UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

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By

R. C. Gilstrap and R. C. Christensen

Prepared in cooperation with the
ARKANSAS GEOLOGICAL COMMISSION

Open-file report

Little Rock, Arkansas
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On July 16, 1963, the city of Hot Springs had severe flooding, which, from all reports, was exceeded only by a flood that occurred in May 1923. The storm, which caused the flooding, was centered in the vicinity of Hot Springs and covered an area including most of Garland County and parts of Hot Spring and Saline Counties. The towns of Owensville, Jessieville, Pleasant Hill, and Malvern were on the outer fringe of the storm area. Flood damage exceeded $2 million in the storm area.

This report presents precipitation and runoff data collected in the storm area and estimates of property damage. It was prepared by the Surface Water Branch of the U.S. Geological Survey in cooperation with the Arkansas Geological Commission. Much of the runoff data were collected under a cooperative program with the Arkansas State Highway Commission. Information from individuals, private companies, and governmental agencies is acknowledged where it appears in the text.

Before the storm subsided, engineers of the Geological Survey were dispatched to the area to collect information on storm precipitation and runoff. Figure 1 shows the location of flood-determination points and precipitation stations at which data were collected.

The flood-producing rain occurred during the early morning of July 16. However, during the period July 12-15, precipitation amounts up to 5.42 inches were recorded in the area.

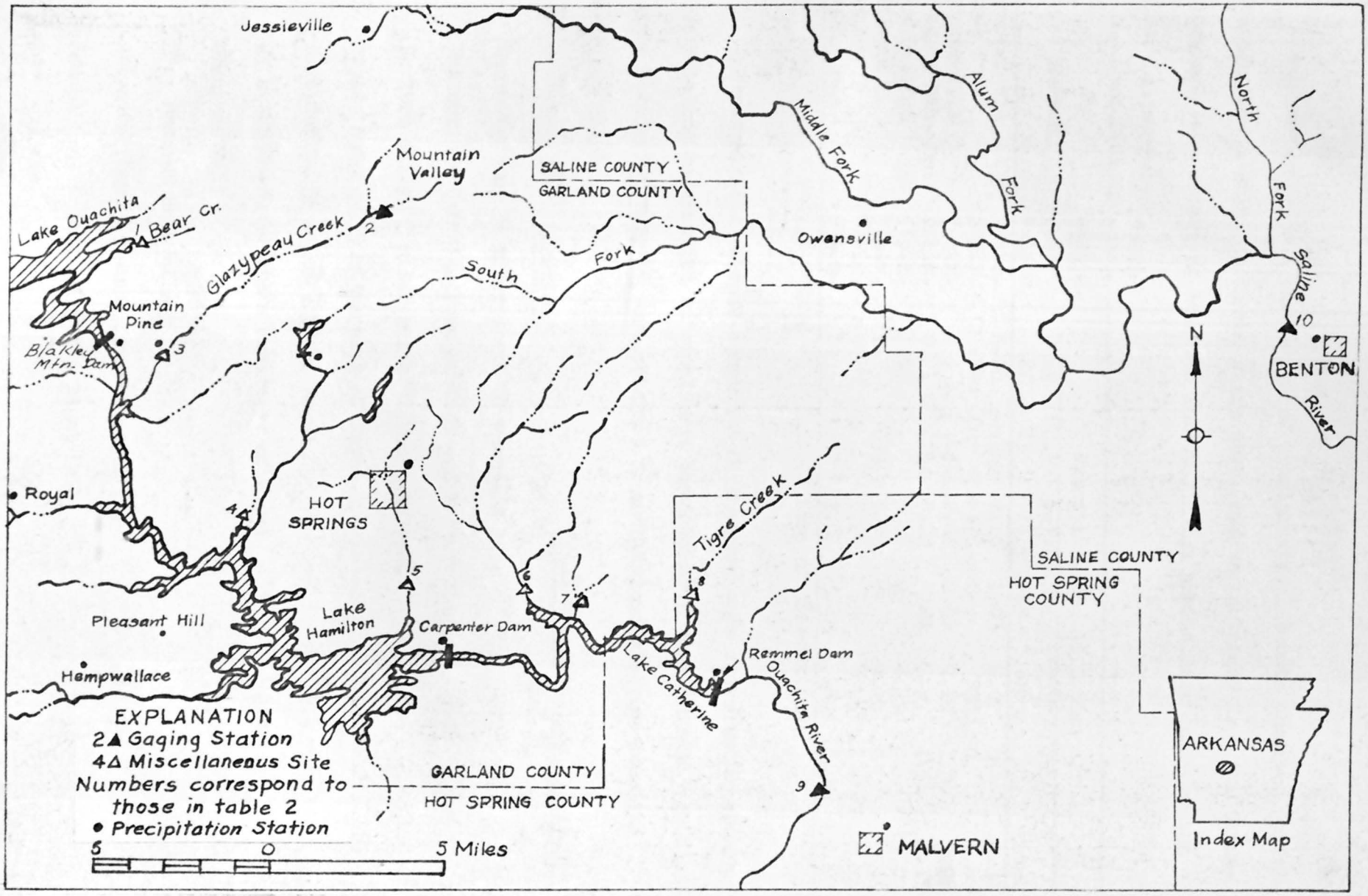

Figure 1.— Map showing location of flood-determination points and precipitation stations.

The following is a tabulation of precipitation amounts observed at U.S. Weather Bureau stations in the storm area, and was obtained from the Climatological Data report of Arkansas for July 1963, published monthly by the U.S. Weather Bureau.

Station	Time of observation	Precipitation, in inches a/						
		July 12	July 13	July 14	July 15	July 16	July 17	Total
Arkadelphia	7 a.m.	0.20	0.22	2.10	1.03	0.07	0	3.62
Alum Fork	5 p.m.	.54	0	.78	0	.08	0	1.40
Jessieville	7 a.m.	0	.45	2.01	2.90	2.10	1.80	9.26
Blakely Mtn. Dam	8 a.m.	0	.15	5.00	.27	7.35	1.54	14.31
Hot Springs 1 NNE	5 p.m.	.85	.09	3.80	0	8.35	0	13.09
Malvern	5 p.m.	T	.39	1.93	0	5.20	0	7.52
Benton	6 a.m.	0	0	1.25	.40	.56	.14	2.35
Owensville	8 a.m.	0	1.00	2.01	.47	.69	.05	4.22

a/ For 24-hour period ending at indicated time of observation.

Individuals and private companies in the area were contacted to obtain precipitation information to supplement the Weather Bureau records. Precipitation totals for July 16 were obtained from individuals at the location described below:

Location	Total precipitation, in inches July 16
Henry Lefton, 3½ miles north of Mountain Pine	8.0
Hot Springs Lakeside Pump Station and Filter Plant	9.98
Herbert Kelly, 2 miles south of Mountain Pine	7.6
Arliss Buttrum, 3 miles west of Royal	4.5
Dave Smith, 5½ miles west of Royal	2.5
J. W. Wagoner, 1½ miles southwest of Royal	2.0
Pleasant Hill	4.0
Mrs. Rush at Hempwallace	2.0
Carpenter Dam, Arkansas Power & Light Co.	4.94
Remmel Dam, Arkansas Power & Light Co.	6.37

The most intense precipitation in the storm area was during the early morning of July 16. At the recording precipitation station at Blakely Mountain Dam, 6.1 inches of rain fell in the 1½-hour period from 5:45 a.m. to 7:15 a.m. Figure 2 shows the cumulative precipitation during the morning of July 16 for the stations at Blakely Mountain Dam, Carpenter Dam, and Remmel Dam.

Flooding occurred principally on the tributaries to the Ouachita River from Lake Ouachita to Malvern and on the headwaters of South Fork Saline River, with minor flooding on the headwaters of Middle Fork Saline River. A peak discharge of 53,800 cfs (cubic feet per second), at a gage height of 21.03 feet, was recorded at the gaging station on the Ouachita River near Malvern. Figure 3 is a hydrograph showing the discharge for July 16-17 at the Malvern station. Flooding on the Saline River was principally from the South Fork and the Middle Fork and produced a moderate peak discharge of 6,850 cfs at the gaging station on the Saline River at Benton.

Three reservoirs are on the Ouachita River in the storm area: Lake Ouachita, formed by Blakely Mountain Dam; Lake Hamilton, formed by Carpenter Dam; and Lake Catherine, formed by Remmel Dam. Hourly storage in these reservoirs is shown in table 1 for July 16-17. Runoff from the storm area above Blakely Mountain Dam was stored in Lake Ouachita and, from information by the Corps of Engineers, the discharge from Lake Ouachita during the period July 14-20 amounted to about 20 cfs, which was leakage through the gates.

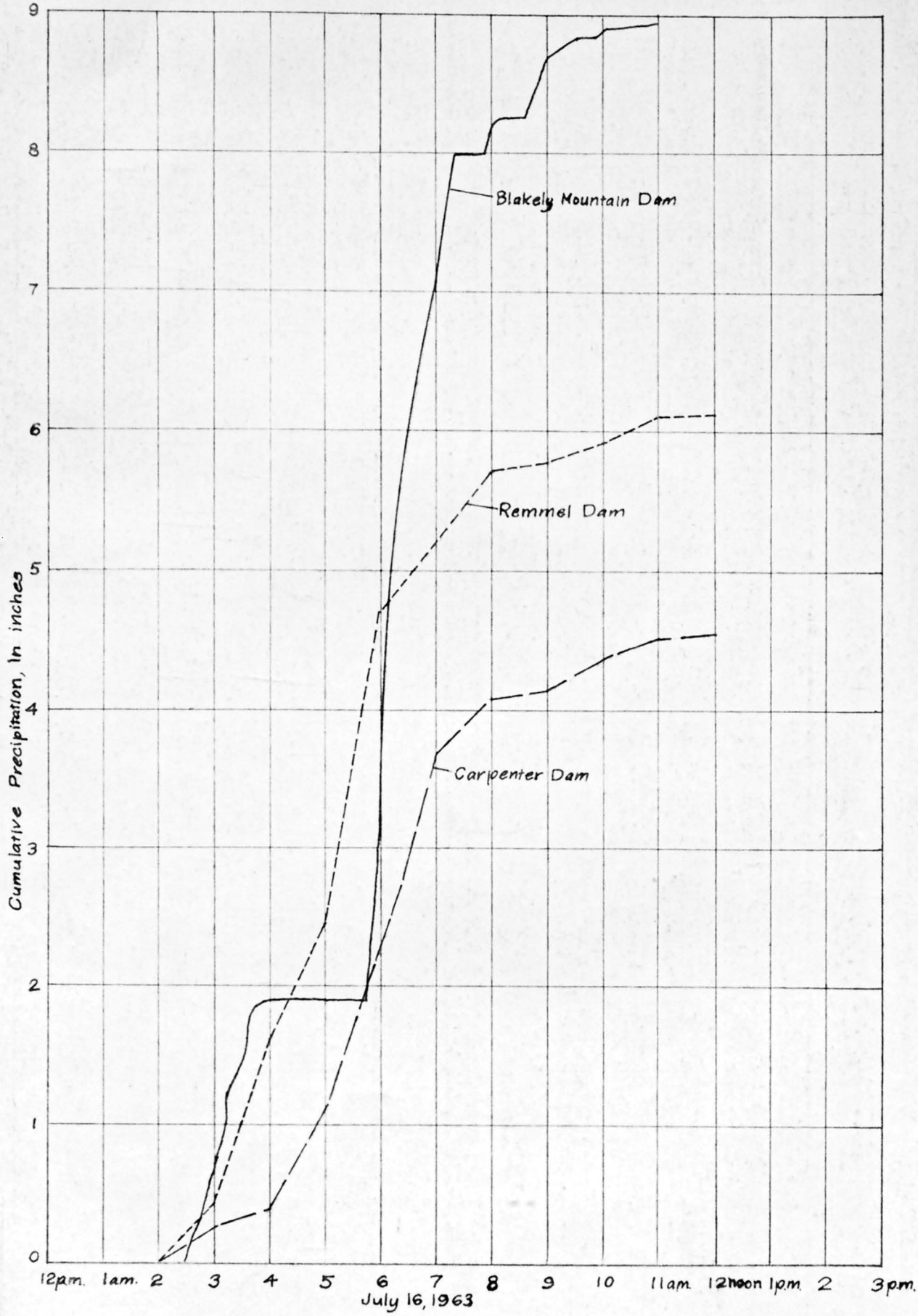

Figure 2.—Cumulative precipitation for selected stations, July 16

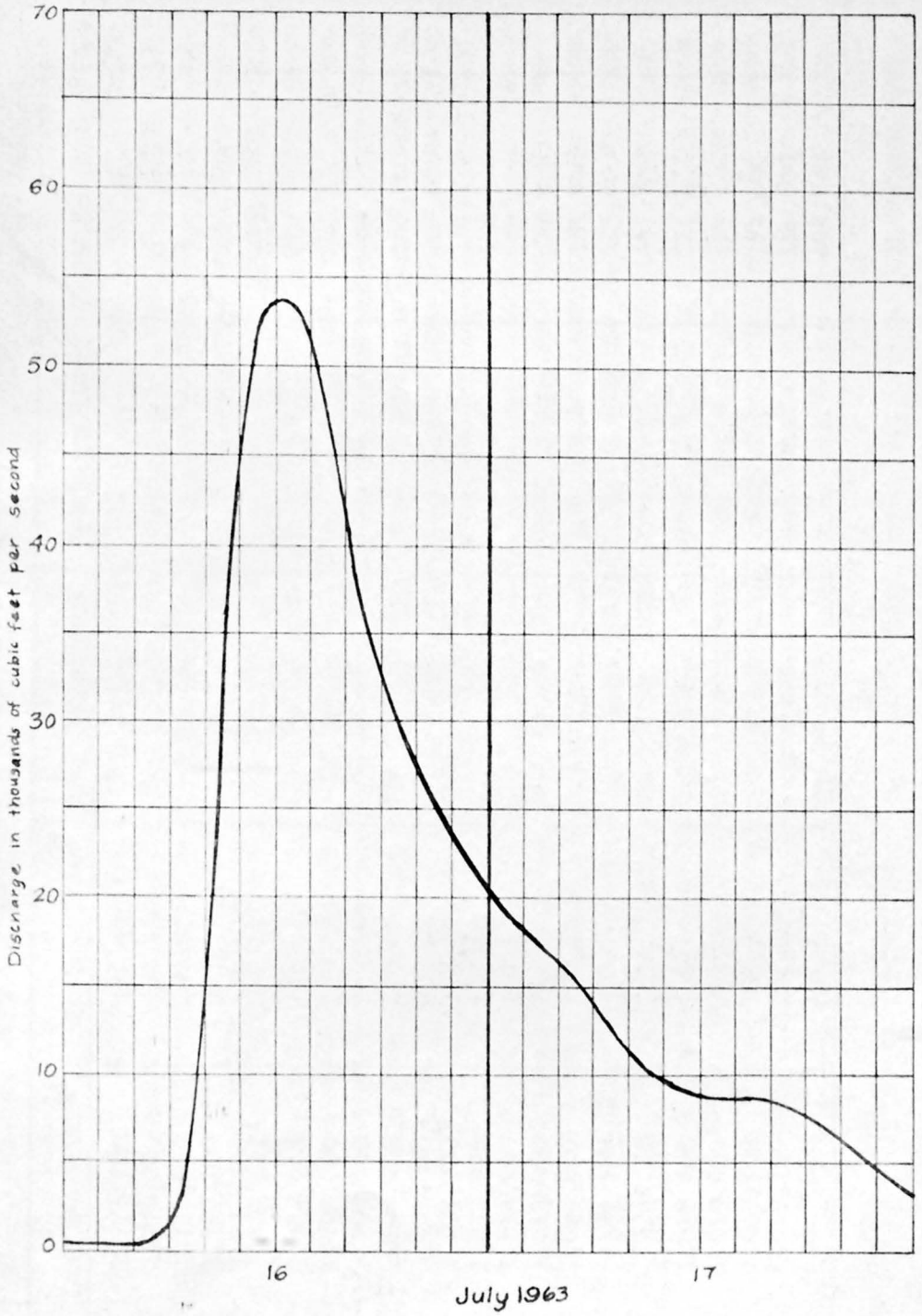

Figure 3.—Hydrograph of discharge, Ouachita River near Malvern, Arkansas

Table 1.--Hourly storage in reservoirs on the Ouachita River in the storm area, July 16-17, 1963

Time	Storage, in acre-feet					
	July 16, 1963			July 17, 1963		
	Lake Ouachita[1/]	Lake Hamilton[2/]	Lake Catherine[2/]	Lake Ouachita[1/]	Lake Hamilton[2/]	Lake Catherine[2/]
1 a.m.	1,776,200	182,500	34,430	1,820,400	191,460	38,020
2	1,776,200	182,500	34,450	1,820,700	190,860	37,710
3	1,776,900	182,570	34,680	1,820,700	190,270	37,430
4	1,777,600	182,570	34,750	1,820,700	189,770	37,180
5	1,778,000	182,830	35,020	1,821,100	189,420	36,790
6	1,778,700	183,230	38,280	1,821,100	189,280	36,240
7	1,783,200	185,460	43,290	1,821,400	189,150	35,840
8	1,792,600	189,080	44,430	1,821,400	189,010	35,490
9	1,799,000	193,090	44,880	1,821,400	188,590	35,350
10	1,804,200	196,060	43,870	1,821,800	188,240	35,350
11	1,806,600	197,950	43,180	1,821,800	187,680	35,290
12 noon	1,807,700	198,510	42,900	1,821,800	187,270	35,250
1 p.m.	1,811,500	198,190	42,750	1,821,800	186,990	35,020
2	1,814,400	197,400	42,650	1,821,800	186,640	35,020
3	1,815,400	196,660	42,430	1,821,400	186,290	34,680
4	1,817,200	196,290	42,110	1,821,400	185,740	34,770
5	1,817,200	195,910	41,320	1,821,400	185,600	34,790
6	1,817,900	195,540	40,680	1,821,400	185,250	34,620
7	1,818,300	195,100	40,170	1,821,400	185,040	34,870
8	1,818,600	194,580	39,700	1,821,400	184,830	34,960
9	1,819,000	193,980	39,170	1,821,800	184,690	35,020
10	1,819,700	193,320	38,870	1,821,800	184,690	34,680
11	1,819,700	192,800	38,640	1,821,800	184,690	34,730
12 p.m.	1,820,000	192,130	38,280	1,821,800	184,620	34,810

1/ Records furnished by Corps of Engineers.

2/ Records furnished by Arkansas Power & Light Co.

Table 2.--Flood stages and discharges, July 16-17, in vicinity of Hot Springs, Arkansas

No.	Permanent station number	Stream and place of determination	Drainage area (sq mi)	Maximum floods					
				Prior to July 16, 1963		July 16, 17, 1963	Gage height (ft)	Discharge	
				Period	Year			Cfs	Cfs per sq mi
1	-	Bear Creek near Mountain Pine, Ark.	0.8	----------	------	July 16	---------	1,470	1,840
2	7-3577	Glazypeau Creek at Mountain Valley, Ark.	4.3	1961-63---	1962	----------	10.36	560	130
				----------	------	July 16	12.41	2,110	491
3	-	Glazypeau Creek at Mountain Pine, Ark.	29	----------	------	July 16	---------	26,600	917
4	-	Bull Bayou tributary near Hot Springs, Ark.	2.5	----------	------	July 16	---------	2,450	980
5	-	Hot Springs Creek at Hot Springs, Ark.	5.81	1956------	1956	----------	---------	4,350	749
				----------	------	July 16	---------	a4,900	843
6	-	Gulpha Creek near Hot Springs, Ark.	50	1956------	1956	----------	---------	21,100	422
				----------	------	July 16	---------	36,800	736
7	-	Potash Sulphur Creek near Hot Springs, Ark.	1.25	----------	------	July 16	---------	2,430	1,940
8	-	Tigre Creek near Hot Springs, Ark.	9.3	----------	------	July 16	---------	13,700	1,470
9	7-3595	Ouachita River near Malvern, Ark.	1,562	1903-04, 1923-63.	1923	----------	30.3	140,000	90
				----------	------	July 16	21.03	b53,800	c118
10	7-3630	Saline River at Benton, Ark.	569	1927------	1927	----------	30.5	(d)	---------
				1938-63---	1939	----------	26.0	67,000	118
				----------	------	July 17	12.86	6,850	---------

a Estimated. Reached a stage about 0.14 ft higher than that of 1956, at site on downstream side of bridge.
b Affected by regulation in reservoirs.
c For 457 square miles below Blakely Mountain Dam.
d Not determined.

High rates of runoff per square mile from small streams occurred during this storm. Flood discharges which were measured on streams in the storm area are shown in table 2. The maximum rate of runoff measured was 1,940 cfs per square mile, computed from an indirect measurement of peak discharge, from a drainage area of 1.25 square miles on Potash Sulphur Creek near Hot Springs. Runoff rates from other tributary streams measured in the storm area range from 491 cfs per square mile from a 4.3-square-mile area on Glazypeau Creek at Mountain Valley, to 1,840 cfs per square mile from an 0.8-square-mile area on Bear Creek near Mountain Pine.

Extensive property damage was caused by this flood; however, no casualties were reported. A large part of the downtown area of Hot Springs was flooded by Hot Springs Creek which normally flows through storm sewers under, and parallel to, Central Avenue. Numerous cars were washed from the streets by the floodwaters, and vehicle traffic through Hot Springs was temporarily halted. Some business establishments, damaged by floodwaters, were closed for about two weeks. Several homes were evacuated along Gulpha and Glazypeau Creeks, and the trailer camp on Gorge Creek and the church camp on South Fork Saline River had to be evacuated during the flood. Numerous washouts occurred on county roads, bridges, and railroads in the area of heavy flood runoff.

Property damage estimates by State Civil Defense, U.S. Bureau of Public Roads, and city and county officials were:

1.	Private property within city of Hot Springs.....	$1,000,000
2.	Private property in Garland County, exclusive of Hot Springs.....	1,000,000
3.	Public streets, bridges, and sewer lines within city of Hot Springs.....	150,000
4.	Public roads and bridges in Garland County.....	200,000
	Total estimate of damages.....	$2,350,000