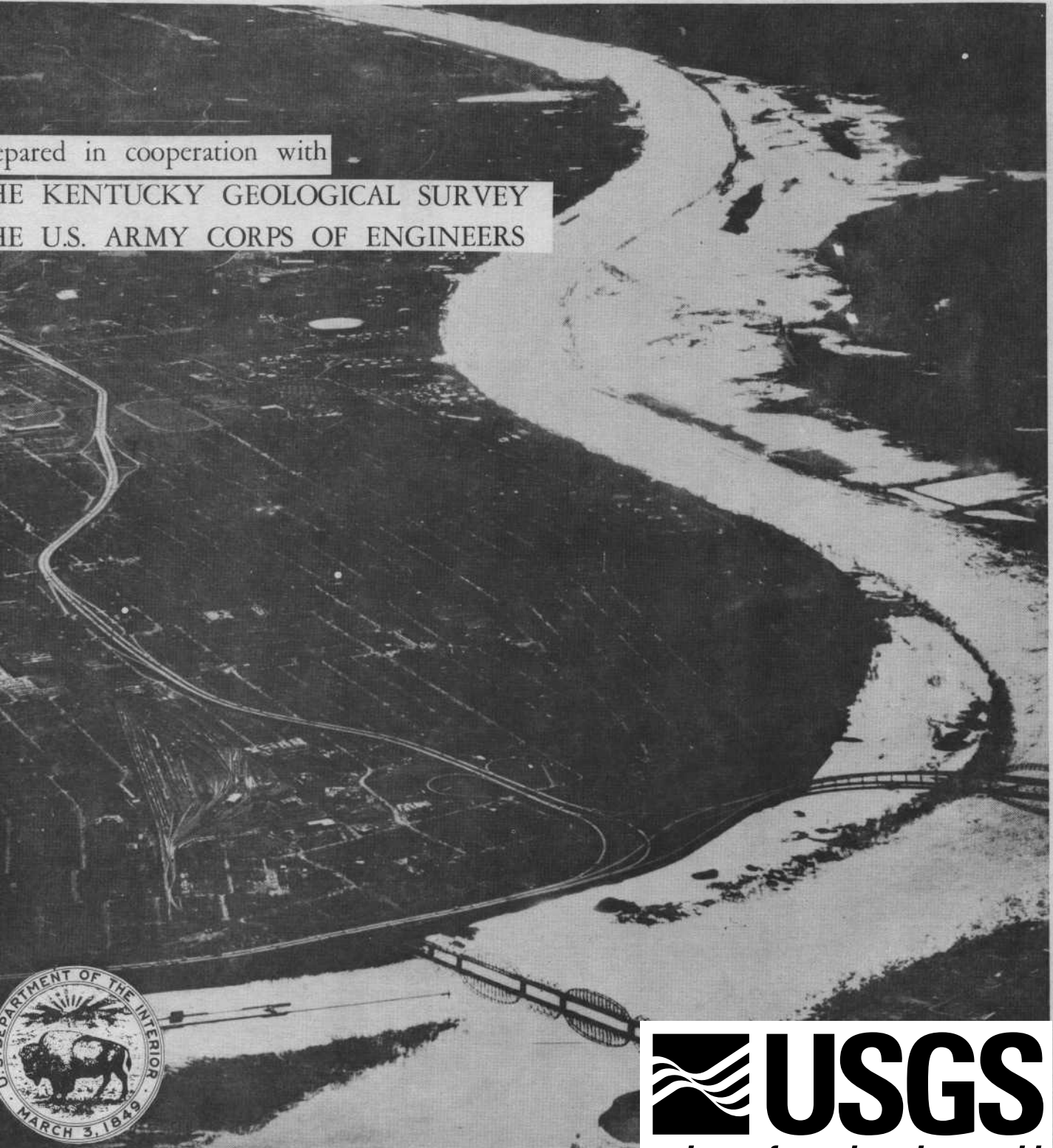


FLOODS OF DECEMBER 1978 IN KENTUCKY

U. S. GEOLOGICAL SURVEY OPEN-FILE REPORT 79-977

Prepared in cooperation with
THE KENTUCKY GEOLOGICAL SURVEY
AND THE U.S. ARMY CORPS OF ENGINEERS



Cover page--Flooding on Ohio River at
Louisville, Kentucky, December 13, 1978.

Photograph provided by Courier-Journal Newspaper

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By J. N. Sullivan, F. Quinones, and R. F. Flint

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April 1979

UNITED STATES DEPARTMENT OF THE INTERIOR

CECIL D. ANDRUS, Secretary

GEOLOGICAL SURVEY

H. William Menard, Director

Open-File Report

For additional information write to:

U.S. Geological Survey
Room 572 Federal Building
Louisville, Kentucky 40202

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DEFINITION OF TERMS

Terms related to streamflow characteristics, water-quality and other flood characteristics described in this report are defined below.

Acre-foot (AC-FT, acre-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot.

Cfs-day is the volume of water represented by a flow of 1 cubic foot per second for 24 hours.

Contents is the volume of water in a reservoir or lake.

Cubic feet per second per square mile ($\text{ft}^3/\text{s}/\text{mi}^2$) is the average number of cubic feet 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) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second.

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

Drainage area of a stream at a specified location is that area, measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the stream above the specified point.

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

Gaging station is a particular site on a stream, canal, lake or reservoir where systematic observation of water surface elevations and/or discharges are determined.

Mean concentration is the time-weighted concentration of suspended sediment passing a stream section during a 24-hour day.

Recurrence interval of a flood is the probability, expressed in years, that a particular flood event may occur. This probability is defined from data collected over a long period of time defining other flood events. Recurrence intervals were determined according to procedures described by the Water Resources Council, Bulletin 17A(1977). The intervals were determined from individual station records.

Sediment is solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water; it includes chemical and biochemical precipitates and decomposed organic material such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and quantity and intensity of precipitation.

Suspended sediment is the sediment that at any given time is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Suspended-sediment discharge is the quantity of sediment, as measured by dry weight, or by volume, that is discharged in a given time. It is computed by multiplying discharge times milligrams per liter (mg/L) times 0.0027.

Suspended-sediment concentration is the velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 ft above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L).

The gage heights reported for flood discharges throughout this report are referenced to a station datum described in the annual series of "Water Resources Data for Kentucky," published by the U.S. Geological Survey. Streamflow discharges were determined according to standard procedures of the U.S. Geological Survey adopted since 1888 and described in U.S. Geological Survey Techniques of Water Resources Investigations, book 3, Chapter A6.

FACTORS FOR CONVERTING U.S. CUSTOMARY UNITS TO INTERNATIONAL
SYSTEM UNITS (SI)

The following factors may be used to convert the U.S. customary units published herein to the International System of Units (SI). Subsequent reports will contain both the U.S. customary and SI unit equivalents in the station manuscript descriptions until such time that all data will be published in SI units.

<u>Multiply U.S. customary units</u>	<u>By</u>	<u>To obtain SI units</u>
Length		
inches (in)	2.54×10^1	millimeters (mm)
	2.54×10^{-2}	meters (m)
feet (ft)	3.048×10^{-1}	meters (m)
Area		
square miles (mi ²)	2.590×10^0	square kilometers (km ²)
Volume		
cubic feet (ft ³)	2.832×10^1	cubic decimeters (dm ³)
	2.832×10^{-2}	cubic meters (m ³)
cfs-days	2.447×10^3	cubic meters (m ³)
	2.447×10^{-3}	cubic hectometers (hm ³)
acre-feet (acre-ft)	1.233×10^3	cubic meters (m ³)
	1.233×10^{-3}	cubic hectometers (hm ³)
	1.233×10^{-6}	cubic kilometers (km ³)
Flow		
cubic feet per second (ft ³ /s)	2.832×10^1	liters per second (L/s)
	2.832×10^1	cubic decimeters per second (dm ³ /s)
	2.832×10^{-2}	cubic meters per second (m ³ /s)
Mass		
tons (short)	9.072×10^{-1}	megagrams (Mg) or metric tons

FLOODS OF DECEMBER 1978 IN KENTUCKY

By

John N. Sullavan, Ferdinand Quinones
and Russell F. Flint

ABSTRACT

Severe flooding throughout the State of Kentucky occurred from December 3-10 as a result of intense precipitation from two storms. The storms of December 3-5 and December 7-10 produced record peak discharges in several areas throughout central and eastern Kentucky, resulting in damages of nearly 50 million dollars and the loss of five lives.

This report summarizes data collected during the floods by the U.S. Geological Survey, Water Resources Division, and other federal and state agencies in Kentucky. The data include precipitation, streamflow, and water quality data (including suspended-sediment) collected during the floods. Estimates of property damages in selected basins are also provided. The information in this report is preliminary and subject to revisions.

INTRODUCTION

The floods of December 1978 caused widespread damage in central and eastern Kentucky. Five lives were lost and property damage was estimated to be about 50 million dollars.

The floods were caused by storms on December 3-5 and December 7-10. The second storm produced most of the damaging floods. The principal basins and streams affected by the floods are shown in figure 1.

The maximum previously known discharge was exceeded at many sites. The peak discharge at Lock 2 on the Kentucky River had a recurrence interval greater than 200 years and Lock 4 on the Kentucky River had a recurrence interval of 200-years. Discharges at Lock 6 and Lock 10 on the Kentucky, Little River near Cadiz and Stoner Creek at Paris exceeded the 100-year flood. Discharges at Dix River near Danville, Tygarts Creek near Greenup, and North Elkhorn Creek near Georgetown exceeded the 100-year recurrence interval. The peak discharge at Rolling Fork near Boston and Bacon Creek near Priceville had a recurrence interval greater than 50-years. Peak discharges for North Fork Triplett Creek near Morehead, Red River near Hazel Green, Red River at Clay City, Russell Creek near Columbia exceeded the 50-year recurrence interval. The Rolling Fork near Lebanon, Beaver Creek near Monticello, South Fork Panther Creek near Whitesville, Rockcastle River at Billows, and Nolin River at White Mills floods exceeded the 25-year recurrence interval.

Samples for suspended sediment and dissolved constituents were collected at several sites. The maximum sampled suspended-sediment concentration of 6,260 mg/L was collected at Clover Fork at Harlan on December 4. The maximum measured instantaneous suspended-sediment discharge of 919,000 tons per day was determined for Markland Dam on December 13.

ACKNOWLEDGMENTS

The National Oceanographic and Atmospheric Administration provided the precipitation data. The Tennessee Valley Authority provided lake, stage and content data. Estimates of damages were provided by the U.S. Army Corps of Engineers, Louisville District. Photographs used in the report are courtesy of the Louisville Courier-Journal and Times newspapers.

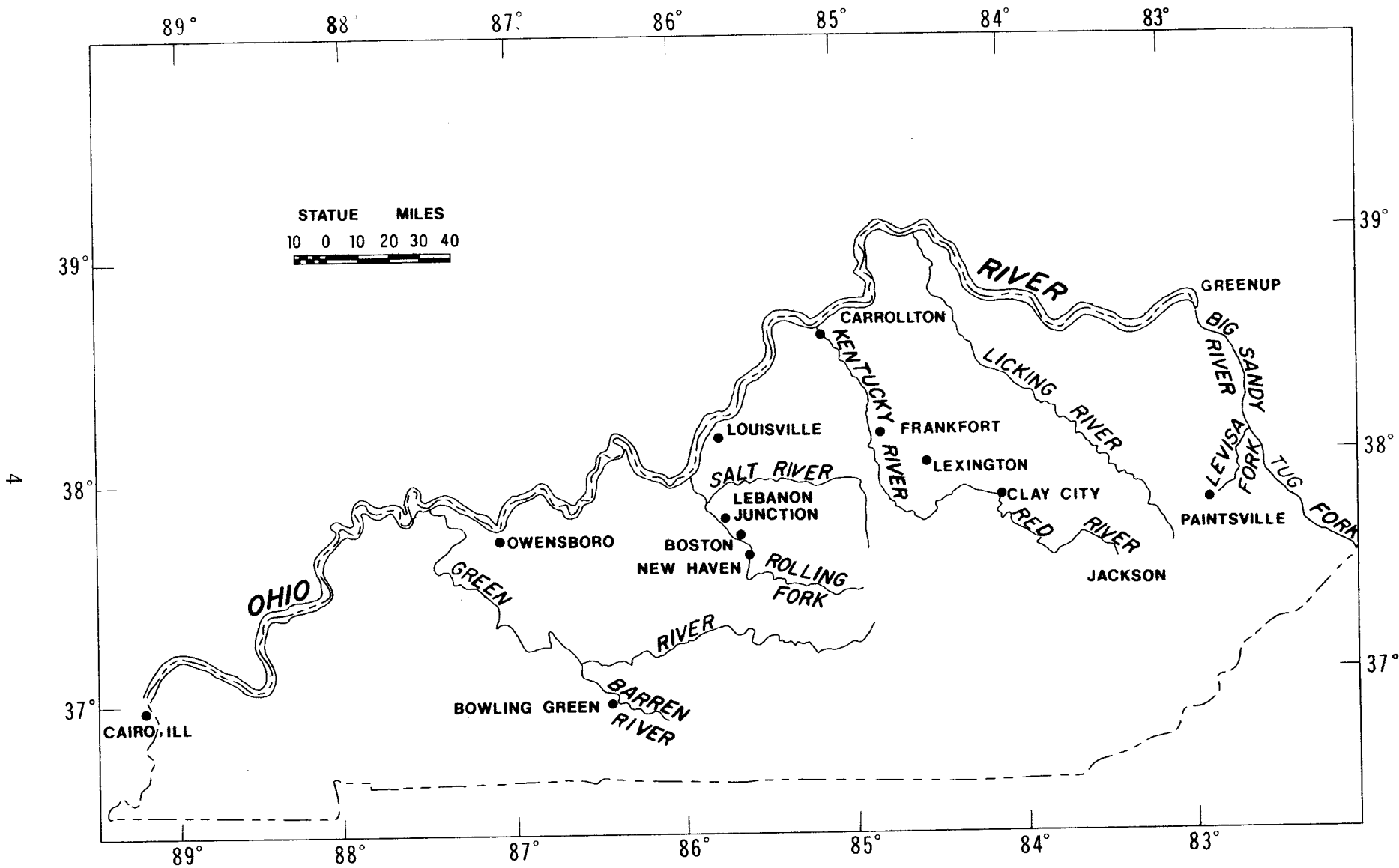


Figure 1.-- Principal streams affected by the December 1978 floods in Kentucky.

STORM CHARACTERISTICS

The climate of Kentucky is moderate and temperate, but has rather wide extremes of temperature and precipitation. The State lies within the path of frequent moisture-laden low pressure systems moving northeast from the Gulf of Mexico. Rainfall during severe storms can amount to as much as eight inches in a 24-hour period. These heavy flood-producing rains occur more frequently during the months from December through March.

Rainfall from the December 3-4 storm was fairly evenly distributed over the entire State with accumulations averaging about two inches. This storm produced the largest rainfall totals in the southwest corner of the State. The second storm (December 7-10) entered the southwest corner of Kentucky, moved in a northeastward direction across the State, and produced the largest rainfall totals for the remainder of the State.

The maximum daily rainfall of 5.56 inches and the maximum storm total of 9.62 inches were observed at the Relief gage, near West Liberty in eastern Kentucky. Storm totals ranging from seven to nine inches were recorded in the upper Green, Salt, Kentucky and Licking River basins. Storms totals at 102 National Oceanographic and Atmospheric Administration stations throughout Kentucky are summarized in table 1. The location of the gages and precipitation totals for each storm are shown on figure 2.

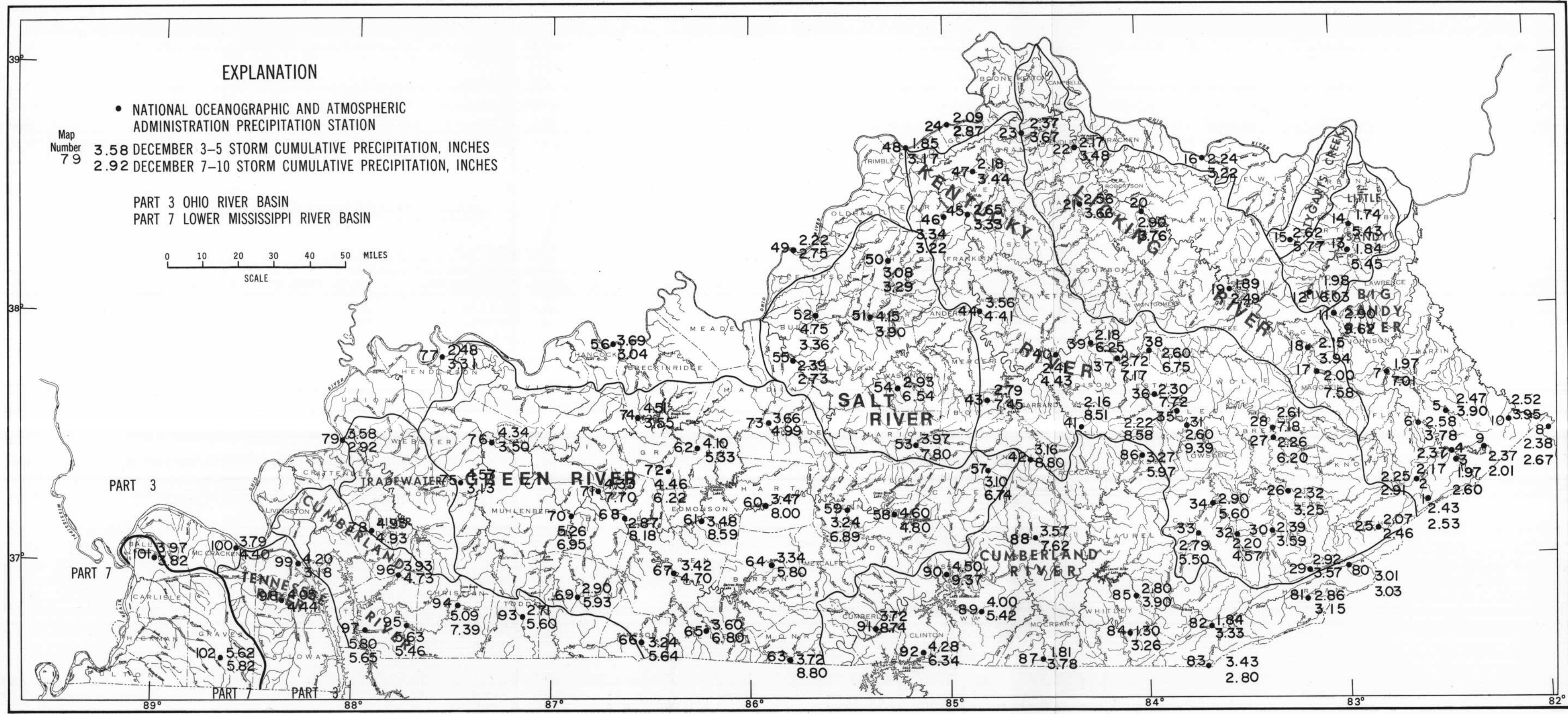


Figure 2.-- Precipitation network and cumulative precipitation from the December 3-5 and December 7-10 storms in Kentucky.

Table 1.--Daily and cumulative precipitation from December 3-5 and December 7-10 at selected stations in Kentucky.

Map No.	Basin	Station	Date (Dec. 1978)			Storm total	Date (Dec. 1978)				Storm total
			3	4	5		7	8	9	10	
1	Big Sandy River.	Burdine.....	0.53	1.50	0.40	2.43	0.53	0	2.00		2.53
2	do.	Virgie.....	.20	1.70	.35	2.25	.10	0.81	1.61	0.39	2.91
3	do.	Elkhorn City...	.47	1.50	0	1.97	.55	.25	1.80		2.60
4	do.	Fishtrap Lake..		1.95	.42	2.37			2.00	.17	2.17
5	do.	Meta.....		2.10	.37	2.47		1.50	2.25	.15	3.90
6	do.	Pikeville.....		2.10	.48	2.58		1.60	2.00	.18	3.78
7	do.	Paintsville....	1.97			1.97	3.40	3.38	.23		7.01
8	do.	Hurley.....	1.92	.46		2.38	.67			2.00	2.67
9	do.	Fed's Creek....		2.05	.32	2.37		.45	1.56		2.01
10	do.	Freeburn		1.82	.70	2.52		1.30	2.52	.13	3.95
11	do.	Relief.....	2.90			2.90	3.95	5.56	.11		9.62
12	Little Sandy River.	Sandy Hook.....		1.98		1.98		2.41	3.53	.09	6.03
13	do.	Grayson Lake...		1.84		1.84		1.90	3.42	.13	5.45
14	do.	Grayson.....		1.74		1.74		1.80	3.53	.10	5.43
15	Tygarts Creek	Olive Hill.....	.03	2.59		2.62		1.61	4.09	.07	5.77
16	Ohio River main stem.	Maysville.....	.20	2.04		2.24		1.15	1.86	.21	3.22
17	Licking River	Salyersville...		2.00		2.00		3.94	3.29	.35	7.58
18	do.	Wheelersburg...	.25	1.90		2.15		1.40	1.54	1.00	3.94
19	do.	Cave Run Lake..		1.89		1.89				2.49	2.49
20	do.	Blue Lick Spring	.19	2.71		2.90		1.37	2.31	.08	3.76
21	do.	Cynthiana.....	.36	2.16	.04	2.56		1.32	2.25	.09	3.66
22	do.	Falmouth	.52	1.65		2.17		2.11	1.37		3.48
23	do.	Williamstown...	1.55	.80	.02	2.37	.60	2.61	.46		3.67
24	Ohio River main stem.	Markland Dam...	.45	1.64		2.09		1.57	1.30		2.87
25	Kentucky River.	Whitesburg.....		1.70	.37	2.07		.44	1.95	.07	2.46
26	do.	Hazard.....	1.97	.35		2.32	1.31	1.68	.26		3.25
27	do.	Quicksand.....	.59	1.67		2.26	1.32	2.39	2.49		6.20
28	do.	Jackson		2.55	.06	2.61		2.92	4.08	.18	7.18
29	do.	Pine Mountain..		2.48	.44	2.92		.70	2.71	.16	3.57
30	do.	Hyden.....		2.23	.16	2.39		.72	2.60	.27	3.59

Table 1.--Continued

Map No.	Basin	Station	Date (Dec. 1978)			Storm total	Date (Dec. 1978)				Storm total
			3	4	5		7	8	9	10	
31	Kentucky River.	Lock 14, Ky....		2.60		2.60		5.02		4.37	9.39
32	do.	Big Creek.....		2.20		2.20		1.56	3.01		4.57
33	do.	Manchester.....		2.65	0.14	2.79		1.38	3.88	.24	5.50
34	do.	Oneida.....		2.85	.05	2.90		2.00	3.50	.15	5.65
35	do.	Lock 13, Ky. River.		2.22		2.22		4.68	3.68	.22	8.58
36	do.	Lock 12, Ky. River.		2.30		2.30		4.22	3.50		7.72
37	do.	College Hill...		2.72		2.72		3.53	3.64		7.17
38	do.	Clay City.....	0.10	2.50		2.60			3.15	3.60	6.75
39	do.	Lock 10, Ky. River.		2.18		2.18		2.56	3.69		6.25
40	do.	Valley View....		2.41		2.41		2.73	1.70		4.43
41	do.	Berea College..	.82	1.34		2.16	1.77	5.08	1.66		8.51
42	do.	Waynesburg.....		3.16		3.16	4.84	3.96			8.80
43	do.	Danville.....	.11	2.68		2.79		3.21	4.14	.10	7.45
44	do.	Tyrone.....		3.56		3.56		1.68	2.73		4.41
45	do.	Lock 3, Ky. River.	.60	2.05		2.65		1.61	1.72		3.33
46	do.	Lockport	1.57	1.77		3.34		1.70	1.52		3.22
47	do.	Jonesville.....	.54	1.64		2.18		2.15	1.29		3.44
48	do.	Carrollton.....	.75	1.10		1.85		1.87	1.30		3.17
49	Ohio River main stem.	McAlpine.....	.53	1.69		2.22		1.34	1.29	.12	2.75
50	Salt River	Shelbyville....	.74	2.34		3.08	.01	1.55	1.73		3.29
51	do.	Taylorsville...	1.95	2.20		4.15		1.84	2.01	.05	3.90
52	do.	Shepherdsville.	1.37	3.38		4.75	.05	1.52	1.73	.06	3.36

Table 1.--Continued.

Map No.	Basin	Station	Date (Dec. 1978)			Storm total	Date (Dec. 1978)				Storm total
			3	4	5		7	8	9	10	
53	Salt River	Bradfordsville.	0.08	3.89		3.97		3.73	4.01	0.06	7.80
54	do.	Springfield....	1.02	1.91		2.93	0.08	2.51	3.92	.03	6.54
55	do.	Boston.....	1.27	1.12		2.39			2.21	.52	2.73
56	Ohio River main stem.	Cannelton.....	.75	2.94		3.69		1.84	1.20		3.04
57	Green River	Liberty.....	.07	3.03		3.10	1.02	2.98	2.74		6.74
58	do.	Pond Station...		4.60		4.60	.80	3.20	.80		4.80
59	do.	Greensburg.....		3.24		3.24	1.02	2.69	3.18		6.89
60	do.	Munfordville...	.05	3.42		3.47	.45	3.41	4.14		8.00
61	do.	Brownsville....	.42	3.06		3.48	.40	2.85	5.34		8.59
62	do.	Leitchfield....	1.50	2.60		4.10	.75	2.48	2.10		5.33
63	do.	Gamaliel.....		3.72		3.72	.56	4.32	3.92		8.80
64	do.	Glasgow.....	.20	3.14		3.34	1.40	2.10	2.30		5.80
65	do.	Scottsville....		3.60		3.60	1.35	2.45	3.00		6.80
66	do.	Franklin.....	.11	3.13		3.24	.43	2.34	2.87		5.64
67	do.	Bowling Green..	.37	3.05		3.42	.08	2.17	2.45		4.70
68	do.	Woodbury.....	.58	2.29		2.87	.89	4.03	3.26		8.18
69	do.	Russellville...	.40	2.50		2.90	.68	2.05	3.20		5.93
70	do.	Rochester.....	2.28	2.98		5.26	.90	3.56	2.49		6.95
71	do.	Aberdeen.....		4.33		4.33	.85	3.55	3.30		7.70
72	do.	Caneyville.....	2.42	2.04		4.46	.84	3.27	2.11		6.22
73	do.	Glendale.....	1.48	2.18		3.66	.60	2.15	2.24		4.99
74	do.	Dundee.....	1.69	2.82		4.51	.32	2.04	1.19		3.55
75	do.	Madisonville...	2.32	2.25		4.57	.46	1.34	1.33		3.13
76	do.	Calhoun.....	1.22	3.12		4.34	.22	2.03	1.25		3.50
77	Ohio River main stem.	Henderson.....	2.24	.24		2.48	1.00	2.31			3.31

Table 1.--Continued.

Map No.	Basin	Station	Date (Dec. 1978)			Storm total	Date (Dec. 1978)				Storm total
			3	4	5		7	8	9	10	
78	Ohio River main stem.	Princeton.....	3.89	1.04		4.93	1.05	3.58	0.30		4.93
79	do.	Ford's Ferry Lick & Dam 50.	1.90	1.68		3.58	.45	1.92	.55		2.92
80	Cumberland River.	Cumberland....		2.73	0.28	3.01		.59	2.35	0.09	3.03
81	do.	Baxter.....		2.53	.33	2.86		.67	2.31	.17	3.15
82	do.	Pineville.....		1.42	.42	1.84	.02	.65	2.55	.13	3.33
83	do.	Middlesboro...	.02	3.11	.30	3.43		.14	2.55	.11	2.80
84	do.	Williamsburg..			1.30	1.30		.83	2.43		3.26
85	do.	Corbin.....	.01	2.64	.15	2.80	.06	.89	2.92	.03	3.90
86	do.	McKee.....	.96	2.31		3.27	1.45	4.37	.15		5.97
87	do.	Stearns.....	.50	1.17	.14	1.81	.05	.76	2.97		3.78
88	do.	Somerset.....		3.57		3.57		3.42	4.20		7.62
89	do.	Monticello....		3.98	.02	4.00	.25	1.31	3.83	.03	5.42
90	do.	Jamestown.....		4.50		4.50	1.00	4.57	3.80		9.37
91	do.	Burkesville...		3.72		3.72	.52	3.89	4.33		8.74
92	do.	Albany.....		4.28		4.28	.34	2.12	3.83	.05	6.34
93	do.	Elkton.....	.73	1.98		2.71	.68	1.65	3.27		5.60
94	do.	Hopkinsville..	.93	4.16		5.09	.72	3.50	3.17		7.39
95	do.	Cadiz.....	1.93	3.70		5.63	.90	2.11	2.45		5.46
96	do.	Cobb.....	1.98	1.95		3.93	.85	1.98	1.90		4.73
97	do.	Canton.....	1.50	4.30		5.80	.90	2.30	2.45		5.65
98	Tennessee River basin.	Benton.....		4.05		4.05	1.05	3.39			4.44
99	do.	Kentucky Dam..	3.60	.60		4.20	1.10	2.00	.08		3.18

Table 1.--Continued.

Map No.	Basin	Station	Date (Dec. 1978)			Storm total	Date (Dec. 1978)				Storm total
			3	4	5		7	8	9	10	
100	Ohio River basin.	Paducah.....	1.94	1.85		3.79	0.59	2.98	0.83		4.40
101	do.	Lovellaceville..	3.67	.30		3.97	1.70	2.12			3.82
102	Mississippi River basin.	Wingo.....	4.94	.68		5.62	.86	4.80	.16		5.82

FLOODS

The storm of December 3-4 did not cause significant flooding except on several small basins in western Kentucky. However, the soils throughout the State were saturated with water from this storm and streamflows were above normal base flows. These conditions intensified some of the flooding that resulted from the December 7-10 storm.

Most of the property damage was caused by the December 7-10 storm which also resulted in the loss of five lives. Severe flooding occurred in the Licking, Kentucky, Salt, Green and Mainstem Ohio basins. Lesser flooding was recorded in the Cumberland River basin.

Big Sandy River Basin

Nearly 10,000 residents of Paintsville (fig. 1) were evacuated from homes after cracks were detected in a temporary earth dam on Paint Creek, upstream from the city. They were allowed to return to the area after the flood water level receded.

Tygarts Creek Basin

The discharge for the Tygarts Creek near Greenup station exceeded the 100-year recurrence interval. Other stations in the basin did not experience severe flooding.

Licking River Basin

The peak discharge for the Stoner Creek at Paris station exceeded the 100-year recurrence interval. The peak discharge for the North Fork Triplett Creek near Morehead station exceeded the 50-year recurrence interval. The U.S. Army Corps of Engineers estimated that about two million dollars in damage was caused by floods in the Licking River Basin.

Kentucky River Basin

The Kentucky River Basin and the area around the city of Frankfort were probably the area most affected by the floods. About one-fifth of Frankfort was flooded and nearly one thousand residents were evacuated from their homes. Damage to private and public property in the Kentucky River Basin exceeded 14.5 million dollars. The Red River flooded Clay City and forced the evacuation of about three hundred of the fifteen hundred residents.

The peak discharge at Lock 2 on the Kentucky River exceeded a recurrence interval of 200 years, while at Lock 4 the flood had a recurrence interval of 200 years. At Locks 6 and 10 on the Kentucky River, Dix River near Danville and North Elkhorn Creek near Georgetown, peak discharges exceeded a recurrence of 100 years. The Red River near Hazel Green and at Clay City recorded peaks with recurrence intervals in excess of 50 years.

Salt River Basin

The Rolling Fork, a tributary of the Salt River, produced record floods at New Haven, Boston and Lebanon Junction. The commercial district in New Haven was flooded and 17 families were evacuated from residential areas. At the gaging station located near Boston, a peak discharge of 65,000 ft³/s with a recurrence interval greater than 50-years was recorded. Nearly 75 families were forced from their homes by the flooding of the Rolling Fork at Lebanon. This flood had a recurrence interval greater than 25 years. Damages to property in the Salt River Basin were about two million dollars.

Green River Basin

Significant floods occurred throughout the tributaries of the Green River. The peak discharge exceeded a recurrence interval of 50-years at Bacon Creek near Priceville and at Russell Creek near Columbia.

The Green River mainstem station at Lock 2 at Calhoun recorded a peak discharge of 73,800 ft³/s. Damages in the Green River Basin were estimated at about seven million dollars.

Cumberland River Basin

The peak discharge at Little River near Cadiz exceeded the 100-year recurrence interval. The peak discharge at Beaver Creek near Monticello exceeded the 25-year recurrence interval.

Ohio River Mainstem

Although the flooding on the Ohio River resulted in significant losses to private property, none of the peaks recorded at the gaging stations on the Ohio River exceeded a recurrence interval of 10-years. Flooding was concentrated in Louisville and upstream with total damages estimated at about 20 million dollars.

STREAMFLOW DATA

Data from ninety-eight streamflow and 10 lake gaging stations operated by the U.S. Geological Survey in Kentucky (fig. 3) are included in this report. Stage data, from which streamflow is derived, is collected on a continuous basis at these sites. During the floods, about 60 water-discharge measurements were made by personnel of the U.S. Geological Survey. Many of these were record measurements.

A summary of peak stages, discharges and recurrence intervals is shown in table 2 for the gaging stations in figure 3. The recurrence intervals are divided into 1.25, 2, 5, 10, 25, and 50, 100 and 200 year probabilities. Discharges at indicated intervals for selected key stations are shown in table 3. Stage hydrographs at five sites are shown in figure 4-8. Stage and contents at selected lakes are listed in table 4. The maximum stage and content during the storm period is shown in the second stage and content columns.

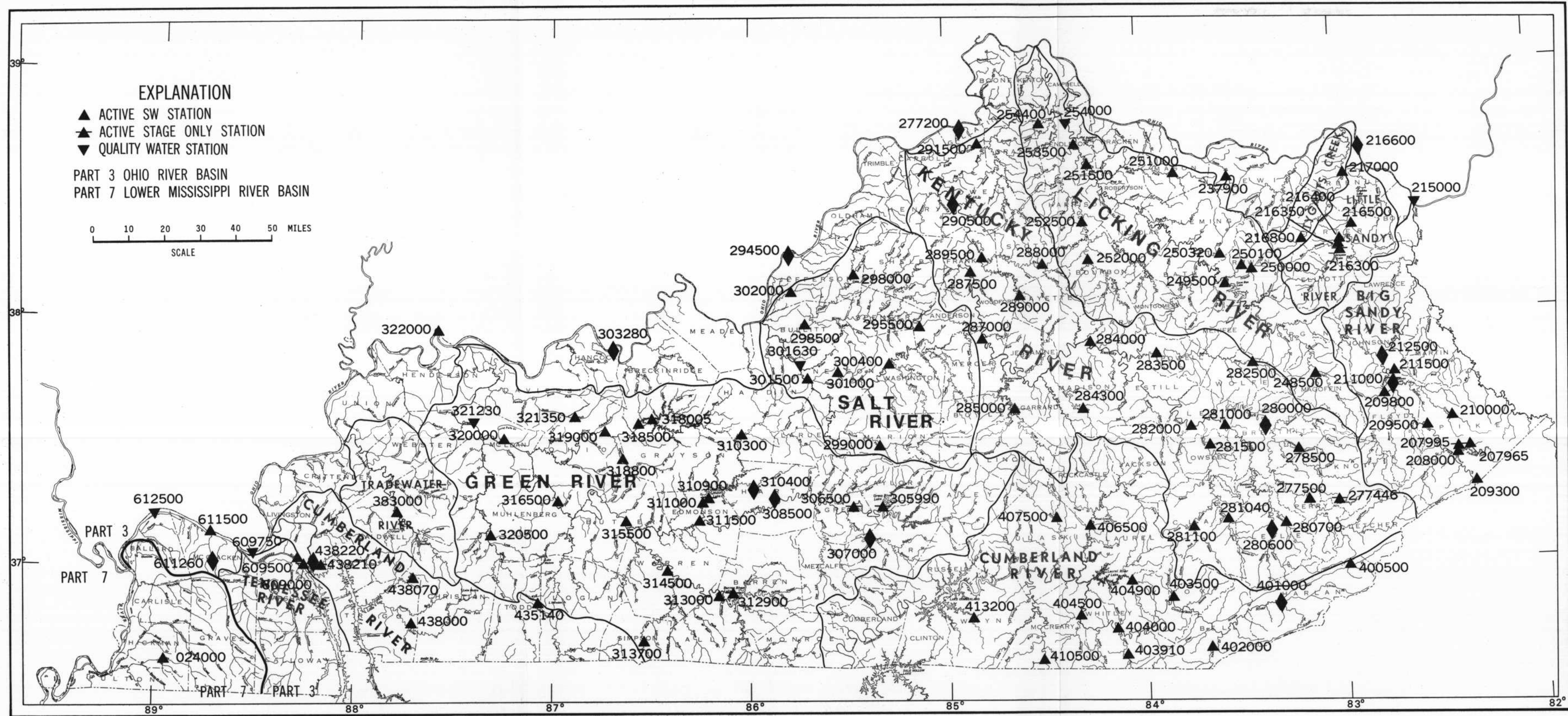


Figure 3.-- Streamflow and water-quality network.

Table 2.--Summary of flood stages and discharges

Station number	Station name	Drainage area (mi ²)	Period of record	Maximum previously known					Maximum during December 1978 flood				
				Date	Gage height (ft)	Discharge (ft ³ /s)	Discharge (ft ³ /s/mi ²)	Date	Gage height (ft)	Discharge (ft ³ /s)	Discharge (ft ³ /s/mi ²)	Recurrence interval (years)	
03207965	Grapevine Cr. nr Phyllis.	6.20	1973-	June 1, 1974	5.45	1,650	266	Dec. 9	2.59	596	96	-	
03208000	Levisa Fk. below Fish-trap Dam nr Millard.	592	1938-	Jan. 29, 1957	55.2	35,000	84	Dec. 9	72.14 ^a	-	-	-	
03209300	Russell Fk. at Elkhorn City.	554	1960-	Apr. 4, 1977	24.80	54,200	98	Dec. 9	15.74	14,500	26	r	
03209500	Levisa Fk. at Pikeville.	1,258	1937-	Jan. 30, 1957	52.72	85,500	69	Dec. 9	25.08	20,200	16	r	
03209800	Levisa Fk. at Prestonsburg.	1,702	1963-	Jan. 30, 1957	48.78	69,700	41	Dec. 10	51.88	26,400	16	r	
03321000	Johns Cr. nr Meta.....	56.3	1941-	Mar. 12, 1963	17.58	7,380	131	Dec. 9	17.41	4,280	76	>5	
03211500	Johns Cr. nr Van Lear.	206	1939-	Jan. 9, 1946 Jan. 30, 1957	- 27.88 ^a	8,350	41	Dec. 8	14.75 ^a	-	-	r	
03212500	Levisa Fk. at Paintsville.	2,144	1928-	Jan. 31, 1957	45.92	69,700	33	Dec. 9	54.21	33,700	16	r	
03216350	Little Sandy R. below Grayson Dam nr Leon.	196	1966-	Mar. 7, 1967	-	5,600	29	Dec. 9	105.30 ^a	-	-	-	
03216400	Little Sandy R. at Leon.	255	1961-	Feb. 28, 1962	51.0	10,800	42	Dec. 9	25.51 ^a	-	-	-	
03216500	Little Sandy R. at Grayson.	460	1938-	Sept. 22, 1950	27.53	24,500	61	Dec. 9	28.99	13,900	35	r	
03216600	Ohio River at Greenup Dam.	62,000	1968-	Jan. 12, 1974 Jan. 13, 1974	- 55.11 ^b	540,000	9	Dec. 11	58.76 ^b	500,000	8	>5	
03216800	Tygarts Cr. at Olive Hill.	59.6	1957-	Apr. 22, 1972	17.06	9,470	159	Dec. 8	18.60	8,600	144	>5	
03217000	Tygarts Cr. nr Greenup.	242	1940-	Feb. 28, 1962	21.58	22,000	91	Dec. 9	22.75	25,400	125	>100	
03237900	Cabin Cr. nr Tollesboro.	22.4	1972-	Apr. 22, 1972	14.42	8,370	374	Dec. 4	11.28	4,820	215	-	
03248500	Licking R. nr Salyersville.	140	1938-	Feb. 3, 1939	25.4	14,300	102	Dec. 9	24.91	13,200	94	>25	
03249500	Licking R. at Farmers.	827	1938-	Feb. 28, 1962	-	24,000	29	Dec. 9	25.32 ^a	-	-	-	
03250000	Triplett Cr. at Morehead.	47.5	1941-	July 5, 1939	18.9	44,000	926	Dec. 8	16.95	10,000	211	>2	
03250100	No. Fk. Triplett Cr. nr Morehead.	84.7	1967-	Apr. 22, 1972	20.15	9,890	117	Dec. 8	19.76	9,380	111	>50	
03250320	Rock Lick Cr. nr Sharkey.	4.01	1973-	Mar. 12, 1975	17.72	1,480	369	Dec. 5	17.45	1,140	284	-	
03251000	No. Fk. Licking R. nr Lewisburg.	119	1946-	July , 1938	22.7	13,300	112	Dec. 9	16.59	7,680	65	>2	

Station number	Station name	Drainage area (mi ²)	Period of record	Maximum previously known				Maximum during December 1978 flood				Recurrence interval (years)
				Date	Gage height (ft)	Discharge (ft ³ /s) (ft ³ /s/mi ²)		Date	Gage height (ft)	Discharge (ft ³ /s) (ft ³ /s/mi ²)		
03251510	Licking R. at McKinneysburg.	2,326	1938-	Mar. 10, 1964	50.26	59,100	25	Dec. 10	38.73	37,800	16	r
03252000	Stoner Cr. at Paris..	239	1953-	Mar. 5, 1964	19.59	17,000	71	Dec. 9	20.55	19,400	81	>100
03252500	So. Fk. Licking R. at Cynthiana.	621	1938-	Apr. 13, 1948	23.32	55,500	57	Dec. 10	22.99	28,200	45	>10
03253500	Licking R. at Catawba.	3,300	1928-	Mar. 10, 1964	52.60	95,000	29	Dec. 11	38.96	61,600	19	r
03254400	No. Fk. Grassy Cr. nr Piner.	13.6	1967-	Apr. 30, 1970	19.92	20,200	1,485	Dec. 7	8.41	1,850	135	>1.1
03277200	Ohio R. at Mark-land Dam.	83,170	1970-	Apr. 9, 1977 Jan. 26, 1937	76.1 ^b	472,000	6	Dec. 3	55.29 ^b	535,000	6	-
03277500	No. Fk. Kentucky R. at Hazard.	466	1940-	Jan. 29, 1957	37.54	47,800	103	Dec. 9	18.85	19,200	41	>2
03278500	Troublesome Cr. at Noble.	177	1949-	Mar. 12, 1963	29.75	22,800	129	Dec. 9	25.34	16,200	92	>5
03280000	No. Fk. Kentucky R. at Jackson.	1,101	1928-1931 1938-	Feb. 4, 1939 Jan. 30, 1957	43.10 -	- 53,500	- 49	Dec. 9	35.03	37,900	34	>5
03280600	Middle Fk. Kentucky R. nr Hyden.	202	1957-	Jan. 29, 1957	33.3	60,000 ^c	297	Dec. 9	13.26	9,820	49	>1.25
03280700	Cutshin Cr. at Wooton.	61.3	1957-	Jan. 1957 Mar. 12, 1963	19.43 -	14,200 -	232	Dec. 9	8.61	4,040	66	>1.25
03281000	Middle Fk. Kentucky R. at Tallega.	537	1930-1932 1939-	Jan. 30, 1957	43.33	52,700	98	Dec. 9	30.53	13,200	25	r
03281040	Red Bird R. nr Big Cr..	155	1972-	1947 Apr. 4, 1977	29.27 -	- 19,100	- 123	Dec. 9	13.55	12,800	83	-
03281100	Goose Cr. at Manchester.	163	1964-	June 28, 1947	40.6	58,000	233	Dec. 9	24.75	9,950	61	>1.25
03281500	So. Fk. Kentucky R. at Booneville.	722	1925-1931 1939-	Jan. 30, 1957	43.40	66,100	92	Dec. 9	36.91	37,400	52	>2
03282000	Kentucky R. at Lock 14 at Heidelberg.	2,657	1925-1931 1938-	Feb. 4, 1939	35.6	120,000	45	Dec. 9	28.32	81,800	31	>2
03282500	Red R. nr Hazel Green.	65.8	1954-	Feb. 27, 1962	22.12	9,080	138	Dec. 9	20.51	7,960	121	>50
03283500	Red R. at Clay City.	362	1930-1932	Feb. 28, 1962	23.90	22,600	62	Dec. 9	26.83	29,000	80	>50
03284000	Kentucky R. at Lock 10 nr Winchester.	3,955	1907-	Feb. 5, 1939	-	92,400	23	Dec. 10	40.2	115,000	29	>100

Table 2.--Summary of flood stages and discharges--Continued

Station number	Station name	Drainage area (mi ²)	Period of record	Maximum previously known				Maximum during December 1978 flood				Recurrence interval (years)
				Date	Gage height (ft)	Discharge (ft ³ /s)	Discharge (ft ³ /s/mi ²)	Date	Gage height (ft)	Discharge (ft ³ /s)	Discharge (ft ³ /s/mi ²)	
03284300	Silver Cr. nr Kingston.	28.6	1967-	Jan. 1, 1957 Apr. 4, 1968	18.5	- 6,410	- 224	Dec. 8	15.21	5,820	204	>2
03285000	Dix R. nr Danville....	318	1942-	Apr. 28, 1970	17.16	33,400	105	Dec. 9	21.81	44,400	140	>100
03287000	Kentucky R. at Lock 6 nr Salvisa.	5,102	1925-	Jan. 25, 1937 Jan. 23, 1937	43.35 -	- 112,000	- 22	Dec. 10	49.04	127,000	25	>100
03287500	Kentucky R. at Lock 4 at Frankfort.	5,412	1925-	Jan. 25, 1937	47.46	115,000	21	Dec. 9 Dec. 10	- 48.47	118,000 -	22	200
03288000	No. Elkhorn Cr. nr Georgetown.	119	1949-	Mar. 5, 1964	19.50	8,500	71	Dec. 9	20.22	9,750	82	>100
03289000	So. Elkhorn Cr. at Fort Spring.	24.0	1950-	June 23, 1960	9.15	1,890	79	Dec. 8	8.85	1,710	71	>10
03289500	Elkhorn Cr. nr Frankfort.	473	1939-	Aug. 2, 1932 Mar. 5, 1964	17.5 -	- 23,200	- 49	Dec. 9	13.47	17,900	38	>5
03290500	Kentucky R. at Lock 2 at Lockport.	6,180	1925-	Jan. 24, 1937 Jan. 26, 1937	56.85 ^a -	- 123,000	- 20	Dec. 11	51.65	122,000	20	>200
03291500	Eagle Cr. at Glencoe..	437	1938-1977	Mar. 10, 1964	26.05	58,200	133	Dec. 9	16.76	18,400	42	>1.25
03294500	Ohio R. at Louisville.	91,170	1928-	Jan. 26, 1937- Jan. 27, 1937	85.44	1,110,000	12	Dec. 13 Dec. 14	- 63.60	635,000	7	>5
03295500	Salt R. nr Van Buren..	196	1938-	Mar. 4, 1964	21.16	16,700	85	Dec. 8	18.40	12,200	62	>5
03298000	Floyds Fork at Fisherville.	138	1944-	Apr. 2, 1970	15.63	28,500	207	Dec. 4	12.20	9,680	70	>1.25
03298500	Salt R. at Shepherdsville.	1,197	1938-	Jan. 26, 1937 Mar. 10-11, 1964	47.3 -	- 78,200	- 65	Dec. 9 Dec. 10	- 32.62	41,300 -	34	>5
03299000	Rolling Fk. nr Lebanon..	239	1938-	1913 Apr. 28, 1970	24.7 -	- 54,800	- 229	Dec. 8	23.17	37,600	157	>25
03300400	Beech Fk. at Maud.....	436	1972-	Mar. 4-6, 1964	25.64	28,300	65	Dec. 9	26.16	34,000	78	-
03301000	Beech Fk. at Bardstown.	669	1939-1974	Mar. 5, 1964	43.5	33,900	51	Dec. 9	46.0	39,900	60	>25
03301500	Rolling Fk. nr Boston.	1,299	1938-	Jan. 1937 Apr. 30, 1970	55.2 -	- 50,500	- 39	Dec. 10	51.73	65,000	50	>50
03302000	Pond Cr. nr Louisville.	64.0	1944-	Mar. 9, 1964	22.69	8,020	125	Dec. 4	18.79	3,130	49	>2
03303280	Ohio R. at Cannelton Dam.	97,000	1975-	Feb. 23, 1976	43.70 ^b	503,000	5	Dec. 15	49.08 ^b	620,000	6	-

Table 2.--Summary of flood stages and discharges - Continued

Station number	Station name	Drainage area (mi ²)	Period of record	Maximum previously known				Maximum during December 1973 flood				Recurrence interval (years)	
				Date	Gage height (ft)	Discharge (ft ³ /s)	Discharge (ft ³ /s/mi ²)	Date	Gage height (ft)	Discharge (ft ³ /s)	Discharge (ft ³ /s/mi ²)		
03306000	Green R. nr Campbellsville.	682	1930-1932 1963-	Feb. 28, 1962	122.6	60,700	89	-	-	-	-	-	-
03307000	Russell Cr. nr Columbia.	188	1939-	Feb. 27, 1962	24.34	29,700	158	Dec. 8	24.12	28,800	153		>50
03308500	Green R. at Munfordville.	1,673	1915-1922 1927-1931 1936-	Mar. 1, 1962	57.72	76,800	46	Dec. 10	51.89	61,800	57		r
03310300	Nolin R. at White Mills.	357	1959-	Apr. 29, 1970	34.86	19,400	54	Dec. 9	34.02	18,500	52		>25
03310400	Bacon Cr. nr Priceville.	85.4	1959-	Nov. 1957 Feb. 24, 1975	21.8 -	- 3,350	- 39	Dec. 8	19.88	6,600	--		>50
03311000	Nolin R. at Kyrock....	703	1930-32, 1939-1950, 1950-	Jan. 30, 1932	59.27	22,700	32	Dec. 26	-	11,200	16		r
03311500	Green R. at Lock 6 at Brownsville.	2,762	1924-31, 1936-37, 1938-	Jan. 24, 1937	44.94	120,000	43	Dec. 11	37.26	70,100	25		r
03311600	Beaverdam Cr. at Rhoda.	10.9	1972-	Mar. 12, 1975	11.19	4,890	449	-	-	-	-		-
03313000	Barron River nr Finney.	940	1941-1950, 1960-	Feb. 27, 1962	110.6	78,000	83	Dec. 2	84.75	3,060	3		r
03313700	West Fk. Drakes Cr. nr Franklin.	110	1968-	Mar. 12, 1975	23.20	27,300	248	Dec. 8	20.03	16,000	145		>5
03314500	Barren R. at Bowling Green.	1,848	1938-	Jan. 8, 1915 Feb. 2, 1962	52.2 -	- 85,000	- 46	Dec. 9	39.47	48,900	26		r
03315500	Green R. at Lock 4 at Woodbury.	5,403	1936-	Jan. 25, 1937	43.1	205,000	38	Dec. 11	34.07	102,000	19		r
03316500	Green R. at Paradise.	6,182	1939-1950 1960-	Mar. 5, 1962	40.46	107,000	17	Dec. 13	36.01	75,700	12		r
03318500	Rough R. at Falls of Rough.	504	1939-	Jan. 25, 1937 Jan. 14, 1950	34.06 -	- 12,400	- 25	Dec. 4	22.82	5,440	11		r
03318800	Caney Cr. nr Horse Br.	124	1956-	Nov. 18, 1957	14.43	10,000	81	Dec. 4	10.35	4,410	36		>1.25
03319000	Rough R. nr Dundee....	757	1939-	Nov. 1, 1937 Jan. 14, 1950	31.8 -	- 20,000	- 26	Dec. 9	28.06	11,600	15		r
03320000	Green R. at Lock 2 at Calhoun.	7,564	1930-	Jan. 27, 1937	42.4	208,000	28	Dec. 16 Dec. 15	32.47 -	- 73,800	10		r
03320500	Pond R. nr Apex.....	194	1940-	Nov. 19, 1957	20.70	21,800	112	Dec. 9	21.42	17,600	91		>10
03321350	So. Fk. Panther Cr nr Whitesville.	58.2	1968-	Apr. 2, 1970 Feb. 18, 1976	18.18 -	- 3,300	- 57	Dec. 4	17.88	3,860	66		>25

Table 2.--Summary of flood stages and discharges--Continued

Station number	Station name	Drainage area (mi ²)	Period of record	Maximum previously known				Maximum during December 1978 flood				Recurrence interval (years)
				Date	Gage height (ft)	Discharge (ft ³ /s) (ft ³ /s/mi ²)		Date	Gage height (ft)	Discharge (ft ³ /s) (ft ³ /s/mi ²)		
03322000	Ohio R. at Evansville.	107,000	1936-	Jan. 31, 1937	53.75	-	-	Dec. 16	44.84	-	7	>5
				Jan. 29, 1937	-	1,410,000	13	Dec. 15	-	701,000	-	
03383000	Tradewater R. at Olney.	255	1940-	Jan. 1937	19.27	-	53	Dec. 9	17.16	6,590	26	>5
				Mar. 10, 1964	-	13,600	-	-	-	-	-	
03400500	Poor Fk. at Cumberland.	82.3	1940-	Jan. 29, 1957	16.50	11,800	143	Dec. 9	9.50	2,290	28	>1.1
03401000	Cumberland R. nr Harlan.	374	1940-	Apr. 5, 1977	30.20	64,500	172	Dec. 9	13.16	15,100	40	>1.25
03402000	Yellow Cr. nr Middlesboro.	60.6	1940-	Apr. 4, 1977	23.35	11,700	193	Dec. 4	13.75	4,340	72	>2
03403500	Cumberland R. at Barbourville.	960	1922-1931 1948-	Apr. 6, 1977	45.91	56,100	58	Dec. 10	30.99	23,900	25	>1.25
03403910	Clear Fork at Saxton..	331	1968-	1929 Apr. 5, 1977	41.7 -	- 22,800	- 69	Dec. 9	22.22	7,010	21	>1.1
03404000	Cumberland R. at Williamsburg.	1,607	1950-	Jan. 10, 1946	34.2	-	-	Dec. 10	20.28	19,700	12	>1.1
				Jan. 31, 1957	-	49,700	31	-	-	-	-	
03404500	Cumberland R. at Cumberland Falls.	1,977	1907-1911 1914-	Jan. 28, 1918	15.5	59,600	30	Dec. 9	9.13	24,100	12	>1.1
03404820	Laurel R. at Municipal Dam nr Cabin.	140	1973-	Mar. 13, 1975	26.12	12,400	89	-	-	-	-	-
03404900	Lynn Camp Cr. at Corbin.	53.8	1973-	Jan. 29, 1957	22.5	9,000	167	Dec. 9	9.06	2,490	46	>1.25
03406500	Rockcastle R. at Billows.	604	1936-	June 29, 1947	45.48	46,800	77	Dec. 9	47.17	50,100	83	>25
03407500	Buck Cr. nr Shopville.	165	1952-	Feb. 27, 1962	23.21	19,900	121	Dec. 8	21.94	18,100	110	>10
03410500	So. Fk. Cumberland R. nr Stearns.	954	1942-	Mar. 1929	52.9	-	-	Dec. 10	26.80	35,100	37	>1.25
				May 28, 1973	-	93,200	98	-	-	-	-	
03413200	Beaver Cr. nr Monticello.	43.4	1968-	1946	10.8	-	-	Dec. 9	8.88	10,900	251	>25
				Apr. 4, 1977	-	8,160	188	-	-	-	-	
03435140	Whippoorwill Cr. nr Claymoor.	20.8	1973-	Mar. 12, 1975	17.75	8,380	403	Dec. 8	14.08	3,770	181	-
03438000	Little R. nr Cadiz....	244	1940-	Mar. 12, 1975	22.28	19,400	80	Dec. 8	22.33	19,600	80	>100
03438070	Muddy Fk. Little R. nr Cerulean.	30.5	1968-	Aug. 10, 1970	19.87	7,320	240	Dec. 3	17.88	3,310	109	>1.25
03438220	Cumberland R. nr Grand Rivers.	17,598	1939-	Jan. 1937	51.1	-	-	Dec. 11	40.39	146,000	8	r
				Mar. 16, 1975	-	209,000	12	-	-	-	-	
03611260	Massac Cr. nr Paducah.	14.6	1971-	June 5, 1975	14.74	3,320	227	Dec. 13	14.02	2,820	193	-
03611500	Ohio R. at Metropolis, IL.	203,000	1928-	Feb. 1, 1937	-	1,850,000	9	Dec. 12	44.70	905,000	4	>2
				Feb. 2, 1937	66.60	-	-	-	-	-	-	
07024000	Bayou de Chien nr Clinton.	687	1939-	Mar. 12, 1975 Jan. 2, 1966	16.22 -	- 9,460	138	Dec. 4	15.83	5,380	78	>5

a backwater; b tail-water gage; c about; r regulated.

Table 3.--Discharge at selected sites

03213500 South Fork Panther Creek nr. Whiteside, Ky.

Date	Time	Discharge (ft ³ /s)	Date	Time	Discharge (ft ³ /s)
Dec. 3, 1978	0200	39	Dec. 4, 1978	1000	3,620
	0400	101		1200	3,470
	0600	446		1800	2,990
	0800	1,640		2400	2,010
	1000	1,990	Dec. 5	0600	1,030
	1200	2,460		1200	453
	1400	2,660		1800	295
	1600	2,860		2400	221
	1800	2,990	Dec. 6	0600	168
	2000	3,190		1200	141
	2200	3,310			
	2400	3,570			
Dec. 4	0200	3,780			
	0400	3,850			
	0600	3,770			
	0800	3,720			

03283500 Red River at Clay City, Ky.

Date	Time	Discharge (ft ³ /s)
Dec. 8, 1978	0600	5,930
	1200	7,140
	1800	11,900
	2400	18,900
Dec. 9	0200	20,600
	0400	22,800
	0600	24,900
	0800	26,800
	1000	27,800
	1200	28,500
	1400	29,000
	1600	28,900
	1800	28,400
	2000	27,100
	2200	26,700
	2400	25,400
Dec. 10	0600	20,900
	1200	16,300
	1800	12,400
	2400	9,840
Dec. 11	0600	8,040
	1200	6,610

Table 3.--Discharge at selected sites--Continued

03285000 Dix River nr. Danville, Ky.

Date	Time	Discharge (ft ³ /s)	Date	Time	Discharge (ft ³ /s)
Dec. 7, 1978	1500	3,840	Dec. 8, 1978	2100	38,500
	1800	8,450		2200	40,300
	2100	10,400		2300	42,000
	2400	12,300		2400	44,100
Dec. 8	0300	14,700	Dec. 9	0100	44,400
	0600	17,600		0200	43,700
	0900	22,000		0300	43,100
	1200	27,300		0600	37,800
	1500	32,100		0900	28,500
	1800	34,600		2100	10,500
			2400	9,500	

03287500 Kentucky River at Lock 4 at Frankfort, Ky.

Date	Time	Discharge (ft ³ /s)	Date	Time	Discharge (ft ³ /s)
Dec. 8, 1978	0300	35,000	Dec. 11, 1978	0300	112,000
	0900	48,900		0600	111,000
	1200	54,900		0900	110,000
	1500	63,600		1200	109,000
	1800	72,000		1500	109,000
	2100	80,900		1800	108,000
	2400	89,100		2400	106,000
	Dec. 9	0300		95,600	Dec. 12
0600		101,000	1200	103,000	
0900		106,000	1800	101,000	
1200		110,000	2400	98,900	
1500		114,000	Dec. 13	0600	95,500
1800		117,000		1200	92,300
2100		118,000		1800	88,600
2400		118,000		2400	83,100
Dec. 10	0300	118,000	Dec. 14	0600	77,400
	0600	118,000		1200	67,700
	0900	117,000		1800	53,500
	1200	115,000		2400	38,100
	1500	116,000			
	1800	115,000			
	2100	114,000			
	2400	113,000			

Table 3.--Discharge at selected sites--Continued

03294500 Ohio River at Louisville, Ky.

Date	Time	Discharge (ft ³ /s)	Date	Time	Discharge (ft ³ /s)
Dec. 7, 1978	0600	367,000	Dec. 12, 1978	0600	596,000
	1200	375,000		1200	607,000
	1800	362,000		1800	617,000
	2400	358,000		2400	626,000
Dec. 8	0600	361,000	Dec. 13	0600	631,000
	1200	381,000		0900	635,000
	1800	401,000		1200	632,000
	2400	422,000		1800	631,000
Dec. 9	0600	437,000	Dec. 14	2400	627,000
	1200	450,000		0600	631,000
	1800	469,000		1200	627,000
	2400	485,000		1800	617,000
Dec. 10	0600	496,000	Dec. 15	2400	614,000
	1200	509,000		0600	600,000
	1800	521,000		1200	581,000
	2400	532,000		1800	562,000
Dec. 11	0600	546,000	Dec. 16	2400	538,000
	1200	560,000		0600	508,000
	1800	584,000		1200	470,000
	2400	584,000		1800	429,000
			Dec. 17	2400	388,000
				0600	338,000
				1200	291,000
				1800	264,000
				2400	244,000

03298500 Salt River at Shepherdsville, Ky.

Date	Time	Discharge (ft ³ /s)	Date	Time	Discharge (ft ³ /s)
Dec. 7, 1978	0300	7,160	Dec. 10, 1978	0300	36,800
	0600	6,260		0600	35,900
	0900	5,610		0900	34,200
	1200	5,250		1200	33,600
Dec. 8				1500	32,400
	1800	25,400		1800	30,600
	2100	28,100		2100	28,800
	2400	30,500		2400	26,900
Dec. 9	0300	33,500	Dec. 11	0600	22,000
	0600	35,800		1200	18,700
	0900	38,600		1800	15,300
	1200	40,200			
	1500	40,800			
	1600	41,300			
	1800	40,200			
	2100	39,100			
2400	37,300				

Table 3.--Discharge at selected sites--Continued

03310300 Nolin River at White Mills, Ky.

Date	Time	Discharge (ft ³ /s)	Date	Time	Discharge (ft ³ /s)
Dec. 7, 1978	0600	1,180	Dec. 9, 1978	1800	18,400
	1200	1,320		2000	18,200
	1800	1,780		2200	17,800
	2400	3,130		2400	17,200
Dec. 8	0600	4,160	Dec. 10	0600	14,700
	1200	5,480		1200	11,700
	1800	6,930		1800	9,080
	2400	8,550		2400	6,370
Dec. 9	0200	9,270	Dec. 11	0600	4,120
	0400	10,300		1200	3,060
	0600	12,200		1800	2,590
	0800	14,300		2400	2,360
	1000	15,900	Dec. 12	0600	2,180
	1200	17,100		1200	2,020
	1400	17,900		1800	1,910
	1600	18,300			

03310400 Bacon Creek nr. Priceville, Ky.

03406500 Rockcastle River at Billows, Ky.

Date	Time	Discharge (ft ³ /s)	Date	Time	Discharge (ft ³ /s)
Dec. 7, 1978	1200	181	Dec. 7, 1978	1800	3,040
	1800	315		2400	6,540
	2400	1,030	Dec. 8	0600	12,200
Dec. 8	0400	1,540		1200	17,400
	0800	2,020		1800	24,700
	1200	3,500		2400	35,800
	1400	4,120	Dec. 9	0400	42,600
	1600	4,540		0800	46,600
	1800	5,030		1200	48,800
	2000	5,920		1600	50,100
	2200	6,520	2000	48,800	
2300	6,600	2400	46,500		
2400	6,560	Dec. 10	0600	40,900	
Dec. 9	0600		5,080	1200	33,600
	1200		3,510	1800	24,800
	1800		2,290	2400	14,400
	2400	1,120	Dec. 11	0600	6,290
Dec. 10	0600	614		1200	3,330
	1200	460			

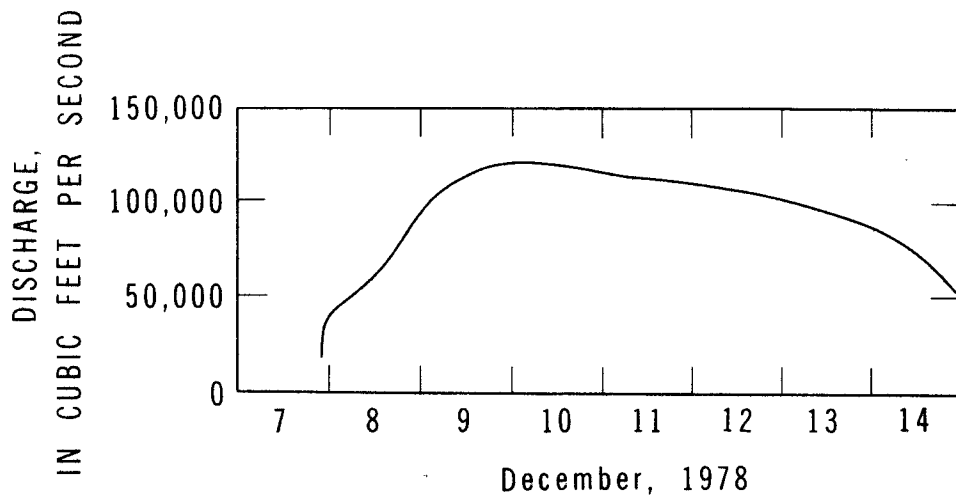


Figure 4.-- Hydrograph of Kentucky River at lock 4, Frankfort, Ky.

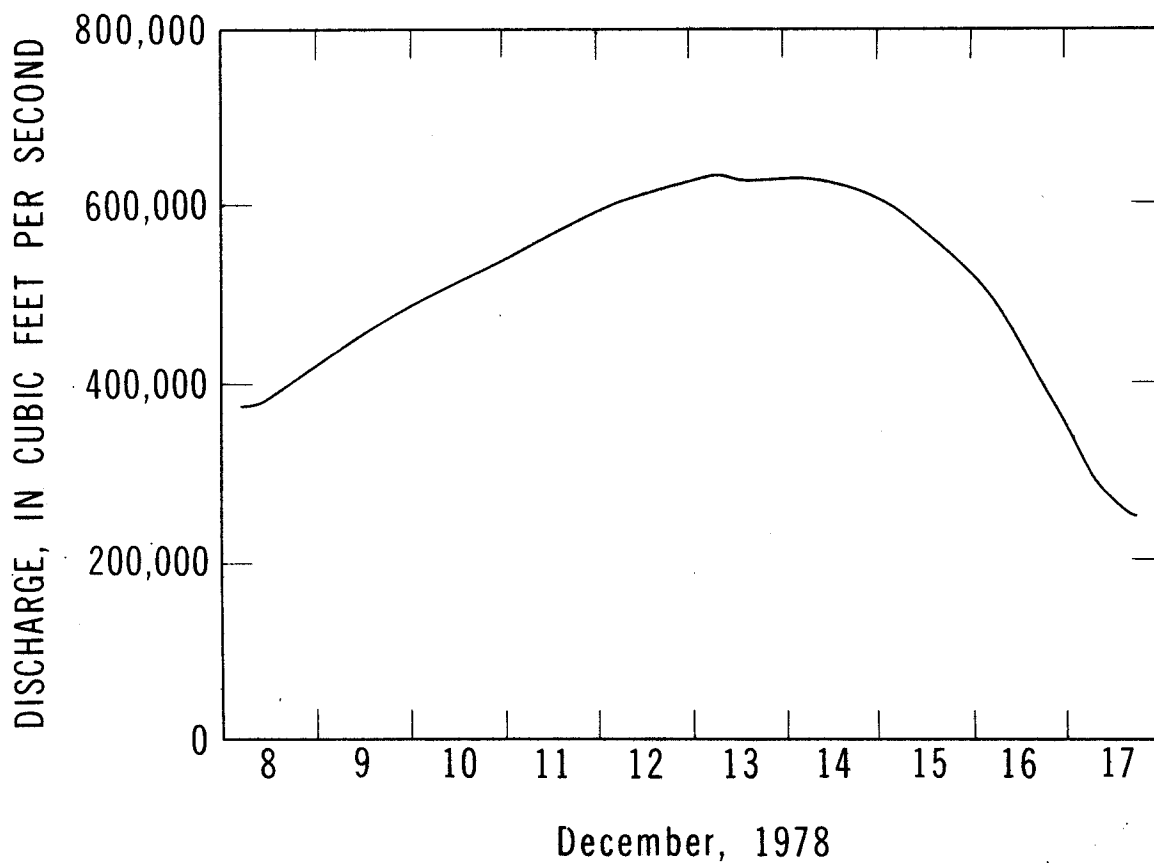


Figure 5.-- Hydrograph of Ohio River at Louisville, Ky.

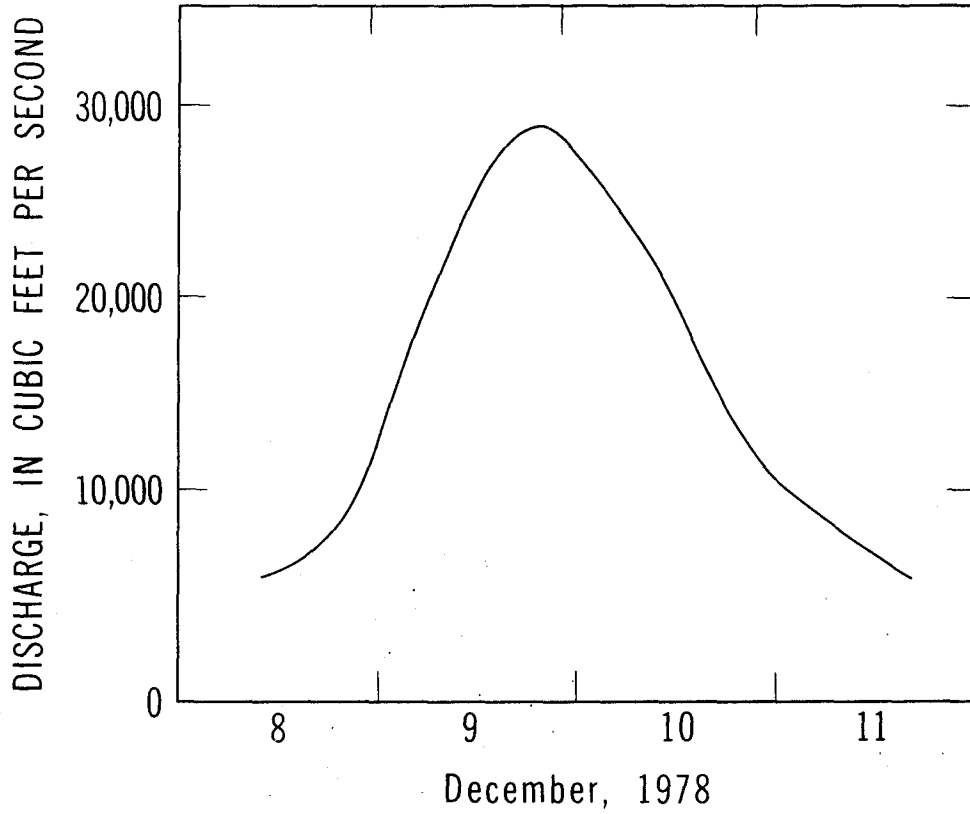


Figure 6.-- Hydrograph of Red River at Clay City, Ky.

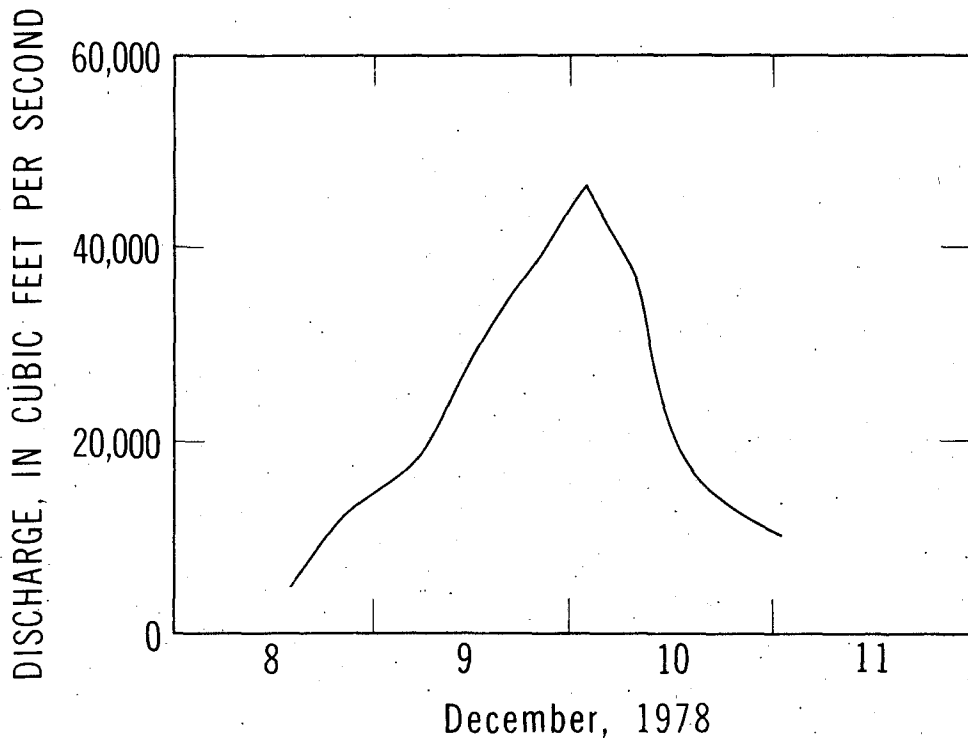


Figure 7.-- Hydrograph of Dix River near Danville, Ky.

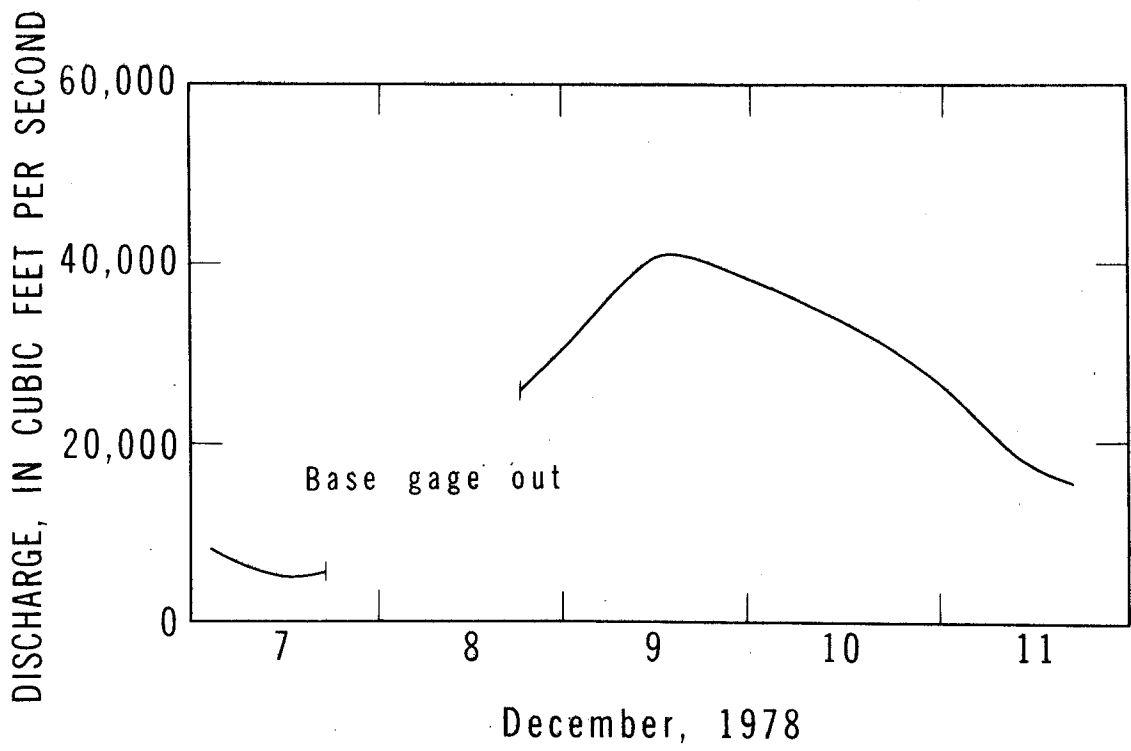


Figure 8.-- Hydrograph of Salt River at Shepherdsville, Ky.

Table 4.--Lake Stages and Contents

<u>Station number</u>	<u>Name</u>	<u>Date</u>	<u>Time hours</u>	<u>Stage feet</u>	<u>Contents acre-feet</u>	<u>Date</u>	<u>Time hours</u>	<u>Stage feet</u>	<u>Contents acre-feet</u>
03207995	Fishtrap Lake	Nov. 30, 1978	2400	725.32	10,700	Dec. 12, 1978	1100	753.60	34,000
03211000	Dewey Lake near Van Lear	Nov. 30, 1978	2400	645.11	12,400	Dec. 12, 1978	0800	667.60	44,200
03216300	Grayson Lake near Leon	Nov. 30, 1978	2400	657.08	18,800	Dec. 12, 1978	1100	664.59	69,300
03277446	Carr Fork near Sassafras	Nov. 30, 1978	2400	1006.85	10,800	Dec. 11, 1978	1200	1021.97	19,230
03286000	Herrington Lake near Burgin	Nov. 30, 1978	2400	751.90	63,450	Dec. 9, 1978	0600	761.2	127,400
03305990	Green River Lake near Campbellsville	Nov. 30, 1978	2400	671.52	216,480	Dec. 14, 1978	1300	703.83	566,470
03310900	Nolin Lake near Kyrock	Nov. 30, 1978	2400	497.76	89,280	Dec. 15, 1978	1500	535.94	326,010
03312900	Barren River Lake near Finney	Nov. 30, 1978	2400	555.59	110,100	Dec. 15, 1978	1000	578.89	611,870
03318005	Rough River Lake near Falls of Rough	Nov. 30, 1978	2400	480.10	57,410	Dec. 15, 1978	1000	509.70	209,900
03438200	Lake Barkley near Grand Rivers	Nov. 30, 1978	2400	554.40	631,100	Dec. 10, 1978	2400	358.87	1,287,400
03609000	Kentucky Lake at Gilbertsville	Nov. 30, 1978	2400	554.39	2,155,300	Dec. 10, 1978	2400	358.27	2,873,700

WATER QUALITY DATA

Significant changes in the water quality characteristics occur during a flood. The increase in runoff usually results in the transport of large amounts of soil and other materials to the streams. Sediment loads usually increase substantially, increasing the turbidity of the waters and resulting in the transport and deposition of large amounts of sands, silts and clays. Flooding usually produces a dilution of most of the dissolved components because of the slower solution rates resulting from shorter contact times with flood waters. Data relative to suspended and dissolved materials in flood waters is scarce. During the December 1978 floods, samples for suspended and dissolved constituents were collected at several sites throughout Kentucky. These sites constitute part of either National or State programs operated by the U.S. Geological Survey.

Suspended Sediment

Suspended-sediment discharge measurements collected at 13 sites during the floods of December 1978, are summarized in table 5. The data from suspended-sediment discharge measurements made at Ohio River mainstem stations at Cannelton and Louisville are summarized in figures 9-12. They include suspended-sediment concentrations, percentage of sand, and point velocities. A computation of the suspended-sediment load at the Ohio River at Louisville indicated that at the peak of the flood, an average of about 800,000 tons of sediment were discharged during a 24-hour period. Time variations of water discharge, suspended-sediment concentration, and suspended-sediment discharge at the Levisa Fork at Paintsville gaging station are shown in figure 13. The suspended-sediment concentration peaked at Paintsville on December 8, about 26 hours ahead of the water-discharge peak.

Chemical, physical, and bacteriological data

Chemical, physical and bacteriological analyses from samples collected at several sites throughout Kentucky during the floods are listed in table 6. Data from samples collected at some of the sites prior to the floods are also included. These data provide a reference for comparison of the changes in concentrations as a result of the flood.

Table 5.--Suspended-sediment data at selected sites, December 1978

Station No.	Station name	Date	Time	Instantaneous water discharge (ft ³ /s)	Instantaneous suspended-sediment concentration (mg/L)	Instantaneous suspended-sediment discharge (T/d)		
03210000	Johns Cr. nr. Meta, Ky.....	Dec. 6, 1978	1520	95	197	51		
		Dec. 6,	1845	93	98	25		
		Dec. 7,	1605	175	2,020	954		
		Dec. 8,	1805	466	1,590	2,000		
		Dec. 9,	1015	4,240	2,060	23,600		
		Dec. 9,	1435	3,800	1,030	10,600		
		Dec. 11,	1630	156	97	41		
		Dec. 12,	0745	116	80	25		
		Dec. 12,	1540	113	42	13		
		Dec. 14,	0750	60	51	8.3		
		Dec. 14,	1530	52	36	5.1		
		03212500	Levisa Fk. at Paintsville, Ky.	Dec. 4, 1978	1450	9,730	1,880	49,400
				Dec. 4,	1735	10,700	1,740	50,300
Dec. 5,	0655			12,100	1,410	46,100		
Dec. 5,	1250			11,900	1,060	34,100		
Dec. 5,	1715			11,200	788	23,800		
Dec. 6,	1230			7,930	670	14,300		
Dec. 6,	1735			7,010	432	8,180		
Dec. 7,	1720			5,780	416	6,490		
Dec. 8,	0700			16,600	1,560	69,900		
Dec. 8,	1245			20,600	1,490	82,900		
Dec. 8,	2200			24,800	916	61,300		
Dec. 11,	1040			23,000	284	17,600		
Dec. 11,	1530			18,400	248	12,300		
Dec. 12,	1545			4,820	328	4,270		
Dec. 15,	1800			8,530	384	8,840		
Dec. 20,	1505	1,620	124	542				

Table 5.--Suspended-sediment data at selected sites, December 1978--Continued

Station No.	Station name	Date	Time	Instantaneous water discharge (ft ³ /s)	Instantaneous suspended sediment concentration (mg/L)	Instantaneous suspended sediment discharge (T/d)
03215000	Big Sandy at Louisa, Ky....	Dec. 21, 1978	0900	3,410	366	3,370
03216600	Ohio River at Greenup, Ky..	Dec. 20, 1978	1530	99,800	209	56,300
03277200	Ohio River at Markland Dam, Ky.	Dec. 13, 1978	1330	535,000	636	919,000
03280000	North Fk. Kentucky River at Jackson, Ky.	Dec. 9, 1978	1740	32,700	1,620	143,000
03280600	Middle Fk. Kentucky River nr. Hyden, Ky.	Dec. 4, 1978	0715	5,280	2,270	32,400
03294500	Ohio River at Louisville, Ky.	Dec. 14, 1978	1715	592,000	507	810,000
03303200	Ohio River at Cannelton Dam, Ky.	Dec. 15, 1978	1340	622,000	507	851,000
03308500	Green River at Munfordville, Ky.	Dec. 8, 1978 Dec. 9, 1978 Dec. 10, 1978	1025 1430 1700	20,300 55,100 58,100	466 278 208	25,500 41,400 32,600
03310400	Bacon Cr. nr. Priceville, Ky.	Dec. 8, 1978 Dec. 8, 1978 Dec. 9, 1978	1540 1930 1245	4,060 5,260 3,300	459 336 136	5,030 4,770 1,210
03401000	Clover Fk. at Harlan, Ky.	Dec. 4, 1978 Dec. 9, 1978 Dec. 19, 1978	1500 1540 0905	4,550 4,950 230	6,260 1,660 41	76,900 22,200 25
03611260	Massac Cr. nr. Paducah, Ky.	Dec. 7, 1978	0840	265	162	116

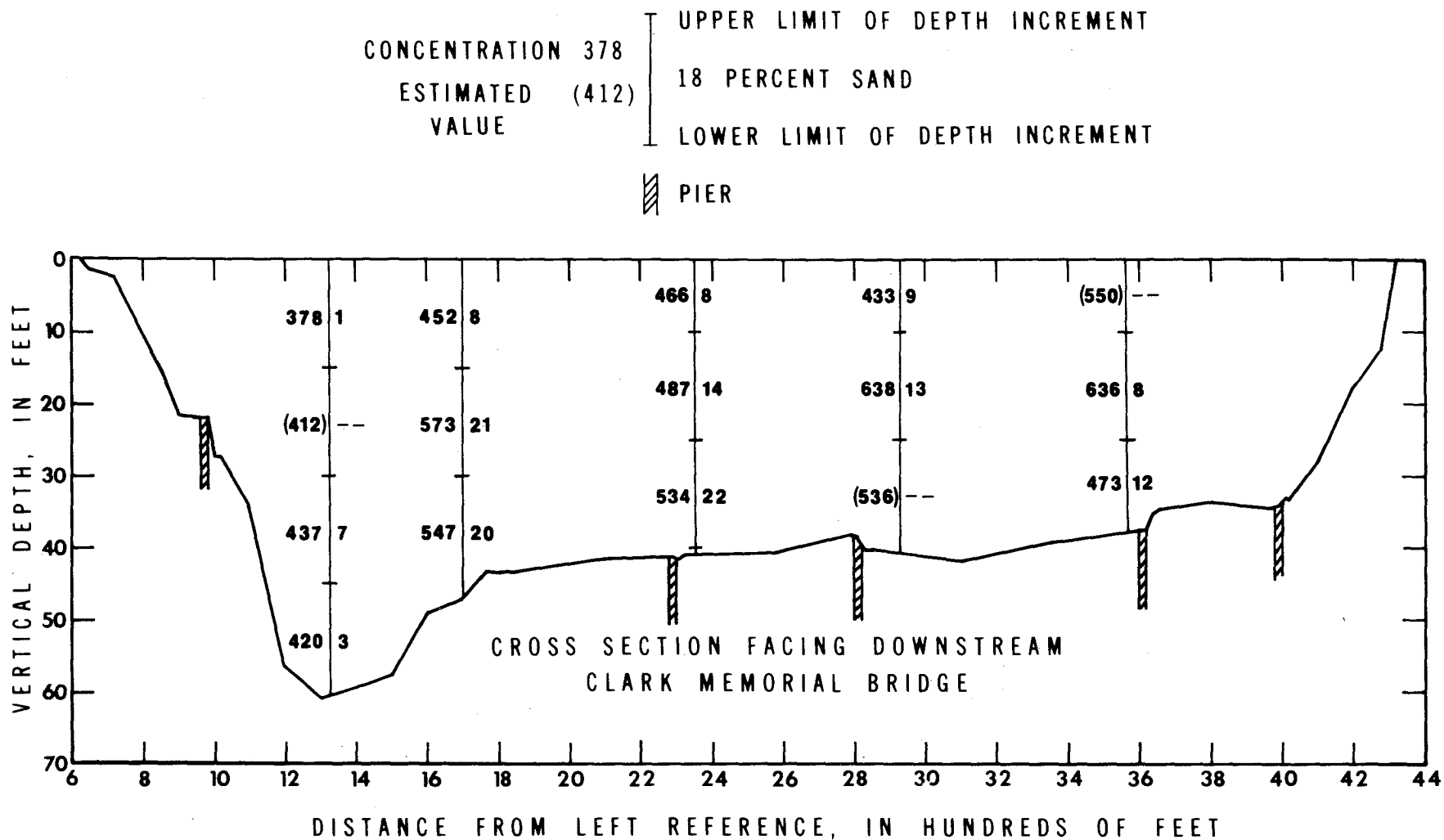


Figure 9.-- Suspended-sediment concentration, in milligrams per liter, and percent of sand for increments of depth, Ohio River at Louisville, Ky., Dec. 14, 1978.

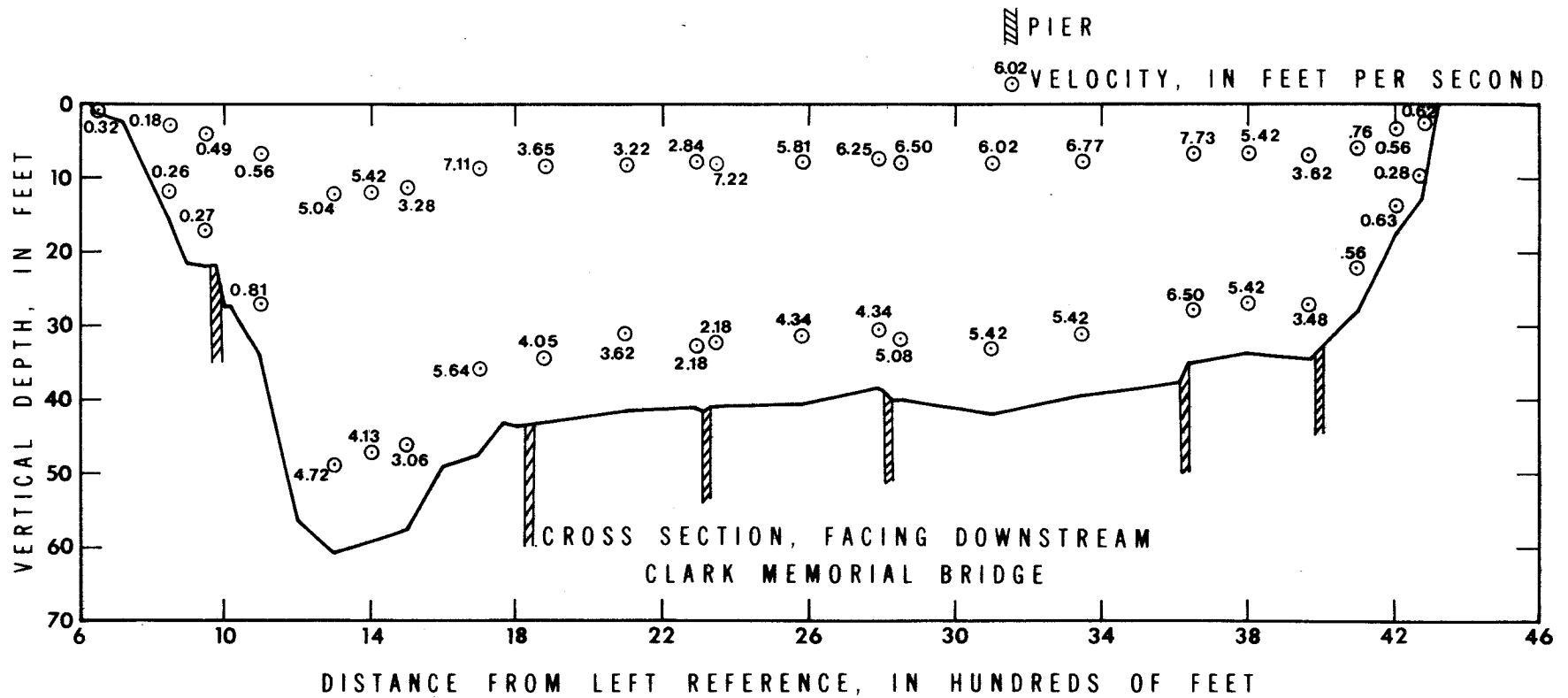


Figure 10.-- Measured velocity, at selected depths, Ohio River at Louisville, Ky., Dec. 14, 1978.

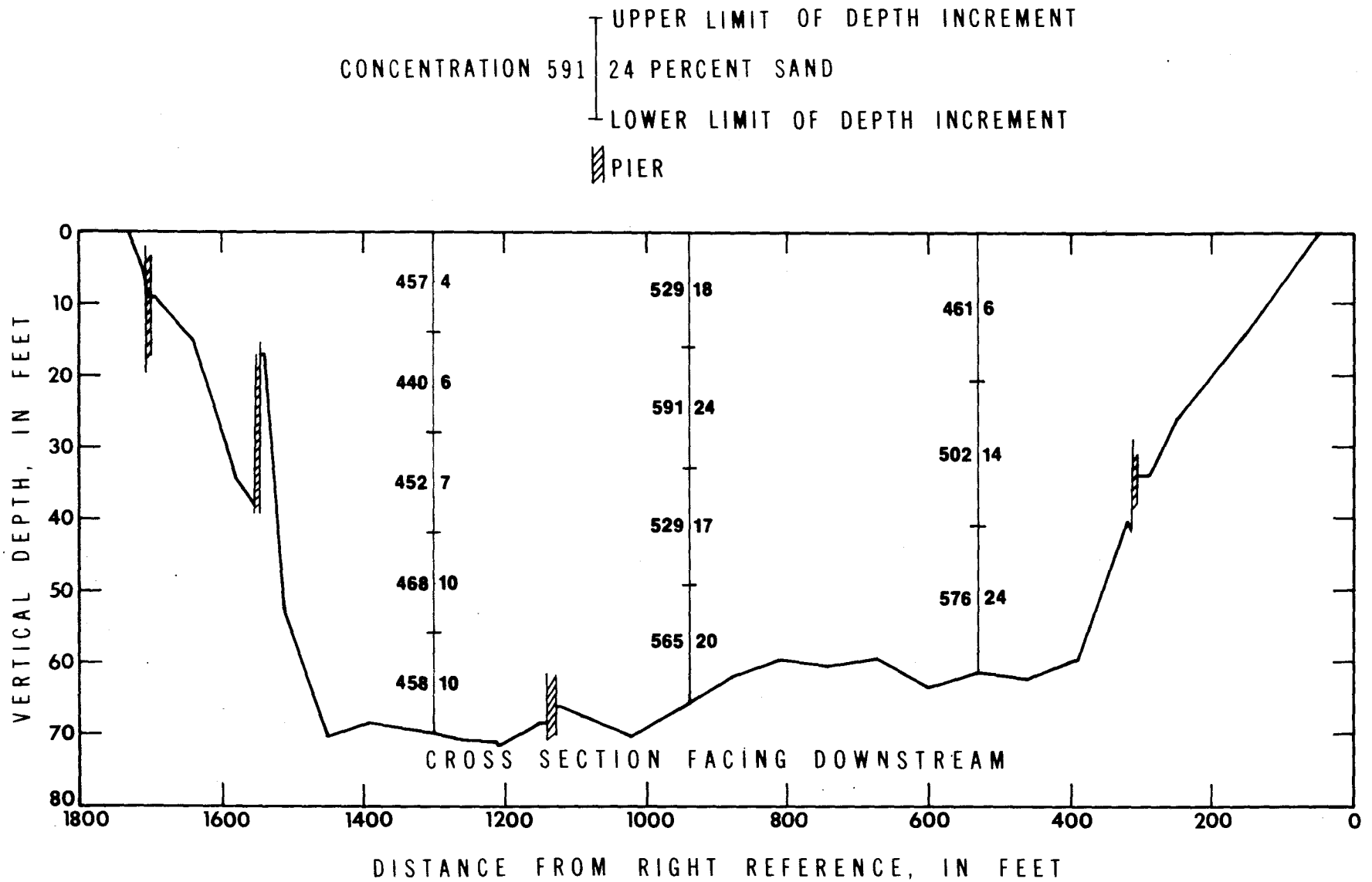


Figure 11.-- Suspended-sediment concentration, in milligrams per liter, and percent of sand for increments of depth, Ohio River at Cannelton, Ky., Dec. 15, 1978.

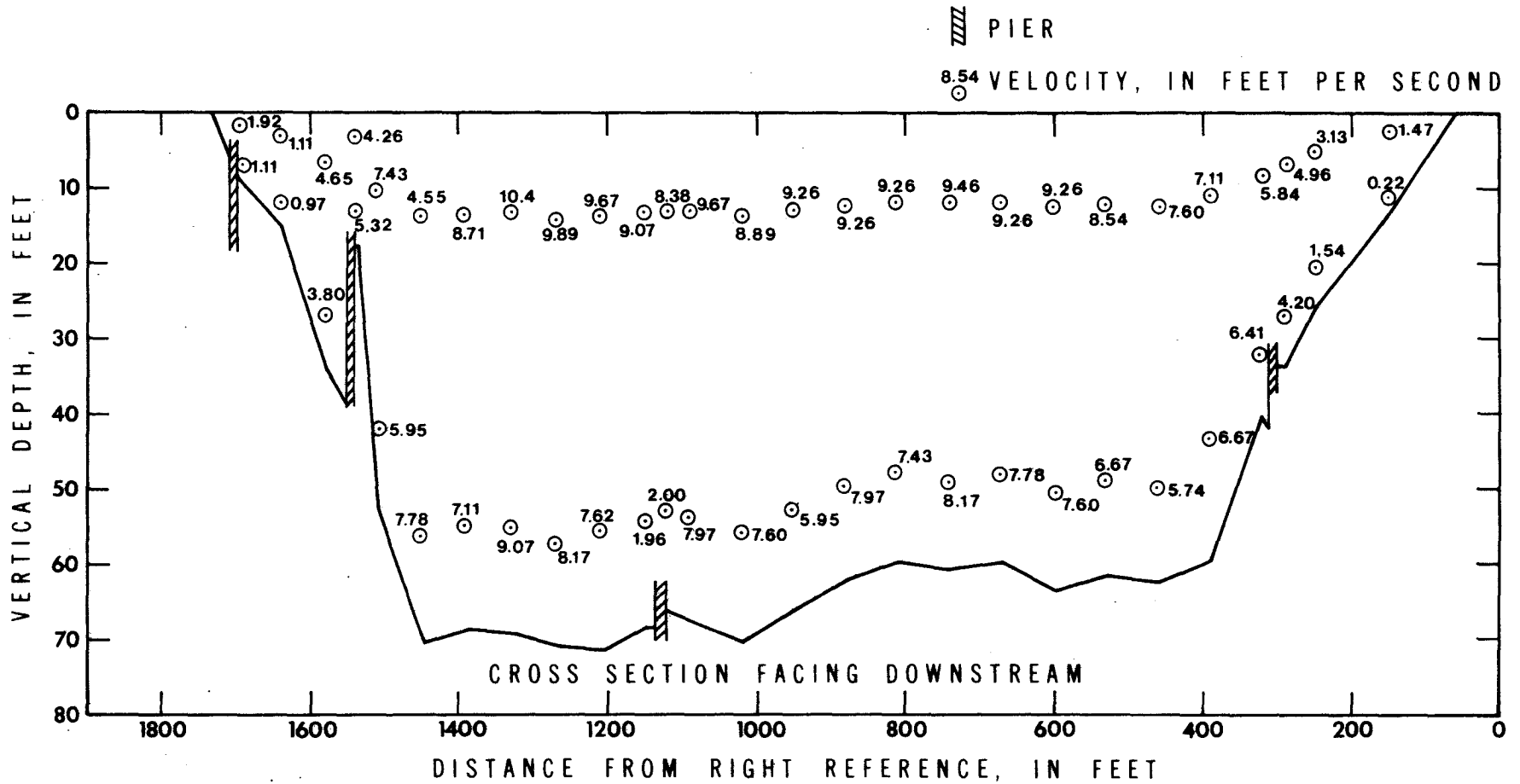


Figure 12.-- Measured velocity, at selected depths, Ohio River at Cannelton, Ky., Dec. 15, 1978.

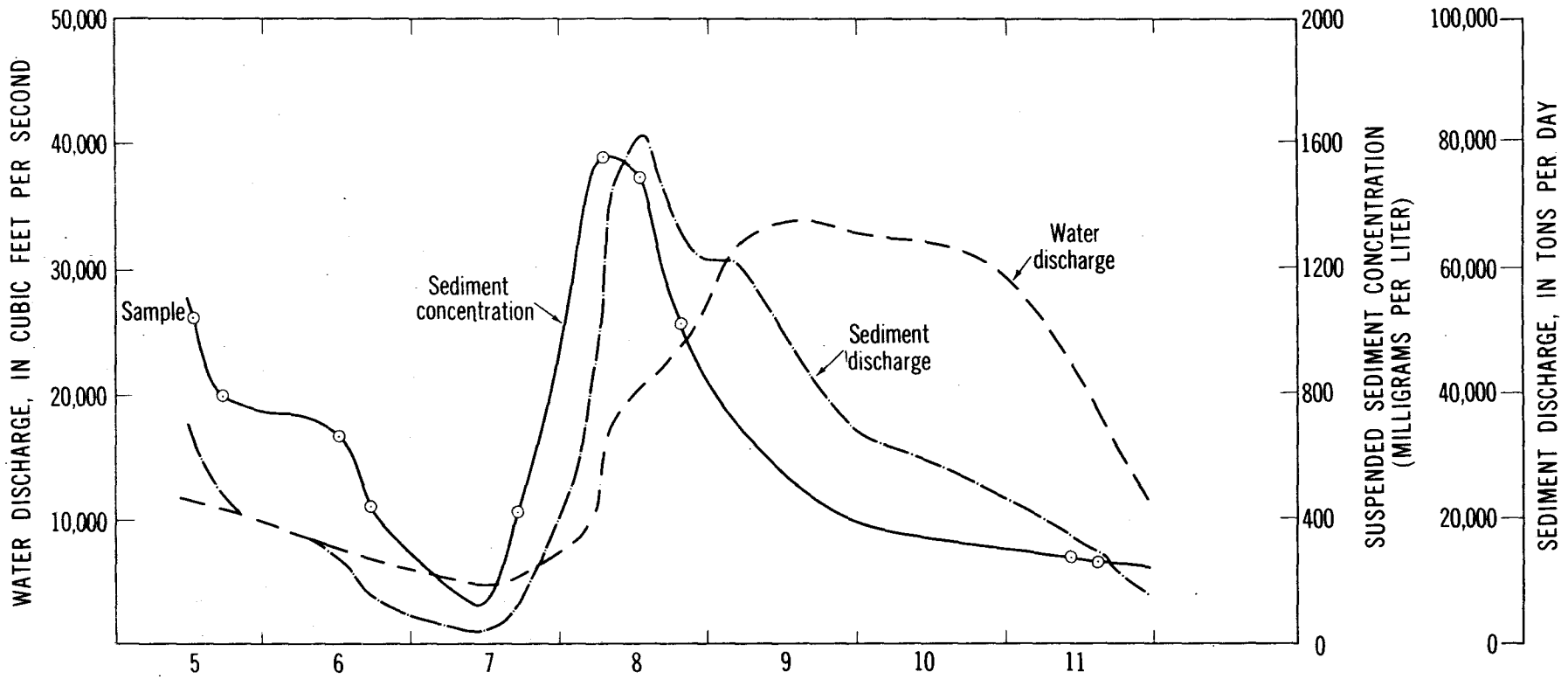


Figure 13.-- Variations of water discharge, sediment concentration, and sediment discharge for period Dec. 5-11, 1978, Levisa Fork at Paintsville, Ky.

Table 6.--Chemical, physical, and bacteriological analyses at selected sites.

03215000 - BIG SANDY R AT LOUISA, KY

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	TUR- RID- ITY (NTU)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
DEC 21...	0900	3410	299	7.1	7.0	150	1700	1300	110	69

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	ALKA- LINITY (MG/L AS CAC03)	SULFATE DIS- SOLVED (MG/L AS S04)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED AS SI02)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)
DEC 21...	24	12	17	2.6	40	85	12	.1	7.2	204

DATE	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)
DEC 21...	.63	.13	.58	.71	.18	1.3	5.9	.13	.00	6.3

Table 6.--Continued.

03216500 - OHIO R AT GREENUP DAM NR GREENUP, KY

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	TUR- BID- ITY (NTU)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	CALCIUM DIS- SOLVED (MG/L AS CA)
DEC 20...	1515	254	7.0	6.0	45	1200	410	88	56	24

DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	ALKA- LINITY (MG/L AS CAC03)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SI02)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)
DEC 20...	6.8	11	2.4	32	56	16	.1	5.8	164	1.0

DATE	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)
DEC 20...	.17	.42	.59	.28	1.6	7.0	.10	.00	5.3

03254000 - LICKING RIVER AT BUTLER, KY.

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	TUR- BID- ITY (NTU)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
DEC										
01...	1130	4070	290	7.9	8.0	40	K1600	4300	150	30
10...	1410	63100	199	7.2	3.0	150	K13000	25000	66	9

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	ALKA- LINITY (MG/L AS CAC03)	SULFATE DIS- SOLVED (MG/L AS S04)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SiO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)
DEC										
01...	49	6.8	3.4	2.8	120	31	4.9	.1	7.1	208
10...	22	2.7	2.4	3.6	57	11	2.2	.1	4.1	102

DATE	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)
DEC										
01...	1.5	.03	.52	.55	.33	2.0	9.1	.21	.09	6.4
10...	.73	.07	1.0	1.1	--	1.8	8.1	.64	--	12

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	TUR- BID- ITY (NTU)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)
DEC										
07...	1545	30600	308	7.7	9.0	200	--	2000	130	71
13...	1330	535000	166	7.3	7.0	200	5700	1200	68	36

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DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	ALKA- LILITY (MG/L AS CAC03)	SULFATE DIS- SOLVED (MG/L AS S04)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SI02)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)
DEC										
07...	35	9.6	19	3.2	56	76	23	.1	4.9	227
13...	19	5.1	6.7	2.6	32	39	8.8	.1	5.4	119

DATE	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)
DEC										
07...	1.4	.14	2.1	2.2	--	3.6	16	.58	--	27
13...	.95	.16	1.2	1.4	.15	2.4	10	.36	.02	11

Table 6.--Continued.

03290500 - KENTUCKY RIVER AT LOCK 2, AT LOCKPORT, KY.

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MH/S)	PH (UNITS)	TEMPER- ATURE (DEG C)	TUR- BID- ITY (NTU)	COLI- FORM, FECAL, JM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CACO3)	HARD- NESS, NONCAR- BONATE (MG/L CACO3)
DEC 11....	1430	114000	174	7.2	8.0	250	K1700	5700	73	17

44

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	ALKA- LINITY (MG/L AS CACO3)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SI02)
DEC 11....	23	3.8	2.9	2.5	56	17	4.7	.1	3.8

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)
DEC 11....	112	.72	.09	.47	.56	1.3	5.7	.21	11

Table 6.--Continued.

03301630 - ROLLING FORK NR LEBANON JUNCTION, KY.

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	TUR- BID- ITY (NTU)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)
DEC 12...	1145	135	7.1	7.0	150	1200	2600	58	10	18	3.1
DATE	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	ALKA- LINITY (MG/L AS CAC03)	SULFATE DIS- SOLVED (MG/L AS S04)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SI02)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)
DEC 12...	1.0	2.4	48	9.0	2.0	.1	3.9	89	.68	.11	10

Table 6.--Continued.

03303280 - OHIO R AT CANNELTON DAM, KY

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TURBIDITY (NTU)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI, FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS AS CAC03 (MG/L)	HARDNESS, NONCARBONATE (MG/L CAC03)
DEC										
05...	1415	286000	392	7.4	9.0	800	4600	5200	160	84
15...	1340	631000	174	7.1	8.0	200	K790	380	67	32

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNESIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTASSIUM, DIS-SOLVED (MG/L AS K)	ALKALINITY (MG/L AS CAC03)	SULFATE DIS-SOLVED (MG/L AS S04)	CHLORIDE, DIS-SOLVED (MG/L AS CL)	FLUORIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SI02)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)
DEC										
05...	45	12	18	3.4	78	74	23	.2	5.3	239
15...	19	4.8	6.1	2.6	35	36	8.0	.1	4.9	117

DATE	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)
DEC										
05...	1.7	.17	1.7	1.9	--	3.6	16	.93	.06	20
15...	.87	.06	.94	1.0	.07	1.9	8.3	.40	.03	17

03321230 - GREEN RIVER NR BEECH GROVE, KY.

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TURBIDITY (NTU)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI, FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CAC03)	HARDNESS, NONCARBONATE (MG/L CAC03)
DEC 20...	1115	52600	130	6.7	6.0	50	120	9900	81	29

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNESIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTASSIUM, DIS-SOLVED (MG/L AS K)	ALKALINITY (MG/L AS CAC03)	SULFATE DIS-SOLVED (MG/L AS S04)	CHLORIDE, DIS-SOLVED (MG/L AS CL)	FLUORIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SI02)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)
DEC 20...	25	4.4	2.4	2.1	52	20	3.3	.1	4.8	108

DATE	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)
DEC 20...	.82	.05	.30	.35	.20	1.2	5.2	.08	.01	5.9

Table 6.--Continued.

03438220 - CUMBERLAND RIVER NEAR GRAND RIVERS, KY.

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)
DEC 21...	1115	61400	220	7.3	6.0	.83	.09	.28

DATE	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)
DEC 21...	.37	.35	1.2	5.3	.17	.07	3.2

Table 6.--Continued.

03609750 - TENNESSEE RIVER AT HIGHWAY 60, NEAR PADUCAH, KY.

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)
DEC 22...	1110	130	6.9	5.0	.43	.05	.34

DATE	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)
DEC 22...	.39	.34	.82	3.6	.11	.06	3.2

Table 6.--Continued.

03612500 - OHIO R AT LOCK AND DAM 53 NR GRAND CHAIN ILL

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)
DEC								
07...	1040	360	7.2	7.0	510	890	1.2	.09
19...	1030	220	7.4	3.0	--	--	1.0	.07

DATE	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)
DEC								
07...	1.0	1.1	--	2.3	10	.42	--	8.5
19...	.62	.69	.33	1.7	7.5	.25	.04	7.8



Figure 14.-- Rolling Fork River in Bullitt County, Ky., at flood stage.
(The town of Lebanon Junction is shown in the foreground).

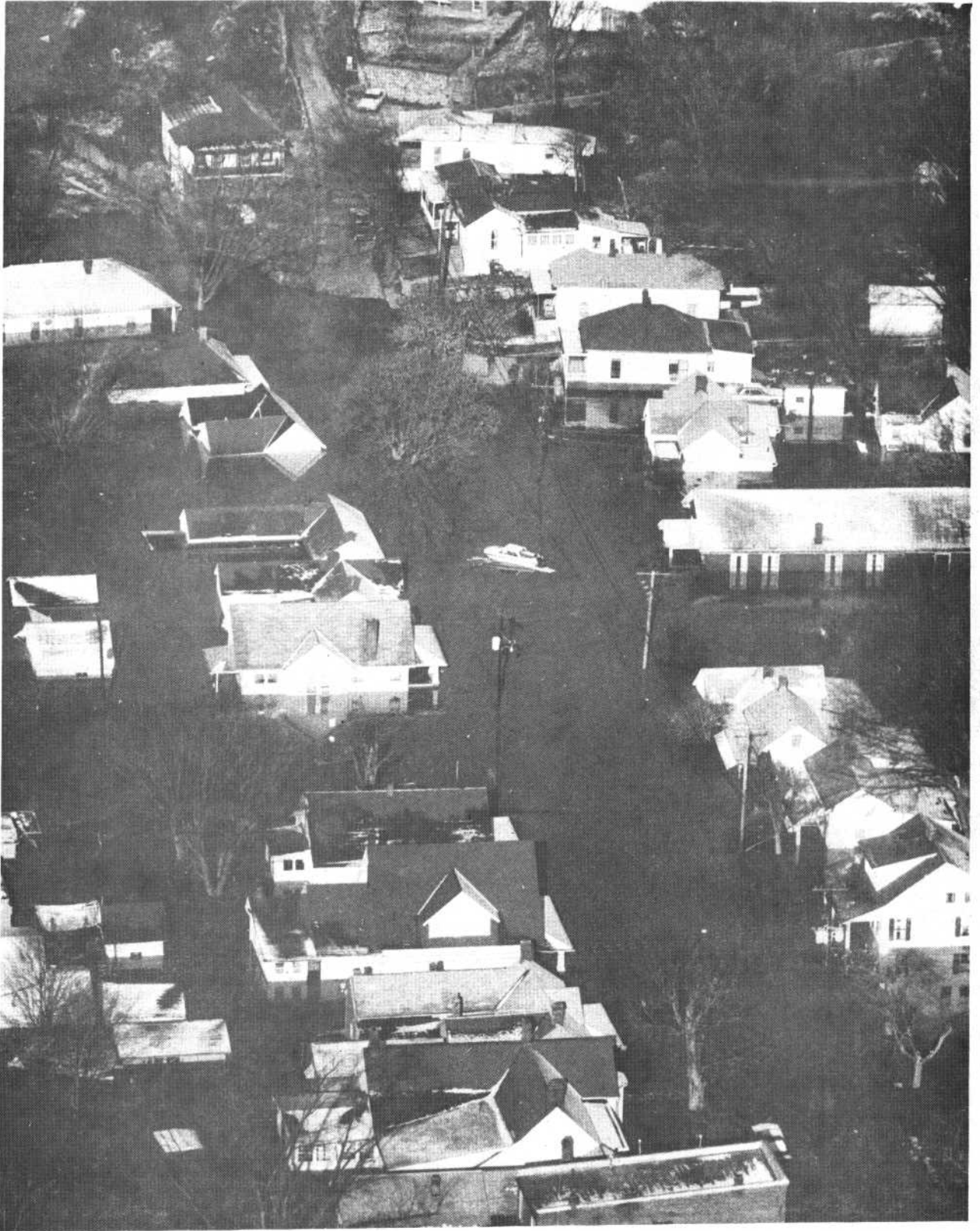


Figure 15.-- Kentucky River at Frankfort at flood stage.

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