REPORT OF THE RIVER MASTER OF THE DELAWARE RIVER

FOR THE PERIOD
DECEMBER 1, 1980 — NOVEMBER 30, 1981

by

Francis T. Schaefer and Robert E. Fish

U.S. GEOLOGICAL SURVEY
Open-File Report 82—341
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UNITED STATES DEPARTMENT OF THE INTERIOR

JAMES G. WATT, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

For additional information write to:

Chief Hydrologist
U.S. Geological Survey, WRD
433 National Center
Reston, Virginia 22092

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and

SPECIAL REPORT

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OFFICE OF THE DELAWARE RIVER MASTER

United States Geological Survey

433 National Center, Reston, Virginia 22092

March 26, 1982

The Honorable
Warren E. Burger
Chief Justice of the Supreme Court
of the United States

The Honorable
Pierre S. duPont IV
Governor of Delaware

The Honorable
Thomas H. Kean
Governor of New Jersey

The Honorable
Hugh L. Carey
Governor of New York

The Honorable
Richard L. Thornburgh
Governor of Pennsylvania

The Honorable
Edward I. Koch
Mayor of the City of New York

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

Dear Sirs:

For the record and in compliance with the provisions of the Amended Decree of the United States Supreme Court entered June 7, 1954, I am transmitting herewith the twenty-eighth Annual Report of the River Master of the Delaware River for the year December 1, 1980 to November 30, 1981.

As the report year began, the water-supply situation was showing

some improvement but it was evident that without appreciable precipitation and runoff, reservoir storage would again decline and that drought status could be reached in a matter of days in spite of the fairly stringent limits which had been placed on allowable diversions and required release rates. For example, storage in the New York City Delaware Reservoirs on December 1, 1980, was only 84.7 billion gallons, or 31.3 percent of capacity as compared to 237 billion gallons or 87.6 percent of capacity one year earlier, and the lowest for this date since 1966, during the most severe drought of record, when storage was only 78.2 billion gallons.

Storage had declined into the drought warning zone of the reservoir operation curves (Appendix B, last page) on October 16, 1980, and then after some replenishment from late November rains that temporarily reversed the trend, decreased into the drought zone on January 3, 1981. Storage continued to decline in spite of the restricted diversions and lower release rates until February 2 when reservoir contents were 68.5 billion gallons, only 25 percent capacity. Further decline was reversed by precipitation and runoff at that time and by February 25 contents had increased to a level higher than the drought warning curve and into the range considered normal for the time of year.

As reported last year, on November 12, 1980, I recommended to the Advisory Committee that the increasingly serious situation required additional conservation measures, including a 600 mgd (million gallons per day) limit on diversions to New York City, and a design flow of Delaware River at Montague, New Jersey, reduced to 1,500 cfs (cubic feet per second). At a meeting of representatives of all parties to the Decree and the Delaware River Basin Commission, agreement was reached on an average of 580 mgd and on 1,560 cfs respectively, the change being placed in effect November 20. These restrictions continued until December 20 when allowable diversions to the City were decreased further to an average of 560 mgd and reservoir releases were reduced again to provide a target flow of 1,550 cfs at the Montague gaging station. New Jersey diversions were limited to an average of 65 mgd.

By December 29, with the reservoir storage at 33 percent of capacity and dropping, I proposed to the Advisory Committee (Appendix A, River Master letter to Advisory Committee) that it would be necessary to consider more stringent conservation measures. By January 3, 1981, storage had declined into the drought zone, so on January 12, 1981 representatives of the parties, this office, and the Basin Commission met at the offices of the Corps of Engineers in Philadelphia, Pennsylvania, to assess the situation and to develop draft resolutions for consideration and action at a summit meeting of the Governors of the four Compact signatory States and the Federal Commissioner scheduled for January 15, 1981, in Trenton, New Jersey. The Commission was to consider whether to formally declare a drought emergency as provided for in Section 3.3 (a) of the Delaware River Basin Compact. This section provides that the Commission, without the unanimous consent of the parties to the U.S. Supreme Court Decree of 1954, "shall not impair, diminish or otherwise adversely affect the diversions, compensating releases . . ." set forth in the Decree, with the exception that after consultation with the River Master the Commission "may find and declare a

state of emergency resulting from a drought or catastrophe . . . and it may thereupon by unanimous consent of its members" (underlining supplied) authorize and direct changes in diversions and releases required by the decree "for such limited time as may be necessary to meet such an emergency condition."

The drought declaration, DRBC Resolution No. 81-1 (Appendix B), was adopted unanimously by the Commission at the January 15, 1981 meeting in Trenton, New Jersey, with, it should be noted, the concurrence of the Mayors of New York City and Philadelphia, who were invited to participate but who were not members of the Commission. Resolution 81-2 (Appendix B) of the same date constituted Conservation Order No. 1 and it prescribed additional temporary modifications of the diversions and releases.

These further modifications specified that allowable diversions to New York City were reduced to an average of 520 mgd and diversions by New Jersey, from all Delaware River basin sources, were limited to an average of 62 mgd. Additionally, the minimum Montague target flow was to be varied between 1,100 cfs and 1,600 cfs, depending on the location of the salt front in the estuary, and on the season of the year, with the higher flows scheduled for the more critical summer months. The salt front is defined as the 250-mg/L (milligram-per-liter) isochlor.

January runoff at Montague was 1,049 cfs, adjusted for diversions and changes in storage, only 19 percent of average and the lowest January runoff for the period of record.

Storage continued to decline and by February 2 the quantity remaining in the reservoirs was only 68.5 billion gallons, or 25.3 percent of capacity. But above-normal precipitation during February reversed the declining trend and, by February 12, storage increased at a rapid rate. Storage rose above the drought level on February 14 and above the drought warning zone on February 25. By month end, storage was at 61 percent of capacity, a most gratifying improvement in the water-supply outlook. Mean discharge for the month at Montague, adjusted, was 20,290 cfs, a new maximum for February for the period of record. The high flows and major ice jams in the vicinity of Port Jervis, New York, and Matamoras, Pennsylvania caused serious flooding and property damage in these communities, and residents were forced to evacuate from some areas. At Port Jervis the highest stage ever recorded, 26.6 feet on February 12, resulted from backwater from ice jams.

Diversions from Lake Hopatcong to the Rockaway River, that commenced November 18, 1980, were terminated February 27. The quantity diverted averaged approximately 25 mgd for the period.

Throughout most of March, inflow to New York City reservoirs, was about equal to diversions, and storage remained comparatively constant at about 64 percent of capacity. Diversions to the City during the month averaged about 500 mgd with most withdrawals being made from Cannonsville Reservoir. Runoff at Montague averaged 4,428 cfs (adjusted), a new record low for the month.

During April, storage increased gradually and reached 71 percent of capacity at month-end, just slightly in excess of the upper limit of the drought-warning zone.

Precipitation for May was favorable and in excess of the long-term average and storage increased rapidly. By May 17, storage had been more than 15 billion gallons above the drought-warning level for 5 consecutive days, so I notified the Advisory Committee and the Basin Commission that operations would be returned to those provided by the 1954 Decree (Appendix A, River Master letter May 18, 1981). This action authorized New York City to increase its diversions to an average of 800 mgd and the Montague flow objective was resumed at 1,750 cfs. By May 31, diversions since May 18 averaged 784 mgd as compared to an average of 519 mgd between January 16 and May 17.

Storage reached 86 percent of capacity, the maximum for the year, in late May and then declined rather steadily until late October. During May, an emergency pipeline was constructed on the George Washington Bridge across the Hudson River. The pipeline was designed to deliver 20 mgd from the New York City system to the system of the City of Hackensack, New Jersey, during periods of low storage in New Jersey. The pipeline and pumping station were tested but never used.

By mid-June it became necessary to direct releases designed to maintain the required basic rate of flow at Montague. The release of the excess quantity defined in paragraph III.B.1. (c) of the Decree was deferred at the unanimous request of the parties (Appendix A, letter from Parties May 27, 1981, River Master response June 1, 1981). Because of the continuing serious water-supply situation there was no question but that the conservation of supplies was the overriding consideration. Storage on July 1 was the lowest for that date since 1967. On this date, New York State requested 495 cfs for relief of thermal stress in streams below the reservoirs. Because of the serious water-supply situation, this office allowed only 229 cfs, the rate needed to satisfy the Montague Formula.

Upon request of the Commission, Pennsylvania Power & Light Company made firm releases from Lake Wallenpaupack weekends August 8 to September 13 in addition to firm releases weekdays to October 16. The Commission also requested firm releases by Orange and Rockland Utilities, Inc., which in turn furnished such releases from Mongaup Reservoir weekdays August 12 to November 10. These actions were for the purpose of conserving water in Pepacton, Cannonsville, and Neversink Reservoirs by reducing requirements for releases to maintain specified flow at Montague.

On October 23, storage reached the lowest point of the summer and fall, 40.8 percent but 13 percent greater than the low point of 1980. Moderate rains then provided some relief and by November 30, storage had increased to 49.8 percent of capacity.

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

Delaware	Dr. Robert R. Jordan Thomas P. Eichler
New Jersey	Dirk C. Hofman
New York	Eldred Rich Edward A. Karath
New York City	Francis X. McArdle
Pennsylvania	R. Timothy Weston

Appreciation is expressed to all members for their cooperation and advice.

The experimental augmented conservation release program that had been agreed to by all parties, approved by the River Master, and originally placed in effect June 27, 1977, was continued July 23 to November 30.

On regular operations, it is reported that diversions for water supply for New York City and releases to maintain the flow of the Delaware River at Montague during the year were made under the supervision of this office as provided in the Decree.

Diversions by New York City from the Delaware River basin reservoirs did not exceed the limit specified by the Decree and did not exceed the limits stated in the several resolutions of the Commission. Current-meter measurements of the East Delaware Tunnel diversions were helpful in determining rates of diversions during two periods of malfunctions in the venturi flow-meter instruments.

Diversions by the State of New Jersey did not exceed the limits imposed in Section V of the Decree. The average rates of diversions for the periods of the resolutions were not exceeded.

During the year, the River Master participated in meetings of the Delaware River Basin Commission to assess the water supplies and to consider measures to ease the growing deficiencies. Upon invitation of the representatives of parties to the Decree, the River Master, or his assistants, met frequently with those representatives as an observer to their "good faith" negotiations. The negotiations concerned proposals for specific releases from the City reservoirs for conservation purposes, definition of drought in the basin, emergency measures to cope with severe droughts, and other items. The negotiations were still in progress at the end of the report year.

The Geological Survey continued the operation of its field office of the Delaware River Master at Milford, Pennsylvania. Robert E. Fish, Deputy Delaware River Master, continued in charge of the office, assisted by William R. Bauersfeld, Robert W. Baebenroth and Beverly A. Roberts. Mr. Bauersfeld transferred to the New Jersey District Office in October. He was

succeeded by Mr. Baebenroth, who transferred from the Arizona District.

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 New York City water-supply system, reservoir contents, daily segregation of flow of the Delaware River at the Montague gaging station, diversions by New Jersey and significant chloride concentrations in the river. 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 during the low-flow season by an "outlook" of the river flow for the forthcoming months was made available to the representatives on the Advisory Committee. Upon request of the parties, a biweekly report was prepared December 1 to May 14 containing data for precipitation, streamflow, storage, diversions and chloride concentrations during the drought.

Section II of the accompanying report describes in detail Delaware River operations during the report year. As shown on page 25, the City of New York diverted a total of 238.100 billion gallons from the basin during the report year ending November 30, 1981, and released 78.492 billion gallons from Pepacton, Cannonsville, and Neversink Reservoirs to the Delaware River during the same period. During the low flows from December 20 to February 5 and June 14 to October 29 (Montague dates), releases to the Delaware River from these reservoirs totaled 72.410 billion gallons. The color graphs on plates 1 and 2 show the effect of these releases on the flow at the Montague gaging station.

Section III of the report describing water quality of the Delaware River estuary was prepared by Charles R. Wood, U.S. Geological Survey, Malvern, Pennsylvania, in collaboration with Mr. Fish. It contains data showing the extent of salinity invasion and other water-quality characteristics in the Delaware River estuary.

During the report year, Pennsylvania Power & Light Company was not required to make supplemental releases from Lake Wallenpaupack as provided in an agreement written in 1975 between the company and the City of New York and approved by this office.

The U. S. Geological Survey operates 170 automated data collection platforms throughout the Nation that transmit hydrologic data several times daily to the National Environmental Satellite Service GOES satellites. The data are instantly relayed by the satellites to centralized Earth stations and are made available to water-data users in near realtime. The COMSAT General Corporation was awarded a contract in 1979 to equip 105 additional sites to enable the Geological Survey to evaluate the potential benefits of realtime data to the water-data user community. The Montague gaging station was one of those selected for the pilot program. At Montague, stream-stage data was transmitted October 15, 1980 to January 26, 1982. About midway in the program, it was discovered that the instrument was dropping bits at low gage heights. The contractor modified the equipment and the

remaining record was of good quality.

The appreciation of the River Master and staff is expressed for the continued and excellent cooperation of all the representatives of the parties to the Decree. Once again, it is gratifying to report that New York City complied with the terms of the Decree and with the resolutions regarding diversions and with the directives of the River Master.

A draft of this report was furnished to the Delaware River Master Advisory Committee for comment.

Sincerely yours,

Francis T. Schaefer

Francis T. Schaefer, P.E.
Delaware River Master

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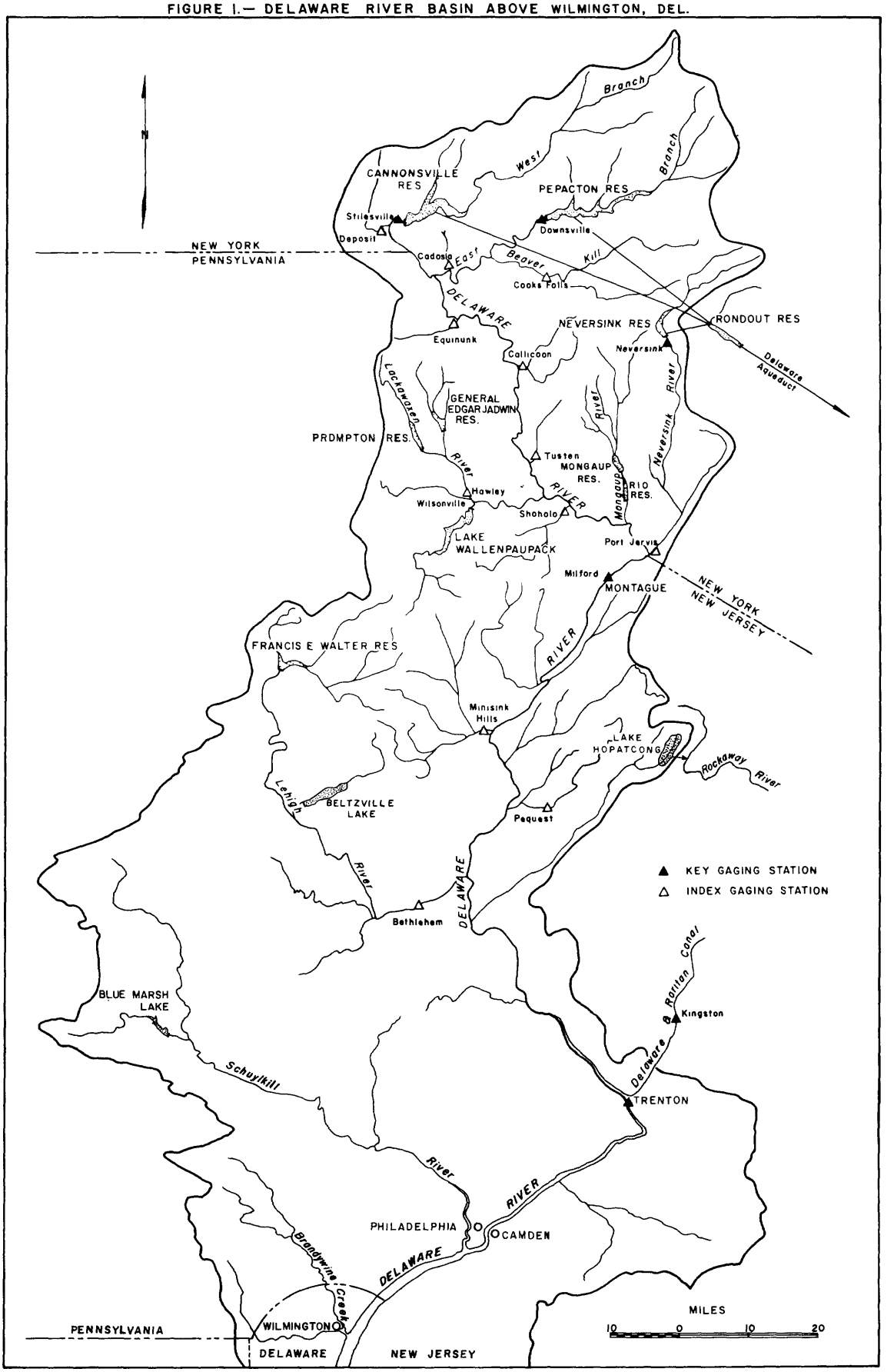
Section II

REPORT OF DELAWARE RIVER OPERATIONS

FIGURE 1.— DELAWARE RIVER BASIN ABOVE WILMINGTON, DEL.



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OFFICE OF THE DELAWARE RIVER MASTER

United States Geological Survey

Milford, Pennsylvania 18337

March 12, 1982

Mr. Francis T. Schaefer, P.E.
Delaware River Master
U.S. Geological Survey
Reston, VA 22092

Dear Sir:

Transmitted herewith is my report on the hydrologic and hydraulic operations of the Delaware River basin as conducted by the Milford office under your direction during the year ending November 30, 1981. This report marks the twenty-eighth year of such activities since the inception of the Amended Decree of the United States Supreme Court, dated June 7, 1954.

Hydrologic conditions in the Delaware River basin during the year were generally in the below-normal range but with striking exceptions. Deficient runoff occurred in five months with January and March being the lowest of record for those months. By contrast, runoff for February was the highest of record for February and May runoff was excessive. As a result of the deficiencies at the beginning of the year, the rates of diversions and target flows for Montague were reduced to conserve water. These actions were taken subsequent to agreement by all parties to the Decree to resolutions adopted by the Delaware River Basin Commission and to a declaration of emergency due to drought by the Commission January 15. Diversions from the basin to New York City and to New Jersey were below limits authorized in the Decree and the resolutions. Releases from the reservoirs were made as prescribed under the resolutions and under the Decree, except that release of the excess quantity was deferred following the unanimous request of parties to the Decree. The hydrologic procedures developed previously were used to guide operations in this office.

The advice and cooperation of your office and the members of the Delaware River Master Advisory Committee are greatly appreciated. Thanks are also given to personnel of the offices of the United States Geological Survey, National Weather Service, New York City Department of Environ-

mental Protection, Bureau of Water Supply and Board of Water Resource Development, Pennsylvania Power & Light Company, Orange and Rockland Utilities, Inc., gage readers, and others for supplying data needed in this report. Special credit is given to Robert W. Baebenroth and Beverly A. Roberts for their capable assistance in preparing this report.

Sincerely yours,

Robert E. Fish, P.E.
Deputy Delaware River Master

Section II

REPORT OF DELAWARE RIVER OPERATIONS

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 reservoirs of the City of New York to the Delaware River to be made under the supervision and direction of the River Master. Resolutions restricting diversions and release requirements for drought conditions were adopted by the Delaware River Basin Commission with the consent of parties to the Decree and were in use since October 17, 1980. This report describes the operations December 1, 1980 to November 30, 1981.

Definitions of Terms and Procedures

The following definitions apply to various terms and procedures as used in operations in this report. A table for converting English Units to International System (SI) Units is given on page 18. The map of the Delaware River basin above Wilmington, Del. (fig. 1), indicates the location of pertinent streams and reservoirs.

Time of day. - Time of day is expressed in 24-hour eastern standard time, which included a 23-hour day April 26 and a 25-hour day October 25.

Rate of flow. - Mean discharge for any stated 24-hour period, in cubic feet per second (cfs) or million gallons per day (mgd).

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 dam or through turbines in powerplants. This does not include spillway overflow at the reservoirs.

Releases from Pepacton and Neversink Reservoirs are usually made at constant rates for 24 hours; directed releases from Cannonsville Reservoir are usually made at two rates during a 24-hour period, and the quantity released is treated as an average rate for 24 hours. At times during 1981, the larger releases from Cannonsville Reservoir were made in steps by New York City in response to an understanding with New York State to effect the change in stage downstream over a longer period of time than would have been obtained from a single operation of release valves. Releases from Wallenpaupack and Mongaup powerplants are chiefly made as a result of peak-power demands and are treated as average rates for 24 hours.

Uncontrolled runoff at Montague. - Runoff from the drainage area above Montague exclusive of the drainage areas above the Pepacton, Cannonsville, Neversink, Wallenpaupack, and Mongaup dams but including spillway overflow at these dams.

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

Storage or contents. - Usable volume of water in a reservoir. Volume is computed on basis of level pool and above the point of maximum depletion. Reservoir contents were observed at 0900 daily.

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

Diversions. - The City of New York diverts water 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.

The State of New Jersey diverts water from the Delaware River through the Delaware & Raritan Canal. As a drought emergency measure, the State diverted water from Lake Hopatcong through a pipeline to Rockaway River December 1 to February 27.

Excess-release quantity.- To conserve water in storage in Pepacton, Cannonsville and Neversink Reservoirs during the drought emergency declared by the Commission, representatives of all parties to the Decree, by letter dated May 27, 1981 to the River Master, requested him to defer the release of the excess quantity.

Acknowledgments

A part of the hydrologic data is presented as records of the 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 Trenton, New Jersey, in cooperation with the States of New York, Pennsylvania, New Jersey, and the City of New York and are found in tables 1 to 7.

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 Lake Wallenpaupack by the Pennsylvania Power & Light Company; and from Mongaup Reservoir by Orange and Rockland Utilities, Inc.

Factors for Converting English Units to International System (SI) Units

Multiply English units	By	To obtain SI units
	LENGTH	
inches	25.4	millimeters (mm)
feet	0.3048	meters (m)
miles	1.609	kilometer (km)
	AREA	
square miles	2.590	square kilometers (km^2)
	VOLUME	
million gallons	3,785	cubic meters (m^3)
billion gallons	3.785	cubic hectometers (hm^3)
cfs-days	0.002447	cubic hectometers (hm^3)

FLOW

million gallons per day (mgd)	0.04381	cubic meters per second	(m^3/s)
cubic feet per second (cfs)	0.02832	cubic meters per second	(m^3/s)

Abstract

A Decree of the U.S. Supreme Court in 1954 established the position of Delaware River Master. The Decree authorizes diversions of water from the Delaware River basin and requires compensating releases from certain reservoirs of the City of New York to be made under the supervision and direction of the River Master. Reports to the Court, not less frequently than annually, were stipulated.

The 1981 report year, December 1, 1980 to November 30, 1981, was a year of below-normal precipitation and much below average runoff in the Delaware River basin. On January 15 the Delaware River Basin Commission declared a state of emergency resulting from drought (Commission Resolution No. 81-1). For the year, Pepacton, Cannonsville, and Neversink Reservoirs of the City of New York reached a minimum combined storage of 25.3 percent of capacity February 2 and a maximum of 85.7 percent May 27.

The annual flow of Delaware River at Montague, adjusted for change in reservoir storage and diversions was 28 percent below median. Conservation measures of the previous year were continued. Diversions and releases from the reservoirs of the City of New York were made within the reduced rates adopted by the Commission with the consent of parties to the Amended Decree December 1 to May 18, to conserve the water supply in the reservoirs. By resolutions of the Commission, minimum releases July 23 to November 30 conformed to those of the Memorandum of Agreement placed in effect by the River Master June 27, 1977. 1/ Diversions by New Jersey through the Delaware & Raritan Canal and from Lake Hopatcong were within prescribed limits of the Amended Decree and within the reductions adopted by the Commission with consent of parties to the Amended Decree December 1 to May 18.

The combined usable contents of Pepacton, Cannonsville, and Neversink Reservoirs on December 1, 1980 was 31.3 percent, and on November 30, 1981, the combined contents was 49.8 percent of capacity.

Precipitation

Precipitation observed on the basin above Montague for the 1981 report year was below normal, totaling 36.83 inches. Monthly precipitation ranged from excessive to deficient. Precipitation for February was higher than previous precipitation for that month in the period of record while that for March was the lowest for that month. Precipitation for January was second lowest of record for that month. The monthly precipitation during the

1/ Schaefer, F.T. and Fish, R.E., Report of the River Master of the Delaware River, 1977, U.S. Geol. Survey.

report year is shown in the following table:

Precipitation, in inches

Delaware River basin above Montague, N.J.

Month	December 1940 to November 1980 Average	December 1980 to November 1981 Amount	Percent of average
December	3.52	1.37	39
January	3.00	.77	26
February	2.70	5.85	217
March	3.38	.50	15
April	3.61	3.89	108
May	4.10	4.72	115
June	3.93	3.71	94
July	4.11	3.74	91
August	4.05	1.94	48
September	3.74	3.81	102
October	3.38	4.63	137
November	3.75	1.90	51
12 months	43.27	36.83	85

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 ten stations distributed over the basin area above Montague. Data on Plate 1 and figure 2 for December 1980 and January and February 1981 are 5-station averages and vary slightly from those above.

December to May is generally considered the normal time of year when surface- and ground-water reservoirs fill. During this period in 1980-81, precipitation of 17.10 inches was observed, which was 84 percent of the 40-year average. During June to November, precipitation of 19.73 inches was observed, which was 86 percent of the 40-year average. The maximum monthly precipitation listed during the year for any of the ten stations was 6.82 inches in February at Rock Hill, N.Y.; the minimum monthly precipitation observed was 0.27 inch in March at Hawley, Pa.

Operations December to May

During the first half of the report year, precipitation was below average and varied considerably by months. Pepacton, Cannonsville and Neversink Reservoirs reached their maximum combined storage of 85.7 percent of capacity May 27.

On December 1, 1980, Pepacton Reservoir contained 54.005 billion gallons of water in storage above the point of maximum depletion, or 38.5 percent of the reservoir's storage capacity of 140.190 billion gallons. Cannonsville Reservoir contained 26.966 billion gallons, or 28.2 percent of the reservoir's storage capacity of 95.706 billion gallons and Neversink Reservoir

contained 3.750 billion gallons, or 10.7 percent of the reservoir's storage capacity of 34.941 billion gallons. The combined storage in the three reservoirs as of December 1 was 84.721 billion gallons, or 31.3 percent of their combined capacities.

Due to the accumulating deficiencies in precipitation and runoff and the low storage in reservoirs, the Delaware River Basin Commission in consultation with this office, and acting under its enabling act (Delaware River Basin Compact, 1961), declared a state of emergency due to drought January 15. The Commission enacted resolutions planned to cope with the deficient conditions by reductions of diversions and releases from the reservoirs provided under the Decree and by other conservation measures.

During the winter and spring, part of the inflow to the three reservoirs was required for diversions and releases. Diversions to Rondout Reservoir during December 1 to May 31 totaled 98.924 billion gallons and averaged 544 mgd. With the consent of parties to the Decree to Resolution No. 80-24 adopted by the Commission November 19, 1980, diversions were limited to an average of 580 mgd December 1-19 and to an average of 560 mgd December 20 to January 15. Subsequently, Resolution No. 81-2, adopted January 15, further restricted diversions to 520 mgd January 16 to May 17 and, provided that restrictions be removed and the terms of the Decree be fully effective again, when storage rose 15 billion gallons above the drought-warning line of the resolution for 5 consecutive days. The equivalent diversion rate June 1, 1980 to May 31, 1981, did not exceed the limit of 800 mgd specified by the Decree.

Releases solely for minimum conservation purposes were made from each reservoir by New York City December 1 to May 31, except for days when the anticipated discharge at Montague, exclusive of water released from the City reservoirs, fell below the design rate. On days when the anticipated discharge was less than the design rate of 1,560 cfs December 1-19, 1,550 cfs December 20 to January 17 or 1,350 cfs January 18 to February 22, moderate releases were required to satisfy Commission Resolutions No. 80-24 or 81-2. The resolutions provided for a design rate of 1,100 cfs February 23 to May 17 and the Decree provided for the minimum basic rate of 1,750 cfs at Montague May 18-31. The anticipated discharge at Montague December 1 to May 31, exclusive of water released from New York City's reservoirs, fell below the respective design rates on 48 days, and releases from the City's reservoirs were directed in amounts to provide the design rate at Montague for those days.

During December 1 to May 31, there were 31 days when the discharge at Montague was less than the respective design rates and 151 days when the discharge was equal to or above those rates. On days when releases were directed and there were deficiencies or excesses in flow, such differences usually were attributable to difficulties in determining the uncontrolled flow because of conditions associated with the cold weather.

The hydrographs on plate 1 for December 1 to February 28 show the

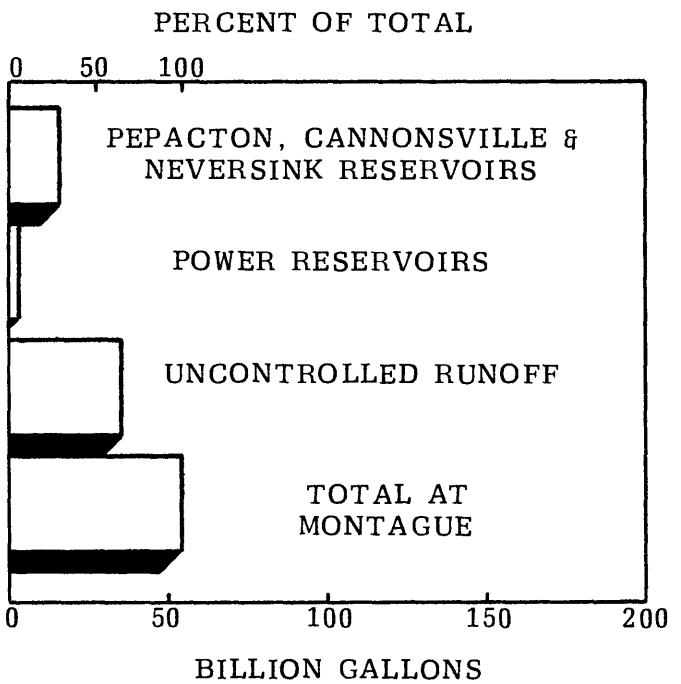
total discharge at Montague, the part derived from uncontrolled runoff downstream from the reservoirs, the part contributed by the power reservoirs, and the part contributed by Pepacton, Cannonsville, and Neversink Reservoirs. In analyzing the water budget at Montague, the uncontrolled runoff is computed as the residual of observed flow less releases from all reservoirs and is subject to all the errors in observations and transit times of the several components of flow. Because of these unavoidable errors, the computed hydrograph of uncontrolled flow is ragged.

The following tabulation summarizes diversions and releases made under the provisions of the Montague Formula and other contributions to the flow of the Delaware River at Montague during December 20 to February 5, the days for which releases were directed.

Diverted to Rondout Reservoir		38,250 cfs-days
Delaware River at Montague	Advance estimates (cfs-days)	Observed operations (cfs-days)
New York City releases (Pepacton, Cannonsville, Neversink) Directed	a 24,631	b 24,676
Wallenpaupack & Mongaup power releases	2,240	4,615
Runoff from uncontrolled area	43,179	54,759
Flow at Montague		84,050

a Directed release as designed
b Actual release

The contributions to flow of the Delaware River at Montague during December 20 to February 5 are also shown in the graph below:



Inflow to the City's reservoirs during December 1 to May 31 generally exceeds draft rates and therefore increases storage. The average inflow to Pepacton, Cannonsville, and Neversink Reservoirs for these 6 months during the 40-year period, December 1940 to May 1980, was 305.7 billion gallons. During the corresponding 6 months of the current report year, inflow to the three reservoirs totaled 260.919 billion gallons. Loss chargeable to evaporation was considered to be insignificant and was not included in the computation. The excess of inflow over the demand increased water storage in these three reservoirs in 1981 to 229.865 billion gallons by May 31, an increase of 145.832 billion gallons from November 30, 1980 to May 31.

Operations June to November

During the second half of the report year, precipitation continued to be below average, and deficiencies accumulated about equal to those of the first half year. During the period, part of the storage and inflow to the New York City reservoirs was required for diversions and releases. Diversions to Rondout Reservoir during June 1 to November 30 totaled 139.176 billion gallons. The equivalent diversion rate did not exceed the limit specified by the Decree and was 761 mgd on November 30. Data on the consumption of water by the City of New York for each calendar year, beginning in 1940, are shown in Table 14. Releases were required to satisfy the Montague Formula on days when the anticipated discharge at Montague, exclusive of water released from the City reservoirs, fell below the design rate with the following exception. Release of the excess quantity was deferred by the River Master following a unanimous request of the representatives of parties to the Decree and the Commission. Releases at conservation rates were made at other times from each reservoir by the City of New York. Under Commission Resolutions No. 81-25 and 81-26 the augmented conservation rates of the Memorandum of Agreement approved by the River Master and dated June 27, 1977 and extended May 22, 1979, were again instituted. The Agreement to provide for investigation of the fisheries and habitats set augmented conservation releases as follows:

Reservoir	Releases in cubic feet per second	
	April 1 to October 31	November 1 to March 31
Pepacton	70	50
Cannonsville	45 (except 325 June 15 to August 15)	33
Neversink	45	25

During June 1 to November 30, the flow required to be maintained in the Delaware River at Montague was the minimum basic rate of 1,750 cfs. The forecasted discharge exclusive of releases from Pepacton, Cannonsville, and Neversink Reservoirs was less than 1,750 cfs on 130 days, and releases were directed as required. On the remaining 53 days, New York City made releases from its reservoirs for minimum conservation purposes

June 1 to July 22 or for augmented conservation purposes in accordance with a regulation of New York State July 23 to November 30. During the 130 days of directed releases, flow at Montague was less than 1,750 cfs on 71 days and greater than 1,750 cfs on 59 days.

On days of directed releases when there were deficiencies or excesses in flow, such differences were attributable to the uncontrolled flow, weather adjustment, or powerplant releases being other than those anticipated.

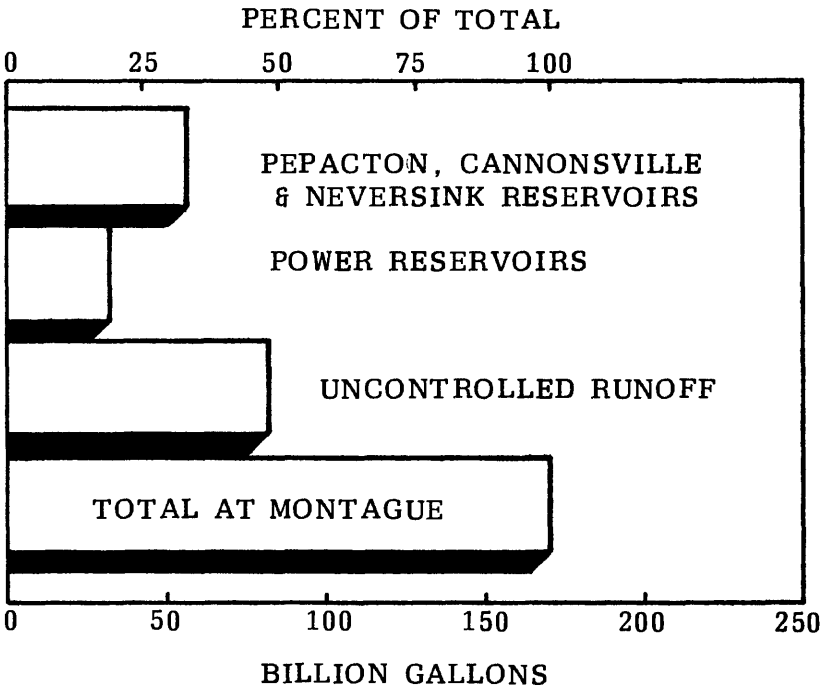
The hydrographs of plate 2, June 1 to November 30, show the total discharge at Montague;the part derived from uncontrolled runoff downstream from the reservoirs; the part contributed by the power reservoirs; and the part contributed by Pepacton, Cannonsville, and Neversink Reservoirs. In analyzing the 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 was subject to all the errors in observations, transit times, and routing of the several components of flow. Because of these uncertainties, the computed hydrograph of uncontrolled runoff was somewhat ragged.

The table below summarizes diversions, releases and other contributions to the flow of the Delaware River at Montague June 14 to October 29. The diversions and releases from the City reservoirs were made under the provisions of the Montague Formula (excepting the provision for release of the excess quantity) and Resolutions No. 81-25 and 81-26.

Diverted to Rondout Reservoir		170,594 cfs-days
Delaware River at Montague	Advance estimates (cfs-days)	Observed operations (cfs-days)
New York City releases (Pepacton, Cannonsville, Neversink)		
Directed	a 84,818	b 85,146
Other		2,197
Wallenpaupack & Mongaup power releases	49,719	49,752
Runoff from uncontrolled area	109,231	127,285
Flow at Montague		264,380

a Directed release as designed
b Actual release

The contributions to flow of the Delaware River at Montague during June 14 to October 29 are also shown in the graph below:



Computations by the River Master's Office indicated that flow at Montague during October 30 to November 30 would generally be above 1,750 cfs.

Summary

From December 1, 1980 to November 30, 1981, diversions to Rondout Reservoir totaled 238.100 billion gallons, and all releases from the New York City reservoirs to the Delaware River totaled 121,427 cfs-days (78.492 billion gallons).

During the year, maximum storage in Pepacton Reservoir was 116.144 billion gallons, or 82.8 percent of capacity, on May 25. Maximum storage in Cannonsville Reservoir was 86.872 billion gallons, or 90.8 percent of capacity, on June 11. Maximum storage in Neversink Reservoir was 31.248 billion gallons, or 89.4 percent of capacity, May 22. The maximum combined storage in the three reservoirs during the year was 232.195 billion gallons, or 85.7 percent of capacity, on May 27.

Minimum storage during the year in Pepacton Reservoir was 38.730 billion gallons, or 27.6 percent of capacity on February 2. The minimum storage in Cannonsville Reservoir was 26.966 billion gallons, or 28.2 percent of capacity on December 1. Minimum storage in Neversink Reservoir was 2.206 billion gallons, or 6.3 percent of capacity on January 5. Minimum combined storage in the three reservoirs was 68.463 billion gallons, or

25.3 percent of capacity February 2.

A resume' of the combined storage of the three reservoirs on the first day of month June 1967 to November 1981 is shown in figure 4. Storages for December to July, September and October were less than those for the respective previous months. During other months of 1981, storage was within the range between highest and lowest storage of earlier years.

On November 30, Pepacton Reservoir contained 72.175 billion gallons or 51.5 percent of capacity. Cannonsville Reservoir contained 45.345 billion gallons, or 47.4 percent of capacity. Neversink Reservoir contained 17.322 billion gallons, or 49.6 percent of capacity. Combined storage in the three reservoirs was 134.842 billion gallons, or 49.8 percent of their combined capacity. During the year, combined storage increased 50.809 billion gallons, or 18.8 percent of capacity.

Supplementary Release from Wallenpaupack Powerplant

An agreement between Pennsylvania Power & Light Company and the City of New York provides for supplementary releases from Wallenpaupack hydroelectric powerplant. The Delaware River Basin Commission may request releases to compensate for water consumed at the Company's Martins Creek steam-electric generating station should the flow of the Delaware River at Trenton, N.J. become less than 3,000 cfs for more than three consecutive days. No supplementary release was requested during the year.

Water Budget, Delaware River at Montague, N.J.

The data and computations of the water budget formed the basic operation records required to carry out the River Master's specific responsibilities with respect to the Montague Formula and the Commission Resolutions during the report year. The water budget was in two parts: (1) segregation of the daily average flow at Montague among its various source compoments and (2) advance estimates of the daily average flow at Montague, exclusive of controlled releases from New York City's reservoirs. The time intervals required for water to travel from the various sources to Montague were taken into account.

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 Mongaup Reservoir on Mongaup River in the production of hydroelectric power.

3. Runoff from the uncontrolled area above Montague.

4. Controlled releases from Pepacton, Cannonsville, and Neversink Reservoirs of the City of New York.

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

Time of Transit

The following schedule of average times for the effective transit of water from the various sources of controlled supply to Montague was used for discharge routing during the 1981 report year except for December 28 to February 11.

Source	Hours
Pepacton Reservoir	60
Cannonsville Reservoir	48 (see below)
Neversink Reservoir	33
Lake Wallenpaupack	16
Mongaup Reservoir	8 Dec. 1-27
	12 Feb. 12 to Nov. 30

This schedule was developed from reservoir and powerplant operations and gaging-station records of prior years and was found generally suitable. At times, noticeable exceptions occur, e.g., 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 12 hours late. In an attempt to cope with such a delay in time of transit, the release scheduled from Cannonsville Reservoir July 2 was started July 1 at 1400h and run for 34 hours. During the winter, the cold weather formed ice in the streams, which, together with the low streamflow gradually increased the resistance to streamflow and lengthened the time of transit. Based upon the probable amount of ice in the streams and the experiences of several past winters, times of transit were lengthened to the following:

Source	Dec. 28 to Feb. 11 Hours
Pepacton Reservoir	84
Cannonsville Reservoir	72
Neversink Reservoir	57
Mongaup Reservoir	24

With melting and breakup of the river ice, transit times from these reservoirs to Montague lessened, and transit times for average open-river conditions were resumed February 12.

Segregation of Flow, Delaware River at Montague, N.J.

In the daily operations, it was necessary that the River Master utilize: (1) discharges computed from recorded or reported stream gage heights for various 24-hour periods without benefit of concurrent specific information that changes in stage-discharge relations might have occurred; (2) daily discharge from New York City's three reservoirs obtained from venturi me-

ters; (3) rainfall reports for the previous 24 hours; (4) actual powerplant operations converted to daily discharge; (5) advance estimates of power demand converted to daily discharge; (6) advance estimates of anticipated uncontrolled runoff at Montague; and (7) average times for routing of water from the several sources. Variable and usually minor errors of estimate occur in projecting data, but these data must be used in the daily design and direction of releases from New York City reservoirs.

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 8. 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 schedules on page 27 for travel time of water. The uncontrolled runoff was computed by subtracting the contributions of the several other sources from the observed discharge at Montague. (It may be noted that the hydrographs of power reservoirs and uncontrolled runoff on Plate 2 do not strictly conform to the data of Table 8 February 16 to November 30. Revisions were made to some of the daily releases from Mongaup Reservoir but were not available in time to correct those days on Plate 2.)

Computation of Anticipated Flow at Montague

The time of transit of water from Pepacton Reservoir to Montague was greater than that from any other reservoir above Montague; therefore, the time of daily directed releases to maintain prescribed rates of flow at Montague was based on time of transit from Pepacton 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 began at Pepacton at 1200, at Cannonsville at 2400, and at Neversink Reservoir at 1500 the following day.

The determination of the amount of release required from the City's reservoirs to maintain specified rates of flow at Montague was based on estimates of releases from Lake Wallenpaupack and Mongaup Reservoir and an estimate of the uncontrolled runoff at Montague. Taking into account the time of transit from these sources to Montague, this determination required that advance estimates of the following components be made on the morning of each day, (1) the expected release of water from Lake Wallenpaupack for power production for a 24-hour period, beginning at 0800, 2 days later; (2) expected release of water from Mongaup Reservoir for power production for a 24-hour period 2 days later, beginning at 1600 December 1-27, at 0001h December 28 to February 11, and at 1200 thereafter; and (3) expected uncontrolled runoff at Montague 3 days later. The River Master daily operation record for computing daily directed release from the City's reservoirs during the periods of low flow is shown in table 9.

The electric power companies cooperated fully in furnishing advance

estimates of powerplant release (table 9). Pennsylvania Power & Light Company and Orange and Rockland Utilities, Inc. committed themselves to large efforts to follow their given schedules, within practicable limits. 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 and unpredictable transmission and mechanical difficulties in electric-system operation. As a result, the actual use of water for power generation was at times at considerable variance with the advance estimates that were used by the River Master's office in design computation. Furthermore, it was impractical for the companies to estimate their probable operation on any period other than 24 hours. In the estimates for the Wallenpaupack plant, the time factor was of little concern, as power operation during periods of low flow was usually between 0800 and 2400, which fell within the 24-hour period beginning at 0800. In routing the Mongaup Reservoir release estimates, some error was introduced at times, as the power operation during periods of low flow was usually between 0700 and 2200 which spanned the 1600 to 1600 and the 1200 to 1200 routing period.

For computation purposes during periods of low flow, the estimate of uncontrolled runoff at Montague 3 days in advance (or 4 days in part of the winter period) was treated as two items: (1) present runoff and (2) estimated increase in runoff from precipitation. The present runoff was computed for 2,156 square miles of uncontrolled drainage area above Montague[1/] based on conditions over the drainage area as of 0800 on the morning the estimate was made. The estimated increase in runoff was computed from precipitation which was forecast to occur on the day the estimate was made and the 2 following days, with the exception that during the winter period, December 20 to February 5, consideration was also given to forecasts for the fourth day and to temperatures. Estimated quantities for these items are shown in table 9.

During the winter period, the advance estimate of the uncontrolled runoff (present conditions) was based on nearby gaging stations and on the recession curve of the uncontrolled flow at Montague projected to the date, 3 (or 4) days hence, under design.

During open-river conditions, the advance estimate of uncontrolled runoff (present conditions) was based on discharges as of 0800 at the following gaging stations:

Station	Drainage area (square miles)
Beaver Kill at Cooks Falls, N.Y.	241
Cadosia Creek at Cadosia, N.Y.	17.7
Oquaga Creek at Deposit, N.Y.	66.4
Equinunk Creek at Equinunk, Pa.	56.3
Callicoon Creek at Callicoon, N.Y.	111

1/ Excludes drainage area of Black Brook whose flow was being directed to Mongaup powerplant since repairs to the penstock in September 1980.

Tenmile River at Tusten, N.Y.	45.0
Lackawaxen River at Hawley, Pa.	290
Shohola Creek near Shohola, Pa.	83.6
Neversink River at Port Jervis, N.Y.	333

The procedure for computing the advance estimate combined a routing and recession (as applicable) of the 0800 discharges of the Beaver Kill, Oquaga, Equinunk, Callicoon and Shohola Creeks, Tenmile, Lackawaxen, and Neversink Rivers gaging stations to Montague, with a computed yield from the remaining ungaged, uncontrolled drainage area. Releases from Neversink Reservoir were deducted from discharge of the Neversink River site. The yield from that remaining uncontrolled drainage area was estimated by using as indexes the 0800 discharges of Cadosia, Oquaga, Equinunk, and Callicoon Creeks, and Tenmile and Lackawaxen Rivers with routing and recession by individual gaging stations.

The advance estimate of increase in runoff from precipitation is shown in table 9 under the heading of "Weather Adjustment." The National Weather Service Office, Philadelphia, Pa., cooperated throughout the low-flow periods by furnishing quantitative forecasts of average precipitation over the drainage area above Montague and air temperatures for each day of the 3-day period, except during the winter period when forecasts were often provided for each day of a 4-day period. During the winter, the probable increase in runoff was estimated from the current state of snow and ice and from forecasted temperature and precipitation for the several days under consideration. During open-river conditions, runoff from the forecasted precipitation was estimated from previously established relationships.

The total anticipated flow at Montague, exclusive of release from the City's reservoirs (table 9), was the sum of the forecasted releases from the power reservoirs, the estimated uncontrolled runoff under then current conditions, and the weather adjustment. The amount by which this computed flow was less than the prescribed Montague rate indicated the expected deficiency at Montague, which would have to be made up by corresponding releases from New York City reservoirs.

Under Commission Resolution No. 81-26 and unanimous consent of parties to the Decree, New York City was credited for any New York State augmented conservation releases over and above releases directed by the River Master July 23 to October 31. Such accumulated credits were reduced by lowered release requirements at Montague after September 15.

There were times when revised forecasts of weather or powerplant release in substantial amount became available before the completion of the required release from New York City reservoirs. At such times, the release required from New York City reservoirs was again computed on the basis of the revised information, and the release required was changed to the revised indicated deficiency. Usually this procedure resulted in a reduced release requirement from New York City reservoirs and the conservation of the water affected by the change. Only the final figures are shown in table 9.

Diversions to New York City Water Supply

Table 10 shows diversions from Pepacton, Cannonsville, and Neversink Reservoirs to the New York City water-supply system during the report year. The tabulation includes a running account of the average of the combined diversions from the reservoirs, computed as prescribed by the Resolutions December 1 to May 17 and the equivalent rate computed as prescribed by the Decree May 18 to November 30. The tabulation shows that the average rates of the Resolutions or the maximum equivalent diversion rate of the Decree were not exceeded at any time under the respective authorizations.

Storage in New York City Reservoirs

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

Reservoir level	Pepacton Res.		Cannonsville Res.		Neversink Res.	
	Elev. (feet)	Contents (billion gallons)	Elev. (feet)	Contents (billion gallons)	Elev. (feet)	Contents (billion gallons)
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 11, 12, and 13 show storage in Pepacton, Cannonsville, and Neversink Reservoirs, respectively, above "point of maximum depletion" or minimum full-operating level.

Analysis of Forecasts

Forecasts of the flow at Montague based on the anticipated flow of the several components (exclusive of the release from the City's reservoirs) vary somewhat with those actually experienced on most days, even under the most favorable conditions. The daily variations are usually largely compensating. Forecasts in 1981 were compared with actual uncontrolled runoff and powerplant releases during December 20 to February 5 and June 14 to October 29 which included most of the days for which releases were directed for the design rates of the Resolutions or the minimum basic rate of the Montague Formula.

Uncontrolled Runoff Forecasts

A comparison of the hydrographs on figures 2 and 3 of forecast uncontrolled runoff and the actual uncontrolled runoff hydrograph indicated that the forecasting procedures were generally adequate. The forecast uncontrolled runoff included anticipated uncontrolled runoff under then-existing conditions plus the weather adjustment based on forecast precipitation. The total uncontrolled runoff during December 20 to February 5 (Montague dates)was 54,759 cfs-days. The forecast of uncontrolled runoff for those days was 43,179 cfs-days, or 21 percent less than actual runoff. The total uncontrolled runoff during June 14 to October 29 (Montague dates) was 127,285 cfs-days. The forecast for those days was 109,231 cfs-days, or 14 percent less than actual runoff.

Powerplant Release Forecasts

During December 20 to February 5 (Montague dates), the total actual release from the powerplants was 4,615 cfs-days. The advance estimates of powerplant releases for those days were 2,240 cfs-days, or 51 percent less than actual releases. During June 14 to October 29 (Montague dates) the total actual release from the powerplants was 49,752 cfs-days. The advance estimates of powerplant releases for those days were 49,719 cfs-days, or 0.1 percent less than actual releases.

Summary of Forecasts

The actual uncontrolled runoff plus actual powerplant releases during December 20 to February 5 (Montague dates) totaled 59,374 cfs-days, and the advance estimate was 45,419 cfs-days. The net cumulative difference between the estimate and the actual was 24 percent. For June 14 to October 29 (Montague dates), the actual uncontrolled runoff plus powerplant releases totaled 177,037 cfs-days, and the advance estimate was 158,950 cfs-days. The net cumulative difference between the estimate and the actual was 10 percent.

On the basis of the observed discharges at Montague, exact forecasting of releases required from the City's reservoirs during December 20 to February 5 would have totaled 24,988 cfs-days. The releases, as designed, totaled 24,631 cfs-days, or 1.4 percent less than for exact forecasting. Based on observed discharges at Montague for June 14 to October 29, exact forecasting of releases would have totaled 85,088 cfs-days. Releases as designed for that period, excluding releases for conservation purposes, totaled 84,818 cfs-days, or 0.3 percent less than for exact forecasting.

Summary Comparisons 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 Geological Survey records. In the com-

parison of releases approximating conservation rates only, data were used in units of million gallons per day and converted to cubic feet per second in the summaries.

East Branch Delaware River at Downsville, N.Y.

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

The Geological Survey gaging station on the East Branch Delaware River at Downsville, N.Y., is 0.5 mile downstream from Pepacton Reservoir dam. The discharge shown in table 1 includes releases from Pepacton Reservoir, a small amount of seepage, which enters the channel between the dam and gage site; and, during storms, a small amount of runoff, which originates between the dam and gage site. The drainage area at the dam is 371 square miles.

Releases were made at conservation or other rates by New York City during the year. There was good agreement, in general, between the venturi record and the Geological Survey record. For flows of approximately 7, 73 and 112 cfs at the gaging station, the venturi meter instruments indicated -9.8, -3.7 and +5.9 percent difference, respectively, in rates of release from the reservoir than those shown by the gaging-station records.

West Branch Delaware River at Stilesville, N.Y.

Data similar to those previously noted on releases from Pepacton Reservoir were collected for Cannonsville Reservoir.

The Geological Survey gaging station on the West Branch Delaware River at Stilesville, N.Y., is 1.4 miles downstream from Cannonsville Dam. The discharge shown in table 2 includes releases from Cannonsville Reservoir and the runoff from 2 square miles of drainage area between the dam and the gage site. The drainage area at the dam is 454 square miles, and that at the gaging site is 456 square miles.

Releases were made in a range from conservation to high rates during the year. There was fair agreement between the venturi record and the Geological Survey record. For conservation flows of approximately 12 and 35 cfs at the gaging station, the venturi meter instruments indicated 32 and 13 percent, respectively, less water being released from the reservoir than those shown by the gaging-station records. The venturi indicated 11 percent more discharge than that shown by the gaging-station records at flows of approximately 400 cfs. The venturi indicated 5.7 percent more discharge for flows in the 800-cfs range than the gaging-station records.

Wallenpaupack Creek at Wilsonville, Pa.

In the River Master operations December 1 to November 30, records of daily discharge through the Wallenpaupack powerplant were furnished

by the Pennsylvania Power & Light Company. Daily discharges were computed on an 0800 to 0800-time basis.

The records of daily mean discharges for Wallenpaupack Creek at Wilsonville, Pa., published by the Geological Survey, were furnished by the Company. These discharges, shown in table 3, represent the flow through the turbines of the powerplant. No water was spilled from Lake Wallenpaupack during the report year.

During December 1980 through November 1981, the River Master's record, based on computations by Pennsylvania Power & Light Company, indicated 0.03 percent more discharge than the Geological Survey record.

Neversink River at Neversink, N.Y.

Similar data to those previously noted on releases from Pepacton Reservoir were collected for Neversink Reservoir.

The Geological Survey gaging station on the Neversink River at Neversink, N.Y., is 1,650 ft. downstream from Neversink Dam. The discharge shown in table 4 includes releases from Neversink Reservoir and, during storms, a small amount of runoff, which originates between the dam and gage site. The drainage area at the dam is 91.8 square miles and that at the gaging station is 91.9 square miles.

Releases were made at conservation or other low rates by New York City during the year. There was good agreement between the venturi record and the Geological Survey record.

For flows of approximately 5, 25 and 45 cfs at the gaging station, the venturi meter instrument indicated -14, +0.5 and +3.8 percent difference, respectively, in rates of release from the reservoir than those shown by the gaging-station records.

Delaware River at Montague, N.J.

The River Master's operation record indicated 1.0 percent less discharge for the year than the Geological Survey record, and daily records were generally in good agreement.

Diversion Tunnels

Records of diversions through the East Delaware, West Delaware, and Neversink Tunnels were furnished to the River Master's office by the City of New York. These records were obtained from calibrated instruments connected to venturi meters installed in the tunnel conduits. Current-meter measurements were made by the River Master's office to verify the accuracy of the reported diversions. The current-meter measurements were made in the outlet channels downstream from the tunnels.

East Delaware Tunnel

This tunnel discharges into Rondout Reservoir. The elevation of Rondout Reservoir was too high many months of the year to permit access to the outlet channel, which is used for measuring discharge from the tunnel by current meter. The results of three current-meter measurements made July to September 1980, showed on the average that the venturi-meter instruments gave higher figures by 14.2 percent for the totalizer, 14.7 percent for the manometer and 14.1 percent for the indicator needle. A current-meter measurement December 5 indicated higher figures by 18.3, 20.1 and 19.3 percent for the same venturi-meter instruments. An examination of the venturi-meter instruments by the City of New York January 19, 1981 disclosed air trapped in the instrument piping. Following a purging of the system, two current-meter measurements January 26 indicated the average difference to be reduced to +8.2 percent for the totalizer, +9.4 percent for the manometer, and +8.1 percent for the indicator needle. Based upon the difference between current-meter measurements made the latter part of 1980 and those of earlier years, the indicated diversions were reduced 9 percent on a daily basis April 21, 1980 (the most feasible date) to January 19, 1981 by the City. A current-meter measurement May 6 showed higher figures by 16.1, 16.8 and 15.4 percent for the respective venturi-meter instruments. After a purging of the instrument piping, a current-meter measurement May 11 indicated higher figures by 5.0, 7.4 and 4.3 percent for the respective venturi-meter instruments. Based on the measurements, the indicated diversions were reduced by 9 percent April 27 to May 8 by the City.

The powerplant that used the water diverted through the tunnel operated most days of the year. On days when the powerplant was not in operation, there was a small amount of leakage through the wicket gates, which was not recorded on the totalizer, as observed in past years. Results of a current-meter measurement May 11 indicated a rate of 10.4 cfs from cooling water and leakage.

Based upon measurements obtained this year and in previous years, the record of quantity of water diverted through the East Delaware Tunnel should be substantially correct.

West Delaware Tunnel

A comparison of one current-meter measurement with venturi measurements indicated that the venturi gave higher results by 3.3 percent for the totalizer, 9.3 percent for the manometer and 3.0 percent for the indicator needle. Inspections of the channel downstream from the outlet, when valves were closed, showed no leakage.

Neversink Tunnel

Results of the comparative data showed that the venturi measurements and two current-meter measurements agreed fairly well. The average dif-

ference between the two methods showed the venturi higher by 4.4 percent for the totalizer, by 2.2 percent for the manometer, and 8.3 percent for the indicator needle.

The powerplant utilizing the water diverted through the Neversink Tunnel usually operated about 12 hours daily on most days of the year. Results of one current-meter measurement made May 6 at a time when the powerplant was not operating indicated the rate of leakage to be 10.1 cfs. The leakage was not recorded on the totalizer instrument, which was used for reporting the quantity of water diverted. On the basis of that meager information, flow in the form of leakage averaged approximately 5 cfs.

It was concluded that the reported record of the quantity of water diverted through the Neversink Tunnel was substantially correct.

Investigation of Ungaged Streams

In an effort to delineate yields of small streams in the ungaged area tributary to the Delaware River, a cooperative program was continued with the respective Geological Survey Districts to develop discharge correlations between small streams and regularly gaged streams. The increased knowledge of the yields of these streams is an aid in the definition of characteristics of the ungaged area.

Diversions by New Jersey

According to the terms of the Decree, the State of New Jersey may divert for use outside the Delaware River basin from the Delaware River or its tributaries in New Jersey, without compensating releases, a quantity of water not to exceed 100 mgd (154.7 cfs), as a monthly average, with the diversion on any day not to exceed 120 mgd (185.6 cfs). The diversion through the Delaware & Raritan Canal was recorded at the gaging station at Kingston, N.J. The gaging station is 6.6 miles beyond the Delaware-Raritan divide, and records include a slight amount of inflow from the Raritan River basin. Resolution No. 80-20 adopted October 17, 1980, by the Delaware River Basin Commission with the consent of parties to the Decree reduced allowable diversions by New Jersey to an average of 65 mgd (100.6 cfs). This rate was effective December 1 to January 15. A pumping station and pipeline were constructed by the State of New Jersey to divert water from Lake Hopatcong in the Delaware River basin to Rockaway River in the Passaic River basin. Water was diverted from Lake Hopatcong at a rate reported by the State to be approximately 25 mgd November 18, 1980 to February 27. A combined allowable diversion rate of 62 mgd (95.9 cfs) was set by Resolution No. 81-2 on January 15. The allowable rate of 100 mgd (154.7 cfs) provided by the Decree was restored May 18. One section of the canal was closed for cleaning October 31. Summarized below are the daily discharges of table 6 and diversions from Lake Hopatcong. The summary shows that the Decree limitations were not exceeded during the year December 1 to November 30. The summary table also shows that the average rates for the entire periods of Resolution No. 80-20, October 18, 1980

to January 15, and Resolution No. 81-2, January 16 to May 17, were not exceeded.

Period	Delaware & Raritan Canal Average discharge, cfs	Maximum daily discharge, cfs	Diversion from Lake Hopatcong cfs	Total diversions cfs	mgd
Oct. 18, 1980 to Jan. 15, 1981	70.0	96	25.1	95.1	61.5
Dec. 1 to Jan. 15	65.0	85	38.7	103.7	67.0
Jan. 16 to May 17	80.2	97	13.8	94.0	60.8
May 18-31	64.4	87	0	64.4	41.6
June	66.1	88	0	66.1	42.7
July	68.0	99	0	68.0	44.0
August	50.9	62	0	50.9	32.9
September	45.2	49	0	45.2	29.2
October	37.7	60	0	37.7	24.4
November	.032	.18	0	.032	.0 21

Conformance of Operations as Provided Under Amended Decree of the U.S. Supreme Court, dated June 7, 1954

Prior to the beginning of the report year, representatives of parties to the Decree had consented to proposals of the Delaware River Basin Commission making reductions in allowable diversions from the basin and rates of flow of Delaware River at Montague as conservation measures during drought. On January 15 the Commission declared an emergency due to drought.

With respect to diversions from the Delaware River basin to the water-supply system of the City of New York, the River Master found that diversions were less than the 800 mgd authorized under the Decree. For a part of year, permissible diversions during the drought were established by resolutions of the Commission. Allowable and actual diversions are shown below.

Effective dates	Allowable diversions under resolutions. Average not to exceed	Actual diversion
Dec. 1-19	580 mgd	558 mgd
Dec. 20 to Jan. 15	560 mgd	521 mgd
Jan. 16 to May 17	520 mgd	519 mgd
Effective dates	**Authorized under Decree. Equivalent rate not to exceed**	**Actual diversion**
May 18-31	800 mgd	784 mgd
June 1 to Nov. 30	800 mgd	761 mgd

Releases from the reservoirs, under the reductions, and in accordance with the design data of the River Master, were made to provide at the gaging station at Montague, N.J.:

Dec. 1-19	1,560 cfs
Dec. 20 to Jan. 17	1,550 cfs
Jan. 18 to Feb. 22	1,350 cfs
Feb. 23 to May 17	1,100 cfs

Under Compensating Releases of the Montague Formula, the City released water from its reservoirs at rates designed by the River Master to maintain the minimum basic rate of flow of 1,750 cfs at Montague May 18 to November 30, with the following exception. Credits from augmented conservation releases were lowered by means of reduced releases at times September 16 to November 30.

Diversions from the Delaware River basin by the State of New Jersey were found to be less than the authorized monthly average of 100 mgd and less than the authorized maximum daily flow of 120 mgd under the Amended Decree. Under Resolution No. 80-20, the average diversion was reported to be less than the authorized 65 mgd October 18, 1980 to January 15; under Resolution No. 81-2, the average diversion was reported to be less than the authorized 62 mgd January 16 to May 17.

Table 1. - Daily discharge in cubic feet per second of East Branch Delaware River at Downsville, N.Y.

for the year ending November 30, 1981

(Preliminary U.S.G.S. gaging-station record)

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	6.9	82	54	7.3	6.9	18	19	45	74	73	68	53
2	7.1	78	30	7.3	6.6	18	19	47	73	73	74	53
3	7.1	76	7.1	7.3	6.4	18	19	43	72	73	68	53
4	6.9	102	6.6	7.1	6.4	18	19	71	72	73	75	53
5	6.9	126	6.6	7.1	6.9	18	19	46	72	73	78	53
6	6.9	100	6.6	7.1	6.9	18	19	45	72	73	70	54
7	6.9	100	6.9	7.1	12	18	19	72	72	73	72	54
8	6.9	123	7.1	6.9	18	18	19	87	72	73	74	53
9	7.1	120	6.9	6.9	18	19	19	108	72	72	74	54
10	6.9	123	6.6	6.6	18	19	19	94	73	72	74	53
11	6.9	126	16	6.4	18	20	47	71	73	72	74	53
12	6.9	90	8.9	6.4	18	21	74	87	87	72	74	55
13	6.9	48	7.6	6.4	18	21	54	104	102	72	74	55
14	6.9	48	7.6	6.4	18	21	31	91	101	72	74	55
15	6.6	50	7.6	6.4	18	21	18	73	102	72	74	55
16	6.9	47	7.3	6.2	17	22	18	81	101	72	74	55
17	59	46	7.6	6.2	18	21	18	99	86	72	74	56
18	85	46	7.3	6.4	18	21	46	99	71	72	74	55
19	50	43	7.1	6.2	18	21	73	103	70	71	74	55
20	51	48	7.8	6.2	18	21	42	61	73	71	74	56
21	74	51	7.8	6.2	17	21	18	18	73	73	74	55
22	120	48	7.8	6.2	18	21	18	45	73	73	74	55
23	117	48	7.8	6.2	18	21	18	73	73	73	74	55
24	111	47	8.1	6.2	18	21	18	74	74	72	74	56
25	120	47	7.8	6.2	18	21	46	74	73	72	74	55
26	87	50	7.6	6.2	18	21	73	74	73	72	74	55
27	51	59	7.6	6.4	18	20	49	74	73	73	74	55
28	51	59	7.3	6.2	18	20	19	74	73	72	74	55
29	54	53		6.2	18	20	18	74	73	72	65	55
30	68	51		6.4	18	19	22	74	73	70	52	55
31	82	54		6.4		19		74	73		53	
Total cfs-days	1,290.7	2,189	285.0	202.7	464.1	616	910	2,255	2,394	2,168	2,229	1,634
Mean cfs	41.6	70.6	10.2	6.54	15.5	19.9	30.3	72.7	77.2	72.3	71.9	54.5

Year total 16,637.5 cfs-days Mean 45.6 cfs

Table 2. - Daily discharge in cubic feet per second of West Branch Delaware River at Stilesville, N.Y.

for the year ending November 30, 1981

(Preliminary U.S.G.S. gaging-station record)

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	16	265	510	14	12	31	29	82	954	954	52	39
2	13	265	262	13	12	30	29	92	580	941	560	39
3	14	335	23	13	12	30	29	510	580	954	590	39
4	14	345	12	12	12	29	30	478	670	994	520	39
5	13	277	11	12	12	29	29	220	718	1,010	382	39
6	12	265	11	12	12	29	29	119	718	1,120	202	41
7	13	330	11	12	12	29	29	78	826	446	394	41
8	13	345	11	12	11	28	29	170	706	320	345	40
9	14	388	11	12	12	28	29	193	462	156	540	40
10	13	388	11	12	12	28	29	610	600	88	486	40
11	12	345	25	12	12	28	29	610	580	658	376	40
12	12	340	42	12	12	32	365	265	670	778	470	40
13	12	412	22	12	11	32	478	177	694	340	530	69
14	10	438	18	12	13	31	193	462	876	202	570	155
15	12	446	16	12	15	31	41	570	876	53	646	55
16	12	454	15	12	29	33	31	590	718	40	889	42
17	12	580	16	13	30	34	30	980	718	502	706	41
18	33	570	16	11	29	32	105	754	790	1,080	365	41
19	207	530	19	11	29	32	259	360	814	1,090	706	41
20	244	478	34	11	29	31	200	308	850	350	790	42
21	226	478	31	11	29	31	87	44	1,040	308	730	42
22	268	462	22	11	29	31	82	29	1,020	340	478	41
23	268	454	20	11	30	31	31	296	902	232	53	41
24	340	530	21	11	31	30	30	766	902	200	149	41
25	350	560	18	11	30	29	55	876	941	902	320	41
26	350	462	16	11	29	30	244	350	941	954	202	41
27	262	478	15	11	29	29	335	312	954	191	265	41
28	235	478	14	11	29	29	87	312	1,040	125	65	41
29	193	540		11	31	29	44	406	1,040	105	41	41
30	250	520		11	35	29	34	418	838	142	39	41
31	265	502		12		30		889	980		39	
Total cfs-days	3,708	13,260	1,253	364	630	935	3,051	12,326	24,998	15,575	12,500	1,374
Mean cfs	120	428	44.8	11.7	21.0	30.2	102	398	806	519	403	45.8

Year total 89,974 cfs-days

Mean 247 cfs

Table 3. - Daily discharge in cubic feet per second of Wallenpaupack Creek at Wilsonville, Pa.

for the year ending November 30, 1981

(Preliminary U.S.G.S. gaging-station record)

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	113	0	0	0	375	1,690	465	553	0	116	853	18
2	117	0	0	0	340	446	463	587	0	111	849	1,130
3	130	97	0	620	336	463	465	0	467	122	0	1,120
4	124	138	0	586	0	850	810	0	367	116	0	1,110
5	127	107	0	604	0	245	834	0	345	223	120	1,120
6	0	0	0	576	0	285	0	405	348	223	0	1,030
7	7	53	0	0	0	225	0	387	354	109	0	0
8	117	0	0	0	0	217	578	595	220	729	123	0
9	137	166	0	517	0	0	575	815	190	682	120	0
10	127	53	0	483	0	0	588	396	374	631	0	667
11	118	56	0	475	0	536	578	0	325	705	0	732
12	120	56	0	467	0	1,230	581	0	307	216	117	711
13	0	56	0	480	574	1,850	0	417	299	227	139	717
14	0	0	0	0	577	1,850	0	473	287	715	117	0
15	130	0	0	0	584	1,840	1,040	470	213	715	118	0
16	137	47	0	358	583	1,840	688	467	222	408	113	0
17	167	0	0	351	0	1,760	514	449	285	343	0	0
18	127	0	0	355	0	1,570	588	0	234	537	0	0
19	153	0	0	350	0	1,180	579	0	238	0	41	0
20	0	0	0	400	230	233	0	464	239	0	0	0
21	0	0	0	0	232	229	0	471	229	732	0	0
22	131	0	0	0	237	241	118	452	224	727	0	0
23	128	11	0	0	237	0	101	282	224	696	0	0
24	115	0	0	0	885	0	150	574	238	706	0	32
25	0	0	0	0	0	0	116	0	177	721	0	0
26	113	0	0	0	0	85	111	0	180	0	0	0
27	0	14	883	0	468	0	0	445	202	0	0	0
28	25	0	0	0	469	344	0	490	216	821	0	0
29	124	0		0	467	350	586	472	217	861	0	0
30	125	0		341	886	0	613	436	218	834	0	0
31	120	0		338		0		470	168		0	
Total cfs-days	2,832	854	883	7,301	7,480	19,559	11,141	10,570	7,607	13,026	2,710	8,387
Mean cfs	91.4	27.5	31.5	236	249	631	371	341	245	434	87.4	280

Year total 92,350 cfs-days

Mean 253 cfs

Table 4. - Daily discharge in cubic feet per second of Neversink River at Neversink, N.Y.

for the year ending November 30, 1981

(Preliminary U.S.G.S. gaging-station record)

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	5.4	24	27	5.7	5.1	16	16	18	43	47	45	24
2	5.4	24	16	5.7	4.8	16	15	18	43	47	44	25
3	5.1	24	5.9	5.7	4.9	17	15	30	43	46	45	26
4	5.2	24	5.5	5.8	4.9	16	15	49	43	45	45	25
5	5.1	24	5.3	5.8	5.0	17	15	38	43	46	45	25
6	5.2	25	5.3	5.7	4.8	16	15	20	43	46	44	28
7	5.2	27	5.3	5.7	9.5	16	15	29	43	46	42	27
8	5.2	25	5.3	5.7	15	16	15	49	45	47	43	27
9	5.2	25	5.5	5.7	16	16	15	55	45	47	44	27
10	5.2	25	5.5	5.7	15	16	15	81	44	46	44	28
11	5.1	25	6.4	5.7	15	17	15	91	45	44	45	27
12	5.2	25	5.8	5.6	15	18	25	75	45	46	45	27
13	5.1	25	5.8	5.2	15	16	43	54	45	46	45	27
14	5.1	25	5.8	4.8	16	16	34	61	45	46	43	27
15	5.2	25	5.7	5.4	15	16	15	49	45	46	44	27
16	5.2	25	5.8	4.9	16	16	15	46	44	46	45	26
17	5.0	25	5.7	4.9	16	16	15	54	44	46	44	26
18	11	25	5.8	4.8	15	16	15	66	44	46	45	26
19	24	25	5.8	4.8	15	16	24	66	44	46	43	27
20	24	25	7.5	4.8	15	16	33	42	46	46	42	27
21	24	25	6.6	4.8	15	16	16	17	46	46	42	27
22	24	25	6.6	4.8	16	16	16	17	46	46	42	27
23	24	25	6.2	4.8	16	16	16	27	46	45	42	27
24	24	26	6.1	4.8	16	16	16	43	46	44	42	27
25	24	26	5.7	4.8	15	16	16	43	46	44	43	27
26	23	26	5.6	4.9	15	16	26	43	45	45	39	28
27	23	26	5.7	4.9	15	16	46	42	45	45	43	28
28	23	26	5.8	4.8	16	16	37	41	45	45	43	28
29	24	27		4.9	16	16	16	41	45	44	43	27
30	25	27		5.0	16	16	17	41	45	44	38	27
31	24	27		4.9		16		41	46		24	
Total cfs-days	409.1	783	195.0	161.5	394.0	501	607	1,387	1,383	1,369	1,323	802
Mean cfs	13.2	25.3	6.96	5.21	13.1	16.2	20.2	44.7	44.6	45.6	42.7	26.7

Year total 9,314.6 cfs-days Mean 25.5 cfs

Table 5. - Daily discharge in cubic feet per second of the Delaware River at Montague, N.J.

for the year ending November 30, 1981

(Preliminary U.S.G.S. gaging-station record)

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	3,020	1,400	1,250	8,010	1,850	8,900	2,070	1,850	1,780	1,610	1,770	4,150
2	2,790	1,300	1,800	7,030	2,690	7,150	2,630	1,870	1,650	1,680	1,970	3,470
3	2,950	1,350	5,000	6,050	4,090	5,510	2,560	1,890	1,640	1,660	2,090	3,950
4	4,260	1,300	8,000	5,540	3,810	5,430	2,870	1,560	2,070	1,680	1,680	3,600
5	3,400	1,200	6,000	5,410	3,000	4,310	3,260	2,060	1,830	1,670	1,670	3,390
6	2,600	1,400	4,500	5,160	3,010	4,020	3,000	2,270	1,970	1,700	1,770	3,400
7	2,700	1,300	3,800	4,470	3,580	3,730	1,910	2,240	2,030	1,750	1,610	3,680
8	2,700	1,400	3,800	3,490	3,340	3,420	1,670	2,050	2,000	1,760	1,510	3,310
9	2,590	1,300	3,800	3,380	3,110	2,980	2,090	2,050	1,870	2,740	2,000	2,750
10	2,750	1,450	3,200	3,900	3,020	2,460	2,030	2,190	1,690	2,390	1,910	2,430
11	2,860	1,300	5,000	3,690	3,030	3,330	2,030	1,800	1,760	2,060	1,770	3,070
12	2,480	1,300	42,000	3,550	2,830	22,800	1,960	1,480	1,700	1,820	1,620	2,900
13	2,150	1,350	24,000	3,380	2,830	32,300	1,860	1,540	1,740	1,380	1,690	2,860
14	2,040	1,300	15,000	3,190	3,780	19,400	1,650	1,800	1,750	1,640	1,770	2,780
15	1,650	1,200	10,000	2,430	5,290	14,400	2,570	1,560	1,790	1,890	1,670	1,940
16	1,570	1,350	7,600	2,260	5,340	23,600	3,810	1,540	1,760	1,820	1,650	2,060
17	1,300	1,450	6,600	2,780	4,550	20,800	3,070	1,810	1,740	1,380	1,730	2,120
18	1,800	1,250	8,000	2,510	3,950	14,800	2,280	1,730	1,770	1,200	1,670	2,230
19	1,800	1,350	10,000	2,260	3,690	11,400	2,040	1,620	1,700	1,500	1,500	2,260
20	2,000	1,450	18,000	2,130	3,370	8,980	1,990	1,630	1,700	1,660	1,380	2,360
21	1,450	1,450	47,000	2,190	3,430	7,350	1,680	2,190	1,690	1,600	1,700	2,870
22	1,400	1,250	26,000	1,650	3,210	6,320	1,770	2,290	1,710	1,890	1,710	3,220
23	1,800	1,300	18,200	1,730	3,170	5,240	2,470	1,980	1,750	1,780	1,710	2,890
24	2,000	1,250	20,100	1,700	4,080	4,110	2,570	1,450	1,720	1,840	1,600	2,810
25	1,900	1,250	19,000	1,620	5,400	3,610	2,350	1,560	1,740	1,870	1,270	2,740
26	1,550	1,250	13,900	1,570	4,180	3,620	2,030	1,560	1,700	1,770	1,780	2,550
27	1,600	1,350	11,300	1,540	3,960	3,440	1,650	1,760	1,700	1,610	2,080	2,230
28	1,550	1,300	9,490	1,620	4,150	2,920	1,610	1,960	1,700	1,620	5,570	2,150
29	1,700	1,250		1,490	4,500	3,070	1,640	1,790	1,740	2,060	9,930	2,140
30	1,900	1,250		1,420	7,260	2,870	1,950	1,800	1,700	1,770	6,410	2,020
31	1,800	1,250		1,760		2,200		1,700	1,710		4,810	
Total cfs-days	68,060	40,850	352,340	98,910	113,500	264,470	67,070	56,580	54,800	52,800	73,000	84,330
Mean cfs	2,195	1,318	12,580	3,191	3,783	8,531	2,236	1,825	1,768	1,760	2,355	2,811

Year total 1,326,710 cfs-days

Mean 3,635 cfs

Table 6. - Daily discharge in cubic feet per second of Delaware & Raritan Canal at Kingston, N.J.

for the year ending November 30, 1981

(Preliminary U.S.G.S. gaging-station record)

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	58	63	61	59	93	94	58	70	54	48	30	0.02
2	61	63	62	75	96	96	59	69	53	46	30	.08
3	61	63	62	96	93	96	61	70	52	47	30	.08
4	73	63	62	95	91	94	61	72	51	46	31	.07
5	75	63	61	95	91	92	61	80	42	46	31	.09
6	59	63	61	95	96	92	60	79	37	46	28	.17
7	60	63	59	97	93	91	60	78	38	46	31	.18
8	59	64	59	97	95	88	60	74	39	46	29	.18
9	59	63	59	95	93	85	59	73	42	46	29	.09
10	60	64	59	89	95	82	63	66	48	43	30	.00
11	63	64	60	91	95	80	65	60	55	45	29	.00
12	65	65	60	93	95	91	64	60	61	45	29	.00
13	69	63	60	93	94	94	63	58	62	41	29	.00
14	68	63	59	93	95	86	64	59	61	47	30	.00
15	63	63	59	93	94	87	67	60	60	46	30	.00
16	61	62	57	93	92	75	68	59	59	47	42	.00
17	61	62	57	93	88	87	65	59	57	48	55	.00
18	61	63	57	93	91	87	63	59	57	49	50	.00
19	61	63	57	93	89	87	62	61	56	49	40	.00
20	74	63	57	93	89	78	63	60	56	48	55	.00
21	85	62	57	93	87	61	63	81	54	47	60	.00
22	71	63	57	92	86	57	63	99	52	48	59	.00
23	63	63	57	93	88	61	66	86	51	47	52	.00
24	69	63	59	93	89	59	72	69	48	46	44	.00
25	74	63	59	95	89	60	70	69	46	43	45	.00
26	81	63	59	93	90	60	88	68	49	44	46	.00
27	72	63	59	95	92	59	85	67	53	44	47	.00
28	64	63	58	92	96	59	82	66	48	43	48	.00
29	65	63		92	96	59	74	62	44	38	49	.00
30	64	63		93	96	58	73	59	44	30	32	.00
31	63	62		95		57		57	48		.01	
Total cfs-days	2,042	1,954	1,653	2,847	2,767	2,412	1,982	2,109	1,577	1,355	1,170.01	0.96
Mean cfs	65.9	63.0	59.0	91.8	92.2	77.8	66.1	68.0	50.9	45.2	37.7	.032

Year total 21,868.97 cfs-days Mean 59.9 cfs

Table 7. - Daily discharge in cubic feet per second of Delaware River at Trenton, N.J.

for the year ending November 30, 1981

(Preliminary U.S.G.S. gaging-station record)

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	6,100	3,070	2,280	18,600	4,460	12,000	6,750	4,730	3,930	3,260	3,590	9,050
2	5,780	2,780	3,310	15,800	6,200	14,300	6,480	4,820	3,740	3,340	3,690	7,990
3	5,210	2,400	12,200	14,200	6,440	13,200	7,910	5,390	3,640	3,180	3,790	7,220
4	4,830	2,150	10,300	12,800	6,950	11,000	8,180	6,430	3,440	3,090	3,880	7,070
5	5,330	1,900	11,200	12,100	7,430	10,200	8,710	7,130	3,510	3,070	3,950	6,530
6	5,590	2,280	10,400	11,600	7,650	9,090	8,660	7,790	3,660	3,020	3,550	6,400
7	4,750	2,500	7,740	10,900	7,350	8,090	8,160	7,790	3,470	2,980	3,620	7,590
8	4,550	2,560	6,640	10,100	7,100	7,570	6,830	7,050	3,950	3,400	3,580	8,290
9	4,630	2,400	6,480	9,240	7,170	6,980	6,040	6,050	4,270	3,550	3,320	7,250
10	4,610	2,430	5,900	9,000	6,940	6,550	6,400	5,490	3,970	4,640	3,200	6,890
11	4,500	2,330	7,490	8,820	6,920	7,080	5,980	5,130	3,680	4,700	3,600	5,930
12	4,620	2,350	31,800	8,550	9,850	30,900	5,510	4,880	3,750	4,070	3,580	5,420
13	4,490	2,210	58,800	7,970	8,580	58,100	5,160	4,210	3,700	3,660	3,460	5,530
14	4,070	2,370	30,800	7,540	8,490	50,100	5,230	3,930	3,610	3,320	3,280	5,380
15	3,650	2,430	23,000	7,170	10,500	34,600	6,980	4,040	3,800	2,780	3,310	5,930
16	3,050	2,500	18,900	6,350	10,600	41,300	8,940	3,840	3,820	3,440	3,320	6,010
17	2,950	2,500	16,200	6,000	10,800	48,400	9,940	3,550	3,620	3,920	3,090	6,440
18	2,850	2,420	14,900	5,780	9,990	37,200	8,040	3,460	3,390	4,200	3,050	5,500
19	2,550	2,500	15,600	5,480	8,760	27,300	6,590	3,560	3,220	4,470	3,260	5,420
20	3,110	2,700	18,700	5,200	8,220	22,800	5,890	3,550	3,150	4,120	3,280	5,440
21	2,940	2,810	42,500	4,900	7,560	19,700	5,600	5,070	5,290	3,880	3,070	5,870
22	2,420	2,840	60,600	4,860	7,180	16,100	6,430	6,340	4,160	3,730	2,870	6,220
23	2,370	2,800	42,100	4,560	6,850	13,600	7,450	5,880	3,150	3,560	3,140	6,530
24	2,710	2,740	47,600	4,190	7,570	12,000	7,020	5,080	2,970	3,680	3,660	6,330
25	2,890	2,770	47,000	4,200	8,660	10,400	6,940	4,330	2,980	3,390	4,230	5,870
26	2,610	2,720	36,700	4,040	10,100	9,270	7,240	3,860	2,950	3,360	4,200	5,600
27	2,390	2,720	27,000	3,900	8,790	8,960	6,720	4,790	2,920	3,370	4,120	5,410
28	2,580	2,820	21,900	3,790	8,050	8,620	5,610	7,330	2,850	3,300	7,300	5,080
29	2,800	2,670		3,710	8,570	8,270	4,980	5,450	2,820	3,210	10,400	5,310
30	3,150	2,640		3,730	9,270	8,660	4,700	4,750	2,870	3,270	15,700	5,530
31	3,210	2,410		4,100		8,020		4,210	2,970		11,400	
Total cfs-days	117,290	78,720	638,040	239,180	243,000	580,360	205,070	159,910	109,250	106,960	139,490	189,030
Mean cfs	3,784	2,539	22,790	7,715	8,100	18,720	6,836	5,158	3,524	3,565	4,500	6,301

Year total 2,806,300 cfs-days Mean 7,688 cfs

Table 8. - Controlled releases from reservoirs in the upper Delaware River basin

and segregation of flow of Delaware River at Montague, N.J.

(River Master daily operation record)

Mean cubic feet per second for 24 hours

Controlled releases from New York City reservoirs					Lake Wallenpaupack		Mongaup Reservoir		Delaware River at Montague						
									Segregation of flow						
Directed		Pepacton	Cannonsville	Neversink	Date	Controlled release	Date	Controlled release	Date	Controlled releases N.Y.C. reservoirs		Power-plants	Computed uncontrolled	Total	
Date	Amount									Directed	Other				
1980	1	2	3	4		5		6		7	8	9	10	11	
Nov. 28	0	6	26	5	Nov. 30	0	Dec. 1	0	Dec. 1	0	37	0	3,023	3,060	
29	0	6	26	5	Dec. 1	113	2	0	2	0	37	113	2,640	2,790	
30	0	6	9	5	2	117	3	173	3	0	20	290	2,630	2,940	
Dec. 1	0	6	9	5	3	130	4	108	4	0	20	238	3,982	4,240	
2	0	6	9	5	4	124	5	0	5	0	20	124	3,256	3,400	
3	0	6	9	5	5	127	6	0	6	0	20	127	2,553	2,700	
4	0	6	9	5	6	0	7	0	7	0	20	0	2,680	2,700	
5	0	6	9	5	7	7	8	0	8	0	20	7	2,673	2,700	
6	0	6	9	5	8	117	9	0	9	0	20	117	2,463	2,600	
7	0	6	9	5	9	137	10	0	10	0	20	137	2,553	2,710	
8	0	6	9	5	10	127	11	0	11	0	20	127	2,693	2,840	
9	0	6	9	5	11	118	12	0	12	0	20	118	2,332	2,470	
10	0	6	9	5	12	120	13	43	13	0	20	163	1,937	2,120	
11	0	6	9	5	13	0	14	86	14	0	20	86	1,874	1,980	
12	0	6	9	5	14	0	15	0	15	0	20	0	1,630	1,650	
13	0	6	9	5	15	137	16	0	16	0	20	137	1,413	1,570	
14	0	6	9	5	16	131	17	0	17	0	20	131	1,149	1,300	
15	0	6	9	5	17	167	18	0	18	0	20	167	1,613	1,800	
16	0	6	9	5	18	127	19	189	19	0	20	316	1,464	1,800	
17	180	121	36	25	19	153	20	70	20	182	0	223	1,595	2,000	
18	350	50	277	25	20	0	21	0	21	352	0	0	1,098	1,450	
19	350	50	272	25	21	0	22	189	22	347	0	189	864	1,400	
20	320	50	246	25	22	134	23	221	23	321	0	355	1,124	1,800	
21	420	101	292	25	23	128	24	156	24	418	0	284	1,298	2,000	
22	460	141	292	26	24	112	25	0	25	459	0	112	1,329	1,900	
23	530	104	401	25	25	0	26	0	26	530	0	0	1,020	1,550	
					26	114			27			114	1,486	1,600	
24	550	127	401	25	27	0	27	0	28	553	0	0	997	1,550	
25	550	128	401	25	28	25	28	0	29	554	0	25	1,121	1,700	
26	350	48	278	25	29	129	29	243	30	351	0	372	1,177	1,900	
27	330	50	258	25	30	120	30	0	31	333	0	120	1,347	1,800	
Total	4,390	1,084	3,359	371		2,714		1,478		4,400	414	4,192	59,014	68,020	

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 ending 1600 Dec. 1-26 and ending 2400 Dec. 27-30.

Col. 7 = Col. 2 + Col. 3 + Col. 4 Dec. 20-31.
Col. 8 = Col. 2 + Col. 3 + Col. 4 Dec. 1-19.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 - 24 hours of calendar day shown.

Note: Computational time of transit from New York reservoirs to Montague was increased 24 hours and from Mongaup to Montague was increased 16 hours beginning Dec. 28 (Montague date); some data adjusted to preserve budget balance.

Table 8. - Controlled releases from reservoirs in the upper Delaware River basin

and segregation of flow of Delaware River at Montague, N.J. - continued

(River Master daily operation record)

Mean cubic feet per second for 24 hours

Controlled releases from New York City reservoirs					Lake Wallenpaupack		Mongaup Reservoir		Delaware River at Montague					
									Segregation of flow					
Directed		Pepacton	Cannonsville	Neversink	Date	Controlled release	Date	Controlled release	Date	Controlled releases N.Y.C. reservoirs		Power-plants	Computed uncontrolled	Total
Date	Amount									Directed	Other			
1980/81	1	2	3	4		5		6		7	8	9	10	11
Dec. 28	280	50	210	26	Dec. 31	120	Dec. 31	0	Jan. 1	286	0	120	1,044	1,450
29	350	51	275	26	Jan. 1	0	Jan. 1	0	2	352	0	0	998	1,350
30	400	84	294	25	2	0	2	0	3	403	0	0	1,047	1,450
31	400	84	292	25	3	99	3	0	4	401	0	99	950	1,450
Jan. 1	400	82	294	25	4	136	4	0	5	401	0	136	663	1,200
2	500	76	401	25	5	107	5	130	6	502	0	237	661	1,400
3	500	76	401	25	6	0	6	253	7	502	0	253	545	1,300
4	450	133	292	25	7	53	7	211	8	450	0	264	686	1,400
5	450	133	292	28	8	0	8	103	9	453	0	103	744	1,300
6	500	76	399	26	9	166	9	227	10	501	0	393	556	1,450
7	550	130	398	25	10	53	10	0	11	553	0	53	694	1,300
8	650	130	493	26	11	56	11	0	12	649	0	56	595	1,300
9	550	130	394	26	12	56	12	275	13	550	0	331	469	1,350
10	550	131	394	26	13	56	13	211	14	551	0	267	482	1,300
11	550	133	394	26	14	0	14	178	15	553	0	178	469	1,200
12	575	50	506	26	15	0	15	194	16	582	0	194	574	1,350
13	575	50	504	26	16	47	16	65	17	580	0	112	758	1,450
14	550	50	478	25	17	0	17	0	18	553	0	0	697	1,250
15	650	50	572	26	18	0	18	0	19	648	0	0	702	1,350
16	750	50	661	26	19	0	19	0	20	737	0	0	713	1,450
17	700	51	628	26	20	0	20	0	21	705	0	0	745	1,450
18	650	50	575	26	21	0	21	0	22	651	0	0	599	1,250
19	650	50	575	25	22	0	22	0	23	650	0	0	650	1,300
20	650	65	558	25	23	11	23	0	24	648	0	11	591	1,250
21	600	50	528	26	24	0	24	0	25	604	0	0	646	1,250
22	600	51	526	26	25	0	25	0	26	603	0	0	647	1,250
23	700	50	625	26	26	0	26	0	27	701	0	0	649	1,350
24	700	50	623	25	27	14	27	0	28	698	0	14	588	1,300
25	600	50	528	25	28	0	28	0	29	603	0	0	647	1,250
26	650	68	551	25	29	0	29	0	30	644	0	0	606	1,250
27	650	76	549	25	30	0	30	0	31	650	0	0	600	1,250
Total	17,330	2,360	14,210	794		974		1,847		17,364	0	2,821	21,015	41,200

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 ending 2400 of date shown.

Col. 7 = Col. 2 + Col. 3 + Col. 4.
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 8. - Controlled releases from reservoirs in the upper Delaware River basin

and segregation of flow of Delaware River at Montague, N.J. - continued

(River Master daily operation record)

Mean cubic feet per second for 24 hours

Controlled releases from New York City reservoirs					Lake Wallenpaupack		Mongaup Reservoir		Delaware River at Montague Segregation of flow						
Directed		Pepacton	Cannonsville	Neversink	Date	Controlled release	Date	Controlled release	Date	Controlled releases N.Y.C. reservoirs		Power-plants	Computed uncontrolled	Total	
Date	Amount									Directed	Other				
1981	1	2	3	4		5		6		7	8	9	10	11	
Jan.28	700	53	623	25	Jan. 31	0	Jan. 31	0	Feb. 1	701	0	0	549	1,250	
29	675	50	597	26	Feb. 1	0	Feb. 1	0	2	673	0	0	1,277	1,950	
30	650	51	575	26	2	0	2	0	3	652	0	0	4,348	5,000	
31	650	53	575	22	3	0	3	0	4	650	0	0	7,350	8,000	
Feb. 1	236	48	183	5	4	0	4	0	5	236	0	0	5,764	6,000	
2	0	6	8	5	5	0	5	0	6	0	19	0	4,481	4,500	
3	0	6	8	5	6	0	6	0	7	0	19	0	3,781	3,800	
4	0	6	9	5	7	0	7	65	8	0	20	65	3,715	3,800	
5	0	6	8	5	8	0	8	0	9	0	19	0	3,781	3,800	
6	0	6	8	5	9	0	9	0	10	0	19	0	3,181	3,200	
7/8	0	12	16	10	10	0	10/11	200	11	0	38	200	4,762	5,000	
9	0	6	8	5	11	0	12	0	12	0	19	0	34,981	35,000	
10	0	6	8	5	12	0	13	0	13	0	19	0	19,981	20,000	
11	0	6	9	5	13	0	14	0	14	0	20	0	12,980	13,000	
12	0	6	9	5	14	0	15	0	15	0	20	0	9,980	10,000	
13	0	6	9	5	15	0	16	108	16	0	20	108	7,472	7,600	
14	0	6	9	5	16	0	17	216	17	0	20	216	6,364	6,600	
15	0	6	9	5	17	0	18	270	18	0	20	270	7,710	8,000	
16	0	6	9	5	18	0	19	275	19	0	20	275	9,705	10,000	
17	0	6	8	5	19	0	20	410	20	0	19	410	17,571	18,000	
16	0	6	8	5	20	0	21	727	21	0	19	727	46,254	47,000	
19	0	6	8	5	21	0	22	421	22	0	19	421	25,560	26,000	
20	0	6	8	5	22	0	23	410	23	0	19	410	17,771	18,200	
21	0	6	6	5	23	0	24	194	24	0	19	194	19,887	20,100	
22	0	6	8	5	24	0	25	421	25	0	19	421	18,560	19,000	
23	0	6	8	5	25	0	26	415	26	0	19	415	13,466	13,900	
24	0	6	8	5	26	0	27	400	27	0	19	400	10,881	11,300	
25	0	6	6	5	27	883	28	410	28	0	19	1,293	8,178	9,490	
Total	2,911	399	2,752	224		683		4,942		2,912	463	5,625	330,290	339,490	

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 ending 2400 Feb. 1-9 and ending 1200 Feb. 10-28.

Col. 7 = Col. 2 + Col. 3 + Col. 4 Feb. 1-5.
Col. 8 = Col. 2 + Col. 3 + Col. 4 Feb. 6-28.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 - 24 hours of calendar day shown.

Note: Computational time of transit from New York City reservoirs to Montague was decreased 24 hours on Feb. 11 (Montague date); some data adjusted to preserve budget balance.

Table 8. - Controlled releases from reservoirs in the upper Delaware River basin

and segregation of flow of Delaware River at Montague, N.J. - continued

(River Master daily operation record)

Mean cubic feet per second for 24 hours

Controlled releases from New York City reservoirs					Lake Wallenpaupack		Mongaup Reservoir		Delaware River at Montague					
									Segregation of flow					
Directed		Pepacton	Cannonsville	Neversink	Date	Controlled release	Date	Controlled release	Date	Controlled releases		Power-plants	Computed uncontrolled	Total
Date	Amount									N.Y.C. reservoirs				
										Directed	Other			
1981	1	2	3	4		5		6		7	8	9	10	11
Feb. 26	0	6	8	5	Feb. 28	0	Mar. 1	400	Mar. 1	0	19	400	7,241	7,660
27	0	6	8	5	Mar. 1	0	2	416	2	0	19	416	6,435	6,870
28	0	6	8	5	2	0	3	167	3	0	19	167	5,884	6,070
Mar. 1	0	6	8	5	3	620	4	16	4	0	19	636	4,915	5,570
2	0	6	8	5	4	586	5	389	5	0	19	975	4,436	5,430
3	0	6	8	5	5	604	6	427	6	0	19	1,031	4,170	5,220
4	0	6	8	5	6	576	7	194	7	0	19	770	3,711	4,500
5	0	6	8	5	7	0	8	0	8	0	19	0	3,541	3,560
6	0	6	8	5	8	0	9	70	9	0	19	70	3,261	3,350
7	0	6	8	5	9	517	10	281	10	0	19	798	3,023	3,840
8	0	6	8	5	10	483	11	227	11	0	19	710	2,941	3,670
9	0	6	8	5	11	475	12	270	12	0	19	745	2,736	3,500
10	0	6	8	5	12	467	13	254	13	0	19	721	2,610	3,350
11	0	6	8	5	13	480	14	194	14	0	19	674	2,437	3,130
12	0	6	8	5	14	0	15	16	15	0	19	16	2,375	2,410
13	0	6	8	5	15	0	16	81	16	0	19	81	2,150	2,250
14	0	6	8	5	16	358	17	281	17	0	19	639	2,052	2,710
15	0	6	8	5	17	351	18	200	18	0	19	551	1,910	2,480
16	0	6	8	5	18	355	19	130	19	0	19	485	1,716	2,220
17	0	6	8	5	19	350	20	0	20	0	19	350	1,741	2,110
18	0	6	8	5	20	400	21	0	21	0	19	400	1,761	2,180
19	0	6	8	5	21	0	22	0	22	0	19	0	1,591	1,610
20	0	6	8	5	22	0	23	0	23	0	19	0	1,671	1,690
21	0	6	8	5	23	0	24	0	24	0	19	0	1,641	1,660
22	0	6	8	5	24	0	25	0	25	0	19	0	1,581	1,600
23	0	6	8	5	25	0	26	0	26	0	19	0	1,521	1,540
24	0	6	8	5	26	0	27	81	27	0	19	81	1,420	1,520
25	0	6	8	5	27	0	28	173	28	0	19	173	1,388	1,580
26	0	6	8	5	28	0	29	0	29	0	19	0	1,461	1,480
27	0	6	8	5	29	0	30	0	30	0	19	0	1,381	1,400
28	0	6	8	5	30	341	31	0	31	0	19	341	1,350	1,710
Total	0	186	248	155		6,963		4,267		0	589	11,230	86,051	97,870

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

Col. 8 = Col. 2 + Col. 3 + Col. 4.
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 8. - Controlled releases from reservoirs in the upper Delaware River basin and segregation of flow of Delaware River at Montague, N.J. - continued

(River Master daily operation record)

Mean cubic feet per second for 24 hours

Controlled releases from New York City reservoirs					Lake Wallenpaupack		Mongaup Reservoir		Delaware River at Montague							
									Segregation of flow							
Directed		Pepacton	Cannonsville	Neversink	Date	Controlled release	Date	Controlled release	Date	Controlled releases			Computed uncontrolled	Total		
										N.Y.C. reservoirs		Powerplants				
Date	Amount									Directed	Other					
1981	1	2	3	4		5		6		7	8	9	10	11		
Mar. 29	0	6	8	5	Mar. 31	338	Apr.1	0	Apr. 1	0	19	338	1,443	1,800		
30	0	6	8	5	Apr. 1	375	2	70	2	0	19	445	2,186	2,650		
31	0	6	8	5	2	340	3	221	3	0	19	561	3,420	4,000		
Apr. 1	0	6	8	5	3	336	4	194	4	0	19	530	3,161	3,710		
2	0	6	8	5	4	0	5	0	5	0	19	0	2,941	2,960		
3	0	6	8	5	5	0	6	65	6	0	19	65	2,906	2,990		
4	0	6	8	5	6	0	7	416	7	0	19	416	3,075	3,510		
5	0	6	8	6	7	0	8	394	6	0	20	394	2,896	3,310		
6	0	6	8	15	8	0	9	389	9	0	29	389	2,682	3,100		
7	0	19	8	15	9	0	10	246	10	0	42	248	2,690	2,980		
8	0	19	8	15	10	0	11	65	11	0	42	65	2,873	2,980		
9	0	19	8	15	11	0	12	0	12	0	42	0	2,788	2,830		
10	0	19	8	15	12	0	13	65	13	0	42	65	2,703	2,810		
11	0	19	8	15	13	574	14	292	14	0	42	866	2,862	3,770		
12	0	19	8	15	14	577	15	275	15	0	42	852	4,456	5,350		
13	0	19	8	15	15	584	16	286	16	0	42	870	4,468	5,380		
14	0	19	14	15	16	583	17	243	17	0	48	826	3,706	4,580		
15	0	19	25	15	17	0	18	194	18	0	59	194	3,747	4,000		
16	0	19	25	15	18	0	19	0	19	0	59	0	3,711	3,770		
17	0	19	25	15	19	0	20	92	20	0	59	92	3,249	3,400		
18	0	19	25	15	20	230	21	265	21	0	59	495	2,886	3,440		
19	0	19	25	15	21	232	22	259	22	0	59	491	2,690	3,240		
20	0	19	25	15	22	237	23	270	23	0	59	507	2,634	3,200		
21	0	19	25	15	23	237	24	297	24	0	59	534	3,497	4,090		
22	0	19	25	15	24	885	25	211	25	0	59	1,096	4,245	5,400		
23	0	19	25	15	25	0	26	0	26	0	59	0	4,181	4,240		
24	0	19	25	16	26	0	27	103	27	0	60	103	3,757	3,920		
25	0	19	24	15	27	468	28	313	28	0	58	781	3,231	4,070		
26	0	19	25	15	28	469	29	302	29	0	59	771	3,510	4,340		
27	0	19	25	15	29	467	30	259	30	0	59	726	6,135	6,920		
Total	0	453	466	372		6,932		5,788		0	1,291	12,720	98,729	112,740		

Col. 2 - 24 hours beginning 1200 of date shown except 23 hours Apr. 25.
Col. 3 - 24 hours ending 2400 one day later, except 23 hours Apr. 25.
Col. 4 - 24 hours beginning 1500 one day later, except 23 hours Apr. 24.
Col. 5 - 24 hours beginning 0800 at date shown, except 23 hours Apr. 25.
Col. 6 - 24 hours ending 1200 of date shown, except 23 hours Apr. 25.

Col. 6 = Col. 2 + Col. 3 + Col. 4.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 - 24 hours of calendar day shown, except 23 hours Apr. 26.

Table 8. - Controlled releases from reservoirs in the upper Delaware River basin and segregation of flow of Delaware River at Montague, N.J. - continued

(River Master daily operation record)

Mean cubic feet per second for 24 hours

Controlled releases from New York City reservoirs					Lake Wallenpaupack		Mongaup Reservoir		Delaware River at Montague					
									Segregation of flow					
Directed		Pepacton	Cannonsville	Neversink	Date	Controlled release	Date	Controlled release	Date	Controlled releases		Computed uncontrolled	Total	
Date	Amount									N.Y.C. reservoirs		Power-plants		
										Directed	Other			
1981	1	2	3	4		5		6		7	8	9	10	11
Apr. 28	0	19	25	15	Apr. 30	1,362	May 1	178	May 1	0	59	1,540	7,251	8,850
29	0	19	25	15	May 1	1,515	2	216	2	0	59	1,731	5,410	7,200
30	0	19	25	15	2	459	3	0	3	0	59	459	4,922	5,440
May 1	0	19	25	15	3	761	4	76	4	0	59	837	4,454	5,350
2	0	19	25	17	4	241	5	292	5	0	61	533	3,696	4,290
3	0	19	25	15	5	245	6	286	6	0	59	531	3,390	3,980
4	0	19	25	15	6	285	7	238	7	0	59	523	3,148	3,730
5	0	19	25	15	7	225	8	275	8	0	59	500	2,841	3,400
6	0	19	25	15	8	217	9	221	9	0	59	438	2,503	3,000
7	0	19	25	15	9	0	10	0	10	0	59	0	2,431	2,490
8	0	19	25	15	10	0	11	97	11	0	59	97	2,884	3,040
9	0	19	25	15	11	536	12	346	12	0	59	882	20,559	21,500
10	0	19	25	15	12	1,843	13	524	13	0	59	2,367	30,374	32,800
11	0	19	25	15	13	1,848	14	518	14	0	59	2,366	17,375	19,800
12	0	19	25	15	14	1,848	15	486	15	0	59	2,334	12,507	14,900
13	0	19	25	15	15	1,841	16	518	16	0	59	2,359	20,782	23,200
14	0	19	25	15	16	1,837	17	518	17	0	59	2,355	18,786	21,200
15	0	19	25	15	17	1,837	18	513	18	0	59	2,350	12,891	15,300
16	0	19	25	15	18	1,442	19	518	19	0	59	1,960	9,581	11,600
17	0	19	25	15	19	701	20	518	20	0	59	1,219	7,762	9,040
18	0	19	25	15	20	233	21	524	21	0	59	757	6,524	7,340
19	0	19	25	15	21	229	22	518	22	0	59	747	5,474	6,280
20	0	19	25	15	22	239	23	470	23	0	59	709	4,452	5,220
21	0	19	25	15	23	0	24	27	24	0	59	27	4,034	4,120
22	0	19	25	15	24	0	25	65	25	0	59	65	3,476	3,600
23	0	19	25	15	25	0	26	367	26	0	59	367	3,174	3,600
24	0	19	25	15	26	85	27	545	27	0	59	630	2,801	3,490
25	0	19	25	15	27	0	28	292	28	0	59	292	2,559	2,910
26	0	19	25	15	28	344	29	302	29	0	59	646	2,355	3,060
27	0	19	25	15	29	350	30	151	30	0	59	501	2,350	2,910
28	0	19	25	15	30	0	31	0	31	0	59	0	2,201	2,260
Total	0	589	775	467		20,523		9,599		0	1,831	30,122	232,947	264,900

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 one day later.
Col. 6 - 24 hours ending 1200 of date shown.

Col. 8 = Col. 2 + Col. 3 + Col. 4.
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 8. - Controlled releases from reservoirs in the upper Delaware River basin

and segregation of flow of Delaware River at Montague, N.J. - continued

(River Master daily operation record)

Mean cubic feet per second for 24 hours

Controlled releases from New York City reservoirs					Lake Wallenpaupack		Mongaup Reservoir		Delaware River at Montague						
									Segregation of flow						
Directed		Pepacton	Cannonsville	Neversink	Date	Controlled release	Date	Controlled release	Date	Controlled releases N.Y.C. reservoirs		Power-plants	Computed uncontrolled	Total	
Date	Amount									Directed	Other				
1981	1	2	3	4		5		6		7	8	9	10	11	
May 29	0	19	25	15	May 31	0	June 1	65	June 1	0	59	65	1,956	2,080	
30	0	19	25	15	June 1	465	2	216	2	0	59	681	1,870	2,610	
31	0	19	25	15	2	463	3	0	3	0	59	463	1,998	2,520	
June 1	0	19	25	15	3	464	4	103	4	0	59	567	2,224	2,850	
2	0	19	25	15	4	810	5	38	5	0	59	848	2,313	3,220	
3	0	19	25	15	5	834	6	43	6	0	59	877	2,044	2,980	
4	0	19	25	15	6	0	7	0	7	0	59	0	1,881	1,940	
5	0	19	25	15	7	0	8	0	8	0	59	0	1,631	1,690	
6	0	19	25	15	8	578	9	0	9	0	59	578	1,443	2,080	
7	0	19	25	15	9	575	10	0	10	0	59	575	1,456	2,090	
8	0	19	25	15	10	588	11	0	11	0	59	588	1,343	1,990	
9	0	19	25	15	11	578	12	0	12	0	59	578	1,313	1,950	
10	0	19	26	15	12	581	13	97	13	0	60	678	1,102	1,840	
11	583	71	459	46	13	0	14	86	14	576	0	86	948	1,610	
12	633	70	517	46	14	0	15	59	15	633	0	59	1,898	2,590	
13	0	28	150	15	15	1,044	16	238	16	0	193	1,282	2,405	3,880	
14	0	19	25	15	16	688	17	259	17	0	59	947	2,114	3,120	
15	0	19	25	15	17	514	18	0	18	0	59	514	1,727	2,300	
16	0	19	25	15	18	588	19	0	19	0	59	588	1,443	2,090	
17	0	19	15	15	19	579	20	81	20	0	49	660	1,331	2,040	
18	501	73	391	45	20	0	21	0	21	509	0	0	1,201	1,710	
19	275	67	193	15	21	0	22	81	22	275	0	81	1,414	1,770	
20	145	19	127	15	22	118	23	238	23	161	0	356	2,123	2,640	
21	0	19	25	15	23	101	24	189	24	0	59	290	2,261	2,610	
22	0	19	25	15	24	150	25	189	25	0	59	339	2,002	2,400	
23	0	19	25	15	25	116	26	108	26	0	59	224	1,797	2,080	
24	85	19	54	15	26	111	27	0	27	88	0	111	1,511	1,710	
25	434	70	322	46	27	0	28	0	28	438	0	0	1,202	1,640	
26	480	74	365	48	28	0	29	0	29	487	0	0	1,223	1,710	
27	0	20	26	15	29	601	30	43	30	0	61	644	1,335	2,040	
Total	3,136	891	3,095	606		10,546		2,133		3,167	1,425	12,679	50,509	67,780	

Col. 2 - 24 hours beginning 1200 of date shown.
Col. 3 - 24 hours ending 2400 one day later (June 17, equivalent for a 14-hour period and June 18, equivalent for a 34-hour period).
Col. 4 - 24 hours beginning 1500 one day later.
Col. 5 - 24 hours beginning 0800 of date shown.
Col. 6 - 24 hours ending 1200 of date shown.

Col. 7 = Col. 2 + Col. 3 + Col. 4, when Col. 1 is greater than 0.
Col. 8 = Col. 2 + Col. 3 + Col. 4, when Col. 1 = 0.
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 6. - Controlled releases from reservoirs in the upper Delaware River basin

and segregation of flow of Delaware River at Montague, N.J. - continued

(River Master daily operation record)

Mean cubic feet per second for 24 hours

Controlled releases from New York City reservoirs					Lake Wallenpaupack		Mongaup Reservoir		Delaware River at Montague							
									Segregation of flow						Credits	
Directed		Pepacton	Cannonsville	Neversink	Date	Controlled release	Date	Controlled release	Date	Controlled releases N.Y.C. reservoirs		Power-plants	Computed uncontrolled	Total	Daily	Cumulative
Date	Amount									Directed	Other					
1981	1	2	3	4		5		6		7	8	9	10	11	12	13
June28	81	19	43	15	June 30	602	July 1	0	July 1	77	0	602	1,231	1,910		
29	0	19	26	15	July 1	553	2	0	2	0	60	553	1,347	1,960		
30	67	19	33	15	2	587	3	0	3	67	0	587	1,326	1,980		
July 1	229	73	142	15	3	0	4	281	4	230	0	281	1,129	1,640		
2	659	19	637	46	4	0	5	0	5	659	43	0	1,418	2,120		
3	587	70	478	46	5	0	6	0	6	594	0	0	1,766	2,360		
4	251	70	162	19	6	405	7	0	7	251	0	405	1,684	2,340		
5	154	19	121	17	7	387	8	151	8	157	0	538	1,445	2,140		
6	183	70	70	46	8	595	9	130	9	186	0	725	1,249	2,160		
7	310	71	200	46	9	815	10	173	10	317	0	988	995	2,300		
8	376	101	209	71	10	394	11	167	11	381	0	561	968	1,910		
9	947	121	729	91	11	0	12	0	12	941	0	0	639	1,580		
10	820	70	662	88	12	0	13	0	13	820	0	0	820	1,640		
11	382	71	271	46	13	424	14	238	14	388	0	662	740	1,790		
12	313	107	144	71	14	468	15	0	15	322	0	468	760	1,550		
13	700	105	555	48	15	469	16	0	16	708	0	469	343	1,520		
14	716	71	599	48	16	467	17	0	17	718	0	467	625	1,810		
15	774	71	657	46	17	449	18	0	18	774	0	449	567	1,790		
16	1,224	101	1,055	68	18	0	19	0	19	1,224	0	0	376	1,600		
17	988	93	811	70	19	0	20	0	20	974	0	0	656	1,630		
18	545	104	373	63	20	464	21	0	21	540	0	464	1,196	2,200		
19	393	101	275	17	21	471	22	0	22	393	0	471	1,466	2,330		
20	0	19	25	17	22	454	23	0	23	0	61	454	1,525	2,040		
21	0	19	25	17	23	280	24	0	24	0	61	280	1,159	1,500		
22	507	71	391	45	24	574	25	0	25	507	0	574	559	1,640		
23	962	71	848	45	25	0	26	0	26	964	0	0	606	1,570		
24	1,067	71	950	45	26	0	27	0	27	1,066	0	0	674	1,740		
25	407	71	356	45	27	460	28	194	28	407	65	654	824	1,950	65	65
26	0	70	345	45	28	475	29	130	29	0	460	605	695	1,760	403	468
27	180	71	343	45	29	472	30	11	30	180	279	483	798	1,740	279	747
26	565	71	450	45	30	436	31	0	31	566	0	436	616	1,620	0	747
Total	14,387	2,099	11,985	1,356		10,701		1,475		14,411	1,029	12,176	30,204	57,820		

Col. 2 - 24 hours beginning 1200 of date shown.
Col. 3 - 24 hours ending 2400 one day later (June 30, equivalent for a 14-hour period, and July 1, equivalent for a 34-hour period.
Col. 4 - 24 hours beginning 1500 one day later.
Col. 5 - 24 hours beginning 0800 of date shown.
Col. 6 - 24 hours ending 1200 of date shown.
Col. 7 = Col. 2 + Col. 3 + Col. 4, when Col. 1 is greater than 0, except July 5, 28, 30 and total.

Col. 6 = Col. 2 + Col. 3 + Col. 4 when Col. 1 = 0. Releases by New York City for augmented conservation rate after July 22.
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 - Difference between augmented and minimum conservation release rates following DRBC Conservation Order No. 9.
Col. 13 - Limit of cumulative credit beginning July 22 = 4.5 billion gallons (6,962 cfs-days).

Table 8. - Controlled releases from reservoirs in the upper Delaware River basin and segregation of flow of Delaware River at Montague, N.J. - continued

(River Master daily operation record)

Mean cubic feet per second for 24 hours

Controlled releases from New York City reservoirs					Lake Wallenpaupack		Mongaup Reservoir		Delaware River at Montague							
									Segregation of flow						Credits	
Directed		Pepacton	Cannonsville	Neversink	Date	Controlled release	Date	Controlled release	Date	Controlled releases N.Y.C. reservoirs		Power-plants	Computed uncontrolled	Total		
Date	Amount									Directed	Other				Daily	Cumulative
1981	1	2	3	4		5		6		7	8	9	10	11	12	13
July 29	571	71	456	45	July 31	470	Aug. 1	0	Aug. 1	572	0	470	638	1,680	0	747
30	1,081	71	967	46	Aug. 1	0	2	0	2	1,084	0	0	416	1,500	0	747
31	1,139	71	1,021	46	2	0	3	27	3	1,138	0	27	395	1,560	0	747
Aug. 1	729	71	605	46	3	467	4	286	4	722	0	753	505	1,980	0	747
2	763	70	648	46	4	367	5	173	5	764	0	540	416	1,720	0	747
3	854	70	733	46	5	345	6	200	6	849	0	545	486	1,880	0	747
4	879	70	761	46	6	348	7	227	7	877	0	575	528	1,980	0	747
5	895	70	775	46	7	354	8	151	8	891	0	505	584	1,980	0	747
6	1,022	70	911	46	8	220	9	0	9	1,027	0	220	593	1,840	0	747
7	859	70	747	46	9	190	10	59	10	863	0	249	558	1,670	0	747
8	608	70	489	46	10	374	11	151	11	605	0	525	600	1,730	0	747
9	773	70	668	46	11	325	12	157	12	784	0	482	384	1,650	0	747
10	735	70	625	46	12	307	13	92	13	741	0	399	580	1,720	0	747
11	832	70	716	46	13	299	14	124	14	832	0	423	475	1,730	0	747
12	868	101	722	46	14	287	15	130	15	869	0	417	484	1,770	0	747
13	1,074	101	933	46	15	213	16	0	16	1,080	0	213	437	1,730	0	747
14	1,049	101	908	46	16	222	17	0	17	1,055	0	222	493	1,770	0	747
15	893	101	747	46	17	285	18	130	18	894	0	415	481	1,790	0	747
16	898	101	755	46	18	234	19	130	19	902	0	364	434	1,700	0	747
17	931	70	820	45	19	238	20	70	20	935	0	308	497	1,740	0	747
18	969	68	857	45	20	239	21	108	21	970	0	347	403	1,720	0	747
19	1,003	70	890	45	21	229	22	108	22	1,005	0	337	388	1,730	0	747
20	1,192	71	1,083	46	22	224	23	0	23	1,200	0	224	356	1,780	0	747
21	1,189	70	1,064	45	23	224	24	0	24	1,179	0	224	407	1,810	0	747
22	1,059	70	950	45	24	238	25	103	25	1,065	0	341	474	1,880	0	747
23	1,061	70	951	45	25	177	26	119	26	1,066	0	296	428	1,790	0	747
24	1,112	70	992	45	26	180	27	108	27	1,107	0	288	365	1,760	0	747
25	1,110	70	995	45	27	202	28	119	28	1,110	0	321	339	1,770	0	747
26	1,127	70	1,012	45	28	216	29	119	29	1,127	0	335	348	1,810	0	747
27	1,186	70	1,074	45	29	217	30	0	30	1,189	0	217	354	1,760	0	747
28	1,195	71	1,077	45	30	218	31	0	31	1,193	0	218	379	1,790	0	747
Total	29,656	2,329	25,952	1,414		7,909		2,891		29,695	0	10,800	14,225	54,720		

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 ending 1200 of date shown.
Col. 7 = Col. 2 + Col. 3 + Col. 4.
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 - Difference between augmented and minimum conservation release rates following DRBC Conservation Order No. 9.
Col. 13 - Limit of cumulative credits beginning July 22 = 4.5 billion gallons (6,962 cfs-days).

Table 8. - Controlled releases from reservoirs in the upper Delaware River basin

and segregation of flow of Delaware River at Montague, N.J. - continued

(River Master daily operation record)

Mean cubic feet per second for 24 hours

Controlled releases from New York City reservoirs					Lake Wallenpaupack		Mongaup Reservoir		Delaware River at Montague							
									Segregation of flow						Credits	
Directed		Pepacton	Cannonsville	Neversink	Date	Controlled release	Date	Controlled release	Date	Controlled releases			Computed uncontrolled	Total		
										N.Y.C. reservoirs		Power-plants				
Date	Amount									Directed	Other				Daily	Cumulative
1981	1	2	3	4		5		6		7	8	9	10	11	12	13
Aug.29	994	71	879	45	Aug. 31	168	Sept.1	108	Sept.1	995	0	276	379	1,650	0	747
30	1,133	70	1,021	48	Sept. 1	116	2	108	2	1,139	0	224	327	1,690	0	747
31	1,123	70	1,009	48	2	111	3	146	3	1,127	0	257	266	1,650	0	747
Sept. 1	1,108	70	998	46	3	122	4	0	4	1,114	0	122	424	1,660	0	747
2	1,118	70	1,006	43	4	116	5	178	5	1,119	0	294	277	1,690	0	747
3	1,142	70	1,035	45	5	223	6	22	6	1,150	0	245	315	1,710	0	747
4	1,174	70	1,063	46	6	223	7	0	7	1,179	0	223	388	1,790	0	747
5	1,276	70	1,163	46	7	109	8	0	8	1,279	0	109	392	1,780	0	747
6	562	71	449	45	8	729	9	113	9	565	0	842	1,353	2,760	0	747
7	443	71	336	48	9	682	10	113	10	455	0	795	1,180	2,430	0	747
8	229	70	111	48	10	631	11	135	11	229	0	766	1,085	2,080	53	800
9	211	70	99	43	11	705	12	130	12	212	0	835	793	1,840	0	800
10	878	70	778	46	12	216	13	0	13	894	0	216	290	1,400	0	800
11	945	70	843	46	13	227	14	0	14	959	0	227	464	1,650	0	800
12	442	70	340	46	14	714	15	130	15	456	0	844	590	1,890	0	800
13	285	70	169	46	15	715	16	162	16	285	0	877	658	1,820	-12	788
14	46	71	37	46	16	354	17	108	17	46	108	462	784	1,400	47	835
15	0	71	37	46	17	333	18	86	18	0	154	419	637	1,210	97	932
16	755	70	628	46	18	542	19	81	19	744	0	623	133	1,500	-50	882
17	1,228	70	1,114	46	19	0	20	0	20	1,230	0	0	410	1,640	-50	832
18	1,267	70	1,151	46	20	0	21	0	21	1,267	0	0	293	1,560	-50	782
19	438	70	334	46	21	732	22	97	22	450	0	829	541	1,820	-50	732
20	454	70	337	46	22	727	23	92	23	453	0	819	458	1,730	-50	682
21	437	70	367	46	23	696	24	108	24	483	0	804	453	1,740	-50	632
22	312	71	198	46	24	709	25	103	25	315	0	812	663	1,790	-50	582
23	367	71	251	46	25	721	26	113	26	368	0	834	518	1,720	-50	532
24	1,110	71	1,001	46	26	0	27	0	27	1,118	0	0	412	1,530	-50	482
25	1,129	70	1,018	46	27	0	28	86	28	1,134	0	86	420	1,640	-50	432
26	228	71	113	46	28	821	29	130	29	230	0	951	869	2,050	-50	382
27	253	71	136	46	29	861	30	43	30	253	0	904	643	1,800	-50	332
Total	21,067	2,110	18,021	1,379		12,303		2,392		21,248	262	14,695	16,415	52,620		

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 ending 1200 of date shown.
Col. 7 = Col. 2 + Col. 3 + Col. 4, except Sept. 17, 18 and total.
Col. 8 - Releases by New York City for augmented conservation rate.
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 - Credit or reduction for releases following DRBC Conservation Order No. 9.
Col. 13 - Limit of cumulative credits beginning July 22 = 4.5 billion gallons (6,962 cfs-days).

Table 8. - Controlled releases from reservoirs in the upper Delaware River basin and segregation of flow of Delaware River at Montague, N.J. - continued

(River Master daily operation record)

Mean cubic feet per second for 24 hours

Controlled releases from New York City reservoirs					Lake Wallenpaupack		Mongaup Reservoir		Delaware River at Montague						
									Segregation of flow					Credits	
Directed		Pepacton	Cannonsville	Neversink	Date	Controlled release	Date	Controlled release	Date	Controlled releases N.Y.C. reservoirs		Power-plants	Computed uncontrolled	Total	
Date	Amount									Directed	Other				Daily	Cumulative
1981	1	2	3	4		5		6		7	8	9	10	11	12	13
Sept 28	210	71	97	46	Sept. 30	835	Oct. 1	113	Oct. 1	214	0	948	628	1,790	-50	282
29	268	71	153	46	Oct. 1	853	2	119	2	270	0	972	748	1,990	-50	232
30	53	70	36	46	2	849	3	103	3	53	99	952	1,016	2,120	45	277
Oct. 1	792	70	681	46	3	0	4	0	4	797	0	0	903	1,700	-50	227
2	768	71	640	46	4	0	5	43	5	757	0	43	880	1,680	-50	177
3	671	70	549	46	5	120	6	130	6	665	0	250	855	1,770	-50	127
4	486	73	373	46	6	0	7	49	7	492	0	49	1,079	1,620	-50	77
5	361	71	243	45	7	0	8	119	8	359	0	119	1,022	1,500	-50	27
6	558	71	447	45	8	123	9	140	9	563	0	263	1,184	2,010	-27	0
7	477	70	368	46	9	120	10	92	10	484	0	212	1,234	1,930	0	0
8	718	71	602	46	10	0	11	0	11	719	0	0	1,021	1,740	0	0
9	652	70	540	46	11	0	12	43	12	656	0	43	911	1,610	0	0
10	513	70	402	46	12	117	13	140	13	518	0	257	865	1,640	0	0
11	637	71	526	46	13	139	14	97	14	643	0	236	821	1,700	0	0
12	697	70	583	48	14	117	15	113	15	701	0	230	689	1,620	0	0
13	740	70	623	46	15	118	16	81	16	739	0	199	662	1,600	0	0
14	822	70	710	50	16	113	17	97	17	830	0	210	620	1,660	0	0
15	1,069	70	958	48	17	0	18	0	18	1,076	0	0	534	1,610	0	0
16	852	71	738	48	18	0	19	43	19	857	0	43	610	1,510	0	0
17	487	70	381	48	19	38	20	86	20	499	0	124	767	1,390	0	0
18	895	71	778	45	20	0	21	113	21	894	0	113	633	1,640	0	0
19	940	71	828	45	21	0	22	103	22	944	0	103	633	1,680	0	0
20	907	71	791	46	22	0	23	113	23	908	0	113	609	1,630	0	0
21	531	70	415	46	23	0	24	81	24	531	0	81	938	1,550	38	38
22	0	70	34	46	24	0	25	0	25	0	150	0	1,060	1,210	93	131
23	337	70	223	46	25	0	26	11	26	339	0	11	1,310	1,660	0	131
24	463	70	348	42	26	0	27	113	27	460	0	113	1,367	1,940	0	131
25	302	70	196	45	27	0	28	86	28	311	0	86	5,283	5,680	0	131
26	346	70	231	45	28	0	29	130	29	346	0	130	9,624	10,100	-13	118
27	0	70	34	46	29	0	30	108	30	0	150	108	6,052	6,310	93	211
28	0	71	36	46	30	0	31	178	31	0	153	178	4,399	4,730	96	307
Total	16,552	2,185	13,564	1,428		3,542		2,644		16,625	552	6,186	48,957	72,320		

Col. 2 - 24 hours beginning 1200 of date shown, except 25 hours Oct. 24.
Col. 3 - 24 hours ending 2400 one day later, except 25 hours Oct. 24.
Col. 4 - 24 hours beginning 1500 one day later, except 25 hours Oct. 23.
Col. 5 - 24 hours beginning 0800 of date shown, except 25 hours Oct. 24.
Col. 6 - 24 hours ending 1200 of date shown, except 25 hours Oct. 24.
Col. 7 = Col. 2 + Col. 3 + Col. 4, except Oct, 3, 25, 30, 31, and total.
Col. 8 - Releases by New York City for augmented conservation rate or other purpose.
Col. 9 = Col. 5 + Col. 6.
Col. 10 = Col. 11 - Col. 7 - Col. 8 - Col. 9.
Col. 11 - 24 hours of calendar day shown, except 25 hours Oct. 25.
Col. 12 - Credit or reduction for releases following DRBC Conservation Order No. 9.
Col. 13 - Limit of cumulative credits beginning July 22 = 4.5 billion gallons (6,962 cfs-days).

Table 8. - Controlled releases from reservoirs in the upper Delaware River basin

and segregation of flow of Delaware River at Montague, N.J. - continued

(River Master daily operation record)

Mean cubic feet per second for 24 hours

Controlled releases from New York City reservoirs					Lake Wallenpaupack		Mongaup Reservoir		Delaware River at Montague						Credits	
									Segregation of flow							
Directed		Pepacton	Cannonsville	Neversink	Date	Controlled release	Date	Controlled release	Date	Controlled releases N.Y.C. reservoirs		Power-plants	Computed uncontrolled	Total	Daily	Cumulative
Date	Amount									Directed	Other					
1981	1	2	3	4		5		6		7	8	9	10	11	12	13
Oct.29	0	50	36	25	Oct.31	0	Nov.1	454	Nov.1	0	111	454	3,455	4,020	77	384
30	0	50	36	25	Nov.1	18	2	308	2	0	111	326	3,043	3,480	77	461
31	0	50	36	25	2	1,128	3	65	3	0	111	1,193	2,616	3,920	77	538
Nov.1	0	50	36	26	3	1,124	4	76	4	0	112	1,200	2,248	3,560	78	616
2	0	50	37	26	4	1,116	5	108	5	0	113	1,224	2,003	3,340	79	695
3	0	50	37	23	5	1,117	6	184	6	0	110	1,301	1,979	3,390	76	771
4	0	50	37	25	6	1,026	7	292	7	0	112	1,318	2,240	3,670	78	849
5	0	50	37	26	7	0	8	448	8	0	113	448	2,709	3,270	37	886
6	0	51	37	26	8	0	9	119	9	0	114	119	2,517	2,750	80	966
7	0	51	37	26	9	0	10	32	10	0	114	32	2,324	2,470	80	1,046
8	0	48	37	26	10	667	11	65	11	0	111	732	2,207	3,050	36	1,082
9	16	51	37	26	11	732	12	11	12	16	98	743	2,003	2,860	30	1,112
10	0	50	37	26	12	711	13	140	13	0	113	851	1,886	2,850	79	1,191
11	0	51	37	26	13	717	14	65	14	0	114	782	1,864	2,760	80	1,271
12	140	51	67	26	14	0	15	0	15	144	0	0	1,796	1,940	-50	1,221
13	249	51	175	28	15	0	16	0	16	254	0	0	1,796	2,050	-50	1,171
14	69	51	37	28	16	0	17	65	17	69	45	65	1,921	2,100	30	1,201
15	26	51	37	26	17	0	18	86	18	26	88	86	1,990	2,190	30	1,231
16	0	51	37	26	18	0	19	194	19	0	114	194	1,952	2,260	80	1,311
17	0	51	37	26	19	0	20	297	20	0	114	297	1,959	2,370	80	1,391
18	0	51	39	26	20	0	21	167	21	0	116	167	2,587	2,870	82	1,473
19	0	51	37	26	21	0	22	86	22	0	114	86	3,010	3,210	80	1,553
20	0	51	37	25	22	0	23	38	23	0	113	38	2,759	2,910	79	1,632
21	0	51	39	25	23	0	24	221	24	0	115	221	2,454	2,790	81	1,713
22	0	51	39	25	24	32	25	211	25	0	115	243	2,352	2,710	81	1,794
23	0	51	39	25	25	0	26	216	26	0	115	216	2,219	2,550	81	1,875
24	0	51	39	26	26	0	27	0	27	0	116	0	2,104	2,220	82	1,957
25	0	51	39	26	27	0	28	0	28	0	116	0	2,004	2,120	82	2,039
26	0	51	37	28	28	0	29	54	29	0	116	54	1,930	2,100	82	2,121
27	0	51	37	28	29	0	30	65	30	0	116	65	1,829	2,010	82	2,203
Total	500	1,518	1,286	775		8,388		4,067		509	3,070	12,455	67,756	83,790		

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 ending 1200 of date shown.
Col. 7 = Col. 2 + Col. 3 + Col. 4, except Nov. 1-14, 17-30 and total.
Col. 8 - Releases by New York City for augmented conservation rate or other purpose.
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 - Credit or reduction for releases following DRBC Conservation Order No. 9. Crediting terminated Nov. 30.
Col. 13 - Limit of cumulative credits beginning July 22 = 4.5 billion gallons (6,962 cfs-days).

Table 9. - New York City Reservoir release design data

(River Master daily operation record)

Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases							Indicated		Directed
Date of advance estimate	Powerplant release forecasts: Lake Wallenpaupack	Powerplant release forecasts: Mongaup Reservoir	Uncontrolled runoff: Present conditions	Uncontrolled runoff: Weather adjustment	Date	Discharge	deficiency		release
	cfs	cfs	cfs	cfs		cfs	cfs		cfs
1980	1	2	3	4		5	6	7	8
MONTAGUE DESIGN RATE = 1,560 CFS DECEMBER 1-19, 1980, 1,550 CFS DECEMBER 20, 1980 TO JANUARY 17, 1981 MONTAGUE DESIGN RATE = 1,350 CFS JANUARY 18 TO FEBRUARY 22 December 1-19, estimated Montague discharge greater than 1,560 cfs									
Dec. 17	120	0	1,250	0	Dec. 20	1,370	180		180
18	0	0	1,200	0	21	1,200	350		350
19	0	50	1,150	0	22	1,200	350		350
20	120	50	1,060	0	23	1,230	320		320
21	120	0	1,010	0	24	1,130	420		420
22	120	0	970	0	25	1,090	460		460
23	0	0	1,020	0	26	1,020	530		530
	0	0	1,000	0	27	1,000	550		550
24	0	0	1,000	0	28	1,000	550		550
25	0	0	1,000	0	29	1,000	550		550
26	120	200	880	0	30	1,200	350		350
27	120	0	1,100	0	31	1,220	330		330
Total	720	300	12,640	0		13,660	4,940		4,940

Col. 1 - Furnished by power company.
Col. 2 - Furnished by power company.
Col. 3 - Computed from index and key gaging stations.
Col. 4 - Computed increase in runoff based on precipitation and temperature forecasts.

Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = 1,560 cfs - Col. 5, Dec. 1-19;
1,550 cfs - Col. 5, Dec. 20-31.
Col. 8 = Col. 6.

Table 9. - New York City Reservoir release design data - continued

(River Master daily operation record)

Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases							Indicated deficiency		Directed release
Date of advance estimate	Powerplant release forecasts: Lake Wallenpaupack	Powerplant release forecasts: Mongaup Reservoir	Uncontrolled runoff: Present conditions	Uncontrolled runoff: Weather adjustment	Date	Discharge			
	cfs	cfs	cfs	cfs		cfs	cfs		cfs
1980/81	1	2	3	4		5	6	7	8
Dec. 28	120	0	1,100	50	Jan. 1	1,270	280		280
29	0	0	1,100	100	2	1,200	350		350
30	0	0	1,150	0	3	1,150	400		400
31	0	0	1,150	0	4	1,150	400		400
Jan. 1	0	0	1,150	0	5	1,150	400		400
2	0	0	1,050	0	6	1,050	500		500
3	0	0	1,050	0	7	1,050	500		500
4	0	0	1,100	0	8	1,100	450		450
5	0	0	1,100	0	9	1,100	450		450
6	0	0	1,050	0	10	1,050	500		500
7	0	0	1,000	0	11	1,000	550		550
8	0	0	900	0	12	900	650		650
9	0	200	800	0	13	1,000	550		550
10	0	250	750	0	14	1,000	550		550
11	0	250	750	0	15	1,000	550		550
12	0	200	775	0	16	975	575		575
13	0	200	775	0	17	975	575		575
14	0	0	800	0	18	800	550		550
15	0	0	700	0	19	700	650		650
16	0	0	600	0	20	600	750		750
17	0	0	600	50	21	650	700		700
18	0	0	650	50	22	700	650		650
19	0	0	650	50	23	700	650		650
20	0	0	650	50	24	700	650		650
21	0	0	700	50	25	750	600		600
22	0	0	700	50	26	750	600		600
23	0	0	600	50	27	650	700		700
24	0	0	600	50	28	650	700		700
25	0	0	600	150	29	750	600		600
26	0	0	650	50	30	700	650		650
27	0	0	650	50	31	700	650		650
Total	120	1,100	25,900	800		27,920	17,330		17,330

Col. 1 - Furnished by power company.
Col. 2 - Furnished by power company.
Col. 3 - Computed from index and key gaging stations.
Col. 4 - Computed increase in runoff based on precipitation and temperature forecasts.

Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = 1,550 cfs - Col. 5, Jan. 1-17;
1,350 cfs - Col. 5, Jan. 18-31.
Col. 8 = Col. 6.

Note. - Releases designed on basis of Montague rate under Delaware River Basin Commission Resolutions No. 80-24, Jan. 1-17; No. 81-2, Jan. 18 to Feb. 22.

Table 9. - New York City Reservoir release design data - continued

(River Master daily operation record)

Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases									
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Date	Discharge	Indicated deficiency		Directed release
	Lake Wallenpaupack	Mongaup Reservoir	Present conditions	Weather adjustment					
	cfs	cfs	cfs	cfs		cfs	cfs		cfs
1981	1	2	3	4		5	6	7	8
Jan. 28	0	0	650	0	Feb. 1	650	700		700
29	0	0	650	25	2	675	675		675
30	0	0	625	75	3	700	650		650
31	0	0	625	75	4	700	650		650
Feb. 1	0	0	625	489	5	1,114	236		236
February 6-22, estimated Montague discharge greater than 1,350 cfs									
MONTAGUE DESIGN RATE = 1,100 CFS FEBRUARY 23 TO MAY 17									
February 23 to May 17, estimated Montague discharge greater than 1,100 cfs									
MONTAGUE DESIGN RATE = 1,750 CFS MAY 18 TO NOVEMBER 30									
May 18 to June 13, estimated Montague discharge greater than 1,750 cfs									
June 11	0	0	1,144	23	14	1,167	583		583
12	0	0	976	141	15	1,117	633		633
13	588	0	991	178	16	1,757	0		0
14	588	0	1,097	589	17	2,274	0		0
15	588	0	1,517	274	18	2,379	0		0
16	588	0	1,437	128	19	2,153	0		0
17	588	0	1,381	0	20	1,969	0		0
18	0	0	1,238	11	21	1,249	501		501
19	0	43	1,053	379	22	1,475	275		275
20	118	270	987	230	23	1,605	145		145
21	118	270	1,030	368	24	1,786	0		0
22	118	160	1,148	1,017	25	2,443	0		0
23	118	160	1,476	22	26	1,776	0		0
24	118	0	1,313	234	27	1,665	85		85
25	0	0	1,279	37	28	1,316	434		434
26	0	0	1,270	0	29	1,270	480		480
27	588	160	1,181	0	30	1,929	0		0
Total	4,118	1,063	23,693	4,295		33,169	6,047		6,047

Col. 1 - Furnished by power company.
Col. 2 - Furnished by power company.
Col. 3 - Computed from index and key gaging stations.
Col. 4 - Computed increase in runoff based on precipitation and temperature forecasts

Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = 1,350 cfs - Col. 5, Feb. 1-5; 1,750 cfs - Col. 5, May 18 to June 30.
Col. 8 = Col. 6.

Note. - Releases designed on basis of Montague rate under Delaware River Basin Commission Resolutions No. 81-1, 81-2 Feb. 23 to May 17, and by letter of May 27, 1981 from representatives of parties to the Amended Decree.

Table 9. - New York City Reservoir release design data - continued

(River Master daily operation record)

Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases							Indicated		Directed
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Date	Discharge	deficiency		release
	Lake Wallenpaupack	Mongaup Reservoir	Present conditions	Weather adjustment					
	cfs	cfs	cfs	cfs		cfs	cfs		cfs
1981	1	2	3	4		5	6	7	8
June 28	588	0	1,081	0	July 1	1,669	81		81
29	588	160	991	31	2	1,770	0		0
30	588	160	876	59	3	1,683	67		67
July 1	0	0	732	789	4	1,521	229		229
2	0	0	867	224	5	1,091	659		659
3	0	160	865	138	6	1,163	587		587
4	412	0	832	255	7	1,499	251		251
5	412	0	1,068	116	8	1,596	154		154
6	410	0	1,157	0	9	1,567	183		183
7	410	0	1,030	0	10	1,440	310		310
8	410	0	920	44	11	1,374	376		376
9	0	0	803	0	12	803	947		947
10	0	150	780	0	13	930	820		820
11	472	150	695	51	14	1,368	382		382
12	472	150	643	172	15	1,437	313		313
13	470	0	580	0	16	1,050	700		700
14	470	0	564	0	17	1,034	716		716
15	470	0	506	0	18	976	774		774
16	0	0	507	19	19	526	1,224		1,224
17	0	270	469	23	20	762	988		988
18	472	270	442	21	21	1,205	545		545
19	472	0	429	456	22	1,357	393		393
20	470	0	455	1,238	23	2,163	0		0
21	470	0	982	305	24	1,757	0		0
22	470	0	773	0	25	1,243	507		507
23	0	0	788	0	26	788	962		962
24	0	0	683	0	27	683	1,067		1,067
25	470	162	608	103	28	1,343	407		407
26	470	162	582	549	29	1,763	0		0
27	472	0	688	410	30	1,570	180		180
28	472	0	616	97	31	1,185	565		565
Total	10,410	1,794	23,012	5,100		40,316	14,387		14,387

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 precipitation forecasts.

Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = 1,750 cfs - Col. 5, except total.
Col. 8 = Col. 6.

Note. - Releases designed on basis of Montague rate following letter of May 27, 1981 from representatives of parties to the Amended Decree.

Table 9. - New York City Reservoir release design data - continued

(River Master daily operation record)

Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases							Indicated		Directed
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Date	Discharge	deficiency		release
	Lake Wallenpaupack	Mongaup Reservoir	Present conditions	Weather adjustment					
	cfs	cfs	cfs	cfs		cfs	cfs		cfs
1981	1	2	3	4		5	6		8
July 29	472	0	707	0	Aug. 1	1,179	571		571
30	0	0	669	0	2	669	1,081		1,081
31	0	0	611	0	3	611	1,139		1,139
Aug. 1	472	0	549	0	4	1,021	729		729
2	472	0	515	0	5	987	763		763
3	355	0	492	49	6	896	854		854
4	355	0	506	10	7	871	879		879
5	355	0	500	0	8	855	895		895
6	219	0	487	22	9	728	1,022		1,022
7	219	0	458	214	10	891	859		859
8	355	220	475	92	11	1,142	608		608
9	296	130	521	30	12	977	773		773
10	296	130	498	91	13	1,015	735		735
11	296	130	439	53	14	918	832		832
12	296	130	456	0	15	882	868		868
13	220	0	451	5	16	676	1,074		1,074
14	220	0	417	64	17	701	1,049		1,049
15	296	130	384	47	18	857	893		893
16	237	130	485	0	19	852	898		898
17	237	130	452	0	20	819	931		931
18	237	130	414	0	21	781	969		969
19	237	130	380	0	22	747	1,003		1,003
20	210	0	348	0	23	558	1,192		1,192
21	210	0	343	8	24	561	1,189		1,189
22	237	130	324	0	25	691	1,059		1,059
23	237	130	322	0	26	689	1,061		1,061
24	178	130	318	12	27	638	1,112		1,112
25	178	130	332	0	28	640	1,110		1,110
26	178	130	315	0	29	623	1,127		1,127
27	237	0	308	19	30	564	1,186		1,186
28	237	0	285	33	31	555	1,195		1,195
Total	8,044	2,040	13,761	749		24,594	29,656		29,656

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 precipitation forecasts.

Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = 1,750 cfs - Col. 5, except total.
Col. 8 = Col. 6.

Note. - Releases designed on basis of Montague rate following letter of May 27, 1981 from representatives of parties to the Amended Decree.

Table 9. - New York City Reservoir release design data - continued

(River Master daily operation record)

Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases							Indicated	Credit	Directed
Date of advance estimate	Powerplant release forecasts: Lake Wallenpaupack	Powerplant release forecasts: Mongaup Reservoir	Uncontrolled runoff: Present conditions	Uncontrolled runoff: Weather adjustment	Date	Discharge	deficiency	reduction	release
	cfs	cfs	cfs	cfs		cfs	cfs	cfs	cfs
1981	1	2	3	4		5	6	7	8
Aug. 29	297	130	289	40	Sept. 1	756	994		994
30	178	130	290	19	2	617	1,133		1,133
31	119	130	328	50	3	627	1,123		1,123
Sept. 1	119	130	327	66	4	642	1,108		1,108
2	119	130	317	66	5	632	1,118		1,118
3	220	0	342	46	6	608	1,142		1,142
4	220	0	341	15	7	576	1,174		1,174
5	119	0	344	11	8	474	1,276		1,276
6	714	130	344	0	9	1,188	562		562
7	714	130	365	98	10	1,307	443		443
8	713	130	374	304	11	1,521	229		229
9	713	130	696	0	12	1,539	211		211
10	220	0	652	0	13	872	878		878
11	220	0	562	23	14	805	945		945
12	714	130	464	0	15	1,308	442		442
13	714	130	429	142	16	1,415	335	-50	285
14	716	130	394	414	17	1,654	96	-50	46
15	716	130	389	709	18	1,944	0	0	0
16	358	130	405	52	19	945	805	-50	755
17	0	0	419	53	20	472	1,278	-50	1,228
18	0	0	418	15	21	433	1,317	-50	1,267
19	716	130	416	0	22	1,262	488	-50	438
20	716	130	400	0	23	1,246	504	-50	454
21	716	130	388	29	24	1,263	487	-50	437
22	716	130	380	162	25	1,388	362	-50	312
23	716	130	487	0	26	1,333	417	-50	367
24	0	0	590	0	27	590	1,160	-50	1,110
25	0	0	571	0	28	571	1,179	-50	1,129
26	836	130	506	0	29	1,472	278	-50	228
27	836	130	453	28	30	1,447	303	-50	253
Total	13,155	2,730	12,680	2,342		30,907	21,787	-700	21,087

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 precipitation forecasts.
Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = 1,750 cfs - Col. 5.
Col. 7 - Credit reduction.
Col. 8 = Col. 6 - Col. 7.

Note. - Releases designed on basis of Montague rate following letter of May 27, 1981 from representatives of parties to the Amended Decree. Release credit reduction applied following Delaware River Basin Commission Conservation Order No. 9.

Table 9. - New York City Reservoir release design data - continued

(River Master daily operation record)

Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases							Indicated deficiency	Credit reduction	Directed release
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Date	Discharge			
	Lake Wallenpaupack	Mongaup Reservoir	Present conditions	Weather adjustment					
	cfs	cfs	cfs	cfs		cfs	cfs	cfs	cfs
1981	1	2	3	4		5	6	7	8
Sept. 28	838	130	522	0	Oct. 1	1,490	260	-50	210
29	838	130	464	0	2	1,432	318	-50	268
30	838	130	437	242	3	1,647	103	-50	53
Oct. 1	0	0	437	471	4	908	842	-50	792
2	0	0	867	65	5	932	818	-50	768
3	120	130	779	0	6	1,029	721	-50	671
4	0	130	769	315	7	1,214	536	-50	486
5	0	130	712	497	8	1,339	411	-50	361
6	120	130	654	238	9	1,142	585	-27	558
7	120	130	1,023	0	10	1,273	477	0	477
8	0	0	1,024	8	11	1,032	718	0	718
9	0	43	1,049	6	12	1,098	652	0	652
10	120	130	987	0	13	1,237	513	0	513
11	120	130	863	0	14	1,113	637	0	637
12	120	130	803	0	15	1,053	697	0	697
13	120	130	760	0	16	1,010	740	0	740
14	120	85	723	0	17	928	822	0	822
15	0	0	671	10	18	681	1,069	0	1,069
16	0	0	643	255	19	898	852	0	852
17	120	130	591	422	20	1,263	487	0	487
18	0	130	570	155	21	855	895	0	895
19	0	130	680	0	22	810	940	0	940
20	0	130	699	14	23	843	907	0	907
21	0	130	605	484	24	1,219	531	0	531
22	0	0	583	1,272	25	1,855	0	0	0
23	0	43	536	834	26	1,413	337	0	337
24	0	130	1,141	16	27	1,287	463	0	463
25	0	130	940	378	28	1,448	302	0	302
26	0	130	946	278	29	1,354	396	-50	346
27	0	130	2,412	796	30	3,338	0	0	0
28	0	130	6,015	21	31	6,166	0	0	0
Total	3,594	3,031	29,905	6,777		43,307	17,029	-477	16,552

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 precipitation forecasts.

Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = 1,750 cfs - Col. 5.
Col. 7 - Credit reduction.
Col. 8 = Col. 6 - Col. 7.

Note. - Releases designed on basis of Montague rate following letter of May 27, 1981 from representatives of parties to the Amended Decree. Release credit reduction applied following Delaware River Basin Commission Conservation Order No. 9.

Table 9. - New York City Reservoir release design data - continued

(River Master daily operation record)

Advance estimate of discharge of Delaware River at Montague exclusive of New York City reservoir releases							Indicated deficiency	Credit reduction	Directed release
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Date	Discharge			
	Lake Wallenpaupack	Mongaup Reservoir	Present conditions	Weather adjustment					
	cfs	cfs	cfs	cfs		cfs	cfs	cfs	cfs
1981	1	2	3	4		5	6	7	8
Oct. 29	0	0	5,160	0	Nov. 1	5,160	0	0	0
30	0	108	3,170	0	2	3,278	0	0	0
31	1,210	130	2,649	0	3	3,989	0	0	0
Nov. 1	1,210	0	2,266	0	4	3,476	0	0	0
2	1,210	130	2,047	0	5	3,387	0	0	0
3	1,210	130	1,818	13	6	3,171	0	0	0
4	1,210	130	1,615	141	7	3,096	0	0	0
5	0	130	1,438	140	8	1,708	42	-42	0
6	0	130	1,712	56	9	1,898	0	0	0
7	0	100	1,899	0	10	1,999	0	0	0
8	0	0	1,709	0	11	1,709	41	-41	0
9	0	0	1,675	9	12	1,684	66	-50	16
10	720	0	1,782	0	13	2,502	0	0	0
11	720	200	1,643	0	14	2,563	0	0	0
12	0	0	1,560	0	15	1,560	190	-50	140
13	0	0	1,451	0	16	1,451	299	-50	249
14	0	86	1,545	0	17	1,631	119	-50	69
15	0	86	1,534	54	18	1,674	76	-50	26
November 19-30 estimated Montague discharge greater than 1,750 cfs									
Total	7,490	1,360	36,673	413		45,936	833	-333	500

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 precipitation forecasts.

Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4.
Col. 6 = 1,750 cfs - Col. 5.
Col. 7 - Credit reduction.
Col. 8 = Col. 6 - Col. 7.

Note. - Releases designed on basis of Montague rate following letter of May 27, 1981 from representatives of parties to the Amended Decree. Release credit reduction applied following Delaware River Basin Commission Conservation Order No. 9.

Table 10. - Diversions to New York City water supply

Million gallons per day for 24-hour period beginning 0900 local time

(River Master daily operation record)

Date 1980	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	*Average to date Nov. 20 - Dec. 19 or Dec. 20-31	Date 1981	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	*Average to date Dec. 20 - Jan. 15 or Jan. 16-31
Dec. 1	409	398	99	539	Jan. 1	410	0	83	509
2	411	0	99	537	2	410	0	103	509
3	412	0	93	535	3	409	0	101	509
4	412	0	95	533	4	410	0	92	508
5	411	0	94	531	5	409	145	0	511
6	411	0	91	529	6	410	202	0	517
7	410	0	119	529	7	410	216	0	523
8	410	156	95	536	8	169	0	0	505
9	410	42	97	537	9	295	274	0	508
10	411	0	95	535	10	409	275	0	516
11	411	0	96	534	11	410	274	0	523
12	410	0	99	533	12	407	0	0	518
13	410	0	95	532	13	409	0	0	514
14	410	203	99	539	14	409	286	0	521
15	412	23	99	539	15	409	103	0	521
16	410	0	103	538	16	410	45	0	455
17	410	0	88	536	17	410	0	0	432
18	410	120	101	540	18	410	0	0	425
19	410	25	87	539	19	406	0	0	420
20	410	0	127	537	20	449	0	0	426
21	410	0	101	524	21	451	214	0	466
22	410	0	90	516	22	451	216	0	495
23	410	0	100	514	23	451	64	0	497
24	411	0	97	513	24	451	0	0	492
25	411	0	97	512	25	451	0	0	488
26	411	0	100	512	26	451	0	0	485
27	411	0	89	511	27	450	120	0	492
28	411	0	103	511	28	452	166	0	501
29	411	0	99	511	29	450	165	0	510
30	411	0	98	511	30	450	47	0	509
31	410	0	90	510	31	450	0	0	505
Total	12,727	967	3,035		Total	12,828	2,812	379	

*Average was computed by periods specified in Delaware River Basin Commission Resolutions agreed to by parties to the Decree.

Table 10. - Diversions to New York City water supply

Million gallons per day for 24-hour period beginning 0900 local time

(River Master daily operation record)

Date 1981	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	*Average January 16, 1981 to date	Date 1981	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	*Average January 16, 1981 to date
Feb. 1	450	0	0	502	Mar. 1	0	496	0	508
2	451	0	0	499	2	0	498	40	508
3	453	0	0	497	3	0	496	80	510
4	453	162	0	502	4	0	497	124	512
5	450	169	0	508	5	0	496	101	514
6	450	167	0	513	6	0	494	101	516
7	450	45	0	512	7	0	494	50	516
8	451	0	0	510	8	0	494	49	517
9	451	0	0	507	9	0	497	0	516
10	451	0	0	505	10	0	495	0	516
11	454	171	0	510	11	0	496	0	515
12	455	173	0	514	12	0	496	0	515
13	342	171	0	514	13	0	497	0	515
14	341	171	0	514	14	0	496	0	514
15	341	171	0	514	15	0	496	0	514
16	341	171	0	514	16	0	496	0	514
17	332	170	0	513	17	0	496	0	514
18	98	393	0	513	18	0	496	0	513
19	0	487	0	512	19	0	496	0	513
20	0	490	0	511	20	0	496	0	513
21	0	490	0	511	21	0	496	0	512
22	0	490	0	510	22	0	496	0	512
23	0	492	0	510	23	0	493	0	512
24	0	494	0	509	24	0	495	0	512
25	0	495	0	509	25	0	495	0	511
26	0	495	0	509	26	0	495	0	511
27	0	495	0	508	27	0	494	0	511
28	0	496	0	508	28	0	494	0	511
					29	0	494	0	510
					30	0	494	79	511
					31	0	494	70	512
Total	7,214	7,058	0		Total	0	15,358	694	

*Average was computed by periods specified in Delaware River Basin Commission Resolutions agreed to by parties to the Decree.

Table 10. - Diversions to New York City water supply

Million gallons per day for 24-hour period beginning 0900 local time

(River Master daily operation record)

Date 1981	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	*Average January 16, 1981 to date	Date 1981	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	*Average to date Jan. 16 to May 17 or May 18-31
Apr. 1	0	494	71	513	May 1	256	222	0	517
2	0	494	69	513	2	0	222	0	514
3	0	494	65	514	3	16	223	0	512
4	0	494	76	515	4	410	222	0	513
5	0	493	70	515	5	411	222	0	514
6	0	496	0	515	6	409	223	0	515
7	0	494	0	515	7	394	223	0	516
8	0	495	0	515	8	254	223	0	515
9	0	494	0	514	9	0	223	0	513
10	0	494	0	514	10	0	223	0	510
11	0	495	0	514	11	423	223	0	512
12	0	495	0	514	12	450	223	0	513
13	0	494	0	513	13	449	224	0	514
14	0	494	0	513	14	452	223	23	516
15	0	495	0	513	15	280	402	406	521
16	0	494	0	513	16	0	49	344	520
17	0	494	0	513	17	18	0	390	519
18	0	495	0	512	18	450	0	227	677
19	0	495	0	512	19	450	0	174	650
20	0	494	0	512	20	432	0	173	635
21	0	494	0	512	21	435	0	146	622
22	0	494	0	512	22	318	0	171	595
23	0	494	0	511	23	0	0	197	529
24	0	494	0	511	24	17	0	196	484
25	0	473	0	511	25	443	0	228	507
26	0	494	0	511	26	435	0	157	517
27	9	494	0	511	27	432	505	433	602
28	401	493	0	514	28	432	497	272	656
29	409	297	0	516	29	431	497	311	705
30	410	223	0	517	30	450	497	333	749
					31	450	497	294	784
Total	1,229	14,337	351		Total	9,397	6,063	4,475	

*Average was computed by periods specified in Delaware River Basin Commission Resolutions agreed to by parties to the Decree.

Table 10. - Diversions to New York City water supply

Million gallons per day for 24-hour period beginning 0900 local time

(River Master daily operation record)

Date 1981	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 1981 to date	Date 1981	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 1981 to date
June 1	449	0	235	684	July 1	452	0	103	767
2	450	0	250	692	2	453	0	160	762
3	450	0	248	694	3	453	0	142	757
4	450	0	251	696	4	451	0	152	752
5	451	0	247	696	5	451	0	145	748
6	450	0	246	696	6	401	0	215	744
7	450	0	243	696	7	400	0	184	740
8	450	0	173	687	8	401	0	48	732
9	450	0	140	676	9	401	0	52	725
10	450	0	141	667	10	401	0	94	719
11	449	176	139	676	11	401	0	97	714
12	451	175	140	684	12	400	0	99	709
13	452	175	143	690	13	400	0	110	704
14	451	15	142	684	14	446	0	102	701
15	452	284	143	697	15	450	209	98	702
16	449	312	148	711	16	450	349	100	706
17	451	305	144	722	17	451	349	87	710
18	452	293	144	731	18	450	349	83	714
19	451	293	139	739	19	450	349	105	718
20	451	293	161	747	20	450	348	109	721
21	450	292	128	753	21	450	348	100	725
22	451	293	142	759	22	449	347	102	728
23	451	294	136	765	23	451	347	108	732
24	451	294	139	770	24	450	347	108	735
25	450	293	70	771	25	450	346	74	737
26	452	294	118	775	26	451	346	70	740
27	452	294	183	781	27	450	346	97	742
28	453	294	208	787	28	450	345	91	745
29	452	0	145	780	29	449	241	96	745
30	452	0	141	774	30	449	227	95	746
					31	450	227	98	746
Total	13,523	4,669	5,027		Total	13,561	5,420	3,324	

Table 10. - Diversions to New York City water supply

Million gallons per day for 24-hour period beginning 0900 local time

(River Master daily operation record)

Date 1981	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 1981 to date	Date 1981	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 1981 to date
Aug. 1	449	227	100	747	Sept.1	450	384	103	787
2	449	226	126	748	2	450	382	93	788
3	452	177	89	747	3	450	380	40	789
4	452	176	97	747	4	450	379	101	790
5	452	176	103	747	5	449	378	108	792
6	453	264	103	748	6	448	376	146	794
7	451	288	100	749	7	449	375	111	795
8	451	287	96	750	8	450	373	99	796
9	451	287	98	751	9	450	214	59	796
10	452	286	115	753	10	450	213	0	794
11	451	286	102	754	11	451	212	105	794
12	451	286	100	755	12	451	211	155	794
13	451	286	100	756	13	450	210	75	794
14	450	286	100	757	14	451	262	91	794
15	451	285	101	758	15	450	266	107	794
16	450	285	80	759	16	450	265	42	794
17	450	285	104	760	17	450	265	113	794
18	450	284	105	761	18	450	164	164	794
19	452	284	102	762	19	449	160	103	793
20	452	283	102	763	20	449	160	102	792
21	452	395	105	765	21	450	162	104	792
22	451	398	105	768	22	452	162	104	791
23	452	397	91	770	23	451	162	105	791
24	461	396	103	772	24	453	162	104	790
25	454	395	114	774	25	451	162	104	789
26	448	394	75	776	26	451	162	106	789
27	450	394	105	778	27	452	162	103	788
28	451	392	7	779	28	451	286	137	789
29	451	392	109	781	29	451	388	93	790
30	450	391	186	783	30	450	420	73	791
31	450	387	101	785					
Total	13,990	9,575	3,124		Total	13,509	7,857	2,950	

Table 10. - Diversions to New York City water supply

Million gallons per day for 24-hour period beginning 0900 local time

(River Master daily operation record)

Date 1981	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 1981 to date	Date 1981	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 1981 to date
Oct. 1	451	422	100	793	Nov. 1	426	0	98	785
2	451	424	51	794	2	426	0	0	782
3	451	423	113	795	3	426	0	62	781
4	450	423	126	797	4	426	0	58	779
5	451	423	96	798	5	424	0	0	776
6	450	166	110	798	6	426	0	67	775
7	451	165	99	797	7	426	0	149	773
8	449	164	98	796	8	427	0	166	772
9	453	160	108	796	9	424	0	69	771
10	453	162	104	795	10	424	0	80	769
11	453	162	79	795	11	424	0	0	767
12	453	160	106	794	12	337	0	101	765
13	453	235	98	794	13	335	0	62	763
14	452	275	110	794	14	335	0	66	760
15	452	275	69	794	15	335	0	135	759
16	452	275	125	795	16	334	161	73	758
17	452	275	99	795	17	335	173	72	757
18	452	274	95	795	18	336	171	71	756
19	451	273	118	795	19	336	170	62	754
20	444	273	59	795	20	336	400	65	755
21	442	272	90	795	21	335	452	52	755
22	442	432	94	796	22	335	452	115	756
23	441	119	102	796	23	335	452	87	757
24	458	0	107	794	24	335	451	150	758
25	441	0	125	792	25	336	452	74	758
26	452	380	104	793	26	335	451	0	758
27	452	402	0	794	27	335	452	47	759
28	449	26	20	792	28	335	451	0	759
29	425	0	48	790	29	335	451	149	760
30	425	0	129	788	30	334	451	73	761
31	426	0	107	787					
Total	13,877	7,040	2,889		Total	11,048	5,590	2,203	

Table 11. - Storage in Pepacton Reservoir, N.Y., for year ending November 30, 1981

(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.)

(River Master daily operation record; gage reading at 0900)

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	54,005	49,903	38,739	77,427	86,523	99,567	115,110	105,526	93,961	80,152	70,091	71,841
2	54,061	49,591	38,730	78,194	87,252	99,908	114,811	105,129	93,527	79,701	70,117	72,060
3	54,239	49,257	42,152	78,871	88,042	100,451	114,562	104,780	93,111	79,277	70,117	72,188
4	54,373	48,936	43,136	79,400	88,764	100,900	114,313	104,399	92,725	78,817	70,053	72,253
5	54,417	48,530	43,545	79,906	89,403	100,947	114,047	104,114	92,264	78,370	69,915	72,266
6	54,440	48,167	43,708	80,370	90,205	100,947	113,750	103,894	91,821	77,883	69,763	72,291
7	54,473	47,933	43,851	80,754	90,864	100,885	113,404	103,641	91,364	77,413	69,738	72,497
8	54,496	47,563	43,995	81,278	91,453	100,807	113,074	103,326	90,967	76,984	69,726	72,562
9	54,562	47,425	44,109	81,554	91,938	100,807	112,744	102,979	90,540	76,783	69,726	72,587
10	54,618	47,140	44,068	81,843	92,606	101,040	112,431	102,633	90,088	76,436	69,663	72,587
11	54,663	46,761	44,140	82,106	93,096	101,351	112,054	102,289	89,636	76,077	69,562	72,562
12	54,629	46,383	50,802	82,385	93,587	102,712	111,678	101,930	89,242	75,679	69,398	72,510
13	54,574	46,058	53,094	82,663	93,976	106,436	111,334	101,539	88,750	75,268	69,235	72,510
14	54,496	45,683	54,339	82,969	94,351	108,443	111,056	101,148	88,302	74,860	69,033	72,574
15	54,362	45,339	55,349	83,220	94,830	109,543	110,860	100,683	87,883	74,755	68,807	72,574
16	54,239	44,996	55,992	83,457	95,207	111,302	110,615	100,265	87,424	74,518	68,507	72,562
17	54,139	44,655	56,467	83,682	95,584	112,810	110,290	99,815	86,980	74,203	68,233	72,549
18	53,893	44,315	57,252	83,878	95,992	114,047	109,965	99,336	86,508	73,836	67,896	72,523
19	53,726	43,964	58,259	84,047	96,325	114,545	109,494	98,891	86,066	73,485	67,697	72,484
20	53,415	43,616	59,810	84,159	96,613	114,911	109,105	98,445	85,613	73,107	67,436	72,471
21	53,138	43,269	63,869	84,426	96,902	115,160	108,766	98,337	85,117	72,743	67,152	72,549
22	52,873	42,830	66,782	84,566	97,146	115,309	108,621	98,091	84,651	72,343	66,868	72,562
23	52,542	42,374	68,882	84,735	97,420	115,476	108,379	97,664	84,229	72,034	66,523	72,562
24	52,288	41,969	70,906	84,933	97,832	115,826	108,089	97,238	83,724	71,802	66,572	72,549
25	51,981	41,567	72,834	85,103	98,199	116,144	107,783	96,796	83,290	71,661	66,498	72,510
26	51,664	41,165	74,282	85,244	98,476	116,060	107,268	96,385	82,858	71,416	66,412	72,446
27	51,357	40,764	75,480	85,429	98,737	115,926	106,964	95,992	82,371	71,122	66,622	72,394
28	51,063	40,377	76,515	85,585	99,014	115,759	106,612	95,599	81,885	70,906	68,308	72,356
29	50,813	39,969		85,740	98,937	115,625	106,228	95,222	81,471	70,677	69,940	72,291
30	50,531	39,584		85,925	99,290	115,492	105,892	94,815	80,988	70,397	70,893	72,175
31	50,227	39,161		86,208		115,293		94,441	80,589		71,493	
Change	-3,700	-11,066	+37,354	+9,693	+13,082	+16,003	-9,401	-11,451	-13,852	-10,192	+1,096	+682
Equiv. mgd	-119.4	-357.0	+1,334	+312.7	+436.1	+516.2	-313.4	-369.4	-446.8	-339.7	+35.4	+22.7
Equiv. cfs	-185	-552	+2,064	+484	+675	+799	-485	-571	-691	-526	+54.8	+35.1

Change for year + 18,248 million gallons Equiv. for year +50.0 mgd Equiv. for year + 77.4 cfs

Table 12. - Storage in Cannonsville Reservoir, N.Y., for year ending November 30, 1981

(Storage in millions of gallons above elevation 1,040.00 ft. Add 2,584 million gallons for total contents above sill of outlet tunnel, elevation 1,020.50 ft.)

(River Master daily operation record; gage reading at 0900)

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	26,966	36,231	27,162	70,589	66,873	68,563	84,545	84,400	72,774	48,181	34,171	37,014
2	27,017	36,231	27,026	71,040	66,898	69,357	84,892	84,444	72,086	47,202	33,963	37,807
3	27,996	36,192	29,969	71,318	67,153	69,993	85,210	84,516	71,556	46,290	33,467	38,538
4	28,903	36,102	31,332	71,450	67,280	70,457	85,499	84,212	71,119	45,367	33,019	39,127
5	29,635	35,984	32,073	71,556	67,397	70,801	85,788	84,024	70,523	44,311	32,666	39,642
6	30,330	35,736	32,500	71,609	67,622	71,106	86,019	84,068	69,847	43,319	32,435	40,167
7	30,924	35,469	32,945	71,596	67,742	71,358	86,222	84,140	69,093	42,426	32,657	40,997
8	31,489	35,083	33,586	71,583	67,794	71,556	86,366	84,198	68,272	41,900	32,731	41,627
9	32,008	35,013	34,210	71,517	67,781	71,715	86,554	84,140	67,609	41,501	32,926	42,184
10	32,685	34,458	34,656	71,437	67,834	71,781	86,713	84,024	67,051	41,344	32,945	42,741
11	33,269	34,042	35,300	71,344	67,848	71,887	86,872	83,547	66,401	41,039	32,917	43,277
12	33,755	33,626	44,556	71,212	67,808	72,351	86,713	83,316	65,790	40,356	32,898	43,744
13	34,230	33,517	49,004	71,093	67,742	73,702	86,366	83,200	65,064	39,684	32,731	44,189
14	34,696	33,319	50,893	70,947	67,609	74,837	86,149	83,114	64,300	39,327	32,398	44,578
15	34,805	32,750	52,292	70,775	67,649	75,763	86,438	82,752	63,447	39,137	32,018	44,967
16	35,102	32,481	53,296	70,616	67,569	76,675	86,308	82,218	62,696	39,064	31,526	45,367
17	35,568	32,231	54,241	70,417	67,503	78,802	86,250	81,351	61,995	38,906	30,905	45,590
18	35,865	31,934	55,469	70,192	67,437	79,990	86,135	80,391	61,231	38,114	30,442	45,812
19	35,954	31,637	56,446	69,966	67,331	81,018	85,831	79,645	60,488	37,371	30,173	46,023
20	36,053	31,415	57,960	69,728	67,217	81,669	85,499	79,065	59,682	36,756	29,580	46,301
21	36,142	31,146	60,976	69,490	67,026	82,608	85,326	78,871	58,864	36,518	29,023	46,112
22	36,112	30,627	63,077	69,225	66,873	83,258	85,282	78,650	57,862	36,192	28,438	46,112
23	36,142	30,210	64,822	68,960	66,669	83,836	85,282	78,318	56,910	35,924	27,996	46,079
24	36,182	29,913	66,236	68,695	66,618	84,299	85,210	77,711	56,019	35,944	28,336	45,990
25	36,182	29,580	67,662	68,444	66,643	84,661	85,065	76,813	55,103	35,894	28,591	45,901
26	36,112	29,339	68,682	68,152	66,618	85,022	84,877	76,011	54,136	35,350	28,745	45,779
27	36,043	29,060	69,477	67,887	66,567	85,354	84,530	75,514	53,167	34,964	28,583	45,701
28	36,043	28,680	70,072	67,609	66,478	85,123	84,270	75,003	52,106	34,964	29,802	45,579
29	36,053	28,251		67,280	66,414	84,877	84,068	74,547	50,998	34,785	32,852	45,501
30	36,172	27,809		67,089	67,582	84,689	84,299	74,091	50,017	34,458	34,637	45,345
31	36,231	27,468		66,962		84,603		73,622	49,107		35,994	
Change	+9,886	-8,763	+42,604	-3,110	+620	+17,021	-304	-10,677	-24,515	-14,649	+1,536	+9,351
Equiv. mgd	+318.9	-282.7	+1,522	-100.3	+20.7	+549.1	-10.1	-344.4	-790.8	-488.3	+49.5	+311.7
Equiv. cfs	+493	-437	+2,355	-155	+32.0	+849	-15.6	-533	-1,223	-755	+76.6	+482

Change for year +19,000 million gallons Equiv. for year +52.1 mgd Equiv. for year +80.6 cfs

Table 13. - Storage in Neversink Reservoir, N.Y. for year ending November 30, 1981

(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.)

(River Master daily operation record; gage reading at 0900)

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	3,750	2,511	2,665	19,134	21,169	24,764	29,747	26,198	23,657	20,342	17,684	17,199
2	3,737	2,459	2,707	19,373	21,264	24,875	29,585	26,144	23,549	20,235	17,629	17,220
3	3,750	2,371	3,568	19,525	21,386	24,977	29,405	26,055	23,421	20,135	17,618	17,333
4	3,772	2,287	3,839	19,606	21,424	25,068	29,257	25,976	23,369	20,079	17,539	17,353
5	3,763	2,206	3,961	19,624	21,446	25,155	29,029	25,917	23,286	19,965	17,418	17,380
6	3,734	2,231	4,068	19,661	21,565	25,242	28,897	25,913	23,179	19,844	17,309	17,473
7	3,732	2,262	4,169	19,682	21,726	25,321	28,716	25,774	23,067	19,690	17,264	17,539
8	3,692	2,286	4,277	19,737	21,845	25,395	28,508	25,595	22,964	19,569	17,189	17,508
9	3,686	2,311	4,393	19,792	21,961	25,462	28,398	25,578	22,870	19,719	17,124	17,418
10	3,697	2,332	4,475	19,891	22,112	25,528	28,324	25,528	22,768	19,759	17,053	17,428
11	3,695	2,356	4,570	19,987	22,225	25,608	28,219	25,420	22,650	19,774	16,968	17,428
12	3,666	2,368	6,403	20,076	22,334	27,676	28,114	25,300	22,548	19,671	16,897	17,487
13	3,634	2,388	7,009	20,161	22,443	29,504	28,005	25,192	22,443	19,522	16,809	17,445
14	3,610	2,397	7,335	20,283	22,529	30,141	27,914	25,076	22,334	19,453	16,718	17,439
15	3,566	2,418	7,598	20,316	22,788	30,510	27,879	24,953	22,225	19,340	16,618	17,445
16	3,519	2,433	7,817	20,387	22,945	30,864	27,831	24,850	22,128	19,242	16,561	17,370
17	3,483	2,459	8,006	20,447	23,071	31,113	27,736	24,748	22,050	19,199	16,444	17,377
18	3,455	2,473	8,253	20,510	23,198	31,085	27,637	24,641	21,934	19,091	16,348	17,370
19	3,401	2,490	8,693	20,559	23,329	31,136	27,528	24,543	21,818	18,929	16,318	17,370
20	3,351	2,507	9,959	20,622	23,433	31,197	27,404	24,429	21,699	18,821	16,252	17,367
21	3,246	2,522	14,249	20,678	23,537	31,220	27,279	24,490	21,581	18,714	16,209	17,428
22	3,181	2,527	15,434	20,731	23,617	31,248	27,223	24,470	21,466	18,600	16,146	17,470
23	3,117	2,550	16,136	20,784	23,701	31,225	27,146	24,397	21,348	18,501	16,063	17,421
24	3,060	2,565	17,032	20,836	23,890	31,160	27,051	24,291	21,237	18,398	16,057	17,398
25	2,989	2,579	17,830	20,889	24,035	31,085	26,945	24,185	21,131	18,292	16,044	17,319
26	2,917	2,591	18,271	20,938	24,149	30,970	26,915	24,108	20,998	18,193	15,991	17,298
27	2,843	2,604	18,643	20,987	24,242	30,915	26,804	24,060	20,908	18,085	16,047	17,346
28	2,783	2,620	18,889	21,051	24,336	30,579	26,625	23,987	20,791	17,997	16,568	17,370
29	2,722	2,635		21,093	24,454	30,414	26,435	23,918	20,765	17,861	16,955	17,418
30	2,648	2,647		21,131	24,629	30,209	26,316	23,838	20,641	17,757	17,131	17,322
31	2,581	2,655		21,142		29,969		23,749	20,454		17,172	
Change	-1,180	+74	+16,234	+2,253	+3,487	+5,340	-3,653	-2,567	-3,295	-2,697	-585	+150
Equiv. mgd	-38.1	+2.39	+579.8	+72.7	+116.2	+172.3	-121.8	-82.8	-106.3	-89.9	-18.9	+5.00
Equiv. cfs	-58.9	+3.70	+897	+112	+180	+267	-188	-128	-164	-139	-29.2	+7.7

Change for year +13,561 million gallons Equiv. for year +37.2 mgd Equiv. for year +57.5 cfs

Table 14. - NEW YORK CITY CONSUMPTION OF WATER - 1940 to 1981

Year	Consumption in City proper Mgd	Gallons per capita per day	Furnished to outside communities mgd	Total mgd	Annual billion gallons
1940	922.7	124	21.6	944.3	345.614
41	964.2	130	24.8	989.0	360.985
42	906.7	124	21.5	928.2	338.793
43	942.7	133	21.5	964.2	351.933
44	1,004.9	144	26.5	1,031.4	377.492
1945	1,056.2	146	22.0	1,078.2	393.543
46	1,117.1	146	24.1	1,141.2	416.538
47	1,159.0	149	30.4	1,189.4	434.131
48	1,172.3	150	31.5	1,203.8	440.591
49	1,166.9	149	36.2	1,203.1	439.132
1950	953.3	121	29.1	982.4	358.576
51	1,041.9	131	28.1	1,070.0	390.550
52	1,087.0	136	32.7	1,119.7	409.810
53	1,093.9	135	44.6	1,138.5	415.552
54	1,063.4	131	46.3	1,109.7	405.040
1955	1,109.9	136	45.3	1,155.2	421.648
56	1,111.3	136.2	48.9	1,160.2	424.633
57	1,169.0	143	57.2	1,226.2	447.563
58	1,152.9	140.8	49.6	1,202.5	438.912
59	1,204.3	146.8	60.3	1,264.6	461.579
1960	1,199.4	153.9	58.9	1,258.3	460.529
61	1,221.0	156.0	64.0	1,285.0	469.022
62	1,207.6	153.5	68.8	1,276.4	465.896
63	1,218.0	154.1	76.7	1,294.7	472.582
64	1,189.2	149.8	79.4	1,268.6	464.295
1965	1,052.1	131.9	71.2	1,123.3	409.995
66	1,044.9	130.4	73.2	1,118.1	408.128
67	1,135.3	141.0	71.0	1,206.3	440.302
68	1,242.0	153.6	78.2	1,320.2	483.175
69	1,328.7	163.5	80.1	1,408.8	514.229
1970	1,400.3	177.9	90.4	1,490.7	544.116
71	1,423.6	180.0	87.9	1,511.5	551.695
72	1,412.4	178.3	83.0	1,495.4	547.340
73	1,448.9	182.7	95.4	1,544.3	563.681
74	1,441.8	181.5	96.3	1,538.1	561.409
1975	1,415.0	177.9	92.1	1,507.1	550.093
76	1,435.0	180.1	95.8	1,530.8	560.264
77	1,483.0	185.9	104.7	1,587.7	579.510
78	1,479.4	185.1	103.0	1,582.4	577.566
79	1,513.0	189.0	104.6	1,617.6	590.426
1980	1,506.3	187.9	110.0	1,616.3	591.582
81	1,309.5	185.2*	100.0	1,409.5	514.475

Data furnished by
New York City
Department of Environmental Protection
Bureau of Water Supply

*Provisional

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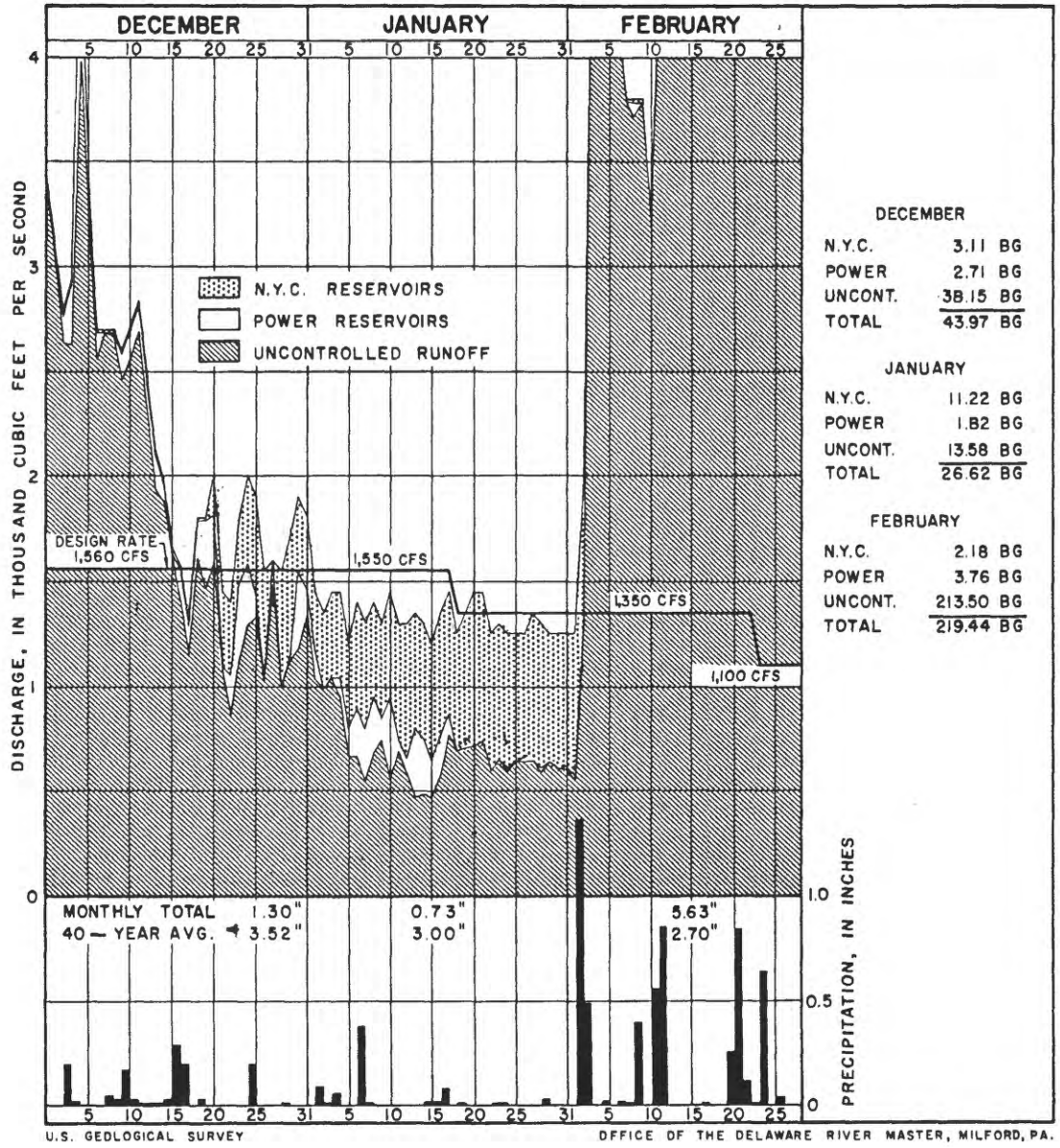
PLATE 1.—COMPONENTS OF FLOW, DELAWARE RIVER AT MONTAGUE, N.J. 1980-81



DECEMBER	
N.Y.C.	3.11 BG
POWER	2.71 BG
UNCONT.	38.15 BG
TOTAL	43.97 BG

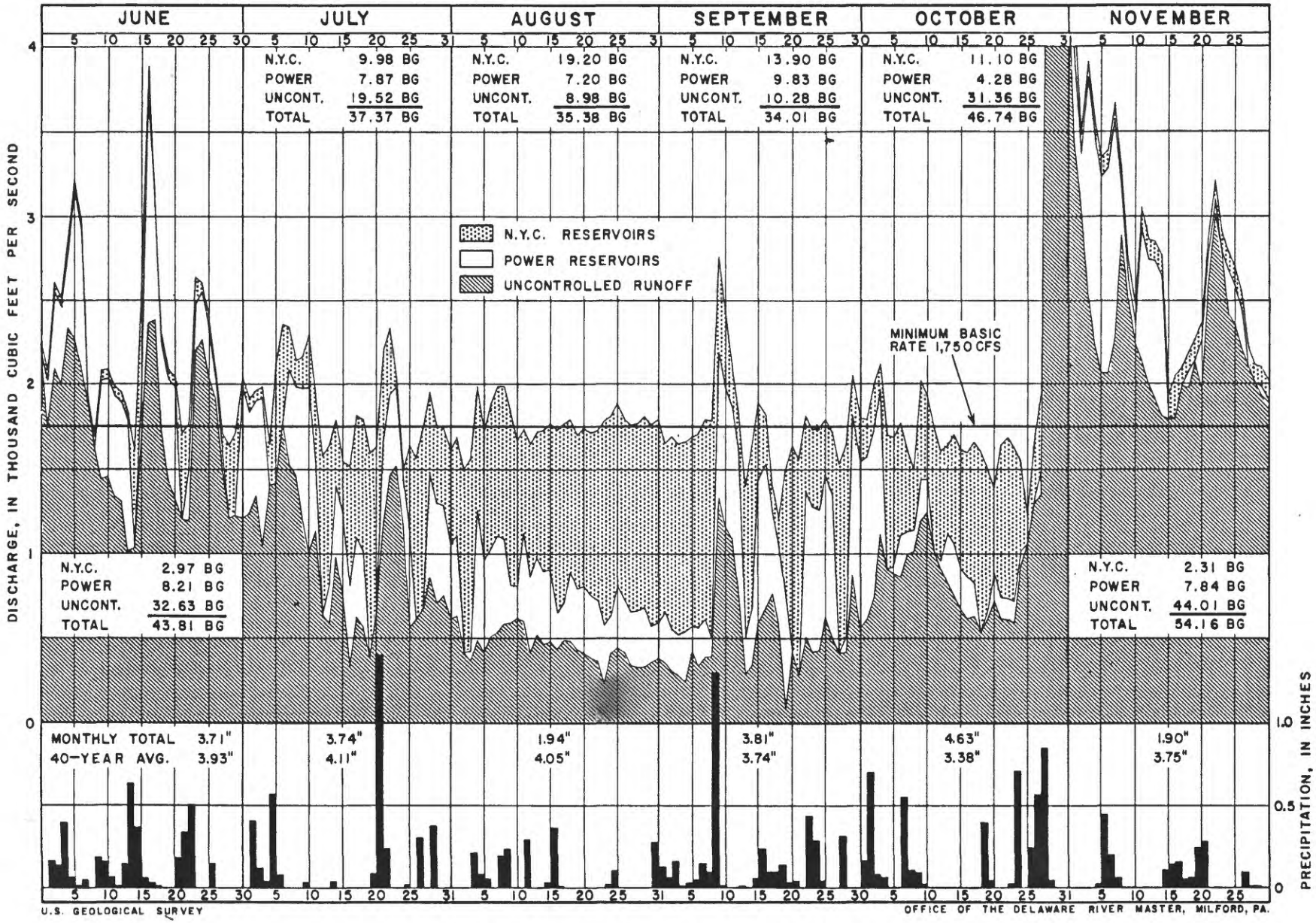
JANUARY	
N.Y.C.	11.22 BG
POWER	1.82 BG
UNCONT.	13.58 BG
TOTAL	26.62 BG

FEBRUARY	
N.Y.C.	2.18 BG
POWER	3.76 BG
UNCONT.	213.50 BG
TOTAL	219.44 BG

U.S. GEOLOGICAL SURVEY

OFFICE OF THE DELAWARE RIVER MASTER, MILFORD, PA.

PLATE 2.–COMPONENTS OF FLOW, DELAWARE RIVER AT MONTAGUE, N.J. 1981



U.S. GEOLOGICAL SURVEY

OFFICE OF THE DELAWARE RIVER MASTER, MILFORD, PA.

FIGURE 2 – UNCONTROLLED COMPONENT,
DELAWARE RIVER AT MONTAGUE, N.J. 1980-1981

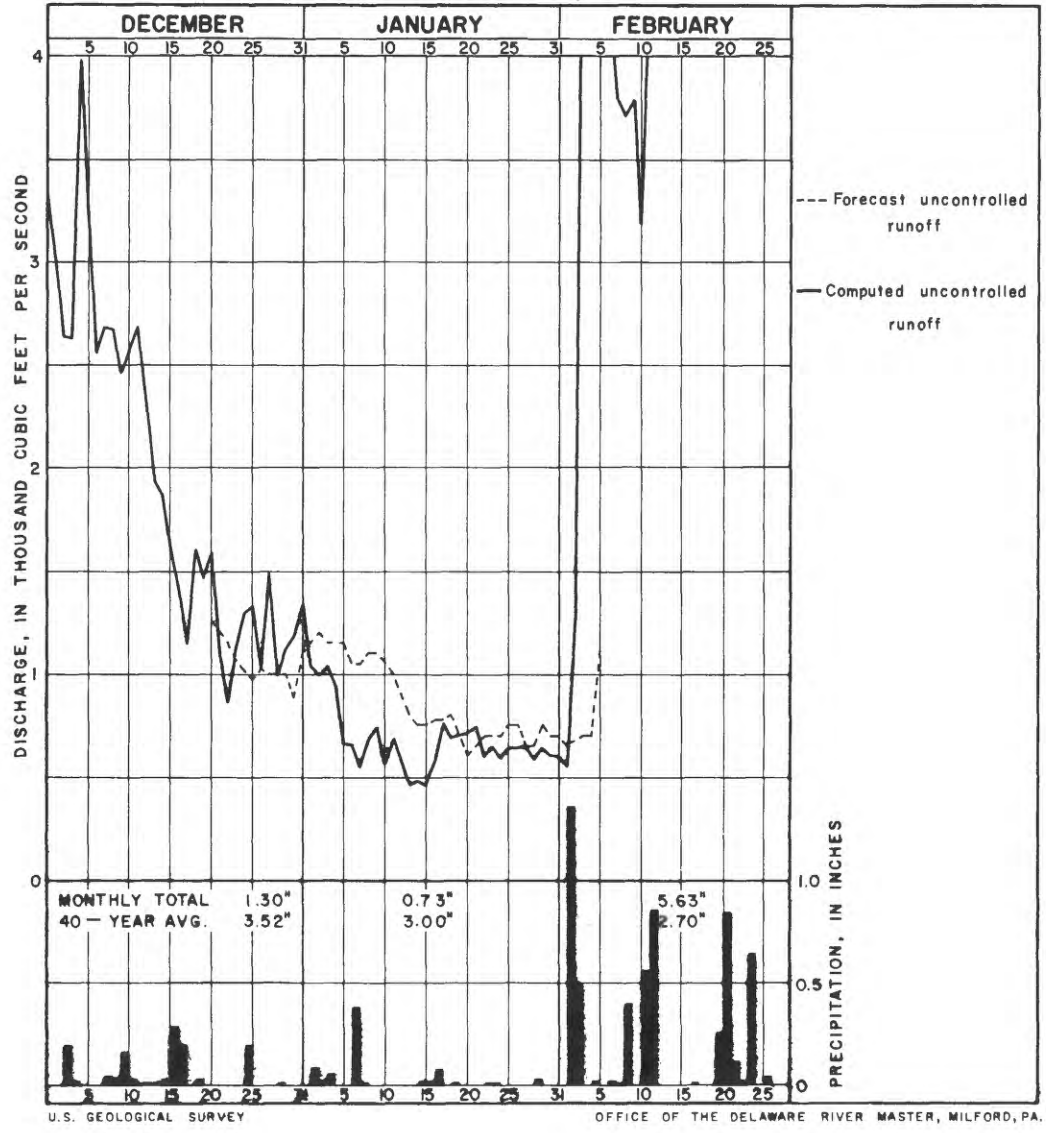
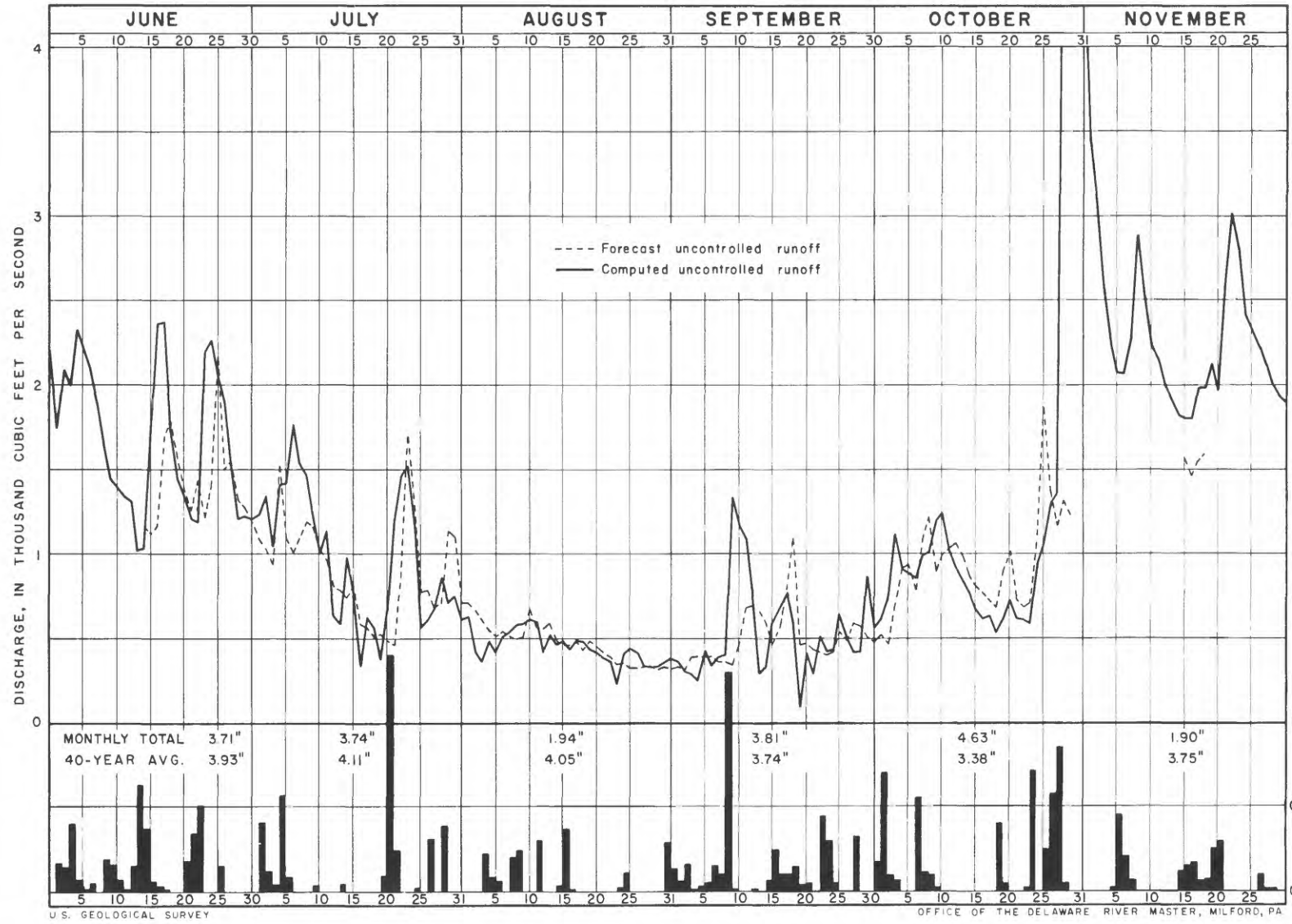


FIGURE 3—UNCONTROLLED COMPONENT, DELAWARE RIVER AT MONTAGUE, N.J. 1981



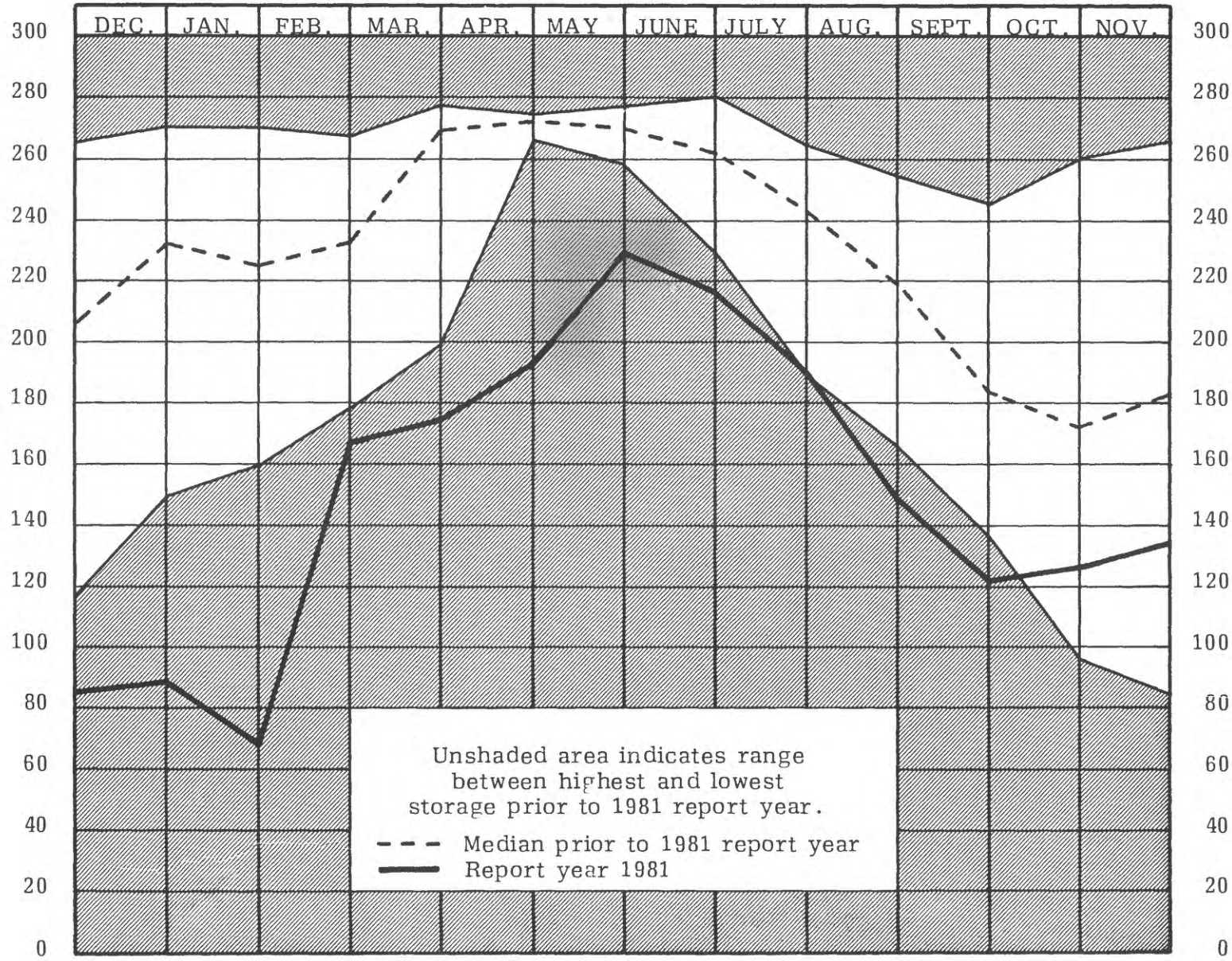
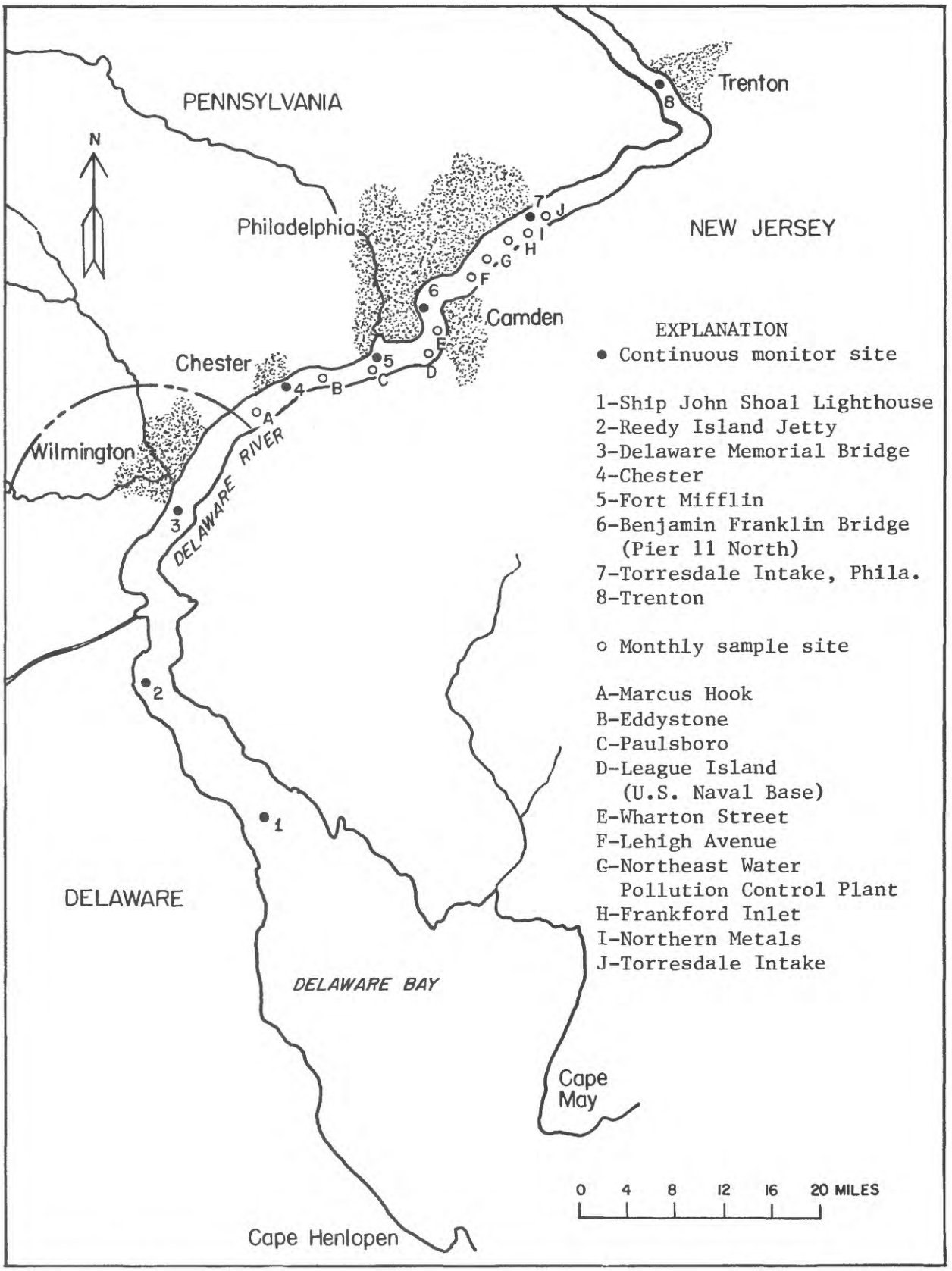


Figure 4. - Combined storage in Pepacton, Cannonsville, and Neversink Reservoirs on first day of month, June 1967 to December 1981

Section III

WATER QUALITY OF THE DELAWARE RIVER ESTUARY

FIGURE 5.--Delaware River Estuary.



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Section III

WATER QUALITY OF THE DELAWARE RIVER ESTUARY

Introduction

This section describes the water-quality monitoring program carried out by the U.S. Geological Survey in the Delaware Estuary during the 1981 report year. Also presented here are some of the data that were obtained by this program and a brief discussion of the significance of the data.

Water-Quality Monitoring Program

Water quality of the Delaware River and Estuary was monitored between Trenton, N.J., and Ship John Shoal Lighthouse, N.J. Data were acquired continuously by electronic instruments at eight monitor sites, one at Trenton, just upstream of the head of tidewater and at seven sites in the estuary (fig. 5). The two monitors at Torresdale Intake, Philadelphia, Pa., and Delaware Memorial Bridge, Del., were discontinued on March 18, 1981. The monitor at Chester, Pa., was operated from April 23, 1981, through the end of the report year, and the monitor at Fort Mifflin, Pa., was operated from February 5, 1981, through the end of the report year. At Ship John Shoal Lighthouse, the water was monitored for temperature and specific conductance. At the remaining sites, the water was monitored for temperature, specific conductance, dissolved oxygen, and pH.

Additional data were obtained at ten sites between Torresdale and Marcus Hook, Pa., on a monthly basis. At each of these sites, samples of water were collected at three points of the cross-section. These samples were analyzed for temperature, chloride, alkalinity, biochemical oxygen demand, 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 monthly sites were processed and stored by the City of Philadelphia Water Department.

The above-described programs were carried out in cooperation with the City of Philadelphia Water Department, Pennsylvania Fish Commission, Delaware River Basin Commission, Delaware River Master, and other agencies of federal, state and county government.

Estuarine Water-Quality Data During 1981

The following is a summary and discussion of the data that were collected during the 1981 report year. Additional information can be found in the tables at the end of this section.

Streamflow

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

Based on streamflow records for the Delaware River at Trenton, mean monthly streamflow was lowest for the year during January (2,539 cfs) and highest for the year during February (22,790 cfs). (See table 7.) The mean monthly streamflow was above the respective median for the period of record during February and May, and below the medians for the rest of the year.

Temperature

The significance of water temperature in regard to water quality in the estuary lies in its profound influence on various physical, chemical, and biological properties of the water. In general, increases in water temperature have deleterious effects on water quality by lowering the saturation level of dissolved oxygen and increasing biological activities.

The primary factors involved in controlling water temperature in the estuary are climatic; however, various uses of the water by man can also have significant effects.

Based on records from Benjamin Franklin Bridge (Pier 11 North) Philadelphia, mean monthly temperatures were below normal February through April and June and above normal during December, January, May, and July through November (compared to the period 1962 to 1972). (See fig. 6.)

Specific Conductance and Chloride

Specific conductance is the ability of a solution to conduct electricity. Basically, it can be used to measure the amount of ionized material in solution and relates approximately to dissolved-solids content.

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

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

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

Chloride concentration was not measured directly at Delaware Memorial Bridge near Wilmington, Del., Fort Mifflin, Pa., and Reedy Island Jetty, Del., but a correlation between specific conductance and chloride concentration was developed based on analyses of water samples taken in the estuary. Chloride concentrations at those sites presented in tables 15, 17 and 18 were derived from that relationship. The relationship 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 relationship. Therefore, chloride concentrations derived from specific conductance are not given when the relationship indicates chloride concentrations of less than 30 mg/L. Only four months of data (December to March) are available for Delaware Memorial Bridge, but these data do show the period of high chloride concentration in February. Chloride concentrations at Chester, Pa., were furnished by Scott Paper Company.

During the past year, water containing more than 50 mg/L of chloride reached the Benjamin Franklin Bridge from early January to February 6, October 16, 17, 18 and 20. The maximum at this site was 133 mg/L on February 2. At Fort Mifflin, the chloride concentrations equaled or exceeded 50 mg/L on many days with a maximum (for the period February 5 through November 30) of 282 mg/L on October 27. (See table 15.) At Chester, the chloride concentrations equaled or exceeded 50 mg/L December 1 to February 15, June 28 to July 4, and July 18 through November 30 and exceeded 250 mg/L December 6, 7, 18 and 19, December 22 to February 11, August 21 to October 30, and November 14 and 15 with a maximum of 1,440 mg/L on February 2. (See table 16.) The maximum daily chloride concentration in the estuary at Chester was greater than 50 mg/L 60 percent of the time and greater than 250 mg/L 35 percent of the time. At the Delaware Memorial Bridge, chloride concentrations were frequently in excess of 250 mg/L with a maximum of 2,980 mg/L on February 2. Data for this site are available only from December 1 to March 18, however, the highest chloride concentrations for the year occurred during this period. (See table 17.) Chloride concentrations in excess of 250 mg/L were recorded every day at Reedy Island Jetty (table 18) with concentrations in the range of 2,000 to 9,000 mg/L being common. The maximum at this site was 9,900 mg/L on February 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 air and photosynthesis in aquatic plants. Dissolved oxygen levels are limited by temperature, salinity, and the partial pressure of atmospheric oxygen.

Dissolved-oxygen levels in the estuary tend to be highest near Trenton and to decrease with distance downstream to a point near Chester, where minimum values are usually reached.

During the past year, mean dissolved-oxygen concentration at the Benjamin Franklin Bridge was below 5 mg/L January 25 to February 1, April 2 and 3, April 9 to 14, April 23 to May 12, May 27 to November 18, and November 20. (See table 19.) The minimum hourly value was 0.5 mg/L on many days in July, August, and September. At Chester, the mean dissolved-oxygen concentration was below 5 mg/L on most days from May 1 through November 30. (See table 20.) The lowest daily mean was 1.8 mg/L on June 6. The minimum hourly value was 1.2 mg/L on July 8. At Reedy Island Jetty, the minimum hourly value was 5.1 mg/L on June 21.

Figure 7 shows the frequency of hourly dissolved-oxygen concentration at Benjamin Franklin Bridge (Pier 11 North) and Chester during the critical summer period, July through September. During this period, the dissolved-oxygen concentration was below 4 mg/L 100 percent of the time at the Benjamin Franklin Bridge and 86 percent of the time at Chester.

Hydrogen-Ion Concentration (pH)

Hydrogen-ion concentration (pH) is fundamentally a measure of acidity or alkalinity. pH values below 7 indicate acidity, whereas values above 7 indicate alkalinity. In natural waters, pH values generally range from 6.0 to 8.5. The main factors controlling the pH of a body of water are usually the geochemistry of the drainage basin and external influences such as pollution. Photosynthetic activity can also have a considerable influence on pH values. Increased photosynthetic activity (algal bloom) produces higher pH values. All pH values at Benjamin Franklin Bridge, Chester, and Reedy Island Jetty were within the range of 5.7 and 8.2. pH in the estuary tends to be highest near Trenton, N.J., and increases downstream.

Table 15 - Chloride concentrations, Delaware River at Fort Mifflin, Pa.

Daily maximum and minimum chloride concentrations in milligrams per liter

February 5, 1981 to November 30, 1981

Day	February		March		April		May		June		July		August		September		October		November	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1	–	–	–	–	55	42	38	*	157	*	37	*	47	38	–	–	85	52	91	47
2	–	–	–	–	59	40	35	*	145	*	42	*	47	40	–	–	88	48	119	42
3	–	–	–	–	–	–	35	*	117	*	–	–	47	42	60	48	85	52	60	40
4	–	–	*	*	–	–	37	*	125	*	–	–	48	43	82	48	94	48	55	40
5	122	60	30	*	–	–	37	*	33	*	–	–	50	43	82	48	77	47	52	38
6	134	80	38	*	–	–	35	*	31	*	–	–	55	45	80	52	94	50	55	38
7	117	77	38	*	–	–	37	*	42	*	–	–	53	45	91	50	214	42	74	40
8	122	77	33	*	–	–	38	*	50	*	–	–	94	45	108	48	162	50	55	42
9	105	59	42	*	–	–	38	*	37	*	–	–	74	43	82	50	91	50	53	30
10	91	57	45	*	–	–	40	*	38	*	–	–	47	42	85	53	91	52	47	37
11	111	60	42	*	–	–	52	*	48	*	–	–	48	35	82	50	97	55	60	38
12	111	47	50	*	–	–	53	*	–	–	–	–	–	–	60	48	139	53	53	38
13	47	*	45	*	–	–	30	*	–	–	–	–	–	–	77	47	122	55	50	38
14	47	*	52	*	–	–	*	*	–	–	–	–	–	–	85	48	108	53	48	40
15	47	*	43	*	–	–	*	*	–	–	–	–	–	–	88	48	119	53	47	30
16	31	*	45	*	–	–	37	*	–	–	–	–	–	–	97	52	139	59	47	33
17	*	*	50	*	*	*	*	*	–	–	–	–	–	–	97	53	159	59	47	35
18	35	*	52	33	30	*	*	*	–	–	–	–	–	–	108	55	177	60	50	35
19	*	*	47	35	31	*	*	*	–	–	–	–	–	–	94	55	119	60	43	30
20	33	*	50	35	33	*	*	*	–	–	–	–	–	–	85	50	131	57	43	31
21	45	*	52	37	38	*	*	*	–	–	43	33	–	–	60	47	117	55	55	30
22	48	*	48	38	40	*	*	*	–	–	40	33	–	–	60	48	134	74	52	*
23	42	*	45	37	43	*	*	*	38	30	42	33	–	–	77	48	122	57	45	33
24	45	*	52	38	37	*	*	*	42	*	40	33	–	–	94	48	111	60	45	*
25	31	*	55	38	33	*	*	*	43	*	42	31	–	–	74	50	119	77	47	35
26	31	*	55	40	35	*	31	*	45	*	37	33	–	–	85	48	142	82	43	33
27	31	*	55	40	37	*	53	*	–	–	–	–	–	–	82	52	282	74	48	*
28	–	–	50	40	38	*	137	*	–	–	–	–	–	–	80	50	114	57	43	30
29	–	–	50	38	38	*	211	*	–	–	–	–	–	–	100	52	219	55	45	30
30	–	–	50	40	38	*	145	*	37	*	42	33	–	–	88	52	211	50	43	30
31	–	–	60	40	–	–	177	*	–	–	45	33	–	–	–	–	139	45	–	–

*Less than 30 mg/L

Table 16 - Chloride concentrations, Delaware River at Chester, Pa.[1]/

Daily maximum and minimum chloride concentrations in milligrams per liter

December 1, 1980 to November 30, 1981

Day	December		January		February		March		April		May		June		July		August		September		October		November	
	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	195	95	450	180	1160	470	24	20	48	37	35	31	26	23	58	34	180	60	440	166	440	175	240	120
2	230	100	530	178	1440	520	23	20	46	36	37	30	25	22	72	34	169	60	465	160	440	185	190	100
3	153	80	420	148	720	300	21	19	48	38	34	31	27	22	68	34	185	73	485	180	370	150	185	90
4	135	75	420	140	680	260	23	20	45	40	34	31	28	22	68	35	195	79	565	190	420	150	180	80
5	190	72	380	135	400	210	23	20	45	38	33	31	27	23	46	34	198	76	550	195	406	160	190	80
6	265	86	580	162	430	220	26	22	43	39	35	32	27	25	40	33	215	72	580	120	480	174	155	70
7	300	80	460	193	410	220	30	21	43	39	35	30	28	25	35	33	250	79	600	225	380	162	120	60
8	240	92	410	165	500	200	30	24	47	40	35	31	28	24	37	34	240	59	580	130	320	148	124	55
9	230	90	500	200	420	150	30	25	48	37	34	31	28	26	36	33	112	59	550	220	310	150	125	55
10	230	72	620	200	260	135	30	26	44	39	36	31	27	25	38	33	104	52	520	190	540	160	145	56
11	200	88	560	210	300	120	37	26	43	38	38	29	27	26	38	33	110	55	440	190	520	200	160	57
12	190	85	560	210	160	75	41	29	43	37	35	29	27	26	37	34	118	57	480	200	520	200	160	59
13	165	80	780	310	90	47	36	29	43	37	37	21	28	26	36	34	118	56	450	185	550	210	175	65
14	175	76	1020	340	55	40	32	29	44	38	27	23	28	26	37	35	150	54	460	180	510	200	300	70
15	165	76	940	260	50	35	34	30	41	37	24	20	38	27	39	35	158	60	500	190	680	240	325	78
16	220	80	1000	460	45	32	37	30	41	35	21	19	32	26	43	37	140	55	440	180	740	240	240	86
17	214	60	800	360	37	26	33	30	40	35	25	19	37	29	45	36	148	58	560	190	670	244	185	66
18	270	95	980	340	35	30	34	30	40	35	21	18	36	30	51	35	172	63	410	165	657	300	160	60
19	260	81	1020	400	34	30	35	30	41	33	24	17	31	30	55	35	190	60	400	160	550	220	128	60
20	212	70	960	410	36	28	34	32	40	34	26	17	34	30	73	40	225	71	350	150	620	230	146	62
21	216	90	1100	375	31	26	35	33	39	33	26	15	35	30	70	35	328	89	340	150	570	240	120	55
22	252	90	1200	444	30	24	38	32	39	34	21	16	35	31	58	37	260	88	390	150	640	270	97	50
23	362	95	1150	320	26	22	37	33	38	34	20	16	35	32	58	40	310	90	290	135	650	290	100	50
24	--	--	1110	500	35	23	38	33	39	33	20	18	34	31	65	46	302	95	280	130	620	270	125	52
25	--	--	1200	480	30	21	40	34	39	33	20	18	37	33	78	46	388	95	440	125	660	240	128	51
26	360	126	1160	460	25	20	40	36	37	32	20	18	37	35	100	48	418	140	460	145	710	300	170	51
27	322	125	1100	460	24	21	42	36	37	31	20	18	40	36	99	49	370	140	420	170	660	270	175	65
28	422	143	1130	490	24	21	42	37	37	31	22	18	58	32	166	50	370	135	350	155	470	230	115	52
29	465	160	1400	400	--	--	42	38	37	31	22	19	58	32	100	54	480	140	460	160	470	220	86	51
30	555	190	1020	460	--	--	44	36	34	31	24	20	68	33	180	48	450	155	420	165	320	190	95	45
31	490	206	1000	430	--	--	44	36	--	--	25	21	--	--	177	55	460	160	--	--	310	140	--	--

[1]/Collection and analysis by Scott Paper Company

Table 17 - Chloride concentrations, Delaware River at Delaware Memorial Bridge, near Wilmington, Del.

Daily maximum and minimum chloride concentrations in milligrams per liter

December 1, 1980 to March 18, 1981

Day	December		January		February		March	
	Max	Min	Max	Min	Max	Min	Max	Min
1	1820	619	2250	946	2570	1430	450	*
2	1990	732	2370	918	2980	1570	693	31
3	1690	274	2150	771	2130	935	239	35
4	1010	411	2030	732	2030	884	428	35
5	1150	507	1850	681	1760	755	715	38
6	1400	619	2200	918	2010	800	552	35
7	1800	608	2240	991	1760	755	450	35
8	1960	631	2000	828	1870	743	946	42
9	2010	676	2130	912	1460	625	805	42
10	2060	653	2080	907	1410	574	800	42
11	1800	642	2050	991	1710	755	940	45
12	1760	648	1890	918	-	-	704	45
13	1620	636	2260	963	-	-	788	48
14	1560	614	2350	1170	-	-	546	42
15	1450	512	2290	1010	-	-	755	48
16	1610	608	2510	1240	-	-	614	55
17	1590	642	2430	1010	-	-	845	45
18	2110	698	2690	997	-	-	563	59
19	1730	603	2600	1240	-	-	-	-
20	1660	529	2650	1280	-	-	-	-
21	1650	552	2740	1320	-	-	-	-
22	1710	574	2820	1550	-	-	-	-
23	1830	625	2940	1510	-	-	-	-
24	1900	726	2970	1570	*	*	-	-
25	1240	411	2750	1420	35	31	-	-
26	1620	664	2640	1480	35	31	-	-
27	1590	738	2470	1390	97	31	-	-
28	1760	794	2480	1350	473	31	-	-
29	2010	800	2590	1440	-	-	-	-
30	2270	957	2420	1220	-	-	-	-
31	2150	923	2420	1200	-	-	-	-

* Less than 30 mg/L.

Table 18 - Chloride concentrations, Delaware River at Reedy Island Jetty, Del.

Daily maximum and minimum chloride concentrations in milligrams per liter

December 1, 1980 to November 30, 1981

Day	December		January		February		March		April		May		June		July		August		September		October		November	
	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	6780	4030	8500	5500	9900	6380	5160	1710	5550	2380	5500	1760	3360	783	4800	1660	6600	3160	–	–	6870	4090	5550	5280
2	7860	3980	9480	5980	9830	6600	5310	1860	5280	2760	5400	1690	3690	884	5090	1780	6380	3290	–	–	7270	4300	5280	5030
3	6450	2730	8450	5280	7600	5030	4520	1510	5220	2500	5940	1760	3600	952	5030	1730	–	–	–	–	7130	4200	5000	4560
4	4700	2450	7920	5160	8130	4700	5280	1240	4150	2480	5970	2070	3880	1020	5000	1860	5550	3440	–	–	7700	4090	6830	4330
5	6850	2390	7920	3640	6820	4380	5310	1820	4300	2130	6820	2070	3700	1020	4150	1680	6280	3510	–	–	8000	4090	6850	5280
6	8040	3670	9630	5600	8040	4380	5750	2030	3640	1850	5450	2030	3830	1220	4440	1610	6250	3190	–	–	8450	5120	7270	4700
7	8130	3700	9000	5600	6990	4440	4380	1790	4000	1660	4200	1970	3600	1220	4090	1620	5970	3050	–	–	7920	4380	5950	3620
8	7890	4030	8130	3080	7920	4700	5910	2010	4380	1680	5750	1850	3650	1170	3930	1580	5960	3590	–	–	7920	3900	6820	3050
9	7530	3980	8600	5830	6780	4150	5830	2070	4030	1540	4650	1970	3850	1400	4350	1620	5600	2670	–	–	9480	4650	6780	3650
10	7470	4030	8350	3640	5900	4030	5030	2170	3160	1360	4380	1960	3510	1050	5120	1720	5830	2660	–	–	9480	5160	6820	4060
11	6890	3700	9240	5830	7500	4380	4150	2070	3600	1430	4600	2170	3670	1160	5550	1850	6600	2590	–	–	9360	5400	6830	4300
12	6950	3880	7700	3360	4560	2940	4120	2000	3670	1270	3950	1610	4700	1220	6000	1960	6500	2800	–	–	9400	5310	6000	4090
13	6380	3640	8310	4700	4440	2350	3690	2000	3980	1610	3510	1030	5090	1380	6350	2430	6380	2800	–	–	8730	5450	8040	4090
14	6920	3090	8130	5400	4700	1710	3980	1520	–	–	2240	816	5030	1690	6280	2250	6500	2920	–	–	8400	5340	8350	4560
15	5930	3220	7700	5280	4120	1610	4650	1540	–	–	1850	659	4650	1660	6970	2320	6850	3050	–	–	8480	5500	9780	5090
16	7130	3510	8040	5370	4150	1450	4600	1440	2670	1040	1240	377	4700	1620	7400	2640	6800	3150	–	–	8870	5600	9040	4700
17	7130	3980	6920	5160	4030	1300	5950	1470	2520	985	1300	217	4480	1570	6940	2810	6450	3060	–	–	9040	5500	7800	4560
18	7970	3880	8130	4380	3650	1300	5220	1860	2600	929	1230	182	4440	1510	7130	2940	6380	3220	–	–	9120	5600	7750	4600
19	6600	3700	8450	4200	3690	1340	5600	1760	2940	805	1660	148	4800	1750	7400	3090	6820	3590	–	–	7430	5400	7270	4300
20	6780	3640	7920	5090	4150	1330	6250	2240	3510	861	1940	125	4380	1650	7000	3650	6600	3930	–	–	7800	4560	7600	6350
21	6920	3700	7970	5280	3690	1340	5930	2460	2630	850	2220	159	4200	1580	6380	2950	6280	4200	–	–	6900	3850	7470	6330
22	7130	3880	8040	5280	2900	760	5950	2520	3650	907	2360	217	4350	1520	5990	2810	–	–	–	–	7700	3930	6300	5600
23	7530	3930	7860	5400	2240	479	6780	2900	2900	884	2730	389	3880	1290	5960	2880	–	–	–	–	7430	4150	6830	5600
24	7920	4200	7800	5280	1660	400	6000	2800	3600	963	2850	377	4060	1290	5960	2850	–	–	–	–	7130	4150	7650	3800
25	5340	2450	7130	5340	884	344	5910	2760	3190	884	3080	490	4200	1340	5980	3110	–	–	–	–	7500	4380	7650	3830
26	8310	4030	7130	5340	2530	456	5940	2920	4120	1040	2660	501	3290	997	6380	3110	–	–	–	–	7860	4520	8090	4120
27	7470	4090	6890	4700	3940	1120	5920	2800	4520	1220	3050	546	4030	895	5990	3130	–	–	–	–	6970	4800	8220	4200
28	7920	4520	6950	4800	4520	2060	5310	2480	5060	1310	2870	693	4750	1020	6890	3040	–	–	–	–	6850	5960	7470	4150
29	9000	5220	7800	5220	–	–	5950	2840	5370	1710	3080	726	4750	1220	5910	3080	–	–	6950	4200	6250	5550	6820	3620
30	9240	5500	8130	5930	–	–	5220	2770	5090	1660	3600	783	5060	1410	6000	2940	–	–	6940	4060	5950	5900	6990	3650
31	9320	5600	8730	5400	–	–	5280	2390	–	–	3440	805	–	–	6900	3090	–	–	–	–	5920	5500	–	–

Table 19 - Dissolved oxygen, Delaware River at Benjamin Franklin Bridge at Philadelphia, Pa.

Daily mean dissolved oxygen in milligrams per liter

December 1, 1980 to November 30, 1981

Day	December Mean	January Mean	February Mean	March Mean	April Mean	May Mean	June Mean	July Mean	August Mean	September Mean	October Mean	November Mean
1	8.1	-	4.7	11.2	5.3	3.1	1.5	1.3	1.5	0.6	1.6	4.6
2	7.7	-	5.5	11.1	4.7	3.2	1.1	1.0	1.5	.6	.8	4.7
3	8.3	-	6.9	11.0	4.7	4.2	.9	.9	1.3	.7	1.4	4.6
4	8.8	-	8.2	10.8	5.2	4.6	.9	.9	1.0	.6	1.8	4.3
5	8.4	-	9.3	10.4	5.6	4.3	.8	1.1	.9	.6	2.0	4.0
6	7.9	-	9.5	10.0	5.8	3.9	.8	1.5	.9	.7	1.7	3.5
7	7.7	-	9.8	10.1	5.8	3.6	.9	1.6	.9	.9	1.8	-
8	7.4	-	9.6	10.1	5.2	3.7	1.0	1.8	1.1	1.3	2.7	-
9	7.2	-	10.0	10.0	4.6	3.7	1.0	2.0	1.1	1.1	2.6	-
10	6.7	-	10.3	10.0	3.9	4.0	.8	1.8	1.1	1.3	2.6	4.9
11	6.5	-	-	9.9	3.3	3.8	.9	1.3	1.1	1.6	2.5	4.6
12	6.4	-	12.1	9.7	3.1	4.1	.9	1.0	.8	1.7	2.5	4.7
13	6.4	7.3	12.8	9.5	3.5	5.3	.9	.9	.7	1.9	2.4	4.6
14	6.5	6.7	12.6	9.6	3.5	6.3	1.0	.9	.7	2.1	2.2	4.5
15	7.0	6.4	12.6	9.8	5.0	6.7	1.0	1.0	.9	1.8	2.0	4.8
16	6.6	6.0	12.7	9.6	5.5	6.7	1.0	.9	1.2	-	1.8	4.8
17	6.2	6.0	12.8	9.4	-	7.2	1.2	.8	1.9	-	2.0	4.8
18	6.1	6.1	12.8	9.0	-	6.8	1.6	.9	2.3	-	2.2	4.9
19	6.2	6.0	12.6	8.5	-	6.6	1.7	1.0	2.3	-	2.3	5.2
20	6.4	5.9	12.4	8.0	-	6.4	1.7	1.1	2.5	-	2.8	4.9
21	6.4	5.5	12.3	7.8	-	6.0	1.9	.9	2.4	-	-	5.0
22	6.5	5.2	12.3	7.7	-	5.6	2.9	.8	1.9	-	-	5.8
23	6.4	5.1	11.9	7.5	4.2	5.3	3.3	1.0	1.6	-	-	6.0
24	6.1	5.0	11.8	7.1	3.4	5.0	3.6	1.1	1.4	-	-	5.8
25	-	4.9	11.9	6.7	3.5	5.2	3.2	1.0	1.2	-	-	5.8
26	-	4.8	11.7	6.3	3.7	5.0	2.6	1.1	1.1	-	-	5.7
27	-	4.7	11.4	6.2	4.0	4.4	2.7	1.3	1.1	-	-	5.4
28	-	4.5	11.1	6.1	3.9	3.8	2.6	1.2	1.1	-	2.3	5.8
29	-	4.4	-	5.9	3.5	2.8	2.2	1.2	.9	3.3	2.9	6.3
30	-	4.7	-	6.1	3.3	2.0	1.6	1.5	.9	2.7	3.4	6.5
31	-	4.8	-	5.5	-	1.7	-	1.5	.7	-	4.2	-

Table 20 - Dissolved oxygen, Delaware River at Chester, Pa.

Daily mean dissolved oxygen in milligrams per liter

April 23, 1981 to November 30, 1981

Day	April	May	June	July	August	September	October	November
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
1	-	4.7	2.6	-	3.1	3.4	4.6	3.4
2	-	4.4	2.6	-	3.1	3.6	4.5	3.3
3	-	4.4	2.5	-	3.1	3.8	4.6	3.2
4	-	4.6	2.7	-	3.1	3.9	4.7	3.1
5	-	4.4	2.6	-	3.2	3.8	4.8	2.8
6	-	4.9	1.8	-	3.3	3.8	4.7	2.9
7	-	5.4	2.1	2.2	3.3	-	4.6	3.5
8	-	5.5	2.2	2.0	3.4	-	-	3.7
9	-	5.8	3.8	1.9	3.1	-	-	3.7
10	-	6.2	4.0	1.9	2.9	-	-	3.6
11	-	5.2	3.8	2.3	2.8	-	-	3.7
12	-	5.0	3.4	2.5	2.6	-	-	3.5
13	-	5.0	3.6	2.9	2.5	-	-	3.7
14	-	5.0	3.7	3.1	2.5	-	-	3.7
15	-	5.2	4.0	3.3	2.9	3.3	3.3	3.8
16	-	5.7	3.6	3.4	3.0	3.3	3.3	3.8
17	-	5.1	3.3	3.1	2.8	3.2	4.1	3.8
18	-	5.5	3.4	3.3	3.1	3.3	4.2	3.7
19	-	5.9	3.7	3.2	3.3	3.2	4.3	3.7
20	-	5.9	3.8	3.0	3.6	3.8	4.3	3.6
21	-	5.6	3.8	3.2	3.9	3.8	4.4	3.6
22	-	5.4	4.3	3.0	3.6	3.8	4.4	3.7
23	5.6	5.2	4.9	2.5	3.6	3.8	4.3	3.7
24	5.5	4.9	4.9	2.6	3.7	4.3	4.3	3.7
25	5.8	4.6	4.6	2.9	3.7	4.6	4.3	3.7
26	5.7	4.2	4.6	2.9	3.7	4.6	4.3	3.7
27	5.3	4.2	3.7	2.9	3.7	4.6	4.1	3.7
28	5.0	4.3	-	2.7	3.7	4.4	3.9	3.7
29	5.1	4.0	-	3.0	3.8	4.6	3.6	3.8
30	5.0	3.1	-	3.3	3.7	4.6	3.6	3.8
31	-	2.7	-	3.3	3.4	-	3.6	-

FIGURE 6.--Mean monthly temperatures of Delaware River at Benjamin Franklin Bridge, Philadelphia, Pa.

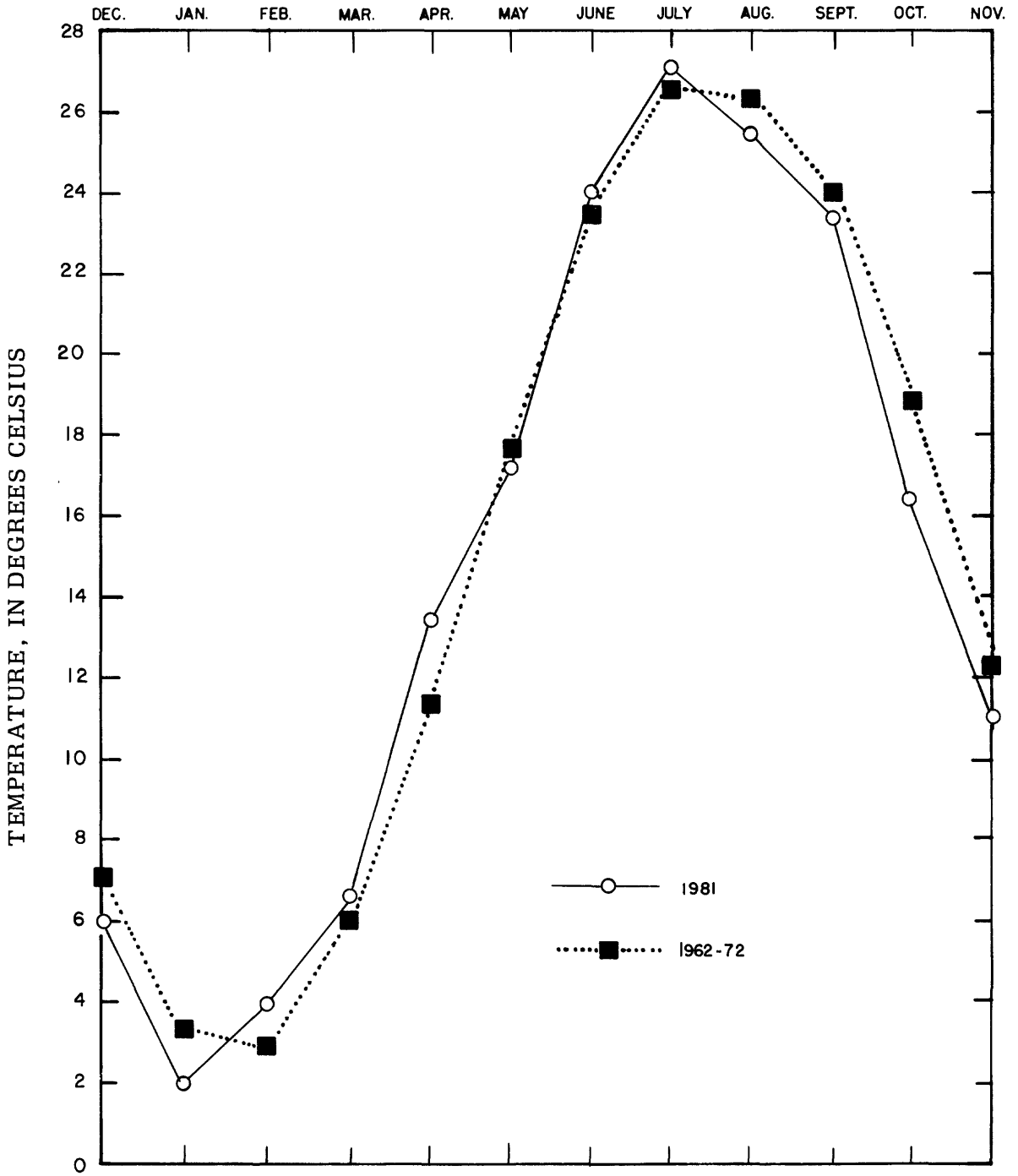
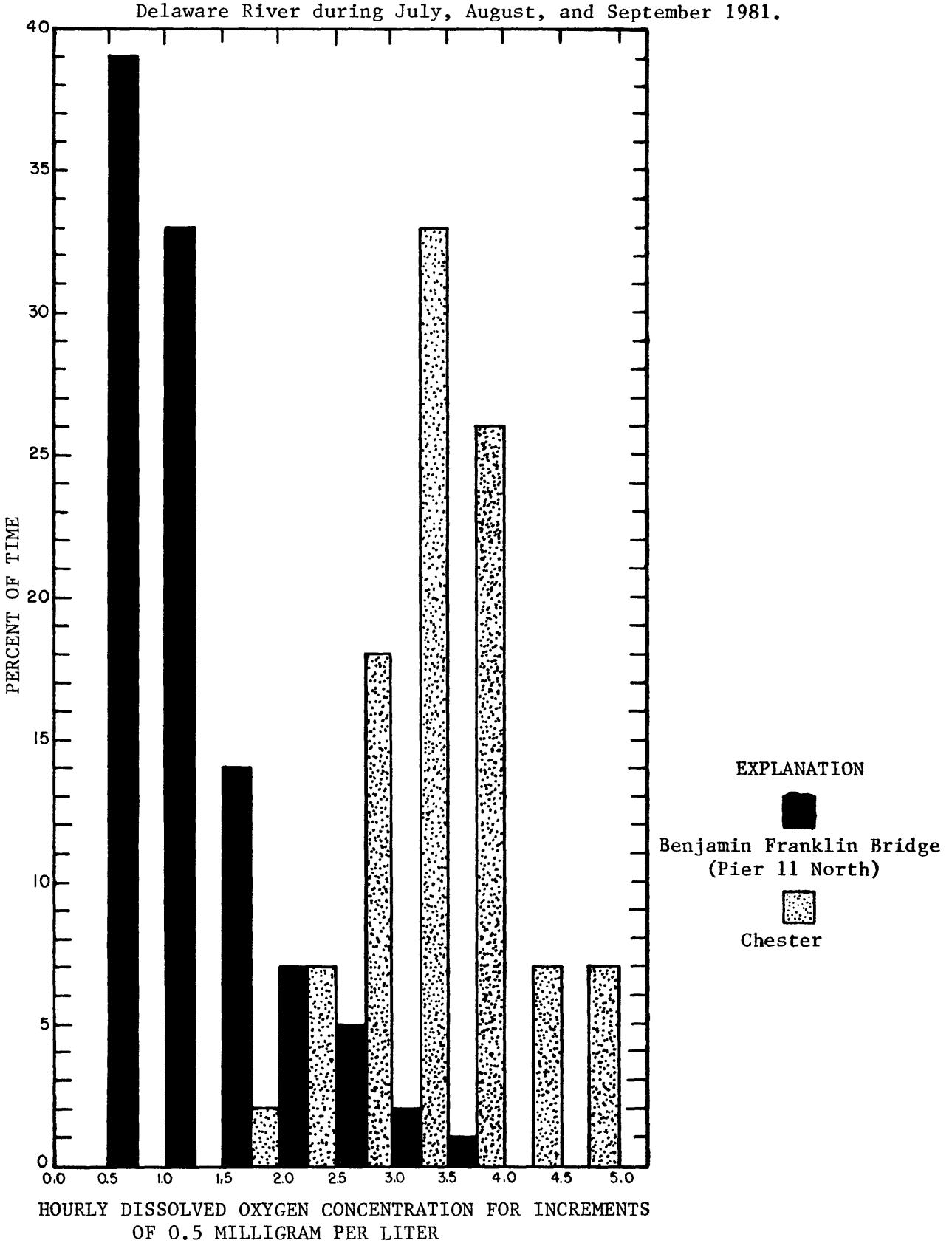


FIGURE 7.--Frequency of dissolved oxygen concentrations at two stations in the Delaware River during July, August, and September 1981.



Appendix

A. RIVER MASTER CORRESPONDENCE

B. DELAWARE RIVER BASIN COMMISSION RESOLUTIONS

United States Department of the Interior

GEOLOGICAL SURVEY

OFFICE OF THE DELAWARE RIVER MASTER

Mail Stop 433, Reston, Va. 22092

December 29, 1980

Members of the Delaware River Master Advisory Committee:

Dr. Robert R. Jordan, Director and State Geologist
Delaware Geological Survey

Mr. Dirk Hofman, Deputy Director, Division of Water Resources
New Jersey Department of Environmental Protection

Mr. Edward A. Karath, Chief, Bureau of Water Resources
New York Department of Enviromental Conservation

Mr. Francis X. McArdle, Commissioner
New York City Department of Environmental Protection

Mr. R. Timothy Weston, Associate Deputy Secretary
Pennsylvania Department of Environmental Resources

Dear Sirs:

On October 17, 1980, the Delaware River Basin Commission, with the consent of all parties to the 1954 Amended Decree of the Supreme Court of the United States, passed Resolution 80-20. The Resolution called for certain reductions in New York City Diversions and in design flows for Montague. This office agreed with the necessity for these conservation measures and placed them in effect immediately.

By early November, the continued decline in reservoir storage caused this office to issue on November 12 a proposal that New York City diversions be further reduced to 600 mgd, that the design flow for Montague be reduced to 1500 cfs, and that total diversions by New Jersey be maintained at not more than 65 mgd.

On November 19 the parties agreed to a diversion rate of 580 mgd to be reduced to 560 mgd on December 20, a Montague design flow of 1560 cfs to be reduced to 1550 cfs on December 20, and a continuation of the 65 mgd limit on New Jersey diversions. DRBC incorporated these figures in Resolution 80-24 and this office immediately issued the implementing directives.

Reservoir storage reached a low point on November 24 but then increased until about December 20 when lack of precipitation and directed releases for Montague began to take effect. Storage was at 33.2 percent of capacity December 28 compared to 34.4 percent on December 19.

In view of the decline in reservoir contents and a continuing unfavorable outlook for normal or greater precipitation along with projected minimal power releases, it is recommended that consideration be given to further reductions in the draft on the New York City reservoirs.

If conditions do not show any improvement by the first of the year, it is thought that a meeting with the Basin Commission should be arranged without delay to consider additional conservation measures. I suggest Tuesday, January 6 as a possible meeting date and I would be willing to arrange the meeting here but am agreeable to any reasonable location.

Comments from all recipients of this letter are invited.

Sincerely yours,

Francis T. Schaefer
Delaware River Master

Copy to: Chief Hydrologist
Deputy Delaware River Master
Thomas P. Eichler
Gerald M. Hansler
Steven J. Picco
Eldred Rich
Sherman W. Tribbitt

United States Department of the Interior

GEOLOGICAL SURVEY

OFFICE OF THE DELAWARE RIVER MASTER

Mail Stop 433, Reston, Va. 22092

May 18, 1981

Gerald M. Hansler, Executive Director,
Delaware River Basin Commission

Dr. Robert R. Jordan, Director and State Geologist
Delaware Geological Survey

Steven J. Picco, Assistant Commissioner,
New Jersey Department of Environmental
Protection

Mr. Edward A. Karath, Chief, Bureau of Water Resources
New York Department of Environmental Conservation

Mr. Francis X. McArdle, Commissioner
New York City Department of Environmental Protection

Mr. R. Timothy Weston, Associate Deputy Secretary
Pennsylvania Department of Environmental Resources

Dear Sirs:

In accordance with paragraph 6.(d) of DRBC Resolution 81-2 adopted January 15, 1981, you are hereby advised that on May 17 storage in Pepacton, Cannonsville and Neversink Reservoirs had remained more than 15 billion gallons above the drought warning rule curve for five consecutive days.

Effective immediately, therefore, the provisions of the 1954 United States Supreme Court decree will be followed. The city of New York may increase its diversions to 800 million gallons per day and the flow objective at Montague will be 1750 cubic feet per second. In the event that additional rains should result in spill possibilities at any of the reservoirs, diversions in excess of 800 million gallons per day will be considered.

Francis T. Schaefer

Francis T. Schaefer
Delaware River Master

Copies to: Thomas P. Eichler
Dirk Hofman
Russell C. Mt. Pleasant
George Mekenian
Robert E. Fish
Philip Cohen

DELAWARE RIVER BASIN COMMISSION
P.O. BOX 7360
WEST TRENTON, NEW JERSEY 08628

(609) 883-9500

GERALD M. HANSLER
EXECUTIVE DIRECTOR

HEADQUARTERS LOCATION
25 STATE POLICE DRIVE
WEST TRENTON, N.J.

May 27, 1981

Francis T. Schaefer,
Delaware River Master
National Center, M.S. No. 433
12201 Sunrise Valley Drive
Reston, Virginia 22092

Dear Mr. Schaefer:

As you know the Delaware River Basin Commission declared a drought emergency on January 15, 1981, pursuant to Resolution 81-1. That emergency declaration is still in effect.

It is very much to the interest of all parties to the U. S. Supreme Court Decree of 1954 that maximum effort be made to conserve reservoir storage until such time as normal conditions are re-established. Accordingly, you are hereby requested not to implement the excess release requirements set forth in Section IIIB1 of the Decree until such time as the drought emergency has been terminated.

State of New Jersey

State of New York

State of Delaware

Commonwealth of Pennsylvania

City of New York

United States Department of the Interior

GEOLOGICAL SURVEY

OFFICE OF THE DELAWARE RIVER MASTER

Mail Stop 433, Reston, Va. 22092

June 1, 1981

Mr. Thomas P. Eichler, Commissioner
Delaware Department of Natural Resources
and Environmental Control

Mr. Steven J. Picco, Assistant Commissioner,
New Jersey Department of Environmental Protection

Mr. Russell C. Mt. Pleasant, Associate Director,
Division of Water, New York Department of
Environmental Conservation

Mr. Francis X. McArdle, Commissioner
New York City Department of Environmental Protection

Mr. R. Timothy Weston, Associate Deputy Secretary
Pennsylvania Department of Environmental Resources

Dear Sirs:

Your letter dated May 27, 1981, requesting a continuation of reservoir storage conservation efforts is acknowledged.

This office agrees that continued conservation measures are still of the utmost importance and will continue to be so until such time as water supply conditions are more favorable.

In view of the unanimous consent evidenced by your letter, this office will hold in abeyance the activation of the requirement of paragraph III. B.1.(d) of the U. S. Supreme Court decree of 1954. If at any time it appears that a change is in order, you will be consulted.

Sincerely yours,

s/Francis T. Schaefer
Francis T. Schaefer
Delaware River Master

Copies to: Gerald M. Hansler
Robert R. Jordan
Dirk Hofman
George Mekenian
Robert E. Fish
Philip Cohen
U. S. Commissioner, DRBC

FTSchaefer/pb

NO. 81-1

EMERGENCY RESOLUTION

A RESOLUTION to declare a state of emergency in the water supplies of the Delaware River Basin.

WHEREAS, reservoir storage, streamflow and ground water levels throughout many areas of the Delaware River Basin are below normal and indicate the progressive development of severe drought conditions; and

WHEREAS, in October 1980, the Commission, acting under Section 3.3(a) of the Compact, and with unanimous consent of all parties to the U.S. Supreme Court decree of 1954, temporarily modified the diversions and releases from the New York City-Delaware River Basin reservoirs in order to conserve available storage, and further modification in such diversions and releases were made by the Commission in November of 1980; and

WHEREAS, Section 10.4 of the Delaware River Basin Compact provides that in the event of a drought which may cause an actual or immediate shortage of available water supply within the basin, the Commission may determine and delineate the area of shortage and declare a water supply emergency therein; and

WHEREAS, a public hearing was held by the Commission on December 1, 1980 to permit members of the general public and representatives of the signatory parties to comment on current drought conditions and make recommendations concerning possible Commission action as required under Section 10.4 of the Compact; now therefore,

BE IT RESOLVED by the Delaware River Basin Commission:

1. Findings of Fact. The Commission hereby finds and determines as follows:

(a) The precipitation deficit in the Delaware Basin since May 1, 1980 is more than 30 percent.

(b) Combined storage in the New York City upper Delaware reservoirs is approximately 31 percent of capacity, and has a 20 percent chance of refilling by June 1, 1981.

(c) The Blue Marsh and Beltzville reservoirs of the U. S. Army Corps of Engineers are currently at 78 and 38 percent of capacity, respectively.

(d) Flows in the Delaware River at Trenton averaged 2970 cfs during September, 3510 cfs during October, 3974 cfs during November, and 3788 cfs during December. These flows compare to long-term average flows for the same months, of 4130 cfs, 4020 cfs, 9020 cfs and 10,800 cfs, respectively.

(e) Location of the 250 milligrams per liter chloride front in the Delaware estuary has in recent months ranged from above Eddystone, Pennsylvania (River Mile 85) to the Walt Whitman Bridge (River Mile 96.5), in response to reduced freshwater inflow. These movements are approximately 20 miles farther upstream than those experienced during normal years.

(f) Wells supplying the City of Camden and other municipal and industrial users in southern New Jersey, southeastern Pennsylvania and northern Delaware are partially recharged by Delaware River water, and excessive concentration of chloride in the river presents a substantial risk of salt water intrusion of the underground aquifer.

2. Declaration of Emergency. By virtue of the powers vested in the Commission by Section 3.3(a) and Section 10.4 of the Compact to declare a water supply emergency, and in view of the foregoing findings and determinations:

(a) A state of emergency in the water supplies of the Delaware River Basin is hereby declared.

(b) For the purposes of further delineation of the area of emergency, and further reference thereto in conservation orders of the Commission to be issued hereunder, the Delaware River Basin is divided into twelve sub-basins as shown on the map Figure 1-3 of the Commission report, Water Management of the Delaware River Basin, April 1975.

3. Delaware River Master. The Delaware River Master is requested to cooperate in the administration of this resolution, and conservation orders issued hereunder, together with such parts of the U. S. Supreme Court decree of 1954 as are not inconsistent herewith.

4. Sanctions; Civil and Criminal.

(a) Any person, association, corporation, public or private entity who or which violates or attempts or conspires to violate any provision of this resolution, or any conservation order, regulation or permit issued in furtherance thereof, shall be punishable as provided in Section 14.17 of the Compact.

(b) General Counsel of the Commission may, in his discretion, request the appropriate law enforcement officers of the signatory parties to prosecute any or all violations of this resolution in accordance with the Compact and the laws of the respective signatory parties, and for recovery of the fines fixed by Section 14.17 of the Compact, in the name and on behalf of the Commission. Pursuant

to the applicable provisions of the Compact, including but not limited to, Sections 1.5, 3.9 and 11.5, each of the signatory parties and their respective law enforcement officers are hereby requested to provide such technical, professional and administrative services as may be required for such enforcement.

(c) In addition to such penal sanctions as may be imposed pursuant to the Compact, any violation of this resolution shall also be subject to all other civil remedies, including injunction, as may be provided by law.

5. Inspections. The Executive Director is authorized to designate investigators pursuant to Section 14.2(b) of the Compact for the purposes of inspecting public and private facilities for water use and conservation, and enforcing compliance with this resolution and conservation orders of the Commission approved hereunder.

6. Duration. This resolution shall take effect immediately and shall remain in full force and effect until such time as the Commission determines that the state of emergency no longer exists.

s/Brendan T. Byrne
Brendan T. Byrne, Chairman

s/W. Brinton Whitall
W. Brinton Whitall, Secretary

Adopted: January 15, 1981

NO. 81-2

CONSERVATION ORDER NUMBER 1

A RESOLUTION implementing Emergency Resolution Number 81-1 and to temporarily modify the diversions and release rights of the parties to the decree in New Jersey v. New York, 347 U. S. 995 (1954).

WHEREAS, the U. S. Supreme Court in New Jersey v. New York, 347 U.S. 995 (1954) authorized the City of New York to withdraw 800 million gallons per day of water from the Delaware River Basin and directed that it make compensating downstream releases as necessary to maintain a minimum flow at Montague, New Jersey, of 1750 cfs; and

WHEREAS, the Commission, under Section 3.3(a) of the Compact, has temporarily modified the diversion and release rights of the parties to the U.S. Supreme Court decree in Resolutions No. 80-20, No. 80-24 and No. 80-28, adopted in October, November and December of 1980, respectively; and these actions have been consented to by all of the parties to the U. S. Supreme Court decree; and

WHEREAS, the Commission has consulted with the River Master and held a public hearing in Philadelphia on December 1, 1980 at which the parties to the U. S. Supreme Court decree and the general public were afforded an opportunity to be heard; now therefore,

BE IT RESOLVED by the Delaware River Basin Commission:

1. Modification of Diversions and Releases Under the U. S. Supreme Court decree.

Pursuant to such authority as is provided in Section 3.3(a) and Article 10 of the Delaware River Basin Compact, and in furtherance of the

purposes of Emergency Resolution Number 81-1, the diversion and release rights of the parties to the decree in New Jersey v. New York, 347 U. S. 995 (1954) are temporarily modified according to the following schedules:

(a) Diversions by the City of New York from its Delaware Basin reservoirs shall not exceed 520 million gallons per day.

(b) Diversions by the State of New Jersey through the Delaware and Raritan Canal and from all other Delaware Basin sources, shall not exceed a combined average of 62 million gallons per day.

(c) Whenever salinity conditions in the Delaware estuary are such that the 250 mg/l chloride line is downstream from River Mile 82.9, releases by the City of New York to the Delaware River shall be in such amounts as are required to sustain a flow at Montague, New Jersey, of not less than 1100 cubic feet per second.

(d) Whenever salinity conditions in the Delaware estuary are such that the 250 mg/l chloride line is upstream from River Mile 92.5, the City of New York shall release to the Delaware River such amounts as are required to sustain a flow at Montague, New Jersey, of not less than 1600 cubic feet per second: provided, however, that such flow at Montague, New Jersey, shall be not less than than 1650 cubic feet per second should such salinity conditions occur in the period between May 1 and November 30.

(e) Whenever salinity conditions in the Delaware estuary are such that the 250 mg/l chloride line is above River Mile 82.9 and below River Mile 92.5, the City of New York shall release to the

Delaware River such amounts as are required to sustain the following flow at Montague, New Jersey:

Period	Flow (cfs)
December 1 through April 30	1350
May 1 through August 31	1600
September 1 through November 30	1500

(f) The River Master is hereby requested to direct releases from the New York City-Delaware Basin reservoirs in such amounts as in his judgment will result in the flow levels required by this section of this resolution.

2. Releases From Lower Basin Reservoirs

Releases from the Beltzville, Blue Marsh, Francis E. Walter and Nockamixon reservoirs shall be made as required to maintain minimum flows in the Delaware River. Such releases shall be in accordance with the following schedule:

(a) Whenever salinity conditions in the estuary are such that the 250 mg/l chloride line is downstream from River Mile 87, the minimum flow objective in the Delaware River at Trenton, New Jersey, shall be 2500 cubic feet per second.

(b) Whenever salinity conditions in the estuary are such that the 250 mg/l chloride line is upstream from River Mile 87 and below River Mile 92.5, the minimum flow objective in the Delaware River at Trenton, New Jersey, shall be 2700 cubic feet per second.

(c) Whenever salinity conditions in the estuary are such that the 250 mg/l chloride line is upstream from River Mile 92.5, the minimum flow objective in the Delaware River at Trenton, New Jersey,

shall be as follows:

Period	Flow (cfs)
December 1 to April 30	2700
May 1 to August 31	2900
September 1 to November 30	2900

3. Monitoring and Technical Measurements

(a) The Executive Director, in consultation with the parties, shall provide for the monitoring of salinity conditions in the Delaware estuary and the Raritan-Magothy aquifer in such locations as shall be necessary to determine river conditions and the impact of diversions and releases on salinity levels in the river and the well fields.

(b) For the purposes of this resolution, salinity shall be measured on the basis of a seven-day running average of the location of the 250 mg/l isochlor. River flow measurements at Montague and Trenton shall be based upon the mean daily flow.

4. Plan Objective and Review

The objective of the diversions, releases and streamflows provided for in this resolution is to increase, by June 1, 1981, the combined storage in the New York City-Delaware Basin reservoirs to a level within the drought warning sector of the operation curves set forth in Appendix A hereof. The Commission will, in consultation with the parties, reassess conditions on or about June 1, 1981, and will, in light of such conditions, determine whether the schedules provided for herein shall remain in effect.

5. Implementation

The Executive Director is hereby directed to implement the provisions

of this resolution and shall notify the River Master of the Commission action taken hereunder.

6. Effective Date and Duration

(a) This resolution shall take effect immediately, and shall remain in effect until January 31, 1982.

(b) On and after June 1, 1981, continued operation pursuant to the schedules set forth in this resolution is conditioned upon the combined storage in the New York City-Delaware River Basin reservoirs recovering to and remaining in the drought warning sector of the drought warning curves set forth in Appendix A.

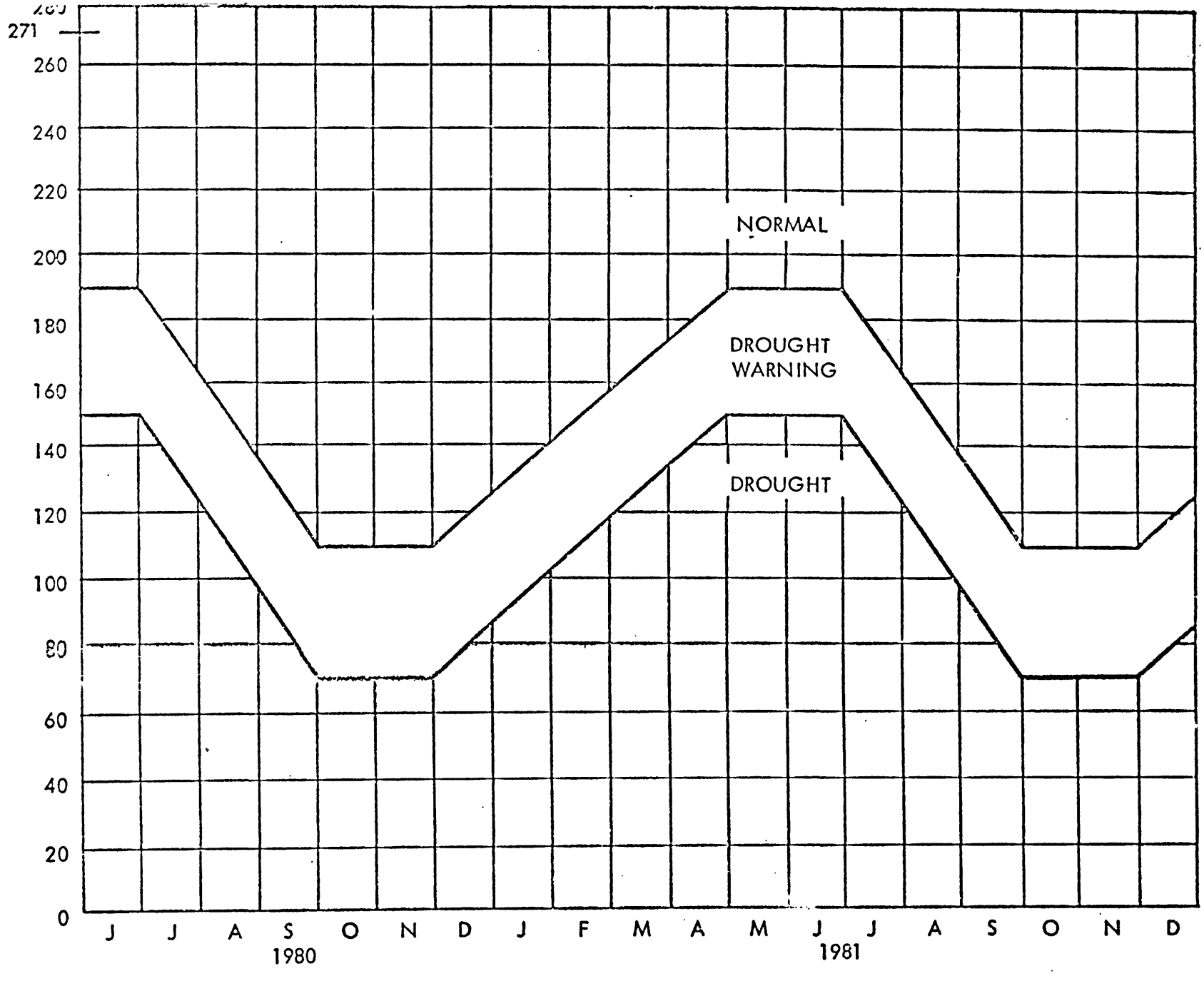
(c) If, on or after June 1, 1981, the combined storage in the New York City-Delaware River Basin reservoirs falls below the drought warning sector of the operation curves set forth in Appendix A for five or more consecutive days, the Commission shall immediately meet for the purpose of reconsidering the operating schedules, and shall, in consultation with the parties, either reconfirm or modify the schedules as appropriate.

(d) If at any time the combined storage in the New York City-Delaware River Basin reservoirs, including the runoff portion of accumulated snow and ice, reaches and maintains a level of 15 billion gallons above the drought warning sector of the operation curves set forth in Appendix A for five or more consecutive days, the River Master shall notify the Commission and all parties, and all provisions of the 1954 U. S. Supreme Court decree shall be reinstated to full force and effect.

s/Brendan T. Byrne
Brendan T. Byrne, Chairman

s/W. Brinton Whitall
W. Brinton Whitall, Secretary

Adopted: January 15, 1981



OPERATING CURVES FOR CANNONVILLE, PEPACTON AND NEVERSINK RESERVOIRS