	30	*	40	36	110	65	204	94	140	96	49	32	58	32
20	35	*	40	31	58	47	59	52	*	*	*	*	45	36	110	60	172	85	160	90	73	40	62	32
21	34	*	35	*	58	48	58	54	*	*	31	*	42	36	98	65	140	70	195	107	74	45	37	*
22	38	*	40	*	63	54	56	52	*	*	30	*	45	36	90	72	183	75	150	88	67	40	38	30
23	39	*	36	*	60	39	52	36	*	*	*	*	42	35	92	66	160	90	180	110	65	38	44	33
24	36	30	34	30	60	52	52	38	*	*	30	*	52	38	150	60	165	88	185	100	42	30	32	*
25	35	30	38	33	62	48	45	36	*	*	32	*	46	38	135	63	150	80	186	86	69	35	35	*
26	40	*	38	32	60	52	37	34	*	*	*	*	48	38	140	72	145	96	140	83	65	36	32	*
27	45	*	40	*	59	50	36	33	*	*	34	30	43	36	155	76	172	88	88	48	47	38	32	*
28	46	32	34	*	60	52	47	*	*	*	32	*	53	36	105	72	--	--	56	46	46	38	55	32
29	34	*	38	30			52	36	*	*	37	32	55	40	175	90	--	--	50	38	71	41	52	*
30	42	32	34	*			38	32	*	*	36	30	55	46	186	100	--	--	55	40	64	42	56	*
31	35	30	34	*			32	*			40	32			150	93	--	--			46	35		

[1] The use of trade, product, or firm names in this table is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

Table 22. Dissolved oxygen, Delaware River at Benjamin Franklin Bridge at Philadelphia, Pa.
Daily mean dissolved oxygen in milligrams per liter
December 1, 1992 to November 30, 1993.
[Monitor was not in operation December 1, 1992, to February 28, 1993]

Date	December	January	February	March	April	May	June	July	August	September	October	November
1				12.3	10.7	9.2	7.2	3.7	3.9	4.0	5.1	7.0
2				12.3	10.6	9.1	7.1	3.7	3.9	4.1	5.1	7.4
3				12.3	10.4	9.2	6.9	3.3	3.8	4.4	5.1	7.5
4				12.4	10.9	8.9	7.1	3.2	3.7	4.3	5.2	7.7
5				12.4	11.1	8.5	6.9	3.4	3.7	4.3	5.4	7.7
6				12.5	11.2	8.0	6.6	3.8	3.7	4.5	5.4	7.8
7				12.4	11.1	--	6.3	3.7	3.6	4.4	5.3	8.2
8				12.3	10.9	--	6.1	3.7	3.4	4.1	5.3	8.4
9				12.1	10.6	--	5.8	3.6	--	3.9	5.1	8.6
10				--	10.2	7.6	5.5	3.7	3.7	3.8	5.3	8.8
11				--	9.9	7.4	5.3	3.7	3.8	3.9	5.7	8.7
12				--	9.7	7.4	5.4	3.6	3.7	4.3	5.9	8.9
13				--	9.8	7.3	5.5	--	3.7	4.6	5.8	9.1
14				--	9.9	7.2	5.5	3.4	--	4.7	6.0	8.7
15				10.4	10.1	7.0	5.6	--	3.8	4.8	6.0	8.7
16				10.9	10.0	6.9	5.7	2.9	3.8	4.8	6.0	8.9
17				10.9	9.7	6.9	5.7	2.9	3.6	4.5	5.9	8.8
18				10.6	9.5	6.7	5.6	3.5	--	4.1	5.8	8.8
19				--	9.2	6.4	5.3	3.8	3.6	3.8	5.9	8.7
20				--	9.4	6.0	5.0	--	3.4	4.1	5.8	8.9
21				--	9.3	5.7	4.5	3.1	--	--	5.8	9.4
22				--	9.1	5.8	3.9	3.2	3.0	--	5.9	9.3
23				--	9.1	6.1	3.8	3.5	3.1	4.0	6.3	9.3
24				--	9.0	6.3	3.7	3.9	3.3	3.8	6.4	9.1
25				--	9.3	6.7	3.7	4.1	3.5	4.4	6.6	9.3
26				11.2	9.5	7.0	4.0	4.2	3.3	4.6	6.6	9.4
27				10.8	9.8	7.4	4.0	3.9	3.5	4.5	6.6	9.4
28				10.7	9.6	7.7	4.0	--	3.5	4.5	6.6	9.2
29				10.5	9.2	7.8	4.0	3.8	3.7	4.9	6.8	9.8
30				10.2	9.2	8.1	3.8	3.9	3.9	5.0	6.7	9.8
31				10.3		7.8		--	4.1		6.8	

Table 23. Dissolved oxygen, Delaware River at Chester, Pa.
Daily mean dissolved oxygen in milligrams per liter
December 1, 1992 to November 30, 1993.
[Monitor was not in operation December 1, 1992, to March 25, 1993; --, missing data]

Date	December	January	February	March	April	May	June	July	August	September	October	November
1					12.0	10.8	8.0	3.9	7.2	5.2	6.8	8.5
2					11.9	10.9	7.9	3.6	7.3	5.1	6.9	8.7
3					12.5	11.0	8.0	4.1	7.2	5.1	6.4	8.6
4					12.5	11.1	7.9	4.2	7.2	4.9	7.1	8.7
5					12.3	10.4	7.5	4.1	7.1	5.0	7.1	8.3
6					12.3	10.4	7.7	3.7	6.5	5.0	6.9	8.2
7					12.3	9.7	7.5	3.5	6.6	4.9	7.4	8.5
8					12.1	8.8	7.1	3.6	7.1	5.0	7.3	8.5
9					11.8	8.7	6.9	3.3	7.1	4.8	7.1	8.3
10					9.7	8.6	6.9	3.3	7.2	5.0	7.0	8.0
11					10.5	8.5	6.8	3.3	6.8	4.6	7.5	7.7
12					10.6	8.3	6.9	3.2	6.7	4.8	7.1	7.9
13					10.8	8.2	7.2	3.2	6.8	5.3	7.5	8.0
14					10.9	8.1	7.4	3.2	7.0	5.3	7.3	7.6
15					11.5	8.2	7.5	3.3	6.3	5.4	7.3	7.6
16					10.7	8.2	7.8	3.3	6.1	--	7.3	7.9
17					10.1	8.2	7.6	3.5	6.0	--	7.0	7.7
18					12.0	7.7	7.5	3.5	6.0	--	7.2	7.8
19					12.3	7.5	7.5	3.4	6.3	--	7.1	7.9
20					12.3	7.0	7.2	3.7	6.4	--	6.7	8.1
21					11.7	7.0	6.6	3.7	6.6	--	7.0	8.8
22					10.3	7.4	6.5	3.7	6.7	--	7.6	8.9
23					--	7.8	6.6	3.7	6.8	--	8.1	8.9
24					--	8.2	6.4	3.7	7.0	--	8.2	8.7
25					--	8.6	5.0	3.7	7.2	--	8.3	9.0
26				13.4	--	8.8	4.0	3.5	6.9	--	8.7	9.3
27				13.5	--	9.0	4.1	3.7	6.4	--	9.2	9.5
28				15.5	--	8.6	4.0	3.8	6.4	--	10.4	9.4
29				14.7	--	8.4	4.0	3.7	6.5	--	8.9	9.5
30				13.7	10.4	8.1	3.9	4.8	6.0	--	7.7	9.6
31				13.1		7.5		7.3	5.8		8.0	

Section IV

APPENDIXES

— PAGE 85 FOLLOWS —

DOCKET NO. D-77-20 CP (REVISION NO. 2)

DELAWARE RIVER BASIN COMMISSION

Modifications To The Schedule Of Release Rates From Pepacton and Neversink Reservoirs
Delaware and Sullivan Counties, New York

PROCEEDINGS

This is an application submitted by the New York State Department of Environmental Conservation (NYS DEC) for approval of a revised schedule of augmented conservation release rates from Pepacton and Neversink Reservoirs to be tried on an experimental basis for up to three years (June 1993 - May 1996).

The current schedule of augmented conservation release rates from Cannonsville, Pepacton and Neversink Reservoirs was added to the Comprehensive Plan and approved by the Delaware River Basin Commission (DRBC) pursuant to Section 3.8 of the Compact on November 30, 1983 by Docket No. D-77-20 CP (Revision). The current release rates were established on an experimental basis first, and later made permanent by the DRBC and parties to the 1983 Good Faith Agreement. "Proceedings" leading to such actions are described in Docket No. D-77-20 CP (Revised). This application (including the Proposed Augmented Conservation Release rates) was reviewed for inclusion of the project in the Comprehensive Plan and approval under Section 3.8 of the Delaware River Basin Compact. A public hearing on this project was held by the DRBC on June 23, 1993.

RESERVOIR RELEASE PROGRAMS

A. Proposed Conservation Releases.

In order to further protect and enhance the recreational use of waters affected by releases from the Pepacton and Neversink Reservoirs, and based on the experience gained since the augmented reservoir release regulations were implemented, the following revisions to the current release rates are proposed for an experimental period of three years (June 1993 - May 1996):

TABLE 1

Reservoir and Operative Dates	Column 1 Basic Conservation Release	Column 2 Current Augmented Conservation Release	Column 3 Proposed Augmented Conservation Release
Pepacton			
1/1 - 3/31	6 cfs	50 cfs	45 cfs
4/1 - 4/7	6	70	45
4/8 - 4/30	19	70	45
5/1 - 5/31	19	70	70
6/1 - 8/31	19	70	95
9/1 - 9/30	19	70	70
10/1 - 10/31	19	70	45
11/1 - 12/31	6	50	45
Neversink			
1/1 - 3/31	5 cfs	25 cfs	25 cfs
4/1 - 4/7	5	45	25
4/8 - 4/30	15	45	25
5/1 - 9/30	15	45	53
10/1 - 10/31	15	45	25
11/1 - 12/31	15	25	25
Cannonsville			
4/1 - 4/15	8 cfs	45 cfs	Same as
4/16 - 6/14	23	45	Column 2.
6/15 - 8/15	23	325	Outlet Works Facility currently has release valve limitations.
8/16 - 10/31	23	45	
11/1 - 11/30	23	33	
12/1 - 3/31	8	33	

B. Basic Montague Release.

At all times, New York City would be required to make such releases as directed by the River Master designed to maintain a minimum basic flow of 1,750 cfs at the Montague gaging station, or the excess release rate during the seasonal period, as already required by the 1954 U.S. Supreme Court Decree.

C. Special Thermal Stress Releases.

Special releases may be made from one or more of the reservoirs in order to relieve thermal stress conditions which pose a threat to fisheries. The total volume of such releases shall not exceed 6,000 cfs-days from all reservoirs. As set forth in Docket No. D-77-20 CP (REVISION), thermal releases, with a one-day lead time, would be made whenever the maximum water temperature in designated downstream areas as determined from measurements at Callicoon, Bridgeville, Woodbourne, or Hale Eddy is projected to exceed a maximum of 75° F, or a 72° F daily average. If the 6,000 cfs-days reserve is not used by October 31 of any year, it will not be used thereafter. No releases for relieving thermal stress would be required from November 1 to April 30 of any year. Releases for purposes of relieving thermal stress shall be at the direction of NYS DEC.

D. Drought Warning and Drought Conditions.

The augmented conservation release will be reduced to the basic conservation release (shown in Table 1, Column 1) during drought warning and drought periods as defined by the attached reservoir storage curves entitled "Operation Curves for Cannonsville, Pepacton, and Neversink Reservoirs" (Figure 1) except that when the Delaware River Master directs releases according to the provisions in the basinwide drought plan as adopted in DRBC Resolution 83-13, New York City shall make such releases from Cannonsville, Pepacton, and Neversink Reservoirs as are necessary and sufficient to maintain the constant minimum flows (specified in Table 1, Column 3) on the West Branch Delaware River, East Branch Delaware River, and the Neversink River, and provided that the total amount of water released from the three reservoirs does not exceed the amount directed by the Delaware River Master., If the amount of directed releases by the River Master is not sufficient to maintain the augmented releases from all reservoirs, the releases from each reservoir will be determined at the discretion of NYS DEC and New York City-Department of Environment Protection (NYC DEP).

Following a drought, a return to the proposed augmented conservation release rates shown in Column 3 of Table 1 shall not be made unless and until combined storage in the three reservoirs reaches 25 billion gallons above the drought warning level, as shown in Figure 1, and remains at or above that level for 15 consecutive days.

E. Plans Concerning Cannonsville Release Rates.

Installation of a new release valve for the Cannonsville reservoir is scheduled to be completed before the end of 1994 and should provide the needed flexibility in making releases to enhance fisheries management.

During the first year of the experimental period, conservation releases from Cannonsville reservoir, which are considered inadequate by NYS DEC, would continue to be made at the current release rates. However, as part of this experimental program, releases from the thermal stress bank will be varied for short periods to study the impact of such releases in mitigating thermal stress conditions at Hale Eddy, Hancock, Lordville, Hankins, Long Eddy and Callicoon. Such operations are designed to conserve the available thermal stress bank and enable NYS DEC to improve fisheries management in the Delaware River.

Ryan thermal gages would be installed at 20 strategic locations below the reservoirs to supplement the existing USGS gaging stations. Data collected would be used to fine tune the water temperature models being developed by NYS DEC in cooperation with NYC DEP and USGS. Experience gained from the above experimental program should lead to improved management of the thermal stress bank.

During the first year of the experimental period, alternative release schemes would be evaluated jointly by NYS DEC and NYC DEP using the existing monthly reservoir simulation model (MRSM) to maximize the use of the new valve. The resulting scheme would be the basis for implementation of an experimental program at Cannonsville.

FINDINGS

During the proposed experimental period, increases in augmented conservation release rates during the summer months will be offset with decreases during other months with no changes in the total releases on a yearly basis.

DRBC staff has operated the daily flow model for the critical drought years, 1961 through 1964, using the modified augmented release schedule as proposed (Table 1, Column 3) and determined that the period of drought warning would be increased by one day in 1961 and one day in 1962, with no changes in 1963 and 1964. Accordingly, application of the Proposed Augmented Conservation Release rates specified in the experimental program should not have a significant impact on drought management in the Basin.

As documented in Docket No. D-77-20 CP (REVISION), the NYS DEC evaluations, to date concerning the monitoring program, indicate that the augmented conservation release program has improved and extended fisheries downstream from the three New York City reservoirs, and other water-related recreational activities have shown increases since the initiation of the experimental program in 1977.

The project does not conflict with or adversely affect the Comprehensive Plan. It provides beneficial use of the water resources and does not adversely influence the present or future use and development of the water resources of the Basin.

DECISION

I. The project, as described above, with modifications specified hereinafter, is hereby added to the Comprehensive Plan.

II. The project is approved pursuant to Section 3.8 of the Compact, subject to the following conditions:

a. Monthly summaries of reservoir operations submitted by NYC DEP to NYS DEC shall also be submitted to the DRBC.

b. Detailed operational records of each reservoir, maintained by both the City and State Reservoir Release Managers, shall be available to the DRBC upon request.

c. The provisions of the reservoir release program approved herein shall not be applicable to any action taken by NYC DEP or NYS DEC with regard to the operation of the Cannonsville, Pepacton, or Neversink Reservoirs in any emergency situation where there is a threat to the continued existence or safe operation of the dams or tunnels or to any appurtenant structures or to the public health or safety. Any emergency action shall continue only for such time as is necessary to avert the threat and is subject to the approval of the Executive Director of the DRBC.

d. Increases in the augmented conservation release levels may not be made except in accordance with the allowances provided for in the Stipulation of Discontinuance in The City of New York vs. The State of New York Department of Environmental Conservation, Index No. 5840-80, and shall be subject to approval by the DRBC.

e. Releases under emergency conditions. The Commission retains its power under Section 3.3(a) and Article 10 of the Compact to declare a drought emergency after consultation with the River Master, in order to conserve the waters in the Delaware River and its tributaries and in the reservoirs of the Upper Delaware River Basin, in order to protect water supply, health, and safety of the residents of the Delaware River Basin and its service area. The River Master retains all of his powers under the Decree including the powers under Article VII, B.1 of the 1954 Decree to conserve the waters in the river, its tributaries, and in reservoirs owned by the City of New York, or in reservoirs developed by other parties to the Decree after 1954.

f. A progress report describing the results of the experimental program shall be submitted by August 1 of each year, beginning August, 1994.

BY THE COMMISSION

DATED: June 23, 1993

Consent to Action by

Delaware River Basin Commission

Consent of the parties to the U.S. Supreme Court Decree in New Jersey vs. New York, 347 U.S. 995 (1954) to the action of the Delaware River Basin Commission in adopting Docket No. D-77-20 CP (Revision No. 2) amending the Comprehensive Plan with respect to experimental modifications to the schedule of release rates from Pepacton and Neversink Reservoirs.

State of New Jersey

State of New York

State of Delaware

Commonwealth of Pennsylvania

City of New York

AGREEMENT

The parties to the U. S. Supreme Court decree convened at 1:00 P.M. on September 22, 1993, at the Goodstay Center, Wilmington, Delaware pursuant to the Delaware River Basin Commission Resolution No. 83-13, to consider modification of current diversions to New York City and New Jersey, releases from the New York City reservoirs, and target flows at the Montague and Trenton gauging stations.

The modifications agreed to were:

1. Establishment of an emergency fisheries protection program designed to allow special stream releases by the NYSDEC within the term specified with this Agreement as requested as specified in Section (d). The emergency program includes the following provisions:

    a. There will be no net loss of the reservoirs' storage capacity.

    b. The maximum use of 3,000 cfs-days will be paid back by DEC to the City through reductions in releases required for Montague.

    c. The credits from releases required for Montague targets may occur at the following rates when the Trenton flow objective is at or above 2,700 cfs.

When Montague design target equals or exceeds	Allowed credit reduction in directed releases
1600 cfs	100 cfs
1500 cfs	50 cfs

    d. The term of this program begins September 22, 1993 and usage continues until extended or upon entry into drought emergency as determined by Resolution No. 83-13, when it will be automatically terminated. Reductions to Montague directed releases will continue until total storage is paid back or until reservoirs spill.

    e. The releases under this program shall not exceed the augmented releases as established in Resolution No. 77-20 (Revision 2), except, for one interim step not to exceed 24 hours when directed releases have ceased and streamflows are being reduced below augmented conservation levels or to limit temperatures to 75° F, maximum, at Hancock, East Branch and Bridgeville.

f. The operation of this emergency program will be directed by NYSDEC upon a continuing showing to the Parties of this Agreement 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 releases each day when it is computed and NYSDEC will report each request for an augmented release.

g. In accordance with the 1980 stipulation of discontinuance between New York City and NYSDEC, NYSDEC agrees to reimburse New York City for all lost hydroelectric power revenues, if any, caused by this emergency reservoir releases program.

h. The parties to this agreement will reconvene by meeting or telephone call to reconsider these arrangements when a significant change in conditions so dictates.

i. These modifications will take effect immediately and will continue until modified by unanimous agreement of the Parties or terminated by any one of these Parties.

9/22/93
State of Delaware Date

9/22/93
State of New Jersey Date

9-22-93
State of New York Date

9/22/93
Commonwealth of Pennsylvania Date

9/22/93
City of New York Date

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