REPORT OF THE RIVER MASTER OF THE DELAWARE RIVER

FOR THE PERIOD DECEMBER 1,1993-NOVEMBER 30, 1994

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

With a section on WATER QUALITY

By Charles R. Wood

U. S. GEOLOGICAL SURVEY
Open File Report 97-371

Reston, Virginia

1997

U.S. DEPARTMENT OF THE INTERIOR
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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 feet per second-day
billion gallons (Bgal)	3.785	cubic hectometer
cubic foot per second-day ($ft^3/s \cdot d$)	0.002447	cubic hectometer
Flow rate		
million gallons per day (Mgal/d)	1.547	cubic feet per second
million gallons per day (Mgal/d)	0.04381	cubic meter per second
billion gallons per day (Bgal/d)	43.81	cubic meter per second
cubic foot per second (ft^3/s)	0.02832	cubic meter per second

Sea level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD 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

/

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

June 16, 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 forty-first annual report of the River Master of the Delaware River for the year December 1, 1993, to November 30, 1994.

Monthly precipitation in the upper Delaware River basin during the 1994 River Master report year ranged from 34 percent of the long-term average during October to 189 percent during August. Total precipitation during the year was 5.69 inches above average. Precipitation during the December to May period, when reservoirs typically refill, was 113 percent of the 53-year average.

On December 1, 1993, when this report year began, combined storage in the New York City reservoirs in the upper Delaware River Basin was 125.867 billion gallons (Bgal), 46.5 percent of the combined storage capacity. Median storage on December 1, based on 26 years of data, is 169.270 Bgal. Operations on December 1, 1993 were being conducted at reduced levels designed to address the water-supply shortages caused by the drought-warning conditions in the basin as prescribed by the "Interstate Water Management Recommendations of the Parties to the Decree" (DRBC Resolution 83-13). The recovery from the drought-warning conditions in the basin that had begun in November, 1993, continued during December, and storage in the New York City reservoirs increased sufficiently by December 5 to allow a return to normal operation as prescribed in the Decree on December 6, 1993. Storage increased steadily during December, remained relatively constant during January and February, 1994, and increased steadily during March until mid-April, when all the reservoirs were spilling.

On November 30, 1994, the end of this report year, the combined storage in the New York City reservoirs was 185.167 Bgal, 68.4 percent of capacity, and the operations in the basin continued to be conducted as prescribed in the Decree.

During the report year, the 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 Acting Delaware River Master met periodically with those representatives as a member of the Flow Management Technical Advisory Committee. Discussions centered primarily 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, Acting Delaware River Master, continued in charge of the office, assisted by Bruce E. Krejmas and Beverly A. Roberts. Mrs. Roberts retired in May, 1994 after more than 20 years of dedicated service. 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, New Jersey 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. The City of New York diverted a total of 257.040 Bgal from the basin during the report year ending November 30, 1994 and released 57.796 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 30.924 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	Daniel J. Campbell
New York City	Albert F. Appleton Marilyn Gelber
Pennsylvania	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 "Interstate Water Management Recommendation of the Parties to the Decree", (DRBC Resolution No. 83-13).

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. Also, appreciation is extended to the Pennsylvania Power & Light Company and the Orange and Rockland Utilities, Inc. for their cooperation in keeping us informed of their plans for power generation and resulting releases as requested by this office.

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

— PAGE 7 FOLLOWS —

SECTION II

REPORT OF DELAWARE RIVER OPERATIONS

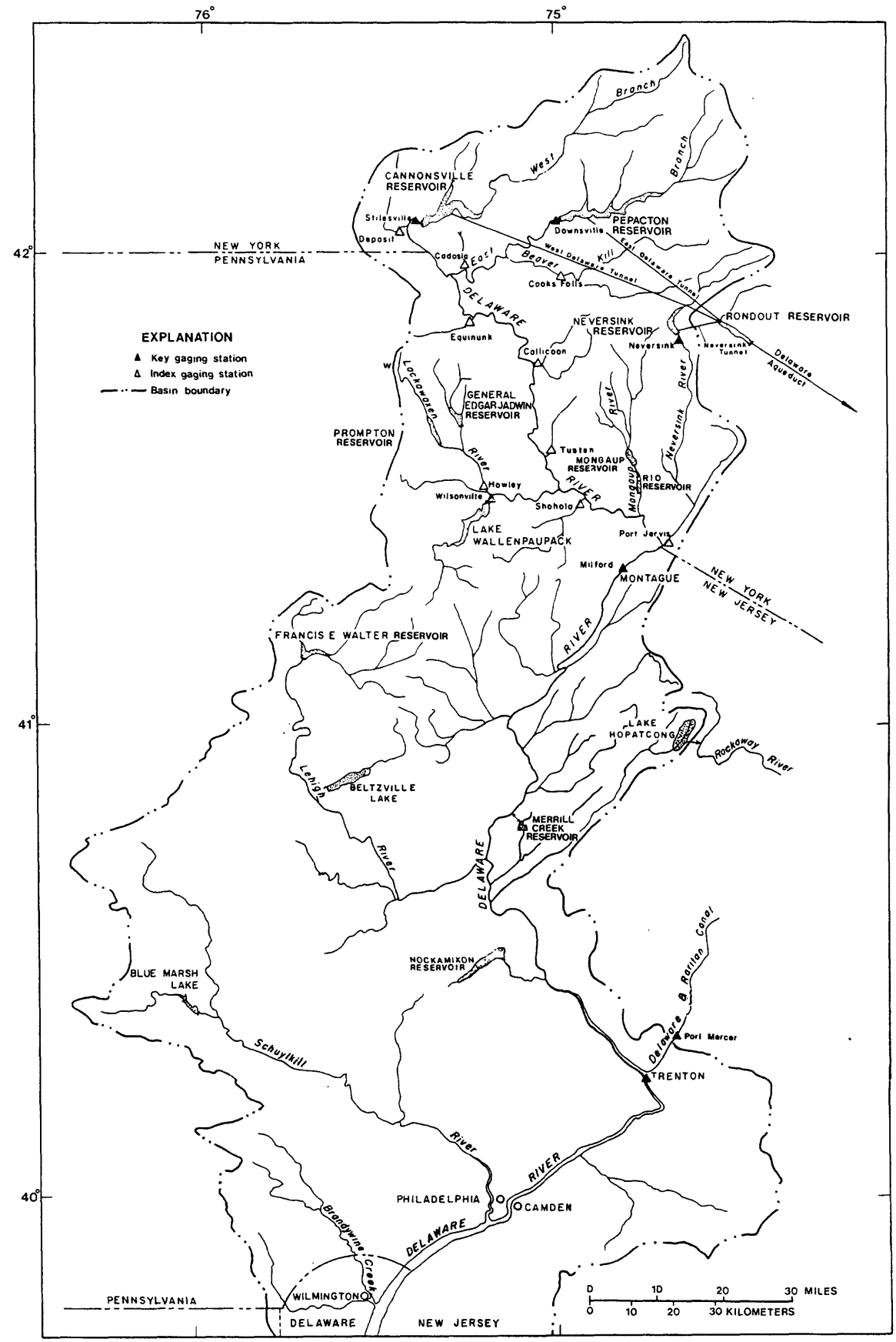

Figure 1.- Delaware River Basin upstream from Wilmington, Delaware

Section II

REPORT OF DELAWARE RIVER OPERATIONS

by Bruce E. Krejmas and William E. Harkness

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 1994 report year, December 1, 1993, to November 30, 1994, the monthly precipitation and runoff ranged from above to below long-term monthly averages in the Delaware River Basin. For the report year, precipitation was 5.69 inches above average. The Delaware River Basin was in a drought warning at the beginning of the report year, and operations were being conducted at reduced levels designed to conserve water. Reservoir storage continued the recovery that was under way at the end of the last report year and operations were returned to normal on December 6, 1993. Combined storage continued to increase until mid-April, when all the New York City reservoirs filled to capacity and spilled. Operations were conducted as prescribed by the Decree from December 6, 1993 through November 30, 1994.

Diversions from the Delaware River Basin by New York City and New Jersey did not exceed those authorized by the terms of the Decree, or the reduced limits imposed because of the drought warning. Releases were made as directed by the River Master at rates designed to meet the Montague flow objective on 66 days during the year. On days when releases were not directed, releases were made at the experimental augmented conservation rates, at rates designed to relieve thermal stress and protect the fishery in the streams downstream from the reservoirs, or during the drought-warning period at the basic conservation rates. The excess-release quantity, as defined by the Decree, was expended on November 4, 1994, and the Montague design rate was reduced to 1,750 cubic feet per second (ft^3/s) as prescribed in the Decree.

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 warning, 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, 1993 to November 30, 1994.

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.

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

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

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.

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.

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.

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

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.

Storage or contents. - Usable volume of water in a reservoir. Unless otherwise indicated, volume is computed on the basis of level pool and above the point of maximum depletion.

Time of day. - Time of day is expressed in 24-hour eastern standard time, which included a 23-hour day April 2 and a 25-hour day October 29.

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.

Precipitation

Precipitation measured in the basin above Montague totaled 48.75 inches for the 1994 report year and was 5.69 inches above the long-term average (table 1)[1]. Monthly precipitation ranged from 34 percent of the long-term (53-year) average in October, 1994 to 189 percent of the average in August, 1994. 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-water reservoirs and ground-water aquifers fill. During this period in 1993-94, average precipitation at the 10 stations was 22.73 inches, which was 113 percent of the long-term average. During June to November, average precipitation at the 10 stations was 26.02 inches, which was 114 percent of the long-term average. The maximum monthly precipitation measured at any of the 10 stations was 9.07 inches in August at Milford, Pennsylvania; the minimum monthly precipitation was 0.51 inches in October at Downsville, New York.

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1. All numbered tables in Section II are grouped at the end of this section, beginning on page 30.

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

Hydrologic conditions in the Delaware River Basin had entered drought warning on September 21, 1993 and remained in drought warning at the beginning of the report year. Operations on December 1, 1993 were being conducted as prescribed by the "Interstate Water Management Recommendations of the Parties to the Decree" (DRBC Resolution 83-13). The Montague flow objective was 1,655 ft^3/s and the allowable diversions to New York City and New Jersey were 680 Mgal/d and 85 Mgal/d, respectively. Conservation releases from New York City reservoirs were being made at the basic levels shown in table 2. Conditions returned to normal in early December and the allowable diversions to New York City and New Jersey were returned to 800 and 100 Mgal/d, respectively, on December 6, 1993. The Montague flow objective was increased to 1,750 ft^3/s effective December 9, 1993. On December 22, 1993, the conservation releases from New York City reservoirs were increased to the experimental augmented-release rates shown in table 2.

During the first half of the report year, total precipitation was 2.55 inches above average and monthly precipitation ranged from 163 percent of the long-term average in March to 77 percent in February (table 1). Runoff in the upper basin was above normal during December, March, and April, and was in the normal range during January, February, and May.

On December 1, 1993, Pepacton Reservoir contained 70.714 Bgal of water in storage above the point of maximum depletion, or 50.4 percent of the reservoir's storage capacity of 140.190 Bgal. Cannonsville Reservoir contained 44.745 Bgal, or 46.8 percent of the reservoir's storage capacity of 95.706 Bgal and Neversink Reservoir contained 10.408 Bgal, or 29.8 percent of the reservoir's storage capacity of 34.941 Bgal. The combined storage in the three reservoirs as of December 1 was 125.867 Bgal, or 46.5 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.

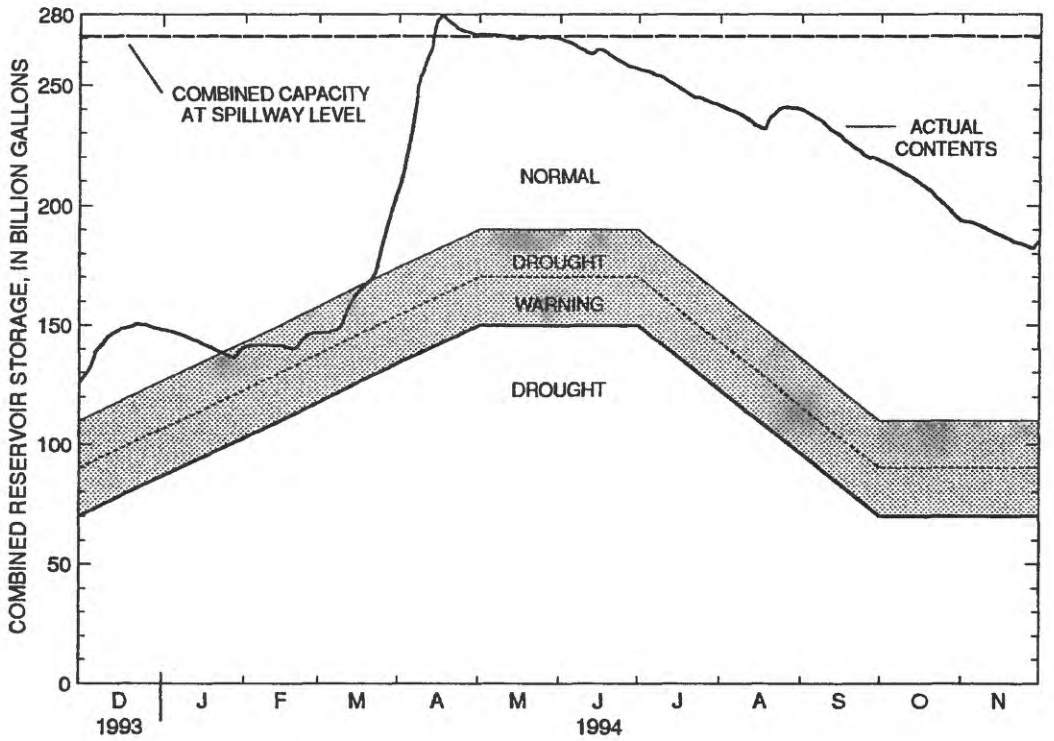

Figure 2.-Operating curves for New York City reservoirs in the Delaware River basin compared with the actual contents of the reservoirs, December 1, 1993 to November 30, 1994 (Sources: Operating curves from Interstate Water Management Recommendations of the Parties to the U.S. Supreme Court Decree of 1954, reservoir contents from New York City Bureau of Water Supply data.)

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 53-year period, December 1940 to May 1993, was 300.1 Bgal. During the corresponding six months of the current report year, inflow to the three reservoirs totaled 363.5 Bgal. Evaporation loss was not included in the computation.

Combined storage increased steadily during December 1993, held relatively steady during January and February, 1994, and increased steadily again during March and April until April 17, 1994, when all three reservoirs were spilling. Storage declined slowly from mid-April through May.

Total storage in the three New York City reservoirs was 123.472 Bgal on November 30, 1993 and 270.091 Bgal on May 31, 1994, an increase of 146.6 Bgal, 54.1 percent of capacity. The maximum storage was 280.013 Bgal on April 17 (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 143.331 Bgal on April 17, 1994, the maximum storage in Cannonsville Reservoir was 101.210 Bgal on April 15, 1994, and the maximum storage in Neversink

Reservoir was 35.568 Bgal on April 17, 1994. During the December to May period, diversions to Rondout Reservoir by New York City totaled 115.790 Bgal (636 Mgal/d). Neither the forecast discharge at Montague, exclusive of water released from the City reservoirs, nor the observed discharge at Montague fell below the design rate, therefore no releases were directed. New York City made releases for conservation purposes at the basic or experimental conservation rates shown in table 2 on all days during the period.

June through November

During the June through November period, monthly precipitation was much below average in October and was above average in all the other months. Total precipitation during the period was 26.02 inches, or 3.14 inches more than the 53-year average of 22.88 inches (table 1).

The New York City Department of Environmental Protection, Bureau of Water Supply, furnished the River Master with the following advance data for the 1994 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 1994 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 1994 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, 1994, 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 66 days between June 1 and November 30, 1994, 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 the experimental 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 3,323 $(ft^3/s)\cdot d$ (2.148 Bgal) was released for the relief of thermal stress from June 6 through August 28.

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.

On June 15, 1994 the seasonal period for the release of the excess quantity began and the Montague design rate was increased to 1,850 ft^3/s. The release of the excess quantity, 11,418 $(ft^3/s)\cdot d$, was completed on November 1, 1994. Consequently, the Montague design rate was reduced to 1,750 ft^3/s effective November 5, 1994. Between June 15, when release of the

excess-quantity began, and November 30, 1994, the forecasted flow at Montague, exclusive of releases from the New York City reservoirs was below the design rate on 56 days and releases were directed.

On 18 days between June 15 and November 4, the observed flow fell below the design rate. Of those 18 days, 13 days were within 10 percent of the design rate and 5 days 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 141.250 Bgal.

Summary of Operations

From December 1, 1993, to November 30, 1994, diversions to Rondout Reservoir totaled 257.040 Bgal, and all releases from the New York City reservoirs to the Delaware River totaled 57.796 Bgal.

During the year, maximum storage in Pepacton Reservoir was 143.331 Bgal, on April 17, 1994. Maximum storage in Cannonsville Reservoir was 101.210 Bgal, on April 15. Maximum storage in Neversink Reservoir was 35.568 Bgal, on April 17. The maximum combined storage in the three reservoirs during the year was 280.013 Bgal, on April 17, when all three reservoirs were spilling.

Minimum combined storage in the reservoirs during the year was 125.867 Bgal on December 1, 1993. The minimum storage in each of the three reservoirs occurred on December 1, 1993. The minimum storage in Pepacton Reservoir was 70.714 Bgal (50.4 percent of capacity), the minimum storage in Cannonsville Reservoir was 44.745 Bgal (46.8 percent of capacity), and the minimum storage in Neversink Reservoir was 10.408 Bgal (29.8 percent of capacity).

On November 30, 1994, combined storage in the three reservoirs was 185.167 Bgal, or 68.4 percent of their combined capacity. During the year, combined storage increased 61.695 Bgal, or 22.8 percent of capacity. The combined storage of the three reservoirs on the first day of the month from June 1967 to November 1994 is shown in figure 4. Storage was below the median from December to April; near the median in May, June, and July; and above the median from August to November. Storage was below the 25th percentile in December, February, March, and April.

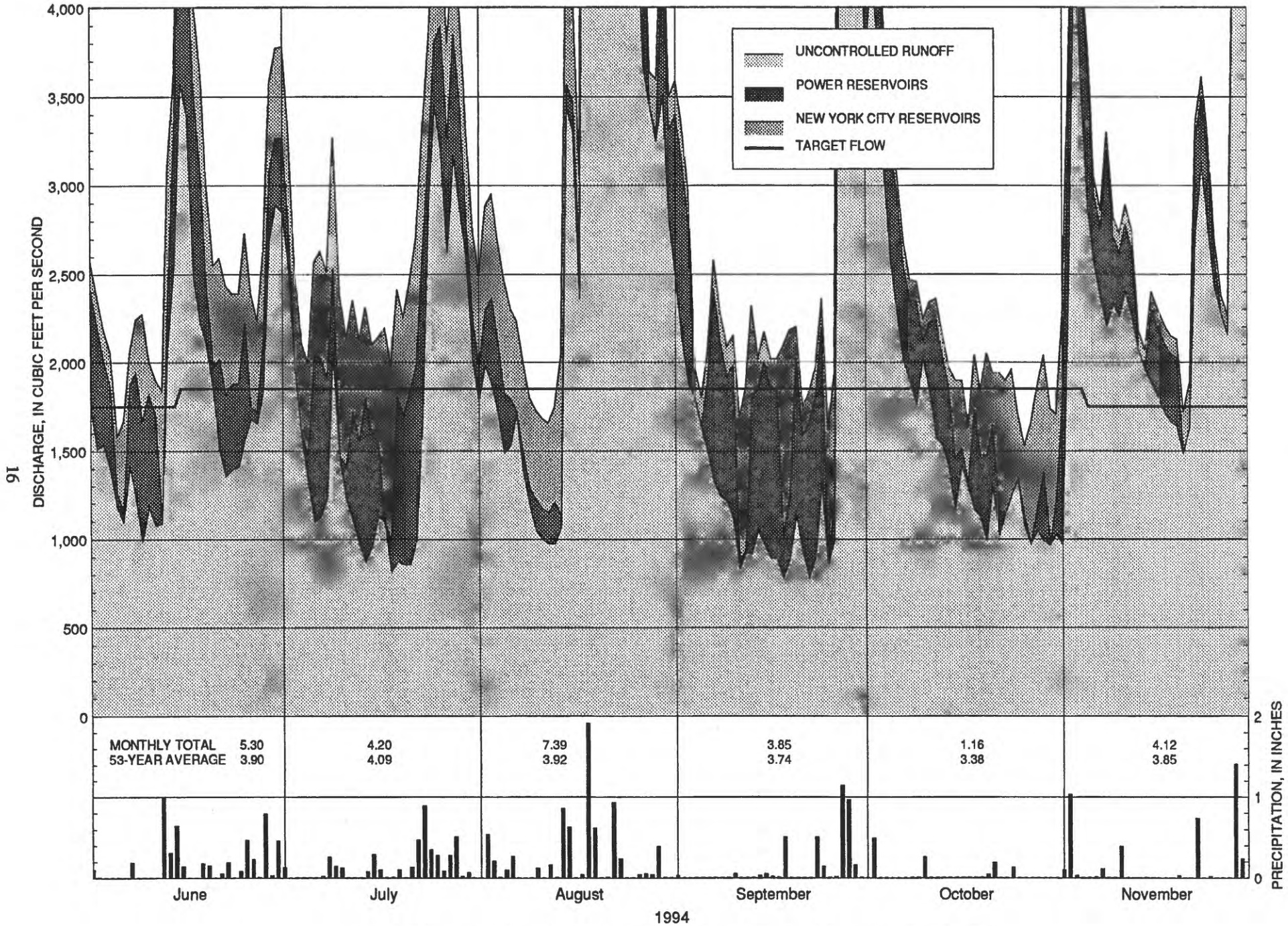

Figure 3.-Components of flow, Delaware River at Montague, N.J., June 1 to November 30, 1994.

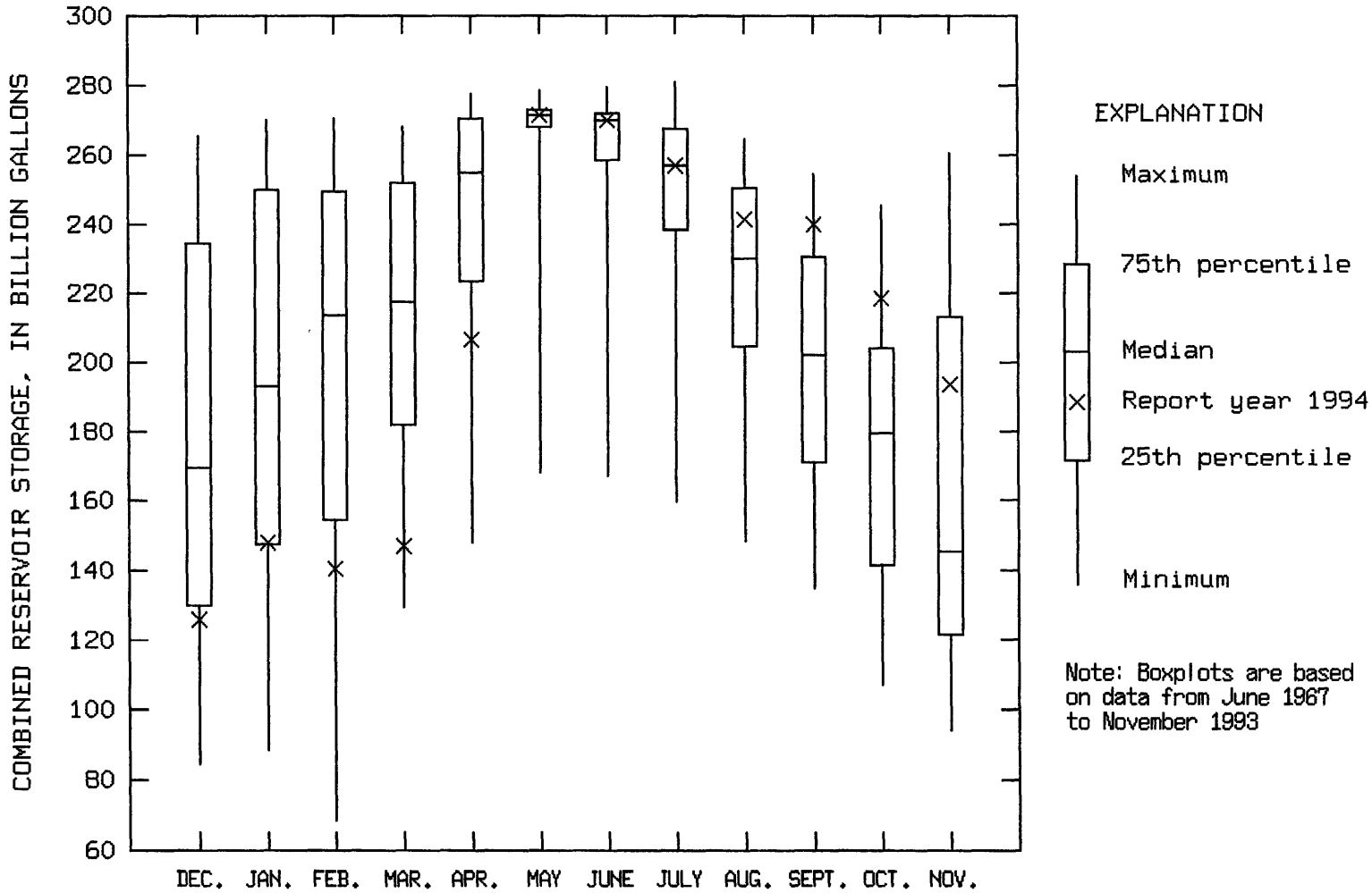

Figure 4.- Combined storage in Pepacton, Cannonsville, and Neversink Reservoirs on the first day of the month, December 1993 to November 1994 (this report year), compared to values for the period of record, June 1967 to November 1993.

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 8) and the segregation of the daily average flow at Montague among its various source components (table 9).

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 the 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 1994 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 to be 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 9. 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 8.

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 from the advance estimates that were used in the design computations.

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 8.

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 (square miles)
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 8 under the heading of "Weather Adjustment." Throughout the low-flow periods, the National Weather Service Office, Mt. Holly, N.J., furnished 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 (table 8), was the sum of the forecasted releases from the power reservoirs, the estimated uncontrolled runoff under then current conditions, and the weather adjustment. 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 8.

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 66 days from June 5 to November 21, 1994. The tabulation below compares the advance estimates of the various contributions to the flow at Montague to the observed operations during the periods, August 11-16, September 11-26, and October 15 to November 3, 1994, when releases were being directed daily.

	Advance estimates [$(ft^3/s)\cdot d$]	Observed operations [$(ft^3/s)\cdot d$]
Directed releases from New York City reservoirs	[a] 20,105	[b] 20,106
Power releases		
Lake Wallenpaupack	8,631	9,637
Rio Reservoir	4,291	6,444
Runoff from uncontrolled area	41,245	52,883

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

During these periods, New York City released slightly more water than was directed, the power companies released 11.7 percent more water from Lake Wallenpaupack and 50.2 percent

more water from Rio Reservoir than was forecast, and the observed runoff from the uncontrolled area was 28.2 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 26,291 $(ft^3/s)\cdot d$. Directed releases totaled 30,933 $(ft^3/s)\cdot d$, or 17.7 percent more than for exact forecasting.

A comparison of the hydrographs of the 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. Adjustments were made periodically 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 indicates 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 is 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 10. 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)
Sept. 21 to Dec. 5, 1993	680	642
Dec. 6, 1993 to May 31, 1994	800	636
June 1 to Nov. 30, 1994	800	772

During the year, a total of 257.040 Bgal of water was diverted to the New York City water supply system. The allowable diversion during the year was 294.125 Bgal.

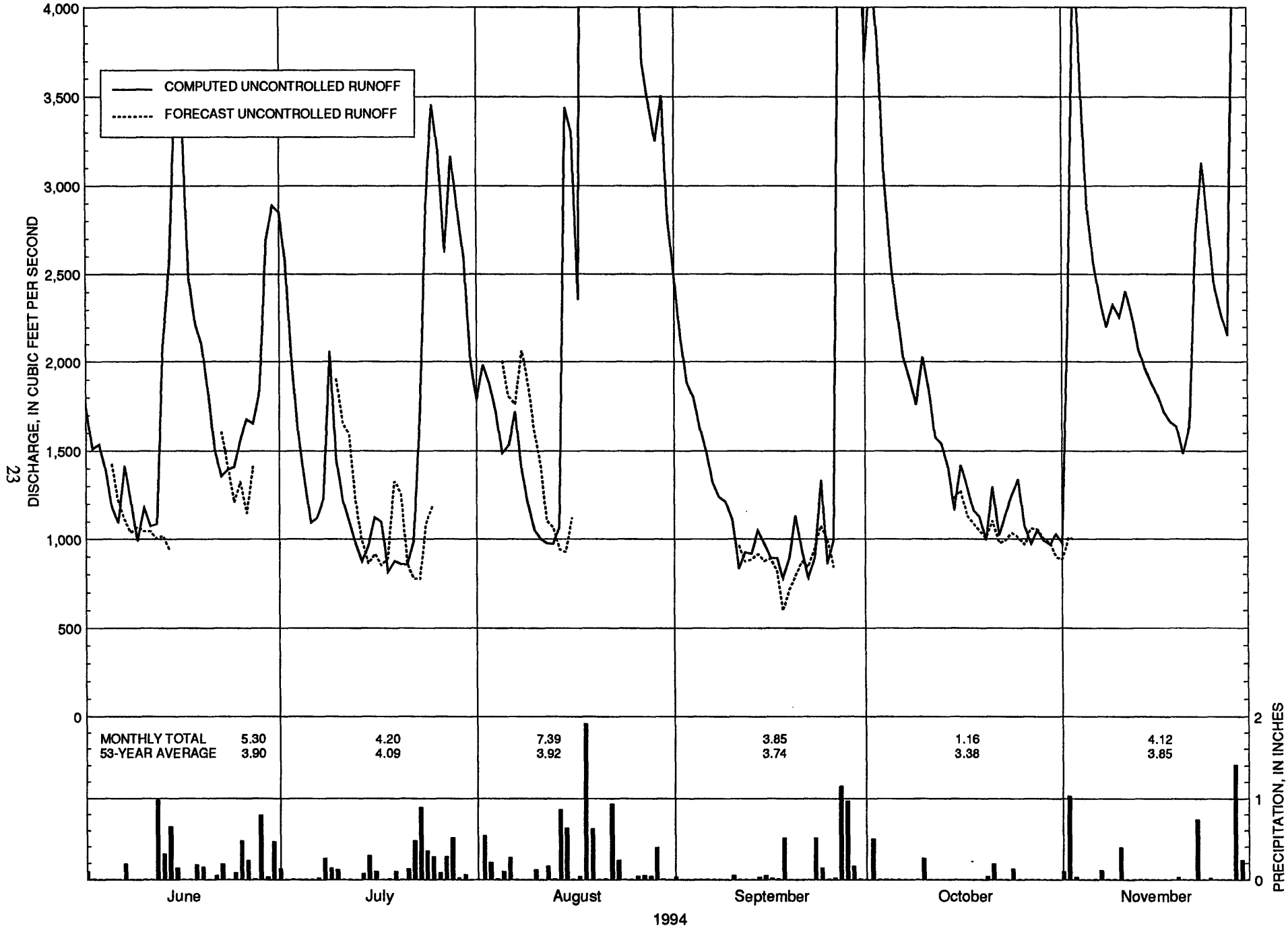

Figure 5.-Uncontrolled runoff component, Delaware River at Montague, N.J., June 1 to November 30, 1994.

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 to be 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, 1993, combined storage in the three reservoirs was 125.867 Bgal, which was the minimum combined storage for the report year. As discussed earlier, storage generally increased during December, held steady during January and February, then increased again during March and April until reaching the maximum for the report year on April 17, when all three reservoirs were spilling (fig. 2).

The seasonal decline in storage began in early June and continued to decline, but at a slower than normal rate, for the rest of the report year. The combined storage was 185.167 Bgal on November 30, 1994.

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 11) includes releases from Pepacton Reservoir and also includes a small amount of seepage and any runoff that 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 compares 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 11) for the target rate of flow shown.

Target rate of flow (ft^3/s)	6	45	70	95
USGS flow (ft^3/s)	7.40	43.0	62.9	84.8
NYC flow (ft^3/s)	6.19	46.2	68.8	92.4
Percent difference NYC flow is from USGS flow	-16.4	+7.4	+9.4%	+9.0%

The target flows are either basic or experimental conservation release rates as shown in table 2. There are two distinctly different comparisons at the 45 ft^3/s rate of flow. For the period December 23, 1993 to April 13, 1994, the difference is +2.6%, whereas for the period, October 2 to November 30, 1994, the difference is +18.3%. The differences are similar to the differences observed in previous years. The calibration of the instruments attached to the venturi meters was adjusted periodically by New York City to insure the accuracy of the readings.

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 12) 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 at Stilesville, N.Y. (table 12) for the target rate of flow shown.

Target rate of flow (ft^3/s)	8	33	45	a/ 330-370	b/ 500-800
USGS flow (ft^3/s)	14.4	36.8	48.0	333	670
NYC flow (ft^3/s)	7.74	32.6	44.2	366	730
Percent difference NYC flow is from USGS flow	-46.2	-11.4	-7.9	+9.9%	+9.0%

a/ Release at summer, June 15 to August 15, conservation rate (table 2).
b/ Highest releases of summer made in response to direction.

The gaging-station records are considered good at flows above 100 ft^3/s and fair below. The gaging-station records include the runoff from precipitation on the area between the dam and the gaging station and include 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, which agrees with estimates made in previous years. If the gaging-station record is adjusted for seepage, the agreement at 8 ft^3/s, 33 ft^3/s, and 45 ft^3/s from the above table becomes -36.6, -5.2 and -3.1 percent, respectively. We are continuing to monitor the differences in cooperation with New York City and the USGS field office at Troy, N.Y. In an effort to investigate the differences further, four discharge measurements were made just below the Cannonsville release outlet during the report year. Measurements at this location eliminate the runoff contribution from the intervening area between the outlet and the gaging station. The measurements were adjusted for the seepage of 2.4 ft^3/s as discussed above. A comparison of the four measurements to the New York City release records showed differences of 0% and +1.9% at the 33 ft^3/s rate, +1.9% at the 45 ft^3/s rate, and +4.5% at the summer, June 15 to August 15, conservation rate (table 2).

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 13) includes releases from Neversink Reservoir and, during storms, a small amount of runoff that 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 compares the releases from Neversink Reservoir reported by New York City to the final records for the USGS gaging station on the Neversink River at Neversink, N.Y. (table 13) for the target rate of flow shown.

Target rate of flow (ft^3/s)	5	25	53	100-110
USGS flow (ft^3/s)	6.18	24.4	50.5	99.7
NYC flow (ft^3/s)	4.80	26.4	53.5	109
Percent difference NYC flow is from USGS flow	-22.3	+8.2	+5.9	+9.3%

The target flows are either basic or experimental conservation release rates except for the highest releases of 100 to 110 ft^3/s, which represented the maximum thermal release rates during the report year.

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. These discharges (table 14) 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.

From December 1993 through November 1994, 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 the 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 9) indicated 0.08 percent more discharge for the year than did the published U.S. Geological Survey record for the gaging station at that site (table 15), 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 on-site 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 on-site 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 March 12 to July 25, 1994 and from August 23 to September 1, 1994, because of high water levels in Rondout Reservoir. The averaged results of two current-meter measurements made during the report year showed that the venturi-meter instruments gave higher discharges by 2.7 percent for the totalizer and 2.1 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 1992 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 83 days during the 1994 report year, the unmeasured leakage was approximately 660 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. Three current-meter measurements of flow in the West Delaware Tunnel outlet channel were made during the report year. Those measurements and two additional 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, 8.0 percent for the totalizer and 7.6 percent for 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. Three 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 5.4 percent higher for the totalizer and 5.6 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 1994 report year, the power plant did not operate for part of the day most of the time and was not operated the equivalent of 244 days. Based on the above rate and on records of power plant operation, approximately 2.2 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 gag-

ing 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 16).

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. 1-5, 1993	85	72.6*
Dec. 6, 1993 to Nov. 30, 1994	100	92.3

* Average diversion for period shown

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 monthly diversion was 92.3 Mgal/d during July, 1994. The maximum daily diversion was 103 Mgal on January 17, 1994. These computations show that the diversions by New Jersey did not exceed the limits allowed by the Decree or the reduced limits in effect during the drought-warning period.

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

Operations were conducted as prescribed in 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 December 1-5, 1993, and as prescribed in the Decree from December 6, 1993, to November 30, 1994.

Diversions from the Delaware River Basin to the New York City water-supply system, during the report year, were less than those authorized by the "Interstate Water Management Recommendations of the Parties to the Decree (DRBC Resolution 83-13) and 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 and, during the drought-warning period, by DRBC Resolution 83-13.

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

Month	December 1940 to November 1993 Monthly Average	December 1993 to November 1994			
		Amount	Percentage of average	Excess (+) or deficit (-) Month	Cumulative
December	3.38	3.36	99	-0.02	-0.02
January	2.85	4.49	158	+1.64	+1.62
February	2.70	2.09	77	-.61	+1.01
March	3.27	5.33	163	+2.06	+3.07
April	3.76	4.18	111	+.42	+3.49
May	4.22	3.28	78	-.94	+2.55
June	3.90	5.30	136	+1.40	+3.95
July	4.09	4.20	103	+.11	+4.06
August	3.92	7.39	189	+3.47	+7.53
September	3.74	3.85	103	+.11	+7.64
October	3.38	1.16	34	-2.22	+5.42
November	3.85	4.12	107	+.27	+5.69
12 months	43.06	48.75	113	+5.69	

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	January 1 to March 31	8	33	33
	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 1-31	8	33	33

Table 3. Storage in Pepacton Reservoir, N.Y. for year ending November 30, 1994
(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	70,714	77,722	76,184	80,302	105,320	140,264	140,190	136,672	125,367	121,453	111,252	101,258
2	71,172	77,708	76,382	80,302	106,772	140,320	139,987	136,399	125,019	121,197	111,089	101,133
3	71,519	77,588	76,501	80,302	108,040	140,227	139,693	136,163	124,673	120,838	110,811	100,978
4	71,905	77,467	76,622	80,302	110,517	140,153	139,528	135,892	124,308	120,480	110,485	100,838
5	72,432	77,347	76,850	80,424	113,008	140,098	139,271	135,493	123,979	120,140	110,257	100,636
6	73,172	77,226	76,957	80,740	115,359	140,024	139,179	135,221	123,531	119,716	109,867	100,342
7	74,583	77,091	76,984	81,047	118,664	139,895	138,848	134,841	123,084	119,461	109,608	100,032
8	75,122	77,011	76,984	81,292	122,981	139,987	138,609	134,462	122,653	119,172	109,364	99,753
9	75,533	76,863	76,984	81,650	125,540	140,006	138,314	134,012	122,258	118,765	109,040	99,459
10	75,798	76,676	76,957	82,051	127,372	139,822	138,149	133,671	121,831	118,344	108,781	99,243
11	76,315	76,488	76,863	82,969	129,873	139,785	137,875	133,240	121,385	117,939	108,363	98,860
12	76,609	76,329	76,863	84,032	131,915	139,693	138,040	132,773	121,026	117,534	108,266	98,568
13	76,743	76,157	77,171	85,059	133,887	139,546	137,985	132,344	120,565	117,132	107,879	98,321
14	76,917	76,024	77,347	86,023	138,958	139,491	138,406	131,915	120,327	116,846	107,605	98,045
15	77,051	75,824	77,226	86,694	142,005	139,509	139,252	131,452	120,242	116,378	107,220	97,771
16	77,266	75,533	77,212	87,352	142,696	139,472	139,491	131,149	119,902	116,060	106,932	97,495
17	77,467	75,387	77,078	87,898	143,331	139,509	139,601	130,688	119,631	115,709	106,548	97,084
18	77,481	75,308	76,984	88,287	142,696	139,914	139,583	130,263	119,699	115,359	106,372	96,825
19	77,601	75,057	76,863	88,662	142,304	140,171	139,528	129,890	120,701	114,928	106,036	96,582
20	77,722	74,820	77,131	89,228	142,005	140,320	139,252	129,377	121,077	114,512	105,733	96,264
21	77,842	74,623	77,695	89,694	141,783	140,412	139,032	129,060	121,163	114,130	105,352	95,841
22	78,153	74,465	78,329	90,379	141,338	140,394	138,793	128,708	121,780	113,667	104,907	95,690
23	78,289	74,281	78,951	91,085	141,116	139,987	138,682	128,479	122,138	113,305	104,653	95,373
24	78,289	74,111	79,537	92,293	140,987	140,209	138,609	128,110	122,292	112,991	104,224	95,025
25	78,329	73,875	80,015	93,976	140,876	140,190	138,277	127,882	122,395	112,596	103,830	94,755
26	78,329	73,745	80,178	95,947	140,746	140,061	138,131	127,442	122,447	112,217	103,594	94,546
27	78,208	73,510	80,302	97,603	140,727	140,153	137,857	127,146	122,292	111,889	103,168	94,186
28	78,085	73,393	80,288	99,351	140,394	140,153	137,510	126,831	122,121	111,889	102,775	94,021
29	77,964	74,334		101,164	140,320	140,171	137,236	126,412	122,087	111,776	102,367	94,665
30	77,883	75,294		102,179	140,209	140,190	136,981	126,202	121,882	111,562	102,008	95,297
31	77,842	75,824		103,940		140,283		125,714	121,677		101,633	
Change	+7,877	-2,018	+4,464	+23,652	+36,269	+74	-3,302	-11,267	-4,037	-10,115	-9,929	-6,336
Equiv. Mgal/d	+254.1	-65.1	+159.4	+763.0	+1,209.0	+2.4	-110.1	-363.5	-130.2	-337.2	-320.3	-211.2
Equiv. ft^3/s	+393	-101	+247	+1,180	+1,870	+3.7	-170	-562	-201	-522	-495	-327

Change for year +25,332 Mgal — Equiv. for year +69.4 Mgal/d — Equiv. for year +107 ft^3/s

Table 4. Storage in Cannonsville Reservoir, N.Y for year ending November 30, 1994
(Storage in millions of gallons above elevation 1,040.00 ft. Add 2,584 million gallons for total contents above sill outlet tunnel, elevation 1,020.50 ft.) Storage at spillway level is 95,706 million gallons.
(River Master daily operations record; gage reading at 0800)

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	44,745	55,530	47,803	48,170	78,470	96,430	95,630	89,499	88,450	92,603	83,200	70,258
2	45,934	55,359	47,970	48,225	80,253	96,511	95,600	89,271	88,572	92,436	83,056	70,271
3	46,913	55,091	47,992	48,336	82,290	96,446	95,584	89,378	88,404	92,101	82,680	70,523
4	47,970	54,824	47,903	48,381	85,528	96,575	95,326	89,651	88,450	91,933	82,492	70,510
5	49,154	54,614	47,925	48,381	88,237	96,655	95,143	89,773	88,511	91,766	82,305	70,483
6	50,998	54,311	47,958	48,336	90,868	96,687	94,869	89,849	88,769	91,523	82,016	70,404
7	52,106	54,031	47,803	48,336	94,459	96,784	94,641	89,773	88,861	91,309	81,741	70,245
8	52,677	53,751	47,825	48,325	98,426	96,800	94,155	89,727	88,845	91,157	81,365	70,165
9	53,342	53,424	47,703	48,826	99,858	96,720	94,139	90,016	88,739	90,823	81,047	69,993
10	53,891	53,167	47,536	49,270	99,906	96,800	93,911	90,032	88,693	90,305	80,861	69,887
11	54,696	52,782	47,358	50,811	100,180	96,575	93,470	89,925	88,602	89,591	80,626	69,609
12	55,567	52,479	47,124	52,339	100,180	96,350	93,090	89,804	88,222	89,256	80,308	69,530
13	55,982	52,152	46,913	53,471	100,083	96,189	92,816	89,727	87,956	89,043	80,060	69,371
14	56,532	51,849	46,702	54,381	101,146	96,140	93,212	89,667	87,089	88,845	79,521	69,199
15	56,910	51,523	46,490	55,188	101,210	96,076	93,516	89,575	86,944	88,587	79,217	69,080
16	57,301	51,126	46,168	56,092	100,695	96,028	93,409	89,393	86,828	88,252	78,844	69,080
17	57,618	50,752	45,968	56,886	101,114	95,947	93,136	89,210	86,626	87,580	78,401	68,947
18	57,679	50,461	45,734	57,435	100,373	95,996	92,740	89,104	86,684	87,103	77,973	68,788
19	57,716	50,064	45,378	58,021	99,842	95,980	92,360	88,997	88,724	86,857	77,393	68,603
20	57,679	49,714	45,123	58,449	99,408	95,980	91,857	88,815	89,925	86,583	77,075	68,324
21	57,704	49,340	45,123	58,839	98,941	95,819	91,370	88,556	90,594	86,294	76,398	68,245
22	57,740	48,959	45,746	59,254	98,555	95,851	91,066	88,343	91,172	86,034	75,735	68,219
23	57,826	48,626	46,468	60,170	97,975	95,676	90,701	88,419	91,766	85,774	75,141	68,099
24	57,606	48,259	47,002	62,110	97,798	95,493	90,366	88,556	91,964	85,065	74,727	68,099
25	57,484	47,903	47,536	64,695	97,540	95,478	90,138	88,708	92,207	84,603	74,326	67,953
26	57,240	47,625	47,814	67,344	97,379	96,092	89,773	88,511	92,314	84,371	73,609	67,794
27	56,983	47,213	48,058	69,516	97,186	96,092	89,438	88,602	92,420	84,169	73,040	67,702
28	56,703	46,891	48,125	71,318	97,058	96,076	89,636	88,495	92,375	84,024	72,391	67,781
29	56,409	46,724		73,424	96,655	95,867	89,621	88,541	92,451	83,764	71,689	68,258
30	56,104	47,158		75,362	96,559	95,835	89,591	88,602	92,573	83,461	71,146	68,682
31	55,848	47,636		77,006		95,722		88,617	92,573		70,682	
Change	+12,560	-8,212	+489.0	+28,881	+19,553	-837.0	-6,131	-974.0	+3,956	-9,112	-12,779	-2,000
Equiv. Mgal/d	+405.2	-264.9	+17.5	+931.6	+651.8	-27.0	-204.4	-31.4	+127.6	-303.7	-412.2	-66.7
Equiv. ft^3/s	+627	-410	+27.0	+1,441	+1,008	-41.8	-316	-48.6	+197	-470	-638	-103

Change for year +25,394 Mgal — Equiv.for year +69.6 Mgal/d — Equiv. for year +108 ft^3/s

Table 5. Storage in Neversink Reservoir, N.Y. for year ending November 30, 1994
(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	10,408	14,930	16,722	18,338	22,913	34,837	33,974	30,804	27,490	25,800	24,088	22,179
2	10,493	15,028	16,837	18,341	23,246	34,946	33,872	30,735	27,387	25,737	24,108	22,163
3	10,549	15,136	16,877	18,395	23,549	34,927	33,717	30,689	27,262	25,674	24,092	22,132
4	10,595	15,229	16,819	18,433	24,055	34,858	33,625	30,575	27,129	25,591	24,072	22,089
5	10,824	15,296	16,904	18,215	24,621	34,764	33,504	30,474	26,996	25,508	24,039	21,985
6	11,408	15,361	16,897	18,285	25,254	34,665	33,365	30,296	26,846	25,420	23,979	21,938
7	11,765	15,425	16,975	18,360	26,265	34,582	33,273	30,186	26,714	25,366	23,926	21,865
8	12,048	15,512	17,069	18,374	27,597	34,533	33,168	30,068	26,587	25,287	23,882	21,749
9	12,295	15,577	17,141	18,388	28,241	34,478	33,029	29,928	26,469	25,189	23,821	21,692
10	12,511	15,625	17,227	18,462	28,725	34,458	32,914	29,760	26,316	25,081	23,765	21,634
11	12,821	15,532	17,292	18,867	29,869	34,423	32,762	29,593	26,219	25,018	23,717	21,558
12	13,081	15,460	17,370	19,025	30,652	34,409	32,652	29,450	26,076	24,908	23,649	21,492
13	13,277	15,551	17,449	19,140	31,322	34,365	32,615	29,311	25,946	24,813	23,589	21,389
14	13,337	15,632	17,525	19,439	33,091	34,276	32,496	29,177	25,845	24,711	23,529	21,325
15	13,301	15,697	17,615	19,464	34,091	34,257	32,468	29,035	25,787	24,625	23,441	21,264
16	13,403	15,587	17,691	19,510	35,016	34,224	32,396	28,892	25,658	24,527	23,405	21,169
17	13,544	15,609	17,726	19,514	35,568	34,267	32,217	28,756	25,533	24,445	23,298	21,120
18	13,671	15,684	17,761	19,537	35,359	34,350	32,085	28,614	25,529	24,340	23,250	21,033
19	13,837	15,736	17,791	19,551	35,299	34,443	31,887	28,438	25,792	24,267	23,199	20,968
20	13,951	15,603	17,840	19,646	35,254	34,523	31,719	28,294	25,804	24,173	23,111	20,871
21	14,101	15,506	17,965	19,778	35,080	34,591	31,551	28,167	25,762	24,043	23,048	20,780
22	14,464	15,541	18,193	19,810	35,016	34,631	31,471	28,018	25,792	23,963	22,973	20,784
23	14,461	15,577	18,384	19,950	34,873	34,720	31,359	28,084	25,967	23,878	22,909	20,762
24	14,399	15,635	18,377	20,205	34,798	34,621	31,215	28,114	26,030	23,830	22,835	20,716
25	14,458	15,674	18,451	20,488	34,744	34,538	31,122	28,045	26,030	23,761	22,733	20,660
26	14,583	15,667	18,444	20,859	34,793	34,497	31,030	27,962	26,072	23,685	22,658	20,563
27	14,655	15,706	18,469	21,135	34,833	34,438	30,900	27,905	26,047	23,617	22,591	20,513
28	14,583	15,853	18,395	21,535	34,837	34.404	30,804	27,792	25,976	24,011	22,572	20,528
29	14,665	16,209		21,988	34,873	34,276	30,786	27,792	25,976	24,116	22,431	21,003
30	14,765	16,481		22,380	34,853	34,184	30,818	27,701	25,904	24,136	22,330	21,188
31	14,863	16,735		22,642		34,086		27,610	25,871		22,267	
Change	+4,644	+1,872	+1,660	+4,247	+12,211	-767.0	-3,268	-3,208	-1,739	-1,735	-1,869	-1,079
Equiv. Mgal/d	+149.8	+60.4	+59.3	+137.0	+407.0	-24.7	-108.9	-103.5	-56.1	-57.8	-60.3	-36.0
Equv. ft^3/s	+232	+93.4	+91.7	+212	+630	-38.3	-169	-160	-86.8	-89.5	-93.3	-55.6

Change for year +10,969 Mgal | Equiv. for year +30.1 Mgal/d | Equiv. for year +46.5 ft^3/s

Table 6. Consumption of Water by New York City - 1950 to 1994
Data furnished by New York City, Department of Environmental Protection, Bureau of Water Supply
[Mgal/d, Million gallons per day; Bgal, billion gallons]

Year	Average daily consumption			Annual consumption (Bgal)
	City proper (Mgal/d)	Outside communities (Mgal/d)	Total (Mgal/d)	
1950	953.3	29.1	982.4	358.576
51	1,041.9	28.1	1,070.0	390.550
52	1,087.0	32.7	1,119.7	409.810
53	1,093.9	44.6	1,138.5	415.552
54	1,063.4	46.3	1,109.7	405.040
1955	1,109.9	45.3	1,155.2	421.648
56	1,111.3	48.9	1,160.2	424.633
57	1,169.0	57.2	1,226.2	447.563
58	1,152.9	49.6	1,202.5	438.912
59	1,204.3	60.3	1,264.6	461.579
1960	1,199.4	58.9	1,258.3	460.529
61	1,221.0	64.0	1,285.0	469.022
62	1,207.6	68.8	1,276.4	465.896
63	1,218.0	76.7	1,294.7	472.582
64	1,189.2	79.4	1,268.6	464.295
1965	1,052.1	71.2	1,123.3	409.995
66	1,044.9	73.2	1,118.1	408.128
67	1,135.3	71.0	1,206.3	440.302
68	1,242.0	78.2	1,320.2	483.175
69	1,328.7	80.1	1,408.8	514.229
1970	1,400.3	90.4	1,490.7	544.116
71	1,423.6	87.9	1,511.5	551.695
72	1,412.4	83.0	1,495.4	547.340
73	1,448.9	95.4	1,544.3	563.681
74	1,441.8	96.3	1,538.1	561.409
1975	1,415.0	92.1	1,507.1	550.093
76	1,435.0	95.8	1,530.8	560.264
77	1,483.0	104.7	1,587.7	579.510
78	1,479.4	103.0	1,582.4	577.566
79	1,513.0	104.6	1,617.6	590.426
1980	1,506.3	110.1	1,616.3	591.582
81	1,309.5	100.0	1,409.5	514.475
82	1,383.0	104.8	1,487.8	543.060
83	1,424.2	112.6	1,536.8	561.010
84	1,465.2	113.9	1,579.1	577.963
1985	1,325.4	106.5	1,431.9	522.656
86	1,351.1	115.2	1,466.3	535.200
87	1,447.1	119.8	1,566.9	571.885
88	1,484.3	125.6	1,609.9	589.090
89	1,402.0	113.4	1,515.4	553.158
1990	1,424.4	122.4	1,546.8	564.577
91	1,469.9	123.6	1,593.5	581.628
92	1,368.7	113.9	1,482.6	542.632
93	1,368.9	118.8	1,487.7	543.011
94	1,357.8	119.2	1,477.0	537.105

Table 7. Design rates for the Delaware River at Montague, N.J. gaging station December 1, 1993 to November 30, 1994
[ft^3/s, cubic feet per second]

Effective dates	Montague Design Rate (ft^3/s)
December 1-8, 1993	1,655
December 9, 1993 to June 14, 1994	1,750
June 15 to November 4	1,850
November 5-30	1,750

Table 8. 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]

Date of advance estimate	Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases: Powerplant release forecasts: Lake Wallenpaupack ft^3/s	Powerplant release forecasts: Rio Reservoir ft^3/s	Uncontrolled runoff: Current conditions ft^3/s	Uncontrolled runoff: 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	Computation of the balancing adjustment: Adjusted directed release: Daily ft^3/s	Adjusted directed release: Cumulative $(ft^3/s)·d$	Actual deficiency: Daily ft^3/s	Actual deficiency: Cumulative $(ft^3/s)·d$	Cumulative difference $(ft^3/s)·d$	Balancing adjustment ft^3/s
1993/94	1	2	3	4		5	6	7	8	9	10	11	12	13	14
						MONTAGUE DESIGN RATE = 1,655 ft^3/s DECEMBER 1, 1993 TO DECEMBER 8, 1993 1,750 ft^3/s DECEMBER 9, 1993 TO JUNE 14, 1994										
						The estimated Montague discharge was greater than the Montague design rate Dec. 1, 1993 to June 4, 1994									
June 2	0	0	1,426	0	June 5	1,426	324		324						
3	0	0	1,220	0	6	1,220	530		530						
4	469	0	1,112	0	7	1,581	169		169						
5	469	0	1,038	0	8	1,507	243		243						
6	0	81	1,011	60	9	1,152	598		598						
7	469	81	1,045	0	10	1,595	155		155						
8	469	57	1,017	29	11	1,572	178		178						
9	0	0	942	60	12	1,002	748		748						
10	0	0	846	174	13	1,020	730		730						
11	469	0	747	184	14	1,400	350		350						
						MONTAGUE DESIGN RATE = 1,850 ft^3/s JUNE 15, 1994 TO NOVEMBER 4, 1994										
						The estimated Montague discharge was greater than the Montague design rate June 15 - 21, 1994									
19	469	177	1,551	58	22	2,255	0	0	0	0	0	30	30	-30	+3
20	469	0	1,324	92	23	1,885	0	0	0	0	0	0	30	-30	+3
21	469	0	1,129	81	24	1,679	171	0	171	171	171	0	30	141	-14
22	469	0	1,268	56	25	1,793	57	0	57	57	228	0	30	198	-20
23	0	57	1,050	98	26	1,205	645	+3	648	645	873	105	135	738	-74
24	0	106	991	442	27	1,519	331	+3	334	334	1,207	129	264	943	-94
25	236	142	1,179	300	28	1,857	0	-14	0	0	1,207	0	264	943	-94
26	236	142	1,284	622	29	2,284	0	-20	0	0	1,207	0	264	943	-94
27	236	142	1,117	709	30	2,204	0	-74	0	0	1,207	0	264	943	-94

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 June 15 to Nov. 4.

Table 8. 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							Indicated deficiency	Balancing adjustment	Directed release	Computation of the balancing adjustment					
	Powerplant release forecasts		Uncontrolled runoff							Adjusted directed release		Actual deficiency		Cumulative difference	Balancing adjustment
Date of advance estimate	Lake Wallenpaupack	Rio Reservoir	Current conditions	Weather adjustment	Date	Discharge				Daily	Cumulative	Daily	Cumulative		
	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
1994	1	2	3	4		5	6	7	8	9	10	11	12	13	14
June 28	236	142	2,055	495	July 1	2,928	0	-94	0	0	1,207	0	264	943	-94
29	236	142	1,804	431	2	2,613	0	-94	0	0	1,207	0	264	943	-94
30	0	0	2,287	0	3	2,287	0	-94	0	0	1,207	0	264	943	-94
July 1	0	0	2,526	0	4	2,562	0	-94	0	0	1,207	251	515	692	-69
2	0	142	2,014	0	5	2,156	0	-94	0	0	1,207	373	888	319	-32
3	466	284	1,618	0	6	2,368	0	-94	0	0	1,207	0	888	319	-32
4	466	284	1,342	15	7	2,107	0	-94	0	0	1,207	0	888	319	-32
5	466	284	1,154	77	8	1,981	0	-69	0	0	1,207	0	888	319	-32
6	466	89	1,076	233	9	1,864	0	-32	0	0	1,207	0	888	319	-32
7	0	284	961	942	10	2,187	0	-32	0	0	1,207	386	1,274	-67	+7
8	0	284	1,516	150	11	1,950	0	-32	0	0	1,207	436	1,710	-503	+50
9	466	284	1,279	314	12	2,343	0	-32	0	0	1,207	130	1,840	-633	+63
10	466	284	1,222	0	13	1,972	0	-32	0	0	1,207	292	2,132	-925	+92
11	466	284	987	0	14	1,737	113	+7	120	120	1,327	51	2,183	-856	+86
12	466	284	837	24	15	1,611	239	+50	289	289	1,616	266	2,449	-833	+83
13	466	70	786	131	16	1,453	397	+63	460	460	2,076	279	2,728	-652	+65
14	0	0	771	80	17	851	999	+92	1,091	1,091	3,167	751	3,479	-312	+31
15	0	95	894	0	18	989	861	+86	947	947	4,114	863	4,342	-228	+23
16	466	212	1,305	23	19	2,006	0	+83	0	0	4,114	47	4,389	-275	+28
17	466	212	869	393	20	1,940	0	+65	0	0	4,114	153	4,542	-428	+43
18	466	212	796	66	21	1,540	310	+31	341	341	4,455	20	4,562	-107	+11
19	466	212	778	0	22	1,456	394	+23	417	417	4,872	0	4,562	310	-31
20	466	280	708	66	23	1,520	330	+28	358	358	5,230	0	4,562	668	-67
21	0	300	706	386	24	1,392	458	+43	501	501	5,731	0	4,562	1,169	-100
22	0	90	846	345	25	1,281	569	+11	580	580	6,311	0	4,562	1,749	-100

The estimated Montague discharge was greater than the Montague design rate July 26, 1994 to August 4, 1994

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 June 15 to Nov. 4.

Table 8. 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							Indicated deficiency	Balancing adjustment	Directed release	Computation of the balancing adjustment					
	Powerplant release forecasts		Uncontrolled runoff							Adjusted directed release		Actual deficiency		Cumulative difference	Balancing adjustment
Date of advance estimate	Lake Wallenpaupack	Rio Reservoir	Current conditions	Weather adjustment	Date	Discharge				Daily	Cumulative	Daily	Cumulative		
	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
1994	1	2	3	4		5	6	7	8	9	10	11	12	13	14
Aug. 2	173	177	1,851	155	Aug. 5	2,356	0	-100	0	0	6,311	29	4,591	1,720	-100
3	173	57	1,726	78	6	2,034	0	-100	0	0	6,311	61	4,652	1,659	-100
4	0	0	1,560	202	7	1,762	88	-100	0	0	6,311	131	4,783	1,528	-100
5	0	0	2,014	51	8	2,065	0	-100	0	0	6,311	361	5,144	1,167	-100
6	173	0	1,884	0	9	2,057	0	-100	0	0	6,311	560	5,704	607	-61
7	173	0	1,606	0	10	1,779	71	-100	0	0	6,311	630	6,334	-23	+2
8	173	0	1,424	0	11	1,597	253	-100	153	153	6,464	678	7,012	-548	+55
9	173	0	1,104	0	12	1,277	573	-100	473	473	6,937	703	7,715	-778	+78
10	173	0	1,055	13	13	1,241	609	-61	548	546	7,483	646	8,361	-878	+88
11	0	0	925	17	14	942	908	+2	910	908	8,391	718	9,079	-688	+69
12	0	0	896	32	15	928	922	+55	977	981	9,372	0	9,079	-293	-29
13	173	0	867	257	16	1,297	553	+78	631	631	10,003	0	9,079	924	-92

The estimated Montague discharge was greater than the Montague design rate August 17, 1994 to September 3, 1994

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 June 15 to Nov. 4.

Table 8. 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							Indicated	Balancing	Directed	Computation of the balancing adjustment					
	Powerplant release forecasts		Uncontrolled runoff							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)·d	ft^3/s	(ft^3/s)·d	(ft^3/s)·d	ft^3/s
1994	1	2	3	4		5	6	7	8	9	10	11	12	13	14
Sept. 1	0	0	2,188	0	Sept. 4	2,188	0	-92	0	0	10,003	47	9,126	877	-88
2	0	0	1,911	0	5	1,911	0	-92	0	0	10,003	216	9,342	661	-66
3	763	0	1,666	0	6	2,429	0	-92	0	0	10,003	0	9,342	661	-66
4	763	0	1,554	0	7	2,317	0	-92	0	0	10,003	0	9,342	661	-66
5	763	248	1,457	0	8	2,468	0	-88	0	0	10,003	0	9,342	661	-66
6	763	142	1,325	0	9	2,230	0	-66	0	0	10,003	0	9,342	661	-66
7	763	0	1,258	0	10	2,021	0	-66	0	0	10,003	0	9,342	661	-66
8	0	0	963	0	11	963	887	-66	821	818	10,821	978	10,320	501	-50
9	0	0	873	0	12	873	977	-66	911	911	11,732	911	11,231	501	-50
10	381	0	886	0	13	1,267	583	-66	517	520	12,252	50	11,281	971	-97
11	763	0	915	0	14	1,678	172	-66	106	106	12,358	0	11,281	1,077	-100
12	763	90	877	0	15	1,730	120	-50	70	70	12,428	0	11,281	1,147	-100
13	763	90	822	68	16	1,743	107	-50	57	57	12,485	0	11,281	1,204	-100
14	763	80	798	22	17	1,663	187	-97	90	90	12,575	0	11,281	1,294	-100
15	0	80	572	26	18	678	1,172	-100	1,072	1,074	13,649	834	12,115	1,534	-100
16	0	100	689	27	19	816	1,034	-100	934	932	14,581	602	12,717	1,864	-100
17	704	100	740	52	20	1,596	254	-100	154	154	14,735	0	12,717	2,018	-100
18	704	100	874	0	21	1,678	172	-100	72	72	14,807	264	12,981	1,826	-100
19	704	100	843	0	22	1,647	203	-100	103	103	14,910	186	13,167	1,743	-100
20	704	100	910	38	23	1,752	98	-100	0	0	14,910	46	13,213	1,697	-100
21	704	28	874	201	24	1,807	43	-100	0	0	14,910	0	13,213	1,697	-100
22	0	0	688	304	25	992	858	-100	758	758	15,668	988	14,201	1,467	-100
23	0	198	807	36	26	1,041	809	-100	709	710	16,378	630	14,831	1,547	-100
24	884	284	926	19	27	2,113	0	-100	0	0	16,378	0	14,831	1,547	-100

The estimated Montague discharge was greater than the Montague design rate September 28, 1994 to October 13, 1994

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 June 15 to Nov. 4.

Table 8. 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]

Date of advance estimate	Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases: Powerplant release forecasts: Lake Wallenpaupack	Powerplant release forecasts: Rio Reservoir	Uncontrolled runoff: Current conditions	Uncontrolled runoff: Weather adjustment	Date	Discharge	Indicated deficiency	Balancing adjustment	Directed release	Computation of the balancing adjustment: Adjusted directed release: Daily	Adjusted directed release: Cumulative	Actual deficiency: Daily	Actual deficiency: 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)·d	ft^3/s	(ft^3/s)·d	(ft^3/s)·d	ft^3/s
1994	1	2	3	4		5	6	7	8	9	10	11	12	13	14
Oct. 11	0	420	1,382	0	Oct. 14	1,802	48	-100	0	0	16,378	0	14,831	1,547	-100
12	0	80	1,232	0	15	1,312	538	-100	438	440	16,818	390	15,221	1,597	-100
13	0	85	1,275	0	16	1,360	490	-100	390	387	17,205	337	15,558	1,647	-100
14	0	300	1,136	0	17	1,436	414	-100	314	312	17,517	532	16,090	1,427	-100
15	0	350	1,091	0	18	1,441	409	-100	309	309	17,826	119	16,209	1,617	-100
16	0	350	1,044	0	19	1,394	456	-100	356	359	18,185	369	16,578	1,607	-100
17	0	170	1,007	0	20	1,177	673	-100	573	578	18,763	378	16,956	1,807	-100
18	0	355	956	149	21	1,460	390	-100	290	292	19,055	202	17,158	1,897	-100
19	0	50	939	38	22	1,027	823	-100	723	723	19,778	697	17,885	1,923	-100
20	0	0	959	33	23	992	858	-100	758	754	20,532	704	18,559	1,973	-100
21	0	0	1,034	0	24	1,034	816	-100	716	716	21,248	606	19,165	2,083	-100
22	378	0	998	10	25	1,386	464	-100	364	361	21,609	511	19,676	1,933	-100
23	378	0	933	34	26	1,345	505	-100	405	404	22,013	724	20,400	1,613	-100
24	0	0	1,061	0	27	1,061	789	-100	689	688	22,701	878	21,278	1,423	-100
25	0	0	1,055	0	28	1,055	795	-100	695	698	23,399	678	21,956	1,443	-100
26	0	85	1,003	0	29	1,088	762	-100	662	665	24,064	475	22,431	1,633	-100
27	0	0	976	0	30	976	874	-100	774	771	24,835	881	23,312	1,523	-100
28	0	350	898	0	31	1,248	602	-100	502	507	25,342	647	23,959	1,383	-100
29	0	350	885	0	Nov. 1	1,235	615	-100	515	513	25,855	73	24,032	1,823	-100
30	0	350	898	111	2	1,359	491	-100	391	389	26,244	0	24,032	2,212	-100
31	230	350	782	213	3	1,575	275	-100	175	173	26,417	0	24,032	2,385	-100
Nov. 1	230	350	829	648	4	2,057	0	-100	0	0	26,417	0	24,032	2,385	-100

MONTAGUE DESIGN RATE = 1,750 ft^3/s NOVEMBER 5 - 30, 1994

The estimated Montague discharge was greater than the Montague design rate November 5 - 19, 1994

17	0	0	1,509	11	20	1,520	230	230	
18	0	0	1,490	10	21	1,500	250	250	

The estimated Montague discharge was greater than the Montague design rate November 22 - 30, 1994

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 June 15 to Nov. 4.

Table 9. 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							
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
Nov. 28		6	22	5	Nov. 30	979	840	Dec. 1		33	1,819	11,448	13,300		
29		6	23	5	Dec. 1	627	843	2		34	1,470	8,696	10,200		
30		6	12	5	2	612	862	3		23	1,474	7,243	8,740		
Dec. 1		6	8	5	3	506	816	4		19	1,322	6,639	7,980		
2		6	8	5	4	598	816	5		19	1,414	10,567	12,000		
3		6	8	5	5	1,109	819	6		19	1,928	18,453	20,400		
4		6	8	5	6	894	801	7		19	1,695	12,586	14,300		
5		6	8	5	7	931	819	8		19	1,750	9,631	11,400		
6		6	8	5	8	914	812	9		19	1,726	7,905	9,650		
7		6	8	5	9	933	777	10		19	1,710	6,831	8,560		
8		6	8	5	10	934	850	11		19	1,784	7,197	9,000		
9		6	8	5	11	998	805	12		19	1,803	7,768	9,590		
10		6	8	5	12	925	734	13		19	1,659	5,872	7,550		
11		6	8	5	13	928	287	14		19	1,215	5,396	6,630		
12		6	8	5	14	930	592	15		19	1,522	4,929	6,470		
13		6	8	5	15	830	451	16		19	1,281	4,390	5,690		
14		6	8	5	16	792	479	17		19	1,271	4,390	5,680		
15		6	8	5	17	828	496	18		19	1,324	3,657	5,000		
16		6	8	6	18	578	337	19		20	915	3,405	4,340		
17		6	8	6	19	503	709	20		20	1,212	3,518	4,750		
18		6	8	5	20	910	465	21		19	1,375	4,106	5,500		
19		6	8	5	21	934	670	22		19	1,604	7,737	9,360		
20		6	8	11	22	634	727	23		25	1,361	6,674	8,060		
21		12	25	25	23	630	716	24		62	1,346	4,972	6,380		
22		45	34	25	24	618	816	25		104	1,434	4,152	5,690		
23		46	34	25	25	524	819	26		105	1,343	4,052	5,500		
24		46	34	25	26	508	858	27		105	1,366	3,429	4,900		
25		48	34	25	27	630	869	28		107	1,499	2,294	3,900		
26		48	34	17	28	869	840	29		99	1,709	2,392	4,200		
27		46	34	25	29	934	837	30		105	1,771	2,324	4,200		
28		46	32	25	30	928	826	31		103	1,754	2,643	4,500		
Total	0	475	478	315		24,468	22,388		0	1,268	46,856	195,296	243,420		

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 9. 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.
1993/94	1	2	3	4		5	6		7	8	9	10	11	12	13
Dec. 29		46	32	25	Dec. 31	514	848	Jan. 1		103	1,362	2,435	3,900		
30		46	32	25	Jan. 1	399	394	2		103	793	2,704	3,600		
31		48	32	25	2	511	294	3		105	805	2,920	3,830		
Jan. 1		48	32	25	3	566	805	4		105	1,371	2,424	3,900		
2		48	32	25	4	539	486	5		105	1,025	2,270	3,400		
3		48	32	25	5	637	184	6		105	821	2,574	3,500		
4		48	32	26	6	716	326	7		106	1,042	2,152	3,300		
5		45	32	26	7	817	394	8		103	1,211	2,086	3,400		
6		46	32	26	8	391	226	9		104	617	2,079	2,800		
7		48	32	26	9	536	784	10		106	1,320	1,974	3,400		
8		48	32	26	10	1,115	333	11		106	1,448	2,046	3,600		
9		48	32	25	11	955	31	12		105	986	2,009	3,100		
10		48	31	26	12	929	0	13		105	929	1,966	3,000		
11		48	32	26	13	951	0	14		106	951	1,943	3,000		
12		43	32	25	14	996	99	15		100	1,095	1,605	2,800		
13		48	32	26	15	1,244	167	16		106	1,411	1,183	2,700		
14		48	32	26	16	985	156	17		106	1,141	1,253	2,500		
15		51	32	26	17	940	252	18		109	1,192	1,199	2,500		
16		51	32	26	18	1,585	273	19		109	1,858	1,033	3,000		
17		48	32	26	19	1,303	198	20		106	1,501	1,393	3,000		
18		48	32	25	20	1,021	128	21		105	1,149	1,246	2,500		
19		50	32	26	21	949	0	22		108	949	1,443	2,500		
20		51	32	26	22	810	0	23		109	810	1,881	2,800		
21		45	32	26	23	523	269	24		103	792	1,505	2,400		
22		45	32	26	24	940	216	25		103	1,156	1,441	2,700		
23		45	32	26	25	532	145	26		103	677	1,320	2,100		
24		48	32	26	26	375	468	27		106	843	1,151	2,100		
25		46	32	26	27	716	301	28		104	1,017	1,579	2,700		
26		46	32	26	28	367	226	29		104	593	2,603	3,300		
27		46	32	26	29	0	426	30		104	426	3,570	4,100		
28		46	32	26	30	0	454	31		104	454	5,642	6,200		
Total	0	1,468	991	797		22,862	8,883		0	3,256	31,745	62,629	97,630		

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.

Table 9. 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-	Rio		Controlled releases N.Y.C. reservoirs		Power-	Computed uncon-		Excess Release Credits	
Date	Amount				Date	paupack	Reservoir	Date	Directed	Other	plants	trolled	Total	Daily	Cumul.
1994	1	2	3	4		5	6		7	8	9	10	11	12	13
Jan. 29		48	32	26	Jan. 31	292	330	Feb. 1		106	622	4,772	5,500		
30		48	32	26	Feb. 1	289	394	2		106	683	3,911	4,700		
31		48	32	26	2	285	298	3		106	583	3,511	4,200		
Feb. 1		50	32	26	3	350	326	4		108	676	2,916	3,700		
2		50	32	26	4	290	36	5		108	326	2,866	3,300		
3		48	32	26	5	0	0	6		106	0	2,794	2,900		
4		48	32	26	6	0	270	7		106	270	2,624	3,000		
5		48	32	26	7	285	149	8		106	434	2,660	3,200		
6		48	32	26	8	284	152	9		106	436	2,358	2,900		
7		48	32	26	9	283	397	10		106	680	2,114	2,900		
8		48	32	26	10	925	227	11		106	1,152	2,042	3,300		
9		48	32	26	11	833	32	12		106	865	2,229	3,200		
10		48	32	26	12	229	53	13		106	282	2,112	2,500		
11		48	32	26	13	55	348	14		106	403	1,991	2,500		
12		48	32	26	14	823	234	15		106	1,057	2,137	3,300		
13		48	32	26	15	391	128	16		106	519	1,975	2,600		
14		48	32	26	16	289	106	17		106	395	1,999	2,500		
15		48	32	26	17	174	372	18		106	546	2,048	2,700		
16		48	32	26	18	296	287	19		106	583	1,911	2,600		
17		48	32	26	19	0	96	20		106	96	2,398	2,600		
18		48	32	26	20	0	326	21		106	326	4,068	4,500		
19		48	32	26	21	119	432	22		106	551	7,343	8,000		
20		48	32	26	22	170	461	23		106	631	9,263	10,000		
21		50	32	26	23	781	734	24		108	1,515	8,377	10,000		
22		50	32	26	24	941	585	25		108	1,526	6,566	8,200		
23		48	32	26	25	952	521	26		106	1,473	4,821	6,400		
24		48	32	26	26	470	372	27		106	842	4,552	5,500		
25		50	32	26	27	395	407	28		108	802	4,190	5,100		
Total	0	1,354	896	728		10,201	8,073		0	2,978	18,274	100,548	121,800		

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 9. 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.
1994	1	2	3	4		5	6		7	8	9	10	11	12	13
Feb. 26		50	32	26	Feb. 28	924	425	Mar. 1		108	1,349	3,743	5,200		
27		50	32	26	Mar. 1	938	453	2		108	1,391	3,101	4,600		
28		46	32	26	2	941	447	3		104	1,388	3,008	4,500		
Mar. 1		50	32	26	3	921	309	4		108	1,230	3,262	4,600		
2		48	32	26	4	828	290	5		106	1,118	3,076	4,300		
3		50	32	26	5	0	301	6		108	301	3,191	3,600		
4		53	32	26	6	113	333	7		111	446	3,343	3,900		
5		53	32	26	7	952	358	8		111	1,310	3,579	5,000		
6		46	32	26	8	949	436	9		104	1,385	5,511	7,000		
7		48	32	26	9	937	677	10		106	1,614	8,280	10,000		
8		48	32	26	10	945	716	11		106	1,661	13,733	15,500		
9		42	32	26	11	906	830	12		100	1,736	13,564	15,400		
10		40	32	26	12	393	833	13		98	1,226	9,976	11,300		
11		40	32	26	13	117	826	14		98	943	9,159	10,200		
12		40	32	26	14	927	837	15		98	1,764	9,338	11,200		
13		42	32	26	15	936	812	16		100	1,748	9,252	11,100		
14		42	32	26	16	1,004	610	17		100	1,614	8,286	10,000		
15		46	34	26	17	932	436	18		106	1,368	7,256	8,730		
16		50	34	26	18	958	621	19		110	1,579	6,661	8,350		
17		46	34	26	19	689	227	20		106	916	5,688	6,710		
18		48	34	26	20	187	592	21		108	779	5,883	6,770		
19		50	34	26	21	927	652	22		110	1,579	8,031	9,720		
20		50	34	26	22	919	684	23		110	1,603	13,887	15,600		
21		50	57	28	23	923	823	24		135	1,746	18,019	19,900		
22		50	34	28	24	1,059	833	25		112	1,892	22,496	24,500		
23		46	34	28	25	940	844	26		108	1,784	22,008	23,900		
24		43	34	28	26	933	844	27		105	1,777	18,418	20,300		
25		43	34	28	27	942	869	28		105	1,811	21,084	23,000		
26		43	34	28	28	946	858	29		105	1,804	21,291	23,200		
27		50	36	26	29	933	876	30		112	1,809	17,779	19,700		
28		50	36	25	30	952	858	31		111	1,810	14,879	16,800		
Total	0	1,453	1,047	817		24,971	19,510		0	3,317	44,481	316,782	364,580		

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 9. 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.
1994	1	2	3	4		5	6		7	8	9	10	11	12	13
Mar. 29		45	36	25	Mar. 31	831	921	Apr. 1		106	1,752	14,242	16,100		
30		46	36	25	Apr. 1	815	834	2		107	1,649	16,644	18,400		
31		40	36	25	2	826	826	3		101	1,652	19,447	21,200		
Apr. 1		50	36	25	3	943	855	4		111	1,798	24,591	26,500		
2		42	34	25	4	948	869	5		101	1,817	23,682	25,600		
3		46	36	26	5	944	858	6		108	1,802	22,890	24,800		
4		48	37	26	6	1,397	872	7		111	2,269	30,220	32,600		
5		40	46	26	7	1,419	855	8		112	2,274	32,214	34,600		
6		40	45	26	8	998	883	9		111	1,881	22,108	24,100		
7		42	45	26	9	826	822	10		113	1,648	19,639	21,400		
8		42	45	26	10	1,026	868	11		113	1,894	25,293	27,300		
9		42	45	26	11	1,053	858	12		113	1,911	22,776	24,800		
10		42	45	26	12	1,409	819	13		113	2,228	24,959	27,300		
11		42	45	28	13	1,697	848	14		115	2,545	44,940	47,600		
12		42	45	28	14	1,818	879	15		115	2,697	32,888	35,700		
13		42	45	28	15	1,834	855	16		115	2,689	28,896	31,700		
14		43	45	25	16	1,832	844	17		113	2,676	35,811	38,600		
15		43	45	25	17	1,843	872	18		113	2,715	26,972	29,800		
16		43	45	25	18	1,770	858	19		113	2,628	20,659	23,400		
17		43	45	25	19	1,845	868	20		113	2,713	16,874	19,700		
18		43	45	25	20	1,856	848	21		113	2,704	13,683	16,500		
19		43	45	25	21	1,843	833	22		113	2,676	11,011	13,800		
20		43	45	25	22	984	840	23		113	1,824	8,863	10,800		
21		43	45	25	23	0	369	24		113	369	8,008	8,490		
22		42	45	25	24	109	656	25		112	765	7,173	8,050		
23		42	45	25	25	964	461	26		112	1,425	6,123	7,660		
24		42	45	25	26	902	677	27		112	1,579	5,729	7,420		
25		42	45	22	27	931	489	28		109	1,420	5,271	6,800		
26		42	45	26	28	953	486	29		113	1,439	4,688	6,240		
27		42	45	26	29	814	213	30		113	1,027	4,050	5,190		
Total	0	1,287	1,287	766		35,430	23,036		0	3,340	58,466	580,344	642,150		

Col. 2 - 24 hours beginning 1200 of date shown.
Col. 3 - 24 hours ending 2400 one day later.
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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.
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Table 9. 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	
									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.
1994	1	2	3	4		5	6		7	8	9	10	11	12	13
Apr. 28		42	45	26	Apr. 30	0	167	May 1		113	167	5,090	5,370		
29		42	45	34	May 1	0	613	2		121	613	7,756	8,490		
30		48	45	51	2	225	712	3		144	937	6,169	7,250		
May 1		68	45	51	3	255	507	4		164	762	5,184	6,110		
2		68	45	51	4	511	379	5		164	890	4,606	5,660		
3		68	45	53	5	221	145	6		166	366	4,308	4,840		
4		68	45	53	6	225	106	7		166	331	3,983	4,480		
5		70	45	53	7	0	436	8		168	436	5,086	5,690		
6		71	45	54	8	0	673	9		170	673	6,657	7,500		
7		70	45	56	9	253	564	10		171	817	5,412	6,400		
8		70	45	57	10	223	372	11		172	595	4,733	5,500		
9		70	45	54	11	224	163	12		169	387	4,444	5,000		
10		70	45	57	12	258	486	13		172	744	4,274	5,190		
11		70	45	57	13	224	273	14		172	497	3,811	4,480		
12		70	45	56	14	0	110	15		171	110	3,649	3,930		
13		68	45	54	15	0	468	16		167	468	4,365	5,000		
14		68	45	54	16	225	543	17		167	768	5,065	6,000		
15		68	45	56	17	222	415	18		169	637	4,554	5,360		
16		67	45	53	18	246	351	19		165	597	4,118	4,880		
17		67	45	53	19	286	330	20		165	616	3,949	4,730		
18		67	45	53	20	336	149	21		165	485	3,720	4,370		
19		67	45	53	21	0	230	22		165	230	3,485	3,880		
20		67	45	53	22	116	379	23		165	495	3,180	3,840		
21		67	45	53	23	695	557	24		165	1,252	2,553	3,970		
22		67	45	53	24	765	199	25		165	964	2,471	3,600		
23		67	45	53	25	994	0	26		165	994	2,531	3,690		
24		67	45	53	26	759	53	27		165	812	2,953	3,930		
25		67	45	54	27	348	0	28		166	348	2,696	3,210		
26		67	45	54	28	0	241	29		166	241	2,393	2,800		
27		67	45	54	29	0	234	30		166	234	2,120	2,520		
28		67	45	54	30	49	230	31		166	279	1,925	2,370		
Total	0	2,040	1,395	1,620		7,660	10,085		0	5,055	17,745	127,240	150,040		

Col. 2 - 24 hours beginning 1200 of date shown.
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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.
1994	1	2	3	4		5	6		7	8	9	10	11	12	13
May 29	0	67	45	56	May 31	406	255	June 1	0	168	661	1,741	2,570		
30	0	67	45	56	June 1	512	178	2	0	168	690	1,512	2,370		
31	0	71	45	54	2	464	11	3	0	170	475	1,535	2,180		
June 1	0	93	46	54	3	412	57	4	0	193	469	1,398	2,060		
2	324	93	178	54	4	0	74	5	325	0	74	1,181	1,580		
3	530	91	377	54	5	54	0	6	522	0	54	1,094	1,670		
4	169	91	43	54	6	407	50	7	169	19	457	1,415	2,060		
5	243	91	152	53	7	581	142	8	243	53	723	1,221	2,240		
6	598	93	452	53	8	468	213	9	598	0	681	991	2,270		
7	155	94	45	54	9	474	163	10	155	38	637	1,180	2,010		
8	178	93	46	54	10	546	85	11	178	15	631	1,076	1,900		
9	748	93	606	54	11	0	0	12	753	0	0	1,087	1,840		
10	730	94	583	54	12	56	216	13	731	0	272	2,087	3,090		
11	350	91	209	54	13	580	142	14	354	0	722	2,544	3,620		
12	0	91	153	54	14	931	364	15	0	298	1,295	3,577	5,170	0	0
13	0	91	246	71	15	828	227	16	0	408	1,055	3,387	4,850	0	0
14	0	93	342	76	16	820	227	17	0	511	1,047	2,482	4,040	0	0
15	0	93	368	101	17	825	39	18	0	562	864	2,214	3,640	0	0
16	0	93	368	110	18	0	326	19	0	571	326	2,103	3,000	0	0
17	0	93	368	111	19	104	28	20	0	572	132	1,846	2,550	0	0
18	0	93	368	110	20	463	50	21	0	571	513	1,506	2,590	0	0
19	0	93	463	54	21	463	0	22	0	610	463	1,357	2,430	30	30
20	0	94	367	53	22	466	14	23	0	514	480	1,396	2,390	0	30
21	171	91	367	53	23	469	0	24	171	340	469	1,410	2,390	171	201
22	57	91	368	53	24	649	0	25	57	455	649	1,569	2,730	57	258
23	648	91	503	51	25	0	67	26	645	0	67	1,678	2,390	640	898
24	334	91	367	51	26	0	67	27	334	175	67	1,654	2,230	305	1,203
25	0	91	367	51	27	230	53	28	0	509	283	1,838	2,630	0	1,203
26	0	87	367	51	28	221	163	29	0	505	384	2,691	3,580	0	1,203
27	0	91	365	51	29	223	153	30	0	507	376	2,887	3,770	0	1,203
Total	5,235	2,689	8,619	1,859		11,652	3,364		5,235	7,932	15,016	53,657	81,840		

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.
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in response to Col. 1.
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Col. 13 - Season limit of cumulative credit beginning June 15, 1994 = 11,418 $(ft^3/s)\cdot d$.

Table 9. 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					
1994	1	2	3	4		5	6		7	8	9	10	11	12	13
June 28	0	94	365	51	June 30	330	89	July 1	0	510	419	2,851	3,780	0	1,203
29	0	93	367	51	July 1	219	0	2	0	511	219	2,570	3,300	0	1,203
30	0	93	367	51	2	0	0	3	0	511	0	1,989	2,500	0	1,203
July 1	0	93	367	51	3	0	0	4	0	511	0	1,599	2,110	100	1,303
2	0	93	367	53	4	0	145	5	0	513	145	1,332	1,990	100	1,403
3	0	93	367	73	5	610	333	6	0	533	943	1,094	2,570	0	1,403
4	0	96	410	96	6	704	202	7	0	602	906	1,122	2,630	0	1,403
5	0	104	410	84	7	525	160	8	0	598	685	1,227	2,510	0	1,403
6	0	104	523	111	8	213	259	9	0	738	472	2,060	3,270	0	1,403
7	0	141	664	111	9	0	14	10	0	916	14	1,450	2,380	100	1,503
8	0	136	475	105	10	105	85	11	0	716	190	1,224	2,130	100	1,603
9	0	136	412	82	11	466	152	12	0	630	618	1,102	2,350	100	1,703
10	0	97	412	53	12	443	145	13	0	562	588	970	2,120	100	1,803
11	120	93	365	53	13	602	322	14	120	391	924	875	2,310	120	1,923
12	289	93	367	56	14	439	184	15	289	227	623	961	2,100	123	2,046
13	460	93	408	68	15	447	0	16	460	109	447	1,124	2,140	281	2,327
14	1,091	118	920	53	16	0	0	17	1,091	0	0	1,099	2,190	440	2,767
15	947	105	835	53	17	0	170	18	947	46	170	817	1,980	184	2,951
16	0	104	412	91	18	562	365	19	0	607	927	876	2,410	47	2,998
17	0	97	365	91	19	699	138	20	0	553	837	860	2,250	100	3,098
18	341	97	442	91	20	799	174	21	341	289	973	857	2,460	341	3,439
19	417	91	526	111	21	687	304	22	417	311	991	991	2,710	417	3,856
20	358	141	441	111	22	703	223	23	358	335	926	1,671	3,290	358	4,214
21	501	118	408	107	23	127	181	24	501	132	308	2,879	3,820	501	4,715
22	580	114	455	84	24	131	223	25	580	73	354	3,453	4,460	580	5,295
23	0	93	418	51	25	514	188	26	0	562	702	3,196	4,460	0	5,295
24	0	93	388	53	26	471	170	27	0	534	641	2,625	3,800	0	5,295
25	0	93	365	51	27	469	216	28	0	509	685	3,166	4,360	0	5,295
26	0	93	376	51	28	574	0	29	0	520	574	2,866	3,960	0	5,295
27	0	93	365	51	29	178	0	30	0	509	178	2,593	3,280	0	5,295
28	0	93	365	51	30	215	0	31	0	509	215	2,006	2,730	0	5,295
Total	5,104	3,195	13,727	2,249		11,232	4,442		5,104	14,067	15,674	53,505	88,350		

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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.
1994	1	2	3	4		5	6		7	8	9	10	11	12	13
July 29	0	93	365	51	July 31	145	50	Aug. 1	0	509	195	1,786	2,490	0	5,295
30	0	93	429	68	Aug. 1	171	138	2	0	590	309	1,981	2,880	0	5,295
31	0	93	429	65	2	171	312	3	0	587	483	1,880	2,950	0	5,295
Aug. 1	0	93	408	68	3	166	227	4	0	569	393	1,718	2,680	0	5,295
2	0	93	475	71	4	168	165	5	0	639	333	1,488	2,460	29	5,324
3	0	93	365	53	5	171	85	6	0	511	256	1,533	2,300	61	5,385
4	0	93	365	53	6	0	0	7	0	511	0	1,719	2,230	100	5,485
5	0	93	365	53	7	98	0	8	0	511	98	1,391	2,000	100	5,585
6	0	93	364	53	8	94	0	9	0	510	94	1,196	1,800	50	5,635
7	0	93	364	53	9	170	0	10	0	510	170	1,050	1,730	-20	5,615
8	153	91	364	53	10	171	0	11	153	355	171	1,001	1,680	-70	5,545
9	473	93	367	53	11	170	0	12	473	40	170	977	1,660	-90	5,455
10	548	91	402	53	12	168	64	13	546	0	232	972	1,750	0	5,455
11	910	91	764	53	13	0	67	14	908	0	67	1,065	2,040	290	5,745
12	977	97	811	73	14	130	0	15	981	0	130	3,439	4,550	981	6,726
13	631	90	490	51	15	168	0	16	631	0	168	3,301	4,100	631	7,357
14	0	99	364	54	16	173	0	17	0	517	173	2,360	3,050	0	7,357
15	0	93	200	54	17	171	213	18	0	347	384	8,089	8,820	0	7,357
16	0	96	203	54	18	522	688	19	0	353	1,210	19,137	20,700	0	7,357
17	0	97	43	54	19	176	450	20	0	194	626	11,580	12,400	0	7,357
18	0	91	45	54	20	0	383	21	0	190	383	7,277	7,850	0	7,357
19	0	91	45	54	21	0	351	22	0	190	351	8,989	9,530	0	7,357
20	0	91	45	54	22	586	493	23	0	190	1,079	11,431	12,700	0	7,357
21	0	91	45	54	23	320	291	24	0	190	611	8,549	9,350	0	7,357
22	0	91	45	54	24	777	699	25	0	190	1,476	5,844	7,510	0	7,357
23	0	91	45	54	25	761	606	26	0	190	1,367	4,633	6,190	0	7,357
24	0	93	45	54	26	773	57	27	0	192	830	3,678	4,700	0	7,357
25	0	91	46	54	27	0	0	28	0	191	0	3,449	3,640	0	7,357
26	0	93	152	74	28	0	31	29	0	319	31	3,250	3,600	0	7,357
27	0	91	178	53	29	755	0	30	0	322	755	3,503	4,580	0	7,357
28	0	91	45	53	30	498	0	31	0	189	498	2,813	3,500	0	7,357
Total	3,692	2,873	8,673	1,752		7,673	5,370		3,692	9,606	13,043	131,079	157,420		

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Table 9. 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-	Rio		Controlled releases			Computed		Excess Release Credits	
									N.Y.C. reservoirs		Power-	uncon-			
Date	Amount				Date	paupack	Reservoir	Date	Directed	Other	plants	trolled	Total	Daily	Cumul.
1994	1	2	3	4		5	6		7	8	9	10	11	12	13
Aug. 29	0	91	45	53	Aug. 31	689	220	Sept. 1	0	189	909	2,492	3,590	0	7,357
30	0	91	45	53	Sept. 1	767	241	2	0	189	1,008	2,133	3,330	0	7,357
31	0	88	45	53	2	767	142	3	0	186	909	1,885	2,980	0	7,357
Sept. 1	0	71	45	51	3	0	0	4	0	167	0	1,803	1,970	47	7,404
2	0	70	45	51	4	0	0	5	0	166	0	1,634	1,800	50	7,454
3	0	68	45	51	5	241	184	6	0	164	425	1,491	2,080	0	7,454
4	0	70	45	51	6	759	333	7	0	166	1,092	1,322	2,580	0	7,454
5	0	68	45	51	7	600	265	8	0	164	865	1,241	2,270	0	7,454
6	0	70	45	51	8	591	120	9	0	166	711	1,213	2,090	0	7,454
7	0	70	46	51	9	715	156	10	0	167	871	1,112	2,150	0	7,454
8	821	68	699	51	10	0	39	11	818	0	39	833	1,690	-60	7,394
9	911	68	789	54	11	0	14	12	911	0	14	925	1,850	100	7,494
10	517	71	396	53	12	760	124	13	520	0	884	916	2,320	520	8,014
11	106	68	45	53	13	604	202	14	106	60	806	1,048	2,020	106	8,120
12	70	68	45	53	14	761	273	15	70	96	1,034	970	2,170	70	8,190
13	57	68	45	53	15	773	188	16	57	109	961	893	2,020	57	8,247
14	90	71	45	53	16	729	230	17	90	79	959	892	2,020	90	8,337
15	1,072	70	951	53	17	0	238	18	1,074	0	238	778	2,090	340	8,677
16	934	70	809	53	18	0	358	19	932	0	358	890	2,180	430	9,107
17	154	68	43	53	19	781	121	20	154	10	902	1,134	2,200	154	9,261
18	72	68	43	53	20	538	113	21	72	92	651	935	1,750	0	9,261
19	103	70	43	53	21	784	99	22	103	63	883	781	1,830	80	9,341
20	0	70	43	53	22	763	145	23	0	166	908	896	1,970	46	9,387
21	0	70	43	53	23	861	0	24	0	166	861	1,333	2,360	0	9,387
22	758	68	637	53	24	0	0	25	758	0	0	862	1,620	-130	9,257
23	709	68	589	53	25	45	177	26	710	0	222	998	1,930	180	9,437
24	0	68	43	53	26	954	475	27	0	164	1,429	4,687	6,280	0	9,437
25	0	68	43	53	27	755	684	28	0	164	1,439	9,397	11,000	0	9,437
26	0	67	43	53	28	934	837	29	0	163	1,771	6,346	8,280	0	9,437
27	0	68	43	53	29	454	858	30	0	164	1,312	5,094	6,570	0	9,437
Total	6,374	2,132	5,888	1,575		15,625	6,836		6,375	3,220	22,461	56,934	88,990		

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and segregation of flow of Delaware River at Montague, N.J.
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[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-	Rio		N.Y.C. reservoirs		Power-	uncon-			
Date	Amount				Date	paupack	Reservoir	Date	Directed	Other	plants	trolled	Total	Daily	Cumul.
1994	1	2	3	4		5	6		7	8	9	10	11	12	13
Sept. 28	0	68	43	54	Sept. 30	899	900	Oct. 1	0	165	1,799	3,706	5,670	0	9,437
29	0	70	43	45	Oct. 1	0	383	2	0	158	383	4,229	4,770	0	9,437
30	0	63	43	26	2	0	504	3	0	132	504	3,804	4,440	0	9,437
Oct. 1	0	45	43	26	3	50	631	4	0	114	681	3,055	3,850	0	9,437
2	0	46	43	25	4	0	621	5	0	114	621	2,575	3,310	0	9,437
3	0	46	43	25	5	0	674	6	0	114	674	2,292	3,080	0	9,437
4	0	46	68	25	6	0	535	7	0	139	535	2,016	2,690	0	9,437
5	0	48	43	25	7	0	453	8	0	116	453	1,901	2,470	0	9,437
6	0	48	43	25	8	0	582	9	0	116	582	1,762	2,460	0	9,437
7	0	48	43	25	9	0	96	10	0	116	96	2,028	2,240	0	9,437
8	0	48	43	25	10	0	379	11	0	116	379	1,845	2,340	0	9,437
9	0	48	43	25	11	0	667	12	0	116	667	1,577	2,360	0	9,437
10	0	48	43	25	12	0	504	13	0	116	504	1,540	2,160	0	9,437
11	0	48	45	25	13	0	447	14	0	118	447	1,415	1,980	0	9,437
12	438	45	370	25	14	0	294	15	440	0	294	1,166	1,900	150	9,587
13	390	43	319	25	15	0	96	16	387	0	96	1,417	1,900	150	9,737
14	314	43	244	25	16	0	21	17	312	0	21	1,297	1,630	-120	9,617
15	309	43	241	25	17	0	567	18	309	0	567	1,164	2,040	290	9,907
16	356	45	288	26	18	0	355	19	359	0	355	1,126	1,840	90	9,997
17	573	45	507	26	19	0	479	20	578	0	479	993	2,050	300	10,297
18	290	45	221	26	20	0	351	21	292	0	351	1,297	1,940	190	10,487
19	723	43	718	26	21	0	131	22	723	64	131	1,022	1,940	190	10,677
20	758	43	685	26	22	0	0	23	754	0	0	1,146	1,900	150	10,827
21	716	43	647	26	23	0	0	24	716	0	0	1,244	1,960	210	11,037
22	364	43	292	26	24	0	0	25	361	0	0	1,339	1,700	-50	10,987
23	405	45	333	26	25	0	50	26	404	0	50	1,076	1,530	-220	10,767
24	689	43	619	26	26	0	0	27	688	0	0	972	1,660	-90	10,677
25	695	45	627	26	27	0	124	28	698	0	124	1,048	1,870	120	10,797
26	662	45	594	26	28	286	99	29	665	0	385	990	2,040	290	11,087
27	774	43	702	26	29	0	0	30	771	0	0	969	1,740	-10	11,077
28	502	45	436	26	30	0	177	31	507	0	177	1,026	1,710	-40	11,037
Total	8,958	1,467	8,472	839		1,235	10,120		8,964	1,814	11,355	53,037	75,170		

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									N.Y.C. reservoirs							
Directed		Pepacton	Cannonsville	Neversink		Lake Wallen-	Rio				Power-	uncon-				
Date	Amount				Date	paupack	Reservoir	Date	Directed	Other	plants	trolled	Total	Daily	Cumul.	
1994	1	2	3	4		5	6		7	8	9	10	11	12	13	
Oct. 29	515	46	442	25	Oct. 31	378	426	Nov. 1	513	0	804	973	2,290	381	11,418	
30	391	45	319	25	Nov. 1	378	471	2	389	0	849	2,362	3,600			
31	175	45	102	26	2	389	351	3	173	0	740	4,417	5,330			
Nov. 1	0	48	32	28	3	336	312	4	0	108	648	3,554	4,310			
2	0	45	32	28	4	382	418	5	0	105	800	2,875	3,780			
3	0	43	32	26	5	0	372	6	0	101	372	2,577	3,050			
4	0	45	32	26	6	0	393	7	0	103	393	2,364	2,860			
5	0	45	32	26	7	356	638	8	0	103	994	2,203	3,300			
6	0	45	32	31	8	385	0	9	0	108	385	2,327	2,820			
7	0	45	32	31	9	364	0	10	0	108	364	2,258	2,730			
8	0	45	32	28	10	382	0	11	0	105	382	2,403	2,890			
9	0	48	32	28	11	376	0	12	0	108	376	2,266	2,750			
10	0	45	32	28	12	0	0	13	0	105	0	2,075	2,180			
11	0	45	32	28	13	0	0	14	0	105	0	1,965	2,070			
12	0	45	32	28	14	410	0	15	0	105	410	1,885	2,400			
13	0	45	32	28	15	382	0	16	0	105	382	1,813	2,300			
14	0	45	32	26	16	386	0	17	0	103	386	1,721	2,210			
15	0	45	32	26	17	383	0	18	0	103	383	1,664	2,150			
16	0	45	32	28	18	384	0	19	0	105	384	1,641	2,130			
17	230	45	161	28	19	0	0	20	234	0	0	1,486	1,720			
18	250	45	181	28	20	0	0	21	254	0	0	1,636	1,890			
19	0	45	32	28	21	380	152	22	0	105	532	2,723	3,360			
20	0	45	32	28	22	377	0	23	0	105	377	3,128	3,610			
21	0	45	32	28	23	386	0	24	0	105	386	2,779	3,270			
22	0	45	32	28	24	0	149	25	0	105	149	2,426	2,680			
23	0	45	32	28	25	0	0	26	0	105	0	2,275	2,380			
24	0	45	32	28	26	0	0	27	0	105	0	2,155	2,260			
25	0	45	32	28	27	0	259	28	0	105	259	4,596	4,960			
26	0	45	32	28	28	673	436	29	0	105	1,109	13,686	14,900			
27	0	45	32	28	29	670	365	30	0	105	1,035	11,260	12,400			
Total	1,561	1,355	2,005	828		8,157	4,742		1,563	2,625	12,899	91,493	108,580			

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, 1994 = 11,418 $(ft^3/s)\cdot d$.

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

Date 1993	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average to date Sept. 21, 1993 or Dec. 6, 1993	Date 1994	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average Dec. 6, 1993 to date
Dec. 1	453	0	186	642	Jan. 1	299	473	0	790
2	452	0	191	642	2	298	473	0	789
3	453	0	191	642	3	301	473	0	789
4	453	0	186	642	4	300	473	0	788
5	453	0	192	642	5	302	473	0	788
6	453	264	60	777	6	299	473	0	787
7	453	258	0	744	7	301	473	0	787
8	453	297	0	746	8	300	472	0	787
9	452	298	0	747	9	300	473	0	786
10	452	296	0	747	10	301	472	144	790
11	453	297	0	748	11	296	471	112	792
12	453	297	0	748	12	300	472	0	792
13	452	297	145	766	13	299	472	0	791
14	426	298	253	790	14	304	470	0	791
15	304	298	82	779	15	302	472	128	793
16	301	298	0	763	16	301	472	0	793
17	303	457	0	763	17	296	471	0	792
18	291	472	0	763	18	300	471	0	792
19	291	473	0	763	19	300	471	145	795
20	301	473	0	763	20	300	471	140	797
21	301	473	0	764	21	339	471	0	797
22	298	472	212	777	22	264	470	0	796
23	299	473	209	788	23	300	470	0	796
24	286	473	60	790	24	368	470	0	796
25	302	474	0	789	25	236	470	0	795
26	300	473	0	788	26	299	469	0	794
27	280	473	148	794	27	294	469	0	794
28	320	473	0	793	28	297	467	0	793
29	301	473	0	793	29	295	469	0	793
30	300	473	0	792	30	293	469	0	792
31	292	473	0	791	31	299	469	0	792
Total	11,381	10,276	2,115			9,283	14,604	669	

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

Date 1994	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average Dec. 6, 1993 to date	Date 1994	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average Dec. 6, 1993 to date
Feb. 1	299	469	90	793	Mar. 1	452	472	103	792
2	301	470	84	794	2	452	472	0	794
3	301	470	105	795	3	452	472	115	797
4	301	470	0	795	4	301	472	312	800
5	306	470	104	796	5	0	472	16	797
6	304	470	0	796	6	0	472	0	793
7	302	470	0	795	7	282	472	100	794
8	305	470	0	795	8	286	473	95	794
9	303	470	0	795	9	277	473	154	795
10	302	470	0	794	10	283	334	146	795
11	301	470	0	794	11	282	301	160	795
12	0	470	0	789	12	0	299	0	789
13	0	470	0	785	13	0	299	0	784
14	283	470	0	784	14	280	299	131	784
15	282	470	0	784	15	281	300	127	783
16	283	470	0	783	16	282	299	131	782
17	283	470	0	783	17	283	299	125	782
18	283	469	0	783	18	280	300	137	781
19	0	469	0	779	19	0	300	0	776
20	0	469	0	774	20	0	300	0	772
21	283	470	0	774	21	0	300	163	769
22	283	470	110	775	22	0	300	0	764
23	282	470	163	777	23	0	1	0	757
24	282	471	68	778	24	0	132	0	752
25	453	472	0	779	25	1	298	0	748
26	452	472	159	783	26	0	299	0	743
27	452	472	168	787	27	0	299	0	739
28	450	472	115	790	28	0	298	0	736
					29	1	0	0	729
					30	0	0	0	723
					31	0	0	0	717
Total	7,676	13,165	1,166			4,475	9,507	2,015	

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

Date 1994	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average Dec. 6, 1993 to date	Date 1994	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average Dec. 6, 1993 to date
Apr. 1	0	0	0	710	May 1	452	298	175	641
2	0	0	0	704	2	452	298	191	643
3	0	0	0	699	3	449	226	199	645
4	0	272	0	695	4	452	57	217	645
5	0	298	0	692	5	452	0	206	645
6	2	48	0	686	6	452	0	208	646
7	0	0	0	681	7	453	0	210	646
8	0	0	0	675	87	453	0	199	646
9	0	0	0	670	9	453	0	134	645
10	0	0	0	665	10	453	189	135	646
11	0	0	0	659	11	452	200	129	647
12	108	0	0	655	12	452	286	135	648
13	0	0	173	651	13	304	112	133	648
14	0	0	172	648	14	451	200	123	649
15	0	0	169	644	15	451	200	141	649
16	0	0	167	640	16	300	200	88	649
17	0	0	168	637	17	0	200	0	646
18	0	0	170	633	18	0	201	0	644
19	0	0	201	630	19	289	201	0	643
20	0	0	395	628	20	146	193	0	641
21	356	0	370	629	21	282	201	0	640
22	358	0	420	630	22	451	199	0	640
23	401	0	317	631	23	304	200	141	640
24	401	0	271	631	24	292	188	141	640
25	450	99	186	632	25	452	200	110	641
26	452	102	182	633	26	150	195	142	640
27	453	99	186	633	27	151	158	101	638
28	452	245	167	635	28	151	216	138	638
29	452	290	215	637	29	147	207	147	637
30	452	298	194	639	30	148	206	143	636
					31	293	199	144	636
Total	4337	1,751	4,123			10,187	5,230	3,830	

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

Date 1994	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average June 1, 1994 to date	Date 1994	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average June 1, 1994 to date
June 1	294	195	142	631	July 1	454	294	143	777
2	302	196	136	633	2	454	0	150	771
3	301	141	136	614	3	454	0	148	766
4	300	222	127	623	4	453	0	147	761
5	288	228	143	630	5	453	0	148	757
6	314	228	142	639	6	454	0	138	752
7	452	235	146	667	7	454	0	144	748
8	291	151	144	657	8	454	0	155	744
9	294	153	144	649	9	454	0	144	740
10	288	186	143	646	10	453	0	149	737
11	300	290	144	654	11	452	0	145	734
12	299	296	150	662	12	451	0	151	730
13	315	296	144	669	13	452	0	150	727
14	300	283	151	674	14	452	0	148	725
15	418	295	147	686	15	452	0	146	722
16	454	295	137	699	16	452	0	142	719
17	454	295	153	710	17	452	0	154	717
18	454	295	148	721	18	453	0	147	714
19	454	295	144	730	19	453	0	149	712
20	453	296	146	738	20	454	0	151	710
21	453	296	146	746	21	454	0	138	707
22	288	186	144	740	22	454	0	164	706
23	296	189	149	735	23	453	0	153	704
24	454	297	124	741	24	453	0	145	702
25	453	297	146	747	25	453	0	146	700
26	453	297	151	753	26	453	0	152	698
27	453	297	145	758	27	453	0	149	697
28	453	297	148	763	28	452	0	146	695
29	453	297	150	768	29	452	0	151	693
30	454	297	155	773	30	452	0	146	692
					31	452	0	154	690
Total	11,235	7,621	4,325			14,041	294	4,593	

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

Date 1994	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average June 1, 1994 to date	Date 1994	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average June 1, 1994 to date
Aug. 1	453	0	151	689	Sept. 1	453	296	100	724
2	453	0	161	688	2	453	296	93	726
3	453	0	159	687	3	451	295	100	727
4	453	0	170	686	4	452	296	130	729
5	453	0	162	685	5	452	296	70	729
6	452	0	150	683	6	452	296	79	730
7	452	0	147	682	7	452	296	98	732
8	452	0	134	681	8	453	296	99	733
9	452	0	155	680	9	453	296	112	734
10	454	0	149	679	10	452	296	102	735
11	454	162	153	680	11	452	296	111	736
12	454	296	150	683	12	452	296	106	738
13	454	296	148	686	13	453	295	97	739
14	454	296	150	689	14	453	295	99	740
15	453	296	144	691	15	453	295	99	741
16	454	296	154	694	16	452	295	101	742
17	454	296	159	697	17	453	295	98	743
18	453	296	149	699	18	452	295	101	743
19	453	296	150	702	19	452	295	97	744
20	454	297	152	704	20	453	277	99	745
21	454	296	139	707	21	454	296	99	746
22	453	296	149	709	22	453	296	102	747
23	452	295	152	711	23	453	296	109	748
24	454	296	103	713	24	453	296	103	749
25	454	296	95	714	25	453	295	100	750
26	454	296	98	716	26	451	294	110	751
27	454	296	97	717	27	453	271	113	751
28	454	296	102	719	28	452	296	99	752
29	454	296	105	720	29	452	296	94	753
30	454	296	94	722	30	452	296	96	754
31	453	295	99	723					
Total	14,054	6,081	4,280			13,574	8,825	3,016	

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

Date 1994	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average June 1, 1994 to date	Date 1994	East Delaware Tunnel	West Delaware Tunnel	Never-sink Tunnel	Average June 1, 1994 to date
Oct. 1	452	296	102	754	Nov. 1	453	294	95	773
2	452	297	103	755	2	452	294	101	773
3	453	297	108	756	3	453	294	95	774
4	454	297	99	757	4	453	294	123	774
5	453	297	102	757	5	453	294	87	775
6	451	297	105	758	6	452	294	113	775
7	452	296	104	759	7	452	290	106	776
8	452	296	105	760	8	452	293	104	776
9	452	296	105	760	9	452	293	102	776
10	452	296	111	761	10	452	293	103	777
11	454	297	104	762	11	452	293	108	777
12	452	298	100	763	12	451	293	102	778
13	452	297	117	763	13	451	293	103	778
14	452	297	99	764	14	453	200	100	778
15	452	297	102	765	15	453	196	103	778
16	452	297	102	765	16	452	197	96	778
17	452	296	104	766	17	452	197	105	778
18	452	296	96	766	18	452	197	104	777
19	453	297	101	767	19	452	197	103	777
20	453	296	108	768	20	452	197	108	777
21	451	296	103	768	21	452	197	105	777
22	452	296	100	769	22	452	197	105	777
23	451	296	99	769	23	452	197	96	777
24	453	296	109	770	24	452	197	103	777
25	309	195	112	769	25	452	198	114	776
26	452	296	102	769	26	451	198	104	776
27	452	293	99	770	27	451	200	104	776
28	452	294	105	770	28	452	221	102	776
29	471	306	102	771	29	44	161	100	774
30	453	294	106	772	30	244	111	100	772
31	453	294	102	772					
Total	13,896	9,089	3,216			12,946	7,070	3,094	

Table 11. Daily Mean discharge, East Branch Delaware River at Downsville, N.Y., (01417000) for the year ending November 30, 1994.
(U.S. Geological Survey published record)
[All values, except total, in cubic feet per second, ft^3/s; total in cubic per second days, $(ft^3/s)\cdot d$]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	73	47	50	46	42	134	76	80	92	71	47	40
2	7.3	48	50	44	45	175	83	78	90	64	42	40
3	7.4	49	49	45	42	135	82	77	90	64	42	38
4	7.4	48	49	46	46	109	82	77	90	64	41	37
5	8.0	46	48	48	43	70	82	84	90	64	41	38
6	7.6	47	48	44	41	65	83	90	90	64	41	38
7	7.6	47	47	45	42	64	83	106	90	64	41	37
8	7.6	48	47	45	41	66	85	129	90	64	41	37
9	7.4	49	46	42	42	63	83	130	93	63	41	37
10	7.7	49	46	39	42	63	83	115	87	64	41	36
11	7.6	49	45	39	43	63	82	88	85	64	41	37
12	7.4	49	45	39	43	63	81	89	89	63	41	37
13	7.3	49	45	39	45	63	80	89	91	63	38	37
14	7.3	49	45	40	708	63	81	104	91	64	38	37
15	7.3	51	45	40	3260	63	81	106	93	64	38	37
16	7.3	51	44	46	4830	62	81	98	89	63	39	37
17	7.1	49	44	44	4490	62	81	95	94	63	39	36
18	7.1	48	44	45	3290	106	79	93	93	63	39	37
19	7.2	49	44	45	2670	284	79	91	85	64	39	37
20	7.1	51	44	46	2170	250	83	116	84	64	36	37
21	7.8	49	44	47	1730	222	80	133	85	64	38	37
22	31	46	45	46	1180	164	79	117	85	63	38	37
23	45	46	44	45	815	89	80	101	84	62	38	37
24	46	46	44	43	566	67	80	91	83	62	38	37
25	48	48	45	40	425	64	78	89	82	60	38	37
26	48	47	45	40	317	63	77	90	83	60	38	37
27	48	47	45	44	239	64	75	90	82	58	38	37
28	47	48	43	47	160	70	80	90	83	58	38	37
29	46	49	---	44	96	71	80	90	82	58	38	37
30	46	49	---	42	56	72	80	91	82	57	38	37
31	47	49	---	42	---	70	---	91	82	---	39	---
Total	673.5	1497	1280	1347	27559	3039	2419	3008	2709	1883	1225	1117
Mean	21.7	48.3	45.7	43.5	919	98.0	80.6	97.0	87.4	62.8	39.5	37.2

Year total 47,756.5 $(ft^3/s)\cdot d$ Mean 131 ft^3/s

Table 12. Daily mean discharge, West Branch Delaware River at Stilesville, N.Y., (01425000) for the year ending November 30, 1994.
(U.S. Geological Survey published record)
[All values, except total, in cubic feet per second, ft^3/s; total in cubic per second days, $(ft^3/s)\cdot d$]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	24	37	36	36	41	260	58	331	393	55	44	128
2	12	37	35	36	41	250	54	331	381	55	43	62
3	13	37	34	37	39	260	126	331	444	54	43	38
4	14	38	34	36	41	280	340	331	335	53	43	37
5	21	36	36	36	45	330	102	371	337	53	62	37
6	17	36	36	36	58	360	139	374	335	53	50	37
7	16	37	35	37	197	390	366	473	335	53	43	37
8	14	37	35	41	2310	380	115	662	336	53	43	36
9	14	36	36	39	3380	380	54	440	336	597	44	37
10	16	36	35	43	3580	350	513	373	336	746	44	37
11	16	36	35	41	3970	240	546	374	370	348	43	36
12	14	36	35	39	3860	190	236	334	732	91	43	36
13	14	36	35	39	4030	160	150	335	768	46	275	36
14	14	37	35	39	5360	140	227	373	498	45	322	36
15	14	37	35	40	5180	110	277	769	335	44	220	36
16	13	35	35	40	4860	90	331	756	233	844	212	36
17	13	36	35	39	5000	92	331	387	195	744	251	36
18	12	35	35	39	4000	84	331	338	81	100	416	112
19	13	34	35	38	3200	80	331	397	62	46	249	153
20	12	35	36	38	2600	70	424	482	54	44	612	92
21	16	34	37	39	2200	64	331	419	53	44	659	39
22	26	35	38	66	1600	56	331	373	52	44	608	37
23	41	35	38	52	1300	52	331	415	51	528	306	36
24	40	35	37	39	1100	52	469	385	52	566	280	36
25	40	35	37	39	900	120	331	351	57	101	540	36
26	40	36	37	39	750	150	331	339	53	47	605	36
27	37	35	36	39	600	140	334	346	139	45	539	36
28	37	37	36	42	470	80	332	336	163	44	648	41
29	37	37	---	41	300	70	332	336	86	44	426	39
30	37	36	---	41	220	58	334	335	64	43	386	38
31	37	36	---	40	---	54	---	386	55	---	312	---
Total	684	1115	999	1246	61232	5392	8507	12583	7721	5630	8411	1469
Mean	22.1	36.0	35.7	40.2	2041	174	284	406	249	188	271	49.0

Year total 114,989 $(ft^3/s)\cdot d$ Mean 315 ft^3/s

Table 13. Daily Mean discharge, Neversink River at Neversink, N.Y., (01436000) for the year ending November 30, 1994.
(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	63	23	24	24	23	58	54	49	62	48	34	23
2	6.2	23	24	24	23	68	53	49	62	48	26	23
3	6.1	23	24	24	23	53	53	49	65	48	24	27
4	6.3	24	24	24	22	51	52	55	58	48	23	26
5	6.8	24	24	24	23	51	51	77	49	48	23	25
6	6.3	24	24	25	23	53	51	76	49	48	23	25
7	6.3	24	24	25	23	53	51	86	49	49	23	25
8	6.3	24	24	25	23	54	51	99	49	49	23	30
9	6.3	24	24	25	23	55	51	99	49	48	24	27
10	6.4	23	24	26	24	55	51	87	49	48	23	26
11	6.1	24	24	25	23	55	50	64	49	49	23	26
12	6.1	24	24	25	24	57	50	50	49	48	24	26
13	6.2	23	24	25	24	57	51	51	58	49	24	26
14	6.3	24	24	26	24	56	56	58	58	48	24	26
15	6.3	24	24	26	23	56	66	56	49	49	24	25
16	6.2	24	24	25	1180	56	83	49	51	48	24	24
17	6.3	24	24	25	1560	56	90	61	51	49	24	25
18	6.3	24	24	26	768	53	96	81	51	49	24	25
19	6.3	23	24	25	493	54	95	81	51	50	24	25
20	4.2	24	24	25	366	54	74	90	49	50	24	25
21	6.6	24	25	26	79	52	49	104	49	49	24	25
22	16	24	24	25	36	52	47	105	49	50	24	25
23	21	24	25	25	22	52	48	92	49	50	24	25
24	21	24	25	25	25	52	49	64	49	49	24	25
25	21	24	24	25	31	52	48	48	49	50	24	25
26	22	24	24	25	31	53	48	50	49	50	25	25
27	22	24	24	25	21	53	49	49	56	51	25	25
28	15	24	24	25	31	52	49	48	60	51	24	26
29	23	24	---	24	29	52	49	48	48	50	24	25
30	23	24	---	22	29	53	49	48	48	50	24	26
31	23	24	---	23	---	54	---	55	48	---	23	---
Total	393.9	738	675	769	5049	1682	1714	2078	1611	1471	750	762
Mean	12.7	23.8	24.1	24.8	168	54.3	57.1	67.0	52.0	49.0	24.2	25.4

Year total 17,636.2 $(ft^3/s)\cdot d$ Mean 48.3 ft^3/s

Table 14. Daily Mean discharge, Wallenpaupack Creek at Wilsonville, Pa., (01432000) for the year ending November 30, 1994.
(Record furnished by Pennsylvania Power & Light Company)
[All values, except total, in cubic feet per second, ft^3/s; total in cubic per second days, $(ft^3/s)\cdot d$]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	624	399	289	943	815	0	460	219	171	767	0	378
2	612	401	285	936	826	225	460	0	171	767	0	389
3	620	622	289	922	890	255	467	0	166	0	50	336
4	575	472	351	941	890	511	0	0	168	0	0	382
5	657	639	0	0	949	221	0	610	171	241	0	0
6	1320	718	0	0	1040	225	460	704	0	759	0	0
7	875	934	285	949	1420	0	539	525	98	0	0	356
8	911	391	284	952	1350	0	458	213	94	591	0	385
9	935	405	283	936	937	253	470	0	170	715	0	364
10	934	1130	811	947	854	223	604	105	171	0	0	382
11	991	957	947	953	1060	224	0	466	170	0	0	376
12	930	929	229	459	1100	258	0	443	168	760	0	0
13	930	948	0	0	1560	224	581	602	0	604	0	0
14	932	994	878	926	1810	0	933	439	130	761	0	410
15	940	1200	276	939	1830	0	881	447	168	773	0	382
16	682	1030	292	00	1830	225	820	0	175	729	0	386
17	938	936	285	932	1840	222	825	0	171	0	0	383
18	578	1170	296	1030	1760	225	0	562	522	0	0	384
19	396	1660	0	736	1850	286	104	699	176	781	0	0
20	923	1070	0	66	1860	357	463	799	0	538	0	0
21	916	956	0	933	1850	0	463	687	0	784	0	380
22	634	921	290	929	1600	0	466	703	586	710	0	364
23	632	416	663	915	0	695	469	127	320	914	0	0
24	611	933	947	1050	0	768	649	131	777	0	0	0
25	641	646	947	942	916	996	0	514	761	0	0	0
26	396	348	586	931	949	754	0	471	773	885	0	0
27	630	743	282	944	930	463	230	469	0	756	0	0
28	927	367	923	940	957	0	221	574	0	1050	286	448
29	881	0	---	935	920	0	223	178	755	337	0	671
30	921	0	---	953	0	0	330	178	498	1020	0	662
31	628	292	---	946	---	455	---	145	689	---	378	---
Total	24120	22627	10718	23985	34593	8065	11576	11010	8219	15242	714	7818
Mean	778	730	383	734	1153	260	386	355	265	508	23.0	261

Year total 178,869 $(ft^3/s)\cdot d$ Mean 490 ft^3/s

Table 15. Daily Mean discharge, Delaware River at Montague, N.J., (01438500) for the year ending November 30, 1994.
(U.S. Geological Survey published record)
[All values, except total, in cubic feet per second, ft^3/s; total in cubic per second days, $(ft^3/s)\cdot d$]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	13300	3900	5500	5200	16100	5350	2570	3700	2440	3580	5780	2360
2	10200	3600	4700	4600	18400	8480	2360	3250	2800	3350	4810	3620
3	8750	3830	4200	4500	21200	7230	2170	2470	2860	3020	4480	5330
4	7980	3900	3700	4600	26500	6090	2060	2080	2620	2000	3840	4320
5	12000	3400	3300	4300	25600	5650	1570	1960	2420	1840	3320	3790
6	20400	3500	2900	3600	24800	4820	1670	2540	2270	2090	3060	3060
7	14300	3300	3000	3900	32500	4470	2060	2610	2200	2610	2670	2870
8	11400	3400	3200	5000	34600	5660	2230	2480	1980	2280	2450	3310
9	9660	2800	2900	7000	24100	7480	2260	3220	1780	2100	2440	2840
10	8570	3400	2900	10000	21400	6380	2010	2350	1710	2150	2220	2740
11	9000	3600	3300	15500	27300	5480	1890	2110	1660	1680	2320	2900
12	9600	3100	3200	15400	24800	4980	1830	2320	1640	1840	2350	2770
13	7560	3000	2500	11300	27300	5170	3070	2090	1720	2320	2150	2190
14	6640	3000	2500	10200	47600	4470	3610	2280	2010	2010	1960	2080
15	6480	2800	3300	11200	35700	3910	5150	2100	4630	2160	1880	2410
16	5700	2700	2600	11100	31600	4980	4830	2150	4160	2010	1870	2310
17	5680	2500	2500	10000	38600	5980	4030	2200	3080	2020	1610	2220
18	5010	2500	2700	8710	29800	5340	3630	1990	8830	2080	2020	2160
19	4350	3000	2600	8340	23400	4860	2990	2420	20700	2180	1820	2140
20	4750	3000	2600	6690	19700	4710	2540	2250	12400	2190	2040	1730
21	5500	2500	4500	6750	16400	4360	2580	2460	8000	1740	1930	1900
22	9370	2500	8000	9710	13800	3870	2420	2710	9570	1820	1930	3370
23	8080	2800	10000	15600	10800	3830	2380	3270	12700	1960	1890	3620
24	6390	2400	10000	19900	8470	3960	2380	3780	9440	2350	1940	3280
25	5700	2700	8200	24500	8030	3590	2720	4390	7560	1600	1690	2690
26	5500	2100	6400	23800	7640	3680	2380	4380	6210	1920	1530	2390
27	4900	2100	5500	20300	7400	3920	2220	3690	4680	6360	1680	2280
28	3900	2700	5100	22900	6770	3200	2620	4260	3600	11000	1890	4960
29	4200	3300	---	23200	6220	2790	3570	3850	3560	8410	2080	14900
30	4200	4100	---	19700	5180	2510	3740	3200	4550	6740	1790	12400
31	4500	6200	---	16800	---	2360	---	2680	3490	---	1770	---
Total	243570	97630	121800	364300	641710	149560	81540	87240	157270	89410	75210	108940
Mean	7857	3149	4350	11750	21390	4825	2718	2814	5073	2980	2426	3631

Year total 2,218,180 $(ft^3/s)\cdot d$ Mean 6,077 ft^3/s

Table 16. Diversions by New Jersey; daily mean discharge, Delaware and Raritan Canal at Port Mercer, N.J. (01460440) for the year ending November 30, 1994.

[All values, except total, in million gallons per day, Mgal/d; total in million gallons, Mgal]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	72	97	85	90	81	85	88	80	91	92	81	87
2	76	97	84	89	84	87	88	92	93	91	84	72
3	89	96	91	85	83	87	90	92	96	92	85	78
4	89	90	92	92	85	87	92	91	90	93	89	86
5	37	97	92	80	80	89	91	96	84	91	90	89
6	51	96	92	74	89	87	86	94	90	92	90	90
7	73	98	88	76	82	88	82	92	91	89	90	91
8	84	101	90	59	82	75	87	92	89	90	87	90
9	83	98	92	61	83	81	90	96	86	89	85	92
10	84	99	96	-37	85	86	90	92	84	89	85	92
11	92	100	79	58	86	85	88	87	84	89	74	89
12	83	98	98	64	87	87	89	96	86	90	74	90
13	81	94	96	67	79	87	85	98	86	86	87	93
14	83	94	96	67	72	87	87	100	78	92	85	92
15	94	94	96	65	83	88	92	98	78	92	85	92
16	96	99	97	70	78	88	90	94	83	89	83	93
17	94	103	98	75	78	85	91	94	85	89	87	95
18	93	54	98	72	83	87	91	94	86	88	87	96
19	94	100	98	75	84	87	93	94	85	89	79	92
20	94	94	96	76	87	85	93	92	86	92	86	90
21	58	90	62	78	87	87	91	92	88	95	89	91
22	76	90	70	41	87	88	94	91	40	93	87	83
23	91	90	72	72	84	88	94	95	55	94	90	90
24	89	90	78	76	83	88	94	87	87	93	89	91
25	89	90	72	75	86	87	94	87	94	95	80	92
26	87	89	83	83	86	82	92	90	86	94	87	92
27	92	91	90	78	85	85	90	90	86	93	92	94
28	96	-14	89	65	88	86	94	96	87	80	92	65
29	95	.31	---	47	86	87	81	88	87	78	87	72
30	98	87	---	72	87	87	81	91	89	78	87	84
31	98	89	---	81	---	87	---	91	90	---	87	---
Total	2611	2691.31	2470	2126	2510	2670	2688	2862	2620	2697	2660	2643
Mean	84.2	86.8	88.2	68.6	83.7	86.1	89.6	92.3	84.5	89.9	85.8	88.1

Year total 31,248.31 Mgal

Mean 85.6 Mgal/d

SECTION III

WATER QUALITY OF THE DELAWARE RIVER ESTUARY

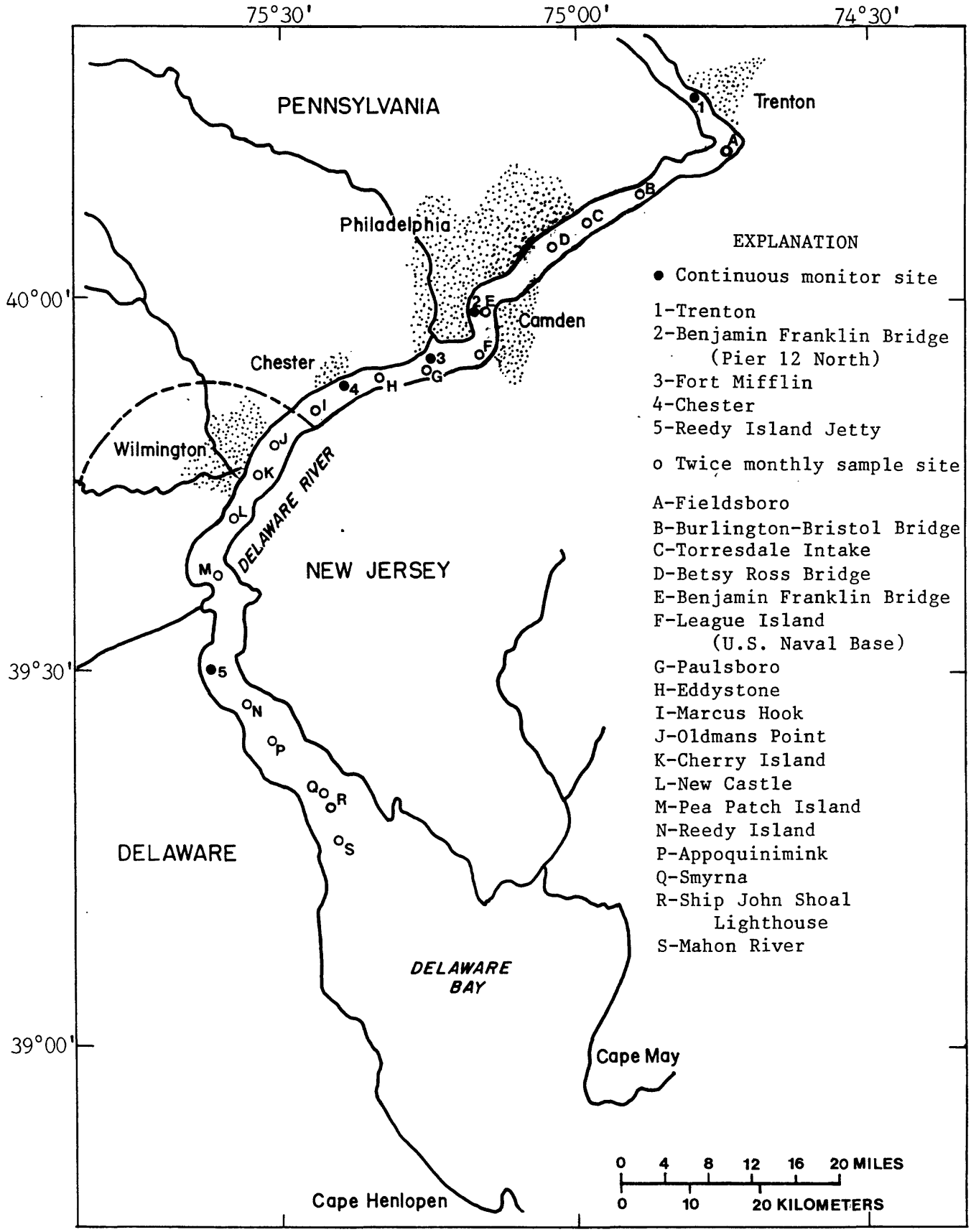

Figure 6.- Location of water quality monitoring sites in the Delaware River Estuary.

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 cooperation with the Delaware River Basin Commission, in the Delaware Estuary during the 1994 report year. Also presented here are some of the data that were obtained by this program and a brief discussion of their significance.

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 1994

The following is a summary and discussion of the data that were collected during the 1994 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 lower specific conductance and chloride levels. Increased flow also aids in maintaining lower water temperature during warm weather and in 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 June (6,393 ft^3/s) and highest during April (38,970 ft^3/s) (table 17)[2]. The monthly mean streamflow was above the respective monthly mean for the period of record in December, March, April, August, and September, 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 processes occurring in 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 activity. The primary factors that control water temperature in the estuary are climatic; however, various uses of the water by man also can have significant effects.

Records from Benjamin Franklin Bridge (Pier 12 North), Philadelphia, Pa., show that mean monthly temperatures for the period March to November 1994, were below the long-term mean during March, April, May, August, September, and October and equaled or exceeded the long-term mean during the rest of the year. The long-term mean is based on historical temperature records from 1962 to 1993 (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 in bodies of water usually reflects the geochemistry of the drainage basin; however, pollution and the intrusion of oceanic salts also can have a considerable effect on specific conductance. Increasing streamflows generally reduces the concentration of dissolved solids thus lowering specific conductance and chloride concentration. Decreasing flows have the opposite effects.

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2. All numbered tables in Section III are grouped at the end of this section, beginning on page 74.

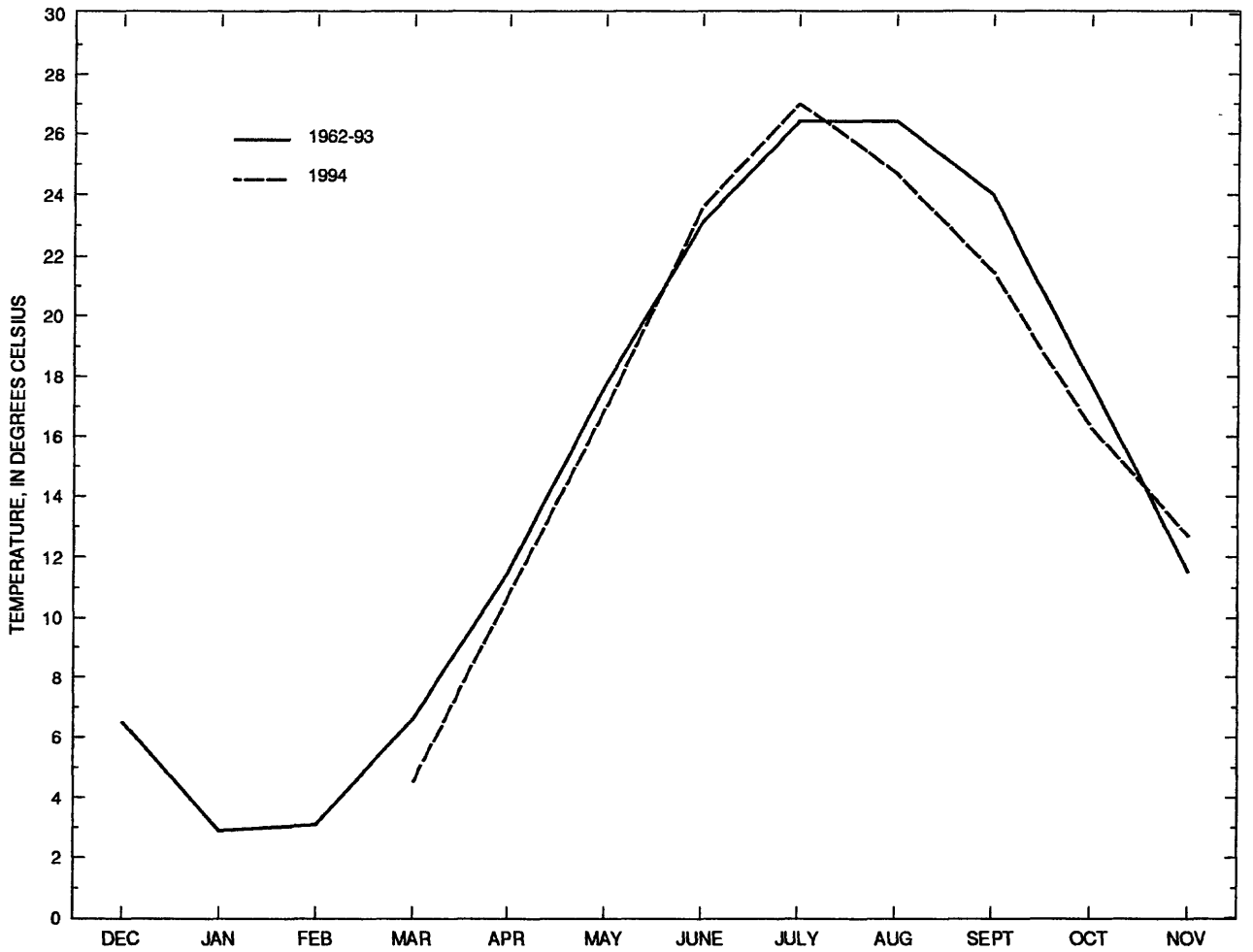

Figure 7.- Monthly mean temperatures of the Delaware River at Benjamin Franklin Bridge, Philadelphia, Pennsylvania.

In the Delaware Estuary, the intrusion of oceanic salts is important to those who 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.

Sea water has a chloride concentration of approximately 19,000 mg/L, so 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 18 and 19. 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 20) were furnished by Scott Paper Company.[3]

At Fort Mifflin, the maximum daily chloride concentration for April 7 through July 9 never exceeded 50 mg/L (table 18). At Chester, the minimum daily chloride concentration equaled or exceeded 50 mg/L, 15 percent of the time. The maximum daily concentration was greater than 50 mg/L, 63 percent of the time (table 20). The maximum daily chloride concentration was 115 mg/L on January 26. Minimum chloride concentrations at Reedy Island Jetty were less than 30 mg/L on March 14, 26-28 and April 4 through May 1 (table 19). Except for periods of very low chloride concentration coinciding with major runoff events in December to May, maximum chloride concentrations typically ranged from 1,500 to 7,000 mg/L. The maximum at this site was 7,000 mg/L on October 15 and November 1.

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. The principal factors that affect dissolved-oxygen concentrations are water temperature, point and nonpoint biochemical oxygen demand (BOD), fresh-water inflow to the estuary, phytoplankton populations, turbidity, salinity, and tidal and wind-driven mixing. Dissolved-oxygen concentrations 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 concentrations are usually reached.

Dissolved-oxygen concentration has been measured by the U.S. Geological Survey at various continuous-monitoring sites in the Delaware Estuary since 1962. Two of these sites, Benjamin Franklin Bridge at Philadelphia, Pa., and Chester, Pa., (fig. 6) have nearly continuous records and are in the reach of the estuary that has been most affected by pollutant loadings. Changes in dissolved-oxygen concentration with time at these two stations for 1965 to 1994 are shown in figure 8. A marked improvement in DO with time is apparent. Although concentrations have increased substantially from 1965 to 1994, substantial variation in monthly means can be seen from year to year. The low dissolved-oxygen concentrations during 1976-81 at the Benjamin Franklin Bridge may be related primarily to construction of secondary-treatment facilities at the Philadelphia wastewater treatment plants. Although the three upgraded wastewater treatment plants in Philadelphia were fully operational by fall 1986, the trend in dissolved-oxygen concentration is still upward after 1986. Some BOD may be from bottom sediments that gradually are being oxidized. If this is true, some further improvement (increases) in DO with time may occur even without further improvements to wastewater treatment plants.

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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.

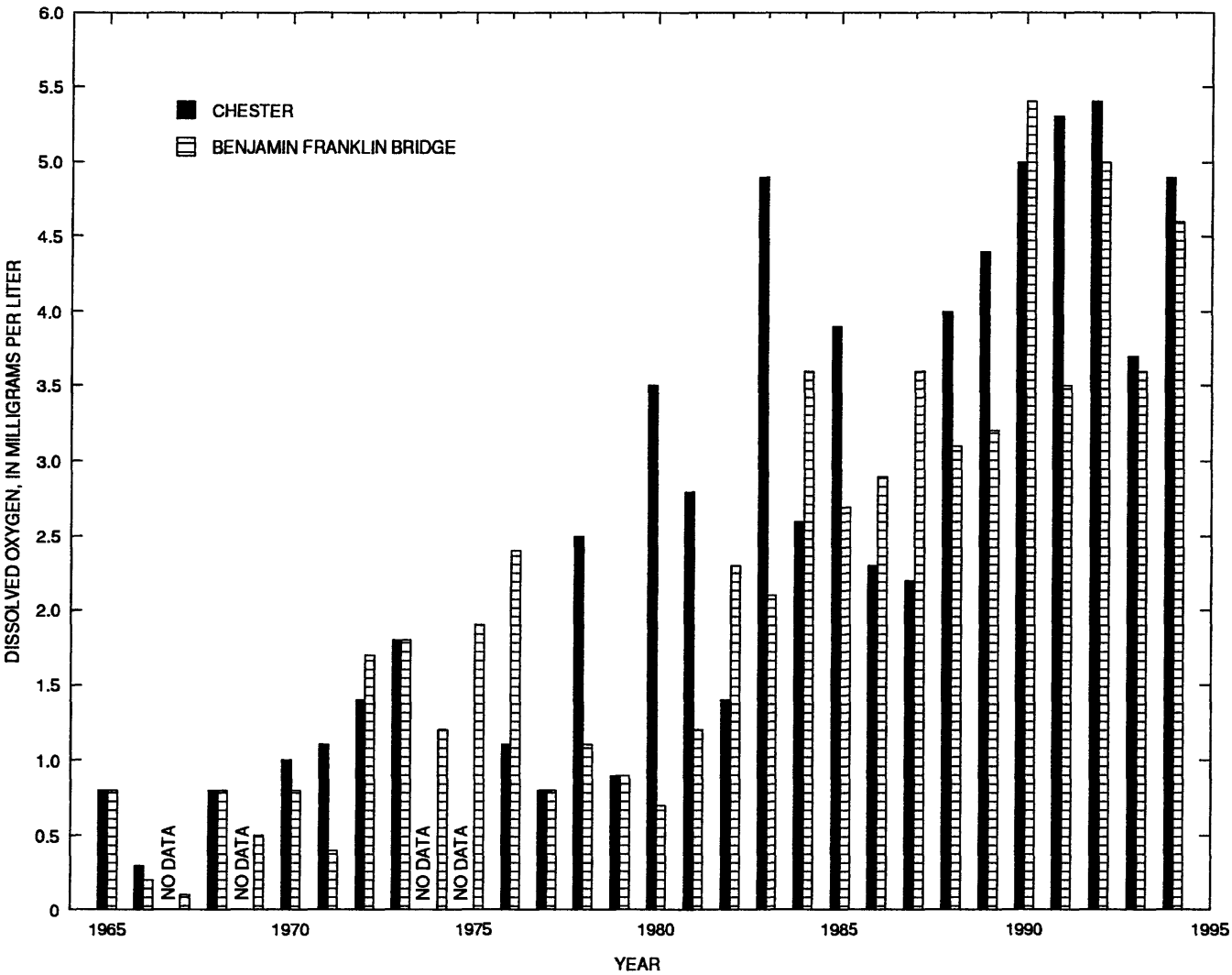

Figure 8.- Mean monthly dissolved-oxygen concentrations for two stations in the Delaware Estuary for July, 1965-94.

During the past year, daily mean dissolved-oxygen concentration at the Benjamin Franklin Bridge was below 5 mg/L on most days in late June, late July, and early August (table 21). The minimum daily mean was 3.4 mg/L on July 20. At Chester, the daily mean dissolved-oxygen concentration was below 5 mg/L on 29 days in June, July, and August (table 22). The lowest daily mean was 4.0 mg/L on July 20. The minimum hourly value was 3.7 mg/L on July 20 and 21. At Reedy Island Jetty, the minimum hourly value was 4.1 on August 26.

The frequency of occurrance of hourly dissolved-oxygen concentrations at Benjamin Franklin Bridge and Chester during the critical summer period, July through September 1994 is shown in figure 9. At Chester, the dissolved-oxygen concentration was equal to or below 4 mg/L,

2 percent of the time in 1994, as compared to 36 percent of the time in 1993 and 6 percent of the time in 1992. At Benjamin Franklin Bridge, the dissolved-oxygen concentration was equal to or below 4 mg/L, 15 percent of time in 1994, as compared with 65 percent of the time in 1993, and 32 percent of the time in 1992

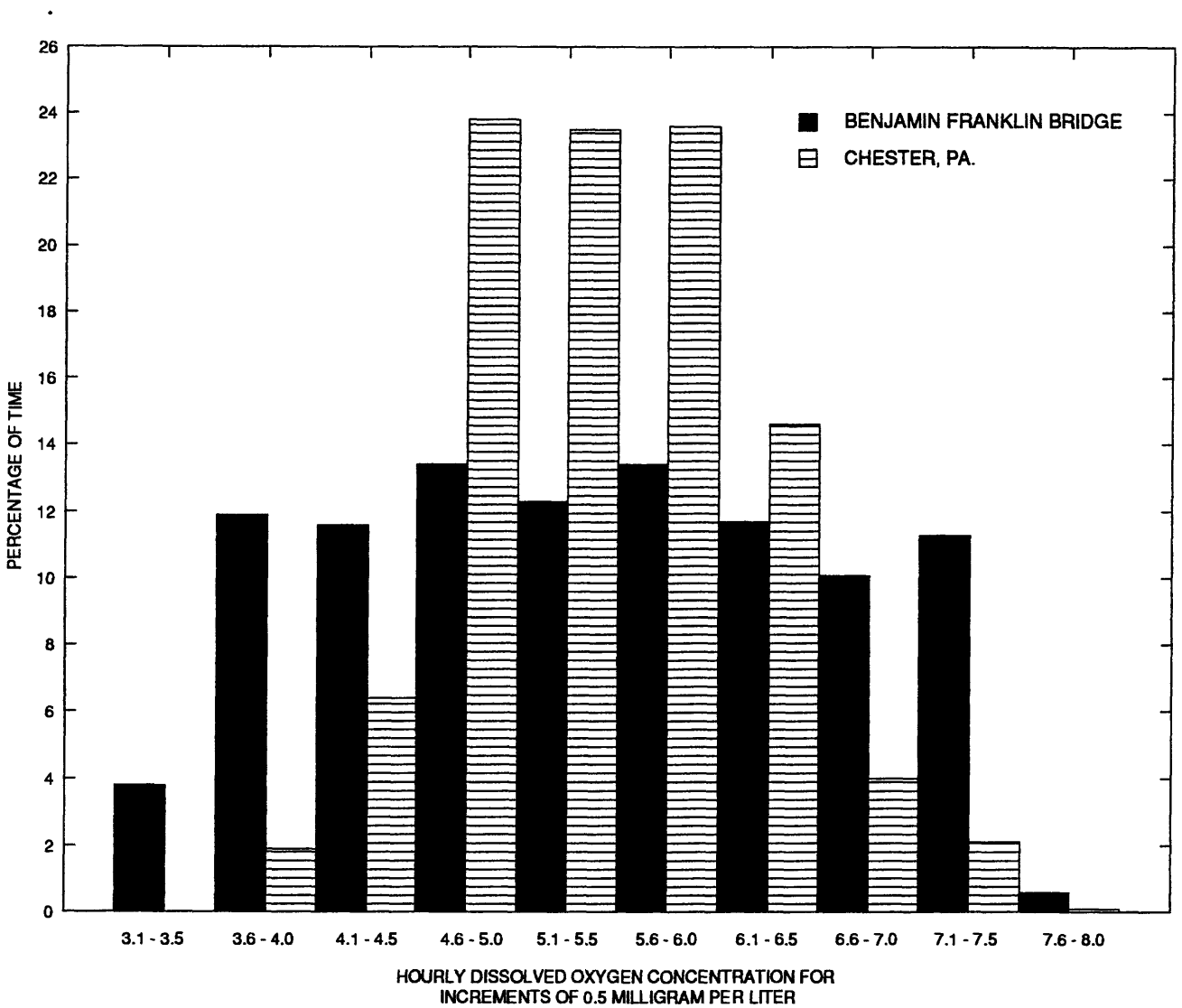

Figure 9.- Frequency of occurrence of dissolved-oxygen concentrations at two stations in the Delaware River, during July, August, and September 1994.

Hydrogen-Ion Activity (pH)

Values of pH (hydrogen-ion activity) 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 also can 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 6.6 to 8.4. The pH range for each station is: Reedy Island Jetty, 6.6 to 8.4; Chester, 6.8 to 7.5; Benjamin Franklin Bridge, 6.6 to 7.6. The pH in the estuary tends to be lowest near Trenton, N.J., and tends to increase downstream.

Table 17. Daily Mean discharge, Delaware River at Trenton, N.J., (01463500) for the year ending November 30, 1994.
(U.S. Geological Survey published record)
[All values, except total, in cubic feet per second, ft^3/s; total in cubic per second days, $(ft^3/s)\cdot d$]

DAY	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
1	39000	8950	17000	13900	42700	13000	5220	15800	5710	8950	13700	4070
2	29600	9380	15000	13600	39600	14100	5200	12100	5030	7990	12800	4860
3	21600	9310	13000	12800	40200	16800	4910	9550	5030	7840	11200	7110
4	17800	8370	11500	12300	43200	15200	4570	7670	5070	7400	10500	9770
5	41100	8490	10500	12500	48600	13000	4490	6620	5160	6260	9640	9400
6	50800	8000	10000	12900	45800	12100	4200	5970	4930	5670	8740	8060
7	43900	6990	9840	11300	45700	10900	6950	5970	4590	5440	7320	6850
8	33500	7250	9200	12200	57600	13600	5760	6500	4420	5920	6480	6180
9	26000	7090	9000	14600	53300	15700	4850	6720	4130	5760	6870	6320
10	21700	6300	8000	26100	42700	16000	4690	6610	3760	5450	7220	6490
11	20600	6100	7600	37500	40100	13900	4460	6330	3460	5290	7440	6460
12	19800	6800	7600	35500	43600	12500	4060	5200	3380	5030	6860	6470
13	18900	7000	8600	33500	44200	11900	7530	5000	3370	4930	6870	6110
14	16100	7230	8100	31400	61500	11300	8700	4820	3700	5180	6270	5640
15	14400	7380	7100	33100	71600	10500	9180	5090	4600	4940	5590	5190
16	14000	6500	7400	33500	58700	9960	8630	4860	5300	5100	5380	5300
17	13200	5600	7200	30700	56100	11500	8810	4600	7580	5020	5060	5310
18	12100	6000	7000	26400	55900	12600	7500	4380	11100	5410	4840	5060
19	11700	5500	7500	23000	44600	11900	6660	4490	18200	5620	4590	4830
20	11100	5800	7690	21000	37200	11000	6050	4200	27500	5520	4660	4750
21	13800	6200	10800	19800	32000	10400	5380	4300	19100	5270	4350	4750
22	19600	6100	18500	27400	27600	9650	5010	4150	24700	5060	4520	6300
23	21100	6000	22500	38200	24100	8540	4760	5080	36400	5080	4400	8390
24	18300	5800	22900	48100	20300	7940	4570	11100	27600	5220	4950	8460
25	15000	6000	23500	53000	17400	8090	5150	8290	20100	5610	5250	7860
26	13500	6500	21300	57500	16300	8060	5760	8120	16500	5140	5120	6940
27	12200	6000	18200	53800	15500	7660	5730	8420	14400	9350	4570	6430
28	10500	5300	15300	56700	15400	7530	7260	11200	12700	19200	4140	11400
29	10500	11000	---	63400	14100	7170	8740	10200	10300	22200	4080	27300
30	9620	13000	---	56100	13600	6190	17000	8130	9650	17000	4150	32400
31	9380	13700	---	48300	---	5680	---	6480	10000	---	4320	---
Total	630400	229640	341830	970100	1169200	344370	191780	217950	337470	217850	201880	244460
Mean	20340	7408	12210	31290	38970	11110	6393	7031	10890	7262	6512	8149

Year total 5,096,930 $(ft^3/s)\cdot d$ Mean 13,960 ft^3/s

Table 18. Daily maximum and minimum chloride concentrations, Delaware River at Fort Mifflin, Pa. (in milligrams per liter) December 1, 1993 to November 30, 1994

[Monitor was not in operation December 1, 1993 to April 6, 1994; --, 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									--	--	*	*	34	*	43	*	--	--	--	--	--	--	--	--
2									--	--	*	*	31	*	36	*	--	--	--	--	--	--	--	--
3									--	--	*	*	30	*	39	*	--	--	--	--	--	--	--	--
4									--	--	40	*	32	*	33	*	--	--	--	--	--	--	--	--
5									--	--	41	*	*	*	30	*	--	--	--	--	--	--	--	--
6									--	--	40	*	33	*	*	*	--	--	--	--	--	--	--	--
7									*	*	35	*	49	*	*	*	--	--	--	--	--	--	--	--
8									*	*	42	*	44	*	*	*	--	--	--	--	--	--	--	--
9									*	*	39	*	34	*	*	*	--	--	--	--	--	--	--	--
10									*	*	31	*	*	*	--	--	--	--	--	--	--	--	42	31
11									*	*	*	*	*	*	--	--	--	--	--	--	--	--	44	31
12									*	*	33	*	*	*	--	--	--	--	--	--	--	--	45	31
13									*	*	34	*	32	*	--	--	--	--	--	--	--	--	40	31
14									*	*	33	*	39	*	--	--	--	--	--	--	--	--	37	31
15									*	*	31	*	40	*	--	--	--	--	--	--	--	--	39	31
16									*	*	31	*	42	*	--	--	--	--	--	--	--	--	38	31
17									*	*	*	*	41	*	--	--	--	--	--	--	--	--	38	32
18									*	*	*	*	39	*	--	--	--	--	--	--	--	--	51	32
19									*	*	*	*	35	*	--	--	--	--	--	--	--	--	49	32
20									*	*	34	*	38	*	--	--	--	--	--	--	--	--	42	30
21									*	*	38	*	40	*	--	--	--	--	--	--	--	--	38	31
22									*	*	34	*	37	*	--	--	--	--	--	--	--	--	54	32
23									*	*	35	*	36	*	--	--	--	--	--	--	--	--	53	33
24									*	*	*	*	35	*	--	--	--	--	--	--	--	--	45	31
25									*	*	37	*	37	30	--	--	--	--	--	--	--	--	39	30
26									*	*	38	*	35	30	--	--	--	--	--	--	--	--	40	*
27									*	*	32	*	36	*	--	--	--	--	--	--	--	--	36	*
28									*	*	*	*	45	31	--	--	--	--	--	--	--	--	43	*
29									*	*	32	*	48	32	--	--	--	--	--	--	--	--	46	*
30									*	*	32	*	43	31	--	--	--	--	--	--	--	--	*	*
31											32	*			--	--	--	--			--	--		

Table 19. Daily maximum and minimum chloride concentrations, Delaware River at Reedy Island Jetty, Del. (in milligrams per liter) December 1, 1993 to November 30, 1994.

[--, 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	490	2,500	590	--	--	2,000	400	--	--	710	*	2,700	1,800	3,100	1,200	3,100	760	4,100	860	5,300	2,200	7,000	3,300
2	1,800	400	3,100	610	--	--	1,800	430	--	--	570	36	3,200	1,800	3,700	1,300	3,800	840	5,500	1,100	6,000	2,400	5,900	2,900
3	1,500	330	2,600	720	--	--	3,600	870	--	--	1,000	30	3,600	2,000	3,400	1,300	4,000	890	5,800	1,900	5,900	2,500	5,200	2,600
4	2,000	350	4,600	1,200	--	--	3,100	880	*	*	1,300	62	3,700	2,100	3,600	840	5,100	1,100	6,000	2,000	5,900	2,700	5,600	2,800
5	1,400	240	2,100	980	--	--	2,400	740	*	*	2,100	230	4,300	2,400	3,800	940	5,100	980	6,400	2,300	5,900	2,700	--	--
6	430	150	1,900	820	--	--	2,100	620	*	*	1,900	290	4,100	2,300	3,800	910	5,400	970	5,900	2,400	6,000	2,700	6,000	2,900
7	200	120	2,600	850	--	--	2,500	570	*	*	2,500	320	4,100	2,000	3,800	910	6,000	1,600	5,300	2,300	5,900	2,700	4,300	2,400
8	320	120	3,100	860	--	--	1,500	460	*	*	2,500	310	3,600	1,800	4,100	1,000	5,900	1,900	5,100	2,200	5,900	2,700	4,500	2,200
9	620	140	2,100	720	--	--	1,500	390	*	*	2,500	300	4,000	2,100	4,200	1,300	5,600	2,000	4,800	2,300	6,000	2,900	5,200	2,100
10	910	170	1,800	680	--	--	1,600	260	*	*	2,600	250	4,100	2,300	4,500	1,400	5,300	2,000	4,400	2,200	5,900	2,800	5,900	2,300
11	340	170	2,900	680	--	--	370	57	*	*	2,100	240	4,000	2,400	4,600	1,400	5,000	1,900	5,000	2,300	6,300	2,800	5,600	2,300
12	1,000	200	3,700	800	--	--	350	41	*	*	2,200	220	4,100	2,500	4,700	1,500	4,400	2,000	4,800	2,300	6,000	3,000	6,000	2,500
13	2,200	220	3,900	980	--	--	260	35	*	*	1,400	100	3,900	2,400	--	--	4,500	2,100	5,200	2,300	5,900	3,100	5,600	2,600
14	3,200	490	3,900	1,300	--	--	85	*	*	*	1,800	120	3,700	2,300	--	--	3,900	1,800	5,900	2,300	5,600	3,200	6,400	2,900
15	2,800	570	2,700	1,200	--	--	60	34	*	*	1,900	170	3,400	2,100	--	--	4,200	1,600	6,000	2,400	7,000	3,500	5,900	2,800
16	3,300	850	1,600	930	--	--	100	39	--	--	2,800	440	3,500	2,100	4,300	1,500	4,300	1,600	5,500	2,600	6,000	3,600	--	--
17	3,500	760	2,900	980	--	--	250	30	50	*	3,400	600	3,700	2,200	4,600	1,600	4,400	1,700	5,300	2,600	6,300	3,600	--	--
18	2,600	750	1,800	1,000	--	--	1,600	54	54	*	4,100	730	3,900	2,200	5,200	1,600	3,400	1,500	5,300	2,500	6,400	3,600	--	--
19	1,600	700	1,600	1,500	--	--	1,500	200	210	*	4,800	1,400	3,800	2,100	5,200	1,700	3,600	1,200	5,500	2,600	6,300	3,600	--	--
20	1,900	630	1,600	1,500	--	--	1,600	200	320	*	5,100	1,700	4,400	2,300	4,800	1,700	3,600	1,200	5,400	2,700	6,200	3,600	--	--
21	2,300	590	1,600	1,500	--	--	2,300	260	710	*	4,500	1,500	4,400	2,500	4,800	1,800	3,600	990	5,200	2,700	5,900	3,400	--	--
22	1,100	400	1,600	1,500	--	--	3,000	510	1,300	*	4,400	1,500	4,400	2,400	4,300	1,300	2,800	690	5,400	2,800	5,900	3,300	--	--
23	1,800	330	1,600	1,600	--	--	2,200	250	1,000	*	4,300	1,500	4,300	2,600	3,700	990	2,800	590	6,800	3,300	6,000	3,100	4,700	2,900
24	2,500	350	--	--	--	--	1,900	120	1,000	*	--	--	4,600	2,700	3,200	940	2,700	420	5,900	3,000	5,900	3,100	5,500	2,600
25	2,700	560	--	--	--	--	910	53	620	*	--	--	4,600	2,700	3,700	970	2,000	430	6,000	3,000	5,300	3,000	5,900	2,800
26	1,600	370	--	--	700	430	180	*	840	*	--	--	3,800	2,300	3,900	1,100	1,600	340	6,000	3,600	5,800	2,900	5,300	2,800
27	1,700	240	--	--	660	340	140	*	1,200	*	--	--	4,000	2,500	3,200	1,100	1,900	350	5,600	3,600	5,800	3,000	6,800	2,600
28	2,000	280	--	--	1,200	340	37	*	590	*	--	--	3,000	2,000	3,500	1,200	2,300	340	5,400	3,100	6,300	3,000	6,500	3,200
29	2,800	500	--	--			--	--	670	*	--	--	3,700	2,100	2,400	880	2,600	440	5,000	2,800	6,800	3,300	4,600	2,600
30	2,300	530	--	--			--	--	670	*	2,500	1,400	3,000	1,800	2,700	880	3,400	510	5,100	2,200	6,300	3,100	4,300	2,000
31	3,200	560	--	--			--	--			2,800	1,400			2,800	770	3,900	700			6,800	3,000		

Table 20. Daily maximum and minimum chloride concentrations, Delaware River at Chester, Pa. (in milligrams per liter) December 1, 1993 to November 30, 1994. Collection and analysis by Scott Paper Company[1]

[--, missing data; 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	60	21	52	29	63	52	50	42	--	--	51	23	32	26	66	30	46	30	58	26	--	--	95	67
2	48	23	52	30	62	50	70	42	--	--	45	26	32	28	64	40	36	30	34	23	--	--	74	56
3	30	22	40	27	61	50	65	46	--	--	53	28	68	32	64	54	39	30	35	28	--	--	74	44
4	26	18	36	28	62	48	64	44	54	26	32	26	68	46	60	36	34	30	69	25	48	32	104	51
5	22	16	43	40	66	46	70	42	46	25	30	26	58	42	59	36	38	30	46	21	45	30	100	52
6	52	17	52	28	62	49	76	54	39	24	54	36	55	32	53	36	36	30	45	23	52	30	86	56
7	35	16	45	35	72	46	72	50	31	21	52	40	56	32	57	35	36	30	58	30	48	30	60	45
8	24	20	110	45	54	45	78	50	30	22	48	30	64	32	39	30	50	30	57	30	49	28	62	50
9	22	18	68	55	52	45	54	46	28	23	50	40	56	32	37	30	48	32	56	22	54	33	75	45
10	25	18	57	49	50	42	50	42	53	25	46	32	42	30	36	32	65	30	46	24	38	30	65	51
11	24	20	68	48	63	41	65	40	52	24	55	32	34	32	55	32	72	34	52	28	38	32	72	54
12	27	20	80	57	67	48	65	38	58	22	54	31	36	32	52	30	62	33	32	29	54	32	64	58
13	27	20	75	40	82	45	60	48	74	42	40	30	68	31	62	30	62	35	32	26	48	30	66	57
14	31	20	80	48	68	48	54	38	88	25	38	28	78	30	52	30	65	35	48	30	56	40	72	55
15	25	22	72	60	68	48	55	36	35	22	36	30	56	40	65	34	40	32	48	30	58	40	68	50
16	28	22	75	60	74	50	39	32	30	21	46	32	54	38	54	37	38	32	57	32	50	38	63	48
17	24	20	82	64	72	45	36	32	30	20	52	38	68	37	72	35	65	32	52	34	55	40	62	52
18	52	23	85	64	100	49	46	32	52	22	58	26	52	32	37	34	65	32	52	32	70	40	95	58
19	55	24	86	72	78	50	40	32	48	22	42	29	65	30	35	32	62	34	54	35	68	45	75	62
20	65	28	82	76	65	60	48	34	46	23	29	24	35	30	68	34	67	32	56	35	68	40	73	48
21	45	26	77	64	82	60	59	32	45	22	33	30	38	33	52	36	82	36	46	32	76	42	78	62
22	45	28	78	56	76	50	72	32	36	22	30	25	54	30	54	32	56	35	75	40	75	40	69	52
23	45	35	82	70	63	55	66	37	42	25	35	25	52	31	40	32	54	32	68	40	86	49	70	43
24	35	30	105	65	65	55	61	26	42	26	36	28	56	35	40	32	34	28	65	40	63	42	58	43
25	35	30	92	85	58	51	62	30	27	22	47	33	52	36	38	32	32	28	64	39	65	45	58	45
26	34	30	115	78	78	50	--	--	27	20	52	32	58	38	36	32	75	32	64	48	65	40	55	41
27	55	26	95	80	74	48	--	--	53	26	58	30	52	35	35	30	68	30	--	--	65	40	60	41
28	54	22	100	73	52	42	--	--	63	25	42	30	48	36	35	26	48	26	--	--	74	40	61	44
29	48	24	80	68			--	--	48	23	58	30	38	26	35	30	32	29	--	--	62	41	50	33
30	55	25	74	61			--	--	58	25	53	30	40	32	37	30	30	26	--	--	62	46	48	38
31	55	25	72	59			--	--			68	31			42	34	48	22			78	50		

[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 21. Dissolved oxygen, Delaware River at Benjamin Franklin Bridge at Philadelphia, Pa.
Daily mean dissolved oxygen in milligrams per liter
December 1, 1993 to November 30, 1994.
[Monitor was not in operation December 1, 1993, to March 9, 1994]

Date	December	January	February	March	April	May	June	July	August	September	October	November
1				--	--	9.1	8.1	4.8	4.3	6.6	6.8	7.1
2				--	11.8	9.1	8.2	--	4.2	6.9	6.8	7.5
3				--	11.7	9.0	8.3	5.3	4.2	7.0	7.1	7.6
4				--	11.5	8.9	8.5	5.6	4.4	7.1	7.3	7.6
5				--	11.4	8.9	8.4	5.6	4.5	7.3	7.4	7.7
6				--	11.2	9.0	8.3	5.7	4.7	7.4	7.4	--
7				--	11.0	9.2	7.6	6.0	4.8	7.4	7.4	7.9
8				--	--	9.2	7.1	6.1	5.0	7.3	7.3	7.1
9				--	--	9.2	6.8	5.9	5.0	7.3	7.2	6.8
10				12.6	--	9.3	6.7	5.8	5.1	7.2	7.2	6.6
11				13.1	--	9.3	6.6	5.7	5.1	7.2	7.3	6.7
12				13.3	--	9.3	6.4	5.5	4.9	7.1	7.4	--
13				13.4	--	9.3	6.0	5.3	4.7	7.0	7.3	6.9
14				13.1	11.1	9.2	5.9	5.1	4.6	6.9	7.2	8.0
15				12.9	11.2	9.1	5.6	4.6	4.5	6.8	7.3	8.5
16				12.5	11.1	8.8	5.3	4.0	4.4	6.6	7.4	--
17				12.3	10.9	8.7	5.0	3.8	--	6.4	7.4	8.5
18				11.9	10.7	8.7	4.8	3.8	4.8	6.3	7.3	8.5
19				11.9	10.6	8.4	4.6	3.5	--	6.2	7.3	8.5
20				12.0	10.6	8.1	4.7	3.4	--	6.1	7.2	8.5
21				12.0	10.6	8.1	4.7	3.5	--	6.0	7.3	8.3
22				12.0	10.4	8.2	4.6	3.7	--	5.9	7.4	8.2
23				12.0	10.2	8.0	4.5	3.8	--	5.9	7.1	8.5
24				11.7	10.1	8.1	4.4	3.8	6.1	5.7	7.2	8.7
25				11.7	9.5	8.2	4.4	3.8	6.0	5.5	7.2	8.8
26				12.1	9.6	8.2	4.7	3.8	6.2	5.5	7.2	--
27				12.2	9.5	7.8	5.0	3.9	--	5.6	--	--
28				12.3	9.5	8.0	4.9	3.9	--	5.7	7.2	--
29				12.5	9.6	8.0	4.8	4.1	--	6.0	7.4	9.6
30				12.6	9.3	8.0	4.9	4.1	--	6.8	7.4	10.1
31				--		8.1		4.3	6.7		7.3	

Table 22. Dissolved oxygen, Delaware River at Chester, Pa.
Daily mean dissolved oxygen in milligrams per liter
December 1, 1993 to November 30, 1994.
[Monitor was not in operation December 1, 1993, to March 23, 1994; --, missing data]

Date	December	January	February	March	April	May	June	July	August	September	October	November
1				--	11.4	8.2	8.8	4.8	5.2	6.6	5.9	--
2				--	11.3	8.2	8.7	4.9	5.1	6.8	5.8	--
3				--	11.2	8.3	8.5	4.9	5.0	6.9	5.9	7.5
4				--	11.1	8.2	8.3	5.0	5.1	6.9	6.0	7.4
5				--	11.0	8.4	8.1	5.1	5.2	6.7	6.0	7.2
6				--	10.8	8.4	7.8	5.1	5.5	6.6	6.0	7.1
7				--	10.5	8.5	7.5	4.9	6.0	6.5	--	7.6
8				--	10.5	8.4	7.1	4.8	6.0	6.4	--	7.4
9				--	10.4	8.4	6.9	4.9	5.1	6.3	--	7.5
10				--	10.3	8.3	6.8	4.9	5.2	6.1	--	7.6
11				--	10.2	8.4	6.7	5.1	5.5	6.0	--	7.9
12				--	10.4	8.1	6.3	5.3	5.4	6.0	6.5	8.1
13				--	10.4	8.2	5.9	5.4	5.3	6.1	6.7	8.2
14				--	10.2	8.2	5.7	5.4	5.5	6.2	--	8.1
15				--	10.3	8.1	5.3	5.1	5.5	6.1	--	8.0
16				--	10.4	8.0	4.9	4.4	5.4	5.9	--	8.0
17				--	10.0	7.9	4.8	4.2	5.4	5.7	--	8.2
18				--	9.5	7.8	5.0	4.4	5.3	5.6	--	8.4
19				--	9.8	7.7	5.1	4.3	4.8	5.6	--	8.3
20				--	10.0	7.4	5.6	4.0	4.5	5.7	7.1	8.3
21				--	9.7	7.5	5.8	4.2	4.6	5.6	6.8	8.3
22				--	9.7	7.5	5.7	4.7	4.7	5.8	6.8	8.3
23				--	9.6	7.4	5.5	4.9	5.1	6.3	--	8.5
24				11.4	9.6	7.4	5.1	4.9	5.3	6.0	--	9.1
25				11.4	9.4	7.6	4.7	4.9	5.6	5.7	6.0	9.3
26				11.3	9.3	7.7	4.9	4.8	6.0	5.7	6.2	9.4
27				11.3	9.1	7.8	5.0	4.8	6.1	5.8	--	9.5
28				11.0	8.9	8.2	5.0	5.0	6.2	5.6	--	9.6
29				10.9	8.7	8.7	4.8	5.0	6.1	5.6	--	9.3
30				11.0	8.4	8.9	4.9	5.1	6.4	5.8	--	9.3
31				11.4		8.9		5.3	6.5		--	

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