

FLOOD OF AUGUST 31 - SEPTEMBER 1, 1978,  
IN CROSSWICKS CREEK BASIN AND VICINITY,  
CENTRAL NEW JERSEY

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U.S. GEOLOGICAL SURVEY

Water-Resources Investigations 80-115

PREPARED IN COOPERATION WITH THE  
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION,  
DIVISION OF WATER RESOURCES



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December 1980

UNITED STATES DEPARTMENT OF THE INTERIOR

CECIL D. ANDRUS, Secretary

GEOLOGICAL SURVEY

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## CONTENTS

	Page
Hydrologic terms.....	IV
Factors for converting inch-pound units to metric units....	VI
Abstract.....	1
Introduction.....	2
Acknowledgments.....	2
Precipitation.....	2
Description of flood.....	5
Site description data.....	9
Flood-crest elevations.....	17
Flood damage.....	17
Summary.....	19
References cited.....	19
Selected flood reports.....	20

## ILLUSTRATIONS

Figure 1.--Location map of flood area, August 31- September 1, 1978.....	3
2.--Map showing stream-gaging and precipitation stations, August 31-September 1, 1978.....	4
3.--Elevation of Crosswicks Creek, August 28, 1971 and August 31-September 1, 1978.....	6

## TABLES

Table 1.--Precipitation at selected stations, August 31- September 1, 1978.....	5
2.--Summary of flood stages and discharges in Central New Jersey, August 31-September 1, 1978.....	8
3.--Flood-crest data for selected sites in Crosswicks Creek basin.....	18

## EXPLANATION OF COMMONLY USED HYDROLOGIC TERMS

Annual probability of exceedence - Probability that a random event will on the average exceed a specified magnitude annually.

Contents - the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

Crest-stage station - a particular site where only information on crest stage and peak discharge are collected systematically.

Cubic feet per second per square mile  $[(ft^3/s)/mi^2]$  - the average number of cubic feet of water flowing per second from each square mile of area drained, assuming that the runoff is distributed uniformly in time and area.

Cubic foot per second  $(ft^3/s)$  - the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second, and equivalent to 7.48 gallons per second or 448.8 gallons per minute.

Discharge - the volume of water that passes a given point within a given period of time.

Drainage area - The drainage area of a stream at a specific location is that area, measured in a horizontal plane, which is enclosed by a drainage divide. Figures of drainage area given herein include all closed basins, or noncontributing areas, within the area, unless otherwise noted.

Drainage basin - a part of the surface of the earth that is occupied by a drainage system, which consists of a stream or body of impounded surface water, together with all tributary streams and bodies of impounded surface water.

Gage-height (GH) - the water-surface elevation referred to some arbitrary gage datum. Gage height is often used interchangeably with the more general term "Stage", although gage height is more appropriate, when used with a reading on a gage.

Gaging station - a particular site on a stream, canal, lake, and reservoir where systematic observations of gage height or discharge are obtained. When used in connection with a discharge record, the term is applied only to those gaging stations where a continuous record of discharge is obtained.

Partial-record station - a particular site where only a few streamflow data are collected systematically over a period of years for use in hydrologic analyses.

Recurrence interval (return period, exceedence interval) - the average time interval between actual occurrences of a hydrologic event of a given or greater magnitude.

National Geodetic Vertical Datum of 1929 (NGVD) - a geodetic datum derived from a general adjustment of the first order level nets of both the United States and Canada. It was formerly called "Sea Level Datum of 1929," or "mean sea level" in reports of the U.S. Geological Survey. Although the datum was derived from the average sea level over a period of many years at 26 tide stations along the Atlantic, Gulf of Mexico, and Pacific Coasts, it does not necessarily represent local mean sea level at any particular place.

## FACTORS FOR CONVERTING INCH-POUND UNITS TO METRIC UNITS

For those readers who may prefer to use metric units rather than inch-pound units, the conversion factors for the terms used in this report are listed below:

<u>Multiply inch-pound unit</u>	<u>By</u>	<u>To obtain metric unit</u>
cubic feet per second (ft <sup>3</sup> /s)	0.02832	cubic meters per second (m <sup>3</sup> /s)
cubic feet per second per square mile (ft <sup>3</sup> /s)/mi <sup>2</sup>	0.01093	cubic meters per second per square kilometer (m <sup>3</sup> /s)/km <sup>2</sup>
feet (ft)	0.3048	meters (m)
feet per second (ft/s)	0.3048	meters per second (m/s)
inches (in)	25.40	millimeters (mm)
miles (mi)	1.609	kilometers (km)
square feet (ft <sup>2</sup> )	0.0929	square meters (m <sup>2</sup> )
square miles (mi <sup>2</sup> )	2.590	square kilometers (km <sup>2</sup> )



FLOOD OF AUGUST 31-SEPTEMBER 1, 1978 IN CROSSWICKS  
CREEK BASIN AND VICINITY, CENTRAL NEW JERSEY

By Arthur A. Vickers

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ABSTRACT

A thunderstorm during the evening of August 31, 1978, caused flooding in a small area of Southcentral New Jersey. Maximum peaks of record occurred on the upper Crosswicks Creek basin in the vicinity of Fort Dix, Wrightstown, and New Egypt. At New Egypt, high water crest elevations for Crosswicks Creek were approximately 4 feet higher than the previous maximum recorded on August 28, 1971. Total damages were in excess of 2 million dollars, with 70 houses and 14 businesses affected.

## INTRODUCTION

Severe flash flooding occurred over a small region of Monmouth, Burlington, and Ocean Counties, New Jersey, during the evening of August 31 and the morning of September 1, 1978. (See fig. 1). A small intense storm cell was stalled over this area on the evening of August 31 for about 6 hours before moving eastward. Extensive damage was reported in New Egypt, Ocean County, as Crosswicks Creek and Oakford Lake flooded.

Meteorologic and hydrologic data collected during this storm are recorded in this report.

This study is limited to Crosswicks Creek and adjoining basins, as heavy rains occurred only over the New Egypt, Wrightstown, and Fort Dix areas. Weather stations close to this region reported no rainfall or only moderate rainfall. Less than 1.5 inches of precipitation was reported within 5-10 mi of the storm's center. (See fig. 2, p. 4.)

## ACKNOWLEDGMENTS

This report was prepared by the U.S. Geological Survey in cooperation with the New Jersey Department of Environmental Protection, Division of Water Resources. Valuable assistance was received from the Burlington County Times and personnel at Fort Dix and McGuire Air Force Base. The National Oceanic and Atmospheric Administration (National Weather Service) furnished precipitation and radarscope data.

## PRECIPITATION

The National Weather Service's (NWS) radar sites at Atlantic City, N.J., and Long Island, N.Y., noted a small intense weather cell over the New Egypt-Fort Dix area from about 4 to 10 p.m. on August 31, 1978. Clouds reached an altitude of 35,000 ft. The Fort Dix Fire Tower reported rainfall in excess of 9 inches. McGuire Air Force Base reported 7.40 inches on August 31, with 2.47 inches recorded between 8 and 9 p.m. The locations of these and other stations are shown on figure 2. One inch of rain fell in this area within a 20-minute period. At approximately 4:30 p.m., 0.5-inch hailstones fell. This intense storm affected an area less than 35 mi<sup>2</sup>. Unless otherwise noted, precipitation data in table 1 was furnished by the National Oceanic and Atmospheric Administration, Environmental Data and Information Service.

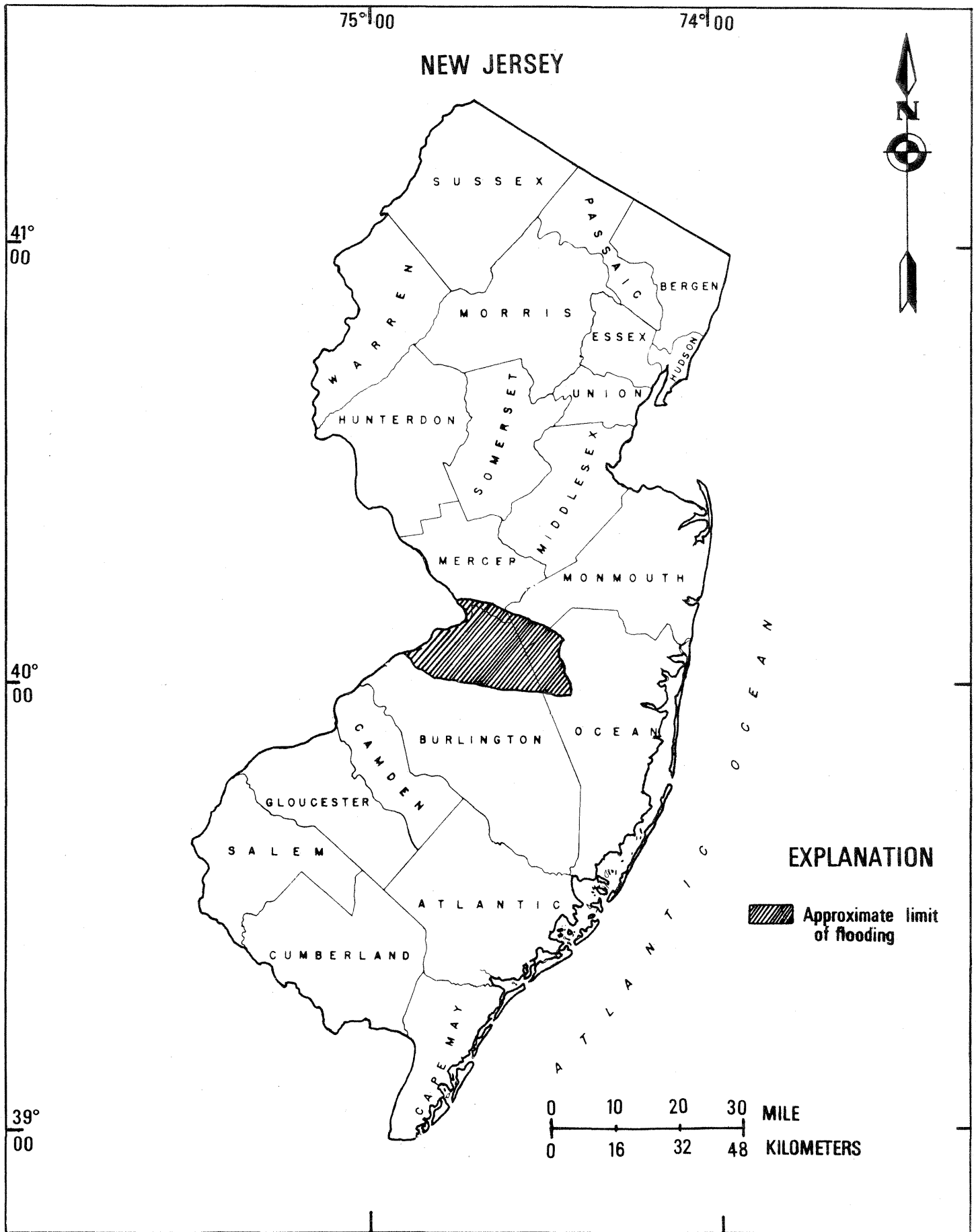


FIGURE 1. -- Location map showing area of flooding on August 31-September 1, 1978, in Central New Jersey.

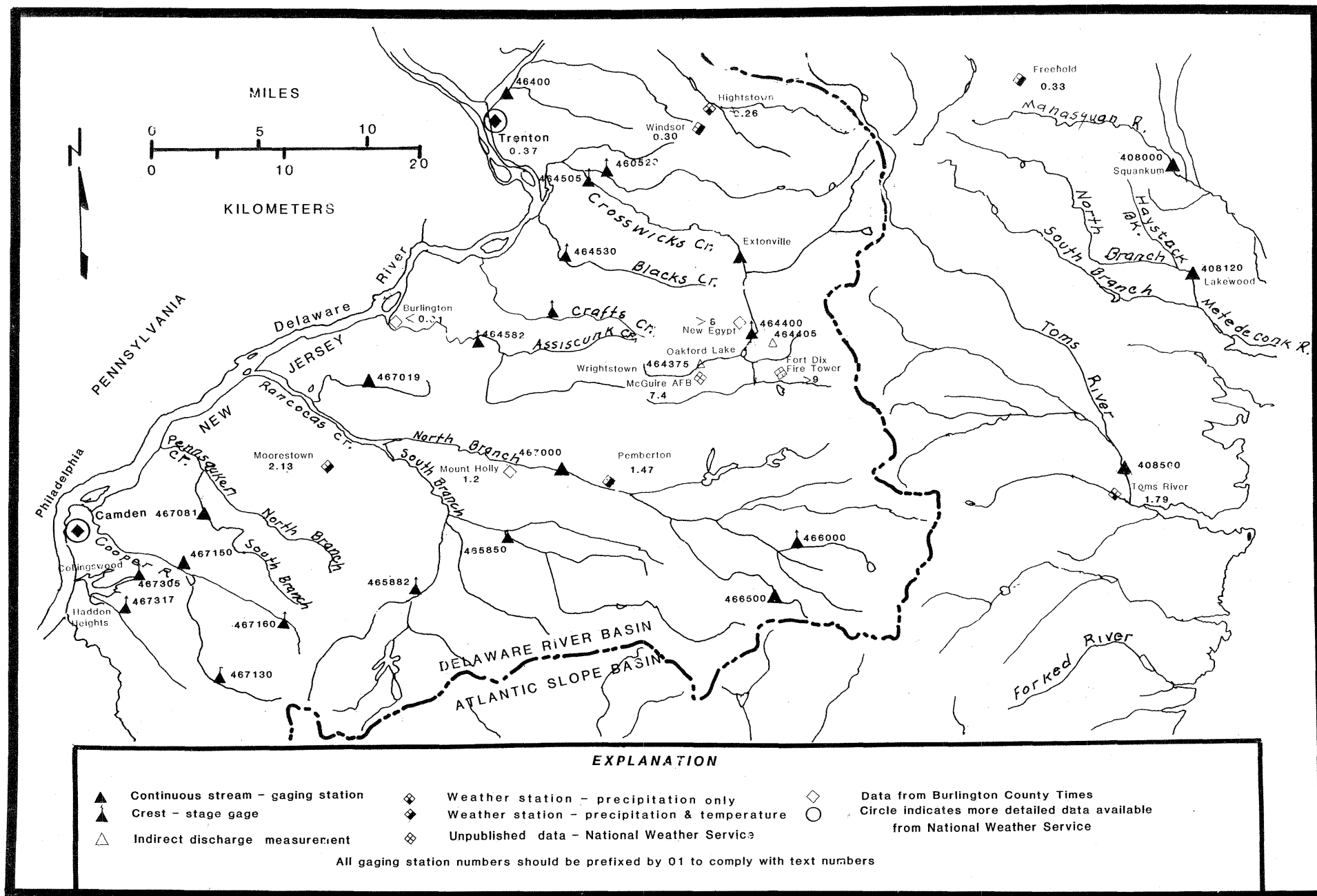


Figure 2. -- Map showing stream - gaging and precipitation stations at various locations in Central New Jersey for the flood of August 31 - September 1, 1978.

Table 1.--Precipitation at selected stations for the flood of  
August 31-September 1, 1978

<u>Station</u>	<u>Precipitation (inches)</u>
Burlington <sup>1/</sup>	Trace
Fort Dix (Fire Tower) <sup>2/</sup>	>9
Freehold	0.33
Hightstown	0.26
McGuire AFB <sup>2/</sup>	7.40
Moorestown	2.13
Mount Holly	1.2
New Egypt <sup>1/</sup>	>8
Pemberton	1.47
Toms River	1.79
Trenton	0.37
Windsor	0.30

<sup>1/</sup> Data from Burlington Times.

<sup>2/</sup> Unpublished teletype data from the National  
Weather Service.

#### DESCRIPTION OF FLOOD

The flood crest of August 31-September 1, 1978, established a new maximum peak stage of record for the crest stage gage on Crosswicks Creek at New Egypt (Station No. 01464400). This maximum exceeded by over 3.9 ft the previous highest stage on August 28, 1971. (See fig. 3, p. 6.) At the regular daily streamflow station, Crosswicks Creek at Extonville (Station No. 01464500), the previous maximum stage, also on August 28, 1971, was exceeded by about 0.25 ft. From the village of Crosswicks to the mouth of the stream, the flood of August 28, 1971, remains the maximum of record.

On August 26-28, 1971, thunderstorms after tropical storm, Doria, caused heavy precipitation (3 to 11 inches) over all of New Jersey for about 32 hours. In comparison, the flood of August 28-September 1, 1978, was caused by a small, intense thunder cell, approximately 10 mi in diameter, that stalled over New Egypt, Wrightstown, and Fort Dix for about 6 hours. Up to 9 inches of rain fell during that time. The magnitude of the flood of Crosswicks Creek at New Egypt on September 1, 1978, will be exceeded, on the average, once every 75 years based upon guidelines of the U.S. Water Resources Council (1977). A comparison of the flood profiles resulting from the storms of August 28, 1971, and August 31-September 1, 1978, is shown in figure 3 [high-water marks identified and elevations determined by U.S. Geological Survey (USGS) personnel immediately after each flood].

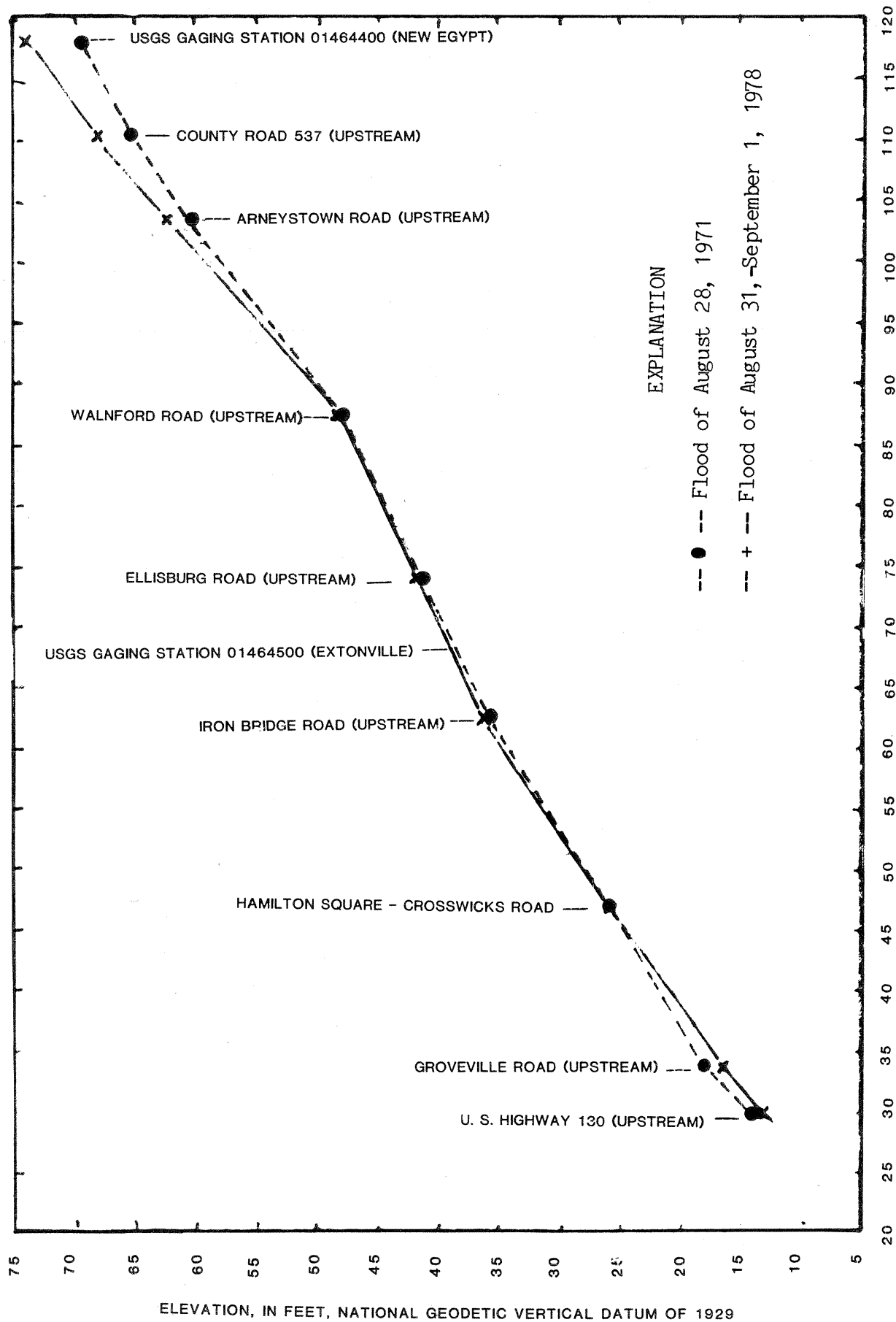


FIGURE 3--Elevation of flooding along Crosswicks Creek for August 28, 1971, and August 31-September 1, 1978

Blacks, Crafts, and Assiscunk Creeks also flooded to some extent after this storm, but data are insufficient for comparison with previous floods in these areas.

From August 31 to September 1, 1978, new peaks of record were recorded on Newton Creek at Collingswood (Station No. 01467305) and South Branch Newton Creek at Haddon Heights (Station No. 01467317). Both peaks were the highest since the beginning of record. However, these peaks were probably the result of a storm other than the one that caused the Crosswicks Creek flood, as numerous small thunder cells were noted over Central New Jersey during August 28 to September 2, 1978.

Table 2 summarizes hydrologic data for the Crosswicks Creek flood and similar information for other floods in the region.

Table 2.--Summary of flood stages and discharges in Central New Jersey for the flood of August 31-September 1, 1978

Station No.	Stream and place of determination	Drainage area (mi <sup>2</sup> )	Period of record	Maximum flood previously known			Maximum during present flood			Annual probability of exceedance		
				Date	Gage height (ft)	Discharge (ft <sup>3</sup> /s) (ft <sup>3</sup> /mi <sup>2</sup> )	Date	Gage height (ft)	Discharge (ft <sup>3</sup> /s) (ft <sup>3</sup> /mi <sup>2</sup> )			
01408000	Manasquan River at Squankum	43.4	1931-78	9/21/38	12.45	2,940	67.7	Sept. 1	3.91	322	7.41	0.99+
01408120	NB Metedeconk R nr Lakewood	34.9	1972-78	11/08/77	9.28	1,370	39.3	Sept. 1	5.53	176	5.00	0.99+
01408500	Toms River near Toms River	124	1928-78	9/23/38	12.50	2,000	16.1	Sept. 1	9.76	1,200	9.67	0.15
01464000	Assumpink Creek at Trenton	89.4	1938-78	7/21/75	14.61	5,450	61.0	Sept. 1	3.99	301	3.36	0.99+
01464375	North Run near Cookstown	4.66	1978	-	-	-	-	Aug. 31	-	1,860	399	a/
01464400	Crosswicks Creek at New Egypt	37.5	1968-78	8/28/71	26.3	1,940	51.2	Sept. 1	30.27	4,500	120	0.01
01464405	Crosswicks Trib No. 2 at New Egypt	1.02	1978	-	-	-	-	Aug. 31	-	340	333	a/
01464500	Crosswicks Creek at Extonville	83.6	1940-78	8/28/71	13.93	4,640	55.5	Sept. 1	14.22	4,860	58.1	0.04
01464505	Crosswicks Creek at Groveville	94.5	1968-78	8/28/71	16.21	-	-	Sept. 1	14.88	-	-	b/
01464520	Doctors Creek at Groveville	25.3	1968-78	1/26/78	9.33	2,080	82.2	Sept. 1	5.59	125	4.94	0.99+
01464530	Blacks Creek at Mansfield Square	19.7	1978	-	-	-	-	Aug. 31	11.2	2,500	127	a/
01464538	Crafts Creek at Columbus	5.38	1978	-	-	-	-	Aug. 31	9.12	328	30.9	a/
01464582	Assiscunk Creek near Columbus	1.09	1978	-	-	-	-	Aug. 31	11.1	1,420	171	a/
01465850	SB Rancocas Creek at Vincentown	53.3	1962-78	8/28/78	7.98	1,320	24.8	Sept. 1	5.65	455	8.54	0.95
01465882	SW Branch Rancocas Ck at Medford	47.9	1975-78	9/25/75	7.21	4,600	96.0	Sept. 1	6.69	3,500	73.1	a/
01466000	Middle Branch Mt Misery Brook	2.52	1952-78	5/29/68	2.52	50	18.3	Sept. 1	1.35	1.0	37	0.99+
01466500	McDonalds Br in Lebanon St Forest	2.31	1953-78	8/25/58	2.33	35	15.2	Sept. 1	1.39	3.6	87	0.99+
01467000	NB Rancocas Creek at Pemberton	111	1921-78	8/31/39	4.23	1,730	15.6	Sept. 1	2.42	712	6.41	0.60
01467019	Mill Creek near Willingboro	4.12	1976-78	1/26/78	9.20	440	107	Aug. 31	9.46	492	119	a/
01467081	SB Pennsauken Ck at Cherry Hill	9.16	1967-78	8/28/78	10.19	868	94.8	Aug. 31	5.82	236	25.8	0.99+
01467130	Cooper River at Kirkwood	12.8	1964-78	8/10/67	2.47	390	30.5					
01467150	Cooper River at Haddonfield	17.4	1963-78	8/28/71	5.46	3,300	190	Aug. 31	1.94	126	7.24	0.99+
01467160	NB Cooper River near Marlton	5.33	1964-78	1/14/68	4.47	320	60.0	Sept. 1	4.30	330	61.9	0.04
01467305	Newton Creek at Collingswood c/	1.32	1964-78	8/28/71	5.18	245	186	Sept. 1	6.40	307	233	0.04
01467317	SB Newton Creek at Haddon Heights c/	0.63	1964-78	8/28/71	4.18	150	238	Sept. 1	4.62	295	468	0.03

a/ Insufficient data for determination

b/ Discharge not determined

c/ Peaks caused by other storm cells



## SITE DESCRIPTION DATA

Descriptive data for the sites listed in table 2 are given in the following section.

### 01408000 MANASQUAN RIVER AT SQUANKUM, NJ

LOCATION.--Lat 40°09'47", long 74°09'21", Monmouth County, Hydrologic Unit 2040301, on right bank 20 ft downstream of bridge on State Highway 547 (Squankum Park Road) in Squankum, and 0.4 mi downstream from Marsh Bog Brook.

DRAINAGE AREA.--43.4 mi<sup>2</sup>.

PERIOD OF RECORD.--July 1931 to September 1978.

STATION INFORMATION.--Water-stage recorder and concrete control. Datum of gage is 18.82 ft National Geodetic Vertical Datum of 1929. Prior to August 13, 1940, water-stage recorder at site 80 ft upstream at same datum.

### 01408120 NORTH BRANCH METEDECONK RIVER NEAR LAKEWOOD, NJ

LOCATION.--Lat 40°05'30", long 74°09'10", Ocean County, Hydrologic Unit 02040301, on upstream right bank at bridge on State Route 549, 1.0 mi upstream from confluence with South Branch Metedeconk River, and 2.3 mi east of Lakewood.

DRAINAGE AREA.--34.9 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1972 to September 1978.

STATION INFORMATION.--Water-stage recorder. Datum of gage is 3.89 ft National Geodetic Vertical Datum of 1929.

### 01408500 TOMS RIVER AT TOMS RIVER, NJ

LOCATION.--Lat 39°59'10", long 74°13'29", Ocean County, Hydrologic Unit 02040301, on left bank 1.9 mi downstream from Union Branch, and 2.6 mi northwest of Toms River.

DRAINAGE AREA.--124 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1928 to September 1978.

STATION INFORMATION.--Water-stage recorder. Datum of gage is 8.10 ft National Geodetic Vertical Datum of 1929.

01464000 CROSSWICKS CREEK AT NEW EGYPT, NJ

LOCATION.--Lat 40°04'03", long 74°31'57", Ocean County, Hydrologic Unit 02040201, at upstream side of bridge on State Route 528 in New Egypt, 300 ft downstream from Oakford Lake Dam.

DRAINAGE AREA.--37.5 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1967 to September 1978.

STATION INFORMATION.--Crest-stage partial record station only. Datum of gage is 43.46 ft National Geodetic Vertical Datum of 1929.

01464375 NORTH RUN NEAR COOKSTOWN, NJ

LOCATION.--Lat 74°35'21", long 40°02'21", Burlington County, Hydrologic Unit 02040201, at culvert on McGuire Air Force Base Access Road opposite Main Gate and 1.5 mi southwest of Cookstown.

DRAINAGE AREA.--4.66 mi<sup>2</sup>.

PERIOD OF RECORD.--Indirect discharge determination of the peak of August 31, 1978, made from the flow through culvert under McGuire Air Force Access Road.

01464405 CROSSWICKS TRIBUTARY NO. 2 AT NEW EGYPT, NJ

LOCATION.--Lat 40°04'43", long 75°30'00", Ocean County, Hydrologic Unit 02040201, at culvert on Lakewood Road, 1.0 mi upstream from confluence with Crosswicks Creek and 0.8 mi from Route 528 and Railroad Avenue in the center of village of New Egypt.

DRAINAGE AREA.--1.02 mi<sup>2</sup>.

PERIOD OF RECORD.--Indirect discharge measurement of the peak of August 31, 1978, made from the flow through culvert and road overflow.

01464500 CROSSWICKS CREEK AT EXTENVILLE, NJ

LOCATION.--Lat 40°08'15", long 74°36'02", Mercer County, Hydrologic Unit 02040201, on right bank upstream from highway bridge at Extenville, 0.5 mi upstream of Pleasant Run, and 0.7 mi downstream from Mercer-Monmouth County Line.

DRAINAGE AREA.--83.6 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1939 to September 1978.

STATION INFORMATION.--Water-stage recorder and concrete control. Datum of gage is 24.94 ft National Geodetic Vertical Datum of 1929.

01464505 CROSSWICKS CREEK AT GROVEVILLE, NJ

LOCATION.--Lat 40°10'26", long 74°40'48", Burlington County, Hydrologic Unit 02040201, at U.S. Highway 130, 0.3 mi upstream from Doctors Creek, 0.5 mi northwest of Groveville, and 0.6 mi southwest of Yardville.

DRAINAGE AREA.--94.5 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1967 to September 1978.

STATION INFORMATION.--Crest-stage partial record station only. Datum of gage is -2.15 ft National Vertical Datum of 1929.

01464520 DOCTORS CREEK AT GROVEVILLE, NJ

LOCATION.--Lat 40°10'21", long 74°39'33", Mercer County, Hydrologic Unit 02040201, at bridge on Groveville-Allentown road at Groveville, 0.7 mi southeast of Yardville, and 1.5 mi upstream of mouth.

DRAINAGE AREA.--25.3 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1967 to September 1978.

STATION INFORMATION.--Crest-stage partial record station only. Datum of gage is 14.23 ft National Geodetic Vertical Datum of 1929.

01464530 BLACKS CREEK AT MANSFIELD SQUARE, NJ

LOCATION.--Lat 40°07'02", long 74°41'58", Burlington County, Hydrologic Unit 02040201, at bridge on Mansfield Square-Crosswicks Road, 0.4 mi east of Mansfield Square, and 3.4 mi above mouth.

DRAINAGE AREA.--19.7 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1978.

STATION INFORMATION.--Peak discharge of the flood of August 31, 1978 made on the basis of indirect determination of flow through bridge and over highway. Crest-stage partial record station established after the peak had receded. Datum of gage is 12.44 ft National Geodetic Vertical Datum of 1929. Site was utilized as a low-flow partial record station from October 1965 to September 1972.

01464538 CRAFTS CREEK AT COLUMBUS, NJ

LOCATION.--Lat 40°04'44", long 74°43'09", Burlington County, Hydrologic Unit 02040201, at bridge on Columbus-Mansfield Road, 0.4 mi north of Columbus and 0.9 mi south of Mansfield.

DRAINAGE AREA.--5.38 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1978.

STATION INFORMATION.--Crest-stage partial record station established after the flood of August 31, 1978. Datum of gage is 33.71 ft National Geodetic Vertical Datum of 1929.

01464582 ASSISCUNK CREEK NEAR COLUMBUS, NJ

LOCATION.--Lat 40°03'20", long 74°44'36", Burlington County, Hydrologic Unit 02040201, at bridge on Petticoat Bridge Road, 600 ft downstream from Assiscunk Branch, and 1.7 mi southwest of Columbus.

DRAINAGE AREA.--10.9 mi<sup>2</sup>.

PERIOD OF RECORD.--August 1978.

STATION INFORMATION.--Crest-stage partial record station established after the flood of August 31, 1978.

01465850 SOUTH BRANCH RANOCAS CREEK AT VINCENTOWN, NJ

LOCATION.--Lat 39°56'22", long 74°45'50", Burlington County, Hydrologic Unit 02040201, on left bank 150 ft downstream from highway bridge on Lumberton-Vincentown Road, 0.8 mi west of Vincentown, 2.9 mi southeast of Lumberton, and 3.1 mi upstream from Southwest Branch.

DRAINAGE AREA.--53.3 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1961 to September 1978.

STATION INFORMATION.--Water-stage recorder, October 1961 to September 1975. Crest-stage partial record station, October 1975 to September 1978. Datum of gage is 13.17 ft National Geodetic Vertical Datum of 1929.

01465882 SOUTHWEST BRANCH RANOCAS CREEK AT MEDFORD, NJ

LOCATION.--Lat 39°54'16", long 74°48'47", Burlington County, Hydrologic Unit 02040201, at bridge on State Route 70, 0.6 mi northeast of Medford, and 4.2 mi upstream from mouth.

DRAINAGE AREA.--47.9 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1975 to September 1978.

STATION INFORMATION.--Crest-stage partial record station only. Datum of gage is 20.72 ft National Geodetic Vertical Datum of 1929.

01466000 MIDDLE BRANCH MOUNT MISERY BROOK IN LEBANON  
STATE FOREST, NJ

LOCATION.--Lat 39°55'00", long 74°30'30", Burlington County, Hydrologic Unit 02040202, 20 ft upstream from bridge on North Branch Road in Lebanon State Forest, 5.1 mi southeast of Browns Mills.

DRAINAGE AREA.--2.73 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1952 to September 1978.

STATION INFORMATION.--Water-stage recorder from October 1952 to September 1965, crest-stage partial record station from October 1966 to September 1978. Datum of gage is 99.71 ft National Geodetic Vertical Datum of 1929.

01466500 MCDONALDS BRANCH IN LEBANON STATE FOREST, NJ  
(Hydrologic bench-mark station)

LOCATION.--Lat 39°53'05", long 74°30'20", Burlington County, Hydrologic Unit 02040202, on right bank in Lebanon State Forest, 25 ft upstream from Butterworth Road Bridge, 3.4 mi upstream from confluence with Cooper Branch, and 7.0 mi southeast of Browns Mills.

DRAINAGE AREA.--2.31 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1953 to September 1978. Prior to October 1962, published as "McDonald Branch in Lebanon State Forest".

STATION INFORMATION.--Water-stage recorder and concrete control. Datum of gage is 117.73 ft National Geodetic Vertical Datum of 1929.

01467000 NORTH BRANCH RANCOCAS CREEK AT PEMBERTON, NJ

LOCATION.--Lat 39°58'10", long 74°41'05", Burlington County, Hydrologic Unit 02040202, on right bank at downstream side of highway bridge at Pemberton, 12 mi upstream from confluence with South Branch.

DRAINAGE AREA.--111 mi<sup>2</sup>.

PERIOD OF RECORD.--September 1921 to September 1978.

STATION INFORMATION.--Water-stage recorder above concrete dams. Datum of gage is 31.19 ft National Geodetic Vertical Datum of 1929. Prior to June 9, 1923, nonrecording gage and June 9, 1923 to Aug. 9, 1951, water-stage recorder at site 600 ft downstream at datum 6.54 ft lower.

01467019 MILL CREEK NEAR WILLINGBORO, NJ

LOCATION.--Lat 40°01'53", long 74°51'14", Burlington County, Hydrologic Unit 02040202, on left upstream wingwall of bridge on Springside Avenue, 2.2 mi upstream from South Branch Mill Creek, 0.2 mi east of Willingboro, and 4.6 mi upstream from mouth.

DRAINAGE AREA.--4.12 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1975 to September 1978.

STATION INFORMATION.--Water-stage recorder. Datum of gage is 21.65 ft National Geodetic Vertical Datum of 1929.

01467081 SOUTH BRANCH PENNSAUKEN CREEK AT CHERRY HILL, NJ

LOCATION.--Lat 39°56'30", long 75°00'05", Camden County, Hydrologic Unit 02040202, on left bank on downstream wingwall of bridge on Mill Road in Cherry Hill, 1.1 mi south of Maple Shade, and 3.8 mi upstream from confluence with North Branch.

DRAINAGE AREA.--9.16 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1967 to September 1976, October 1977 to September 1978.

STATION INFORMATION.--Water-stage recorder. Datum of gage is 8.12 ft National Geodetic Vertical Datum of 1929.

01467130 COOPER RIVER AT KIRKWOOD, NJ

LOCATION.--Lat 39°50'11", long 75°00'06", Camden County, Hydrologic Unit 02040202, at outlet of Kirkwood Lake in Kirkwood, 100 ft east of tracks of Pennsylvania-Reading Seashore Lines, and 1.0 mi north of Laurel Springs.

DRAINAGE AREA.--5.14 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1963 to September 1978.

STATION INFORMATION.--Crest-stage partial record station only. Datum of gage is 57.82 ft National Geodetic Vertical Datum of 1929. Also operated as a low-flow partial record site.

01467150 COOPER RIVER AT HADDONFIELD, NJ

LOCATION.--Lat 39°54'11", long 75°01'19", Camden County, Hydrologic Unit 02040202, on right bank of Wallworth Lake in Pennypacker Park, 200 ft upstream from bridge on State Highway 41 (Kings Highway) in Haddonfield, 0.6 mi upstream from North Branch Cooper River, and 7.7 mi upstream from mouth.

DRAINAGE AREA.--17.4 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1963 to September 1978.

STATION INFORMATION.--Water-stage recorder above a cut-stone dam. Datum of gage is 9.29 ft National Geodetic Vertical Datum of 1929.

01467160 NORTH BRANCH COOPER RIVER NEAR MARLTON, NJ

LOCATION.--Lat 39°53'20", long 74°58'08", Camden County,  
Hydrologic Unit 02040202, at bridge on blacktop road to  
Springdale, 2.5 mi west of Marlton.

DRAINAGE AREA.--5.33 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1963 to September 1978.

STATION INFORMATION.--Crest-stage partial record station  
only. Datum of gage is 36.36 ft National Geodetic  
Vertical Datum of 1929.

01467305 NEWTON CREEK AT COLLINGSWOOD, NJ

LOCATION.--Lat 39°54'30", long 75°03'13", Camden County,  
Hydrologic Unit 02040202, at bridge on Park Avenue in  
Collingswood, 0.3 mi east of Cuthbert Avenue.

DRAINAGE AREA.--1.32 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1963 to September 1978.

STATION INFORMATION.--Crest-stage partial record station  
only. Datum of gage is 18.74 ft National Geodetic  
Vertical Datum of 1929.

01467313 SOUTH BRANCH NEWTON CREEK AT HADDON HEIGHTS, NJ

LOCATION.--Lat 39°52'45", long 75°04'26", Camden County,  
Hydrologic Unit 02040202, at bridge in Haddon Heights  
Park, and 2.6 mi south of Collingswood.

DRAINAGE AREA.--0.63 mi<sup>2</sup>.

PERIOD OF RECORD.--October 1963 to September 1978.

STATION INFORMATION.--Crest-stage gaging station only. Datum  
of gage is 23.34 ft National Geodetic Vertical Datum of  
1929.



## FLOOD-CREST ELEVATIONS

The availability of flood-profile data is essential to the solution of engineering and planning problems. Examples are the proper design of structures on flood plains and the evaluation of flood-prone areas for land-use regulation and flood-insurance rates. Water-surface profiles are affected by obstructions, contractions, and expansions of the channel; roughness of the bed, banks, and overflow areas; changes in alignment of the channel; and flow of tributaries. For example, an abrupt change in profile occurs at many bridges as upstream and downstream surface elevations fluctuate. A steep gradient of a stream flowing under a bridge indicates that, at the time of the crest, the bridge structure controlled the elevation of the upstream surface to some extent. Hydraulic characteristics of the channel downstream from the bridge control the water-surface elevation below the bridge. Accumulations of debris, channel enlargement, or fill could alter the amount of water flowing under the bridge and may also affect the areal extent of flooding upstream from the bridge.

Flood-crest data for Crosswicks Creek and tributaries of the August 28-September 1, 1978 flood were obtained by USGS employees using standard procedures (see table 3). Flood-crest data gathered by the USGS at the same locations during the flood of August 28, 1971 are also included in this table for comparison. These data define the actual crest stages occurring at the time of the two mentioned floods. Any or all of the conditions described in the above paragraph may be applicable.

## FLOOD DAMAGE

Although no human lives were lost during this flood, some farm animals and family pets were drowned. Flood related injuries were reported, which included: heart attacks from excitement and exertion, sprained backs as a result of removing household goods from the floodway, and injuries resulting from automobile accidents due to hazardous conditions after the storm. Flooded highways and broken telephone lines delayed the administration of first aid and transportation of the victims to the hospital.

Damage was extensive in New Egypt and vicinity. Losses, as reported by the Burlington County Times, were estimated at over 2 million dollars, with 70 homes and 14 businesses damaged.

The above information was gathered from people living in the flooded area and from the Burlington County Times (September 1 and 2, 1978).

Table 3.--Flood-crest data for selected sites in Crosswicks Creek basin

Stream and location	Distance above mouth	Site reference	Flood of August 28, 1971		Flood of August 31, 1978	
			Elevation NGVD (ft)	Discharge (ft <sup>3</sup> /s)	Elevation NGVD (ft)	Discharge (ft <sup>3</sup> /s)
North Run at Wrightstown Jobstown Road		upstream downstream			124.2 123.4	
North Run at McGuire Air Force Base (opposite main gate)		upstream downstream			112.2 106.3	399
Crosswicks Creek Trib. 2 at Lakewood Avenue, New Egypt		upstream downstream			92.1 84.7	333
Stony Ford Brook at Moorehouse Road, New Egypt		upstream downstream			80.5 78.1	
Stony Ford Brook at Bridge Road, New Egypt		upstream downstream			74.1 73.0	
Crosswicks Creek at Route 528, New Egypt	19.6 mi (117,600 ft)	upstream downstream	69.8 69.5	1,940	73.7 73.7	4,500
Crosswicks Creek at Route 537, New Egypt	18.3 mi (110,200 ft)	upstream downstream	65.4 65.2		68.4 68.0	
Crosswicks Creek at Arneystown	17.0 mi (103,000 ft)	upstream downstream	60.5 60.3		62.1 61.7	
Crosswicks Creek at Wainford	14.2 mi (87,200 ft)	upstream downstream	47.9		48.1 48.0	
Crosswicks Creek at Ellisdale	12.3 mi (73,800 ft)	upstream downstream	41.5 40.8		41.8 41.6	
Crosswicks Creek at Extonville (USGS gaging station)	11.5 mi (68,800 ft)	upstream downstream	38.9 38.9	4,640 (revised)	39.2 39.1	4,860
Crosswicks Creek at Iron Bridge Road	10.5 mi (62,300 ft)	upstream downstream	35.9 35.3		36.3 36.1	
Crosswicks Creek at Crosswicks	8.9 mi (47,000 ft)	upstream downstream	26.0 25.8		26.2 25.8	
Crosswicks Creek at New Jersey Turnpike	7.4 mi (43,900 ft)	upstream downstream	23.6 22.8			
Crosswicks Creek at Groveville	5.8 mi (33,700 ft)	upstream downstream	18.3 18.1		16.8 16.8	
Crosswicks Creek at Route 130	5.1 mi (29,800 ft)	upstream downstream	14.1		13.2 12.8	

## SUMMARY

Thunderstorms lasting approximately 6 hours caused flooding in the New Egypt-Wrightstown-Fort Dix area on August 31-September 1, 1978. The area of precipitation was small, encompassing a radius of less than 5 mi, but rainfall in excess of 9 inches was recorded near the storm's center. Several streams were flooded, including Crosswicks, Blacks, Crafts, and Assiscunk Creeks. The flooding of Crosswicks Creek in the vicinity of New Egypt has a probability of being exceeded on the average once in 75 years. Several other locations had floods with a probability of being exceeded on the average once in 20 to 30 years. See table 2, p. 8, for flood stages and discharges.

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