

# 07265450 Mississippi River near Arkansas City, Arkansas

## (USGS Arkansas Water Science Center)

### Review of peak discharge for the flood of May 1927 (exact date is unknown)

**Location:** This flood was located about 3.3 mi south-southwest of Arkansas City, Ark., at 33.5597N and 91.2317W.

**Published peak discharge:** The peak discharge listed by USGS in the Peak-Flow File for the 1927 flood is 2,470,000 ft<sup>3</sup>/s and is footnoted as an estimate, affected by regulation and diversion. It also is published in the station description (NWIS) as an approximate value that “*would have occurred for the May 1927 flood if flow had been confined between levees.*”

The 1927 flood generally is considered the largest known flood in the downstream reaches of the Mississippi River. There are several “estimates” and published values for the 1927 peak discharge in the vicinity of Arkansas City, Ark., that range from 2.4 to 3 million ft<sup>3</sup>/s. As near as can be determined, there is no direct or indirect measurement of this peak. In fact, even the day of the flood is not certain. Following are some of the estimates for the 1927 flood.

2,400,000 ft <sup>3</sup> /s	Published in the book “Floods,” by Hoyt and Langbein (1955).
2,470,000 ft <sup>3</sup> /s	Described by Major Elliott as official U.S. Army Corps of Engineers data and considered to be the maximum confined discharge.
2,472,000 ft <sup>3</sup> /s	Published in Handbook of Applied Hydrology, by Chow (1964). The peak discharge is in a section of the handbook authored by Tate Dalrymple.
2,544,000 ft <sup>3</sup> /s	Described by John M. Barry as an “official U.S. Army Corps of Engineers reading,” but this value could not be verified according to Martin Reuss of the Corps’ Office of History.
3,000,000 ft <sup>3</sup> /s	Published by John M. Barry (1997) in “Rising Tide” as the 1927 peak discharge at the mouth of the Arkansas River about 20 or 30 mi upstream of the Arkansas City gage. Barry bases the 3 million ft <sup>3</sup> /s discharge on several sources. One is the “Bulletin of the American Railway Engineering Association, July 1927.” That report indicates that a peak discharge of 2 million ft <sup>3</sup> /s is most commonly used but that a peak discharge of 3,250,000 ft <sup>3</sup> /s has been estimated. Location is not specified but presumed to be at Vicksburg, MS, a considerable distance downstream of Arkansas City, Ark. Other sources include (1) James Kemper, an engineer, (2) the chief engineer of the Mississippi Levee Board, and (3) U.S. Army Corps of Engineers District engineers quoted in both New Orleans and Memphis newspapers while the flood was at its worst. At a later time, the Corps claims that 3 million ft <sup>3</sup> /s is a design flood and that the peak for the 1927 flood was about 20 to 25 percent less. Barry chose to stick with 3 million ft <sup>3</sup> /s.

**Drainage area:** 1,126,600 mi<sup>2</sup>, of which 22,240 mi<sup>2</sup> is noncontributing as published by USGS in the station description (NWIS) for the gaging station at Arkansas City, Ark. Drainage area in table 1 is listed as 1,130,700 mi<sup>2</sup>, source unknown. Drainage area on the USGS Web site and in Peak-Flow File is 1,130,600 mi<sup>2</sup>.

**Data for storm causing flood:** Little published information could be found regarding the nature of the storm causing the 1927 flood (see Hoyt and Langbein, 1955, p. 370). It is presumed that intense spring rains on accumulated snow in the upstream part of the basin resulted in the large runoff. Photographs were not available for this extraordinary flood, and none were taken during the 2003 review.

**Method of peak discharge determination:** As best as can be determined, there was no direct or indirect measurement of the peak discharge at or near the Arkansas City gage site for the 1927 flood. The results of current-meter measurements at a location described as “at Chicot, Ark.” are published for most days between April 2-20, 1927, prior to the peak discharge. This site is now known as the Arkansas City gage site; however, the discharge measurement range is believed to be about 10 mi upstream of the gage site. The maximum measured discharge during this period is 1,712,000 ft<sup>3</sup>/s on April 20, 1927. These measurements are published by the Mississippi River Commission (1930), the State of Arkansas Geological Survey (Frame, 1950), and the U.S. Army Corps of Engineers (1997). According to these reports, the measurements were made by the Mississippi River Commission and the U.S. Army Corps of Engineers. The measurements were not available for review and presumably have been lost or misplaced.

The following footnote regarding the 1927 measurements appears in the Corps of Engineers report (1997):

“A crevasse occurred at the Mound Landing (433.6 T) about 4 miles below the discharge range on April 21, 1927. The current increased to such an extent that the boat in use could not stem the current and observations were not secured after April 20, 1927. The maximum gage reading at Arkansas City, Ark. (436.7 miles below Cairo) was 60.4 feet on April 21, 1927; the gage reading on April 22, 1927 was 57.1 feet.”

The most recent topographic maps show a location on the left bank, about 6 mi upstream of the current gage location, called “Mound Crevasse.” This probably is the site of the crevasse mentioned in the preceding footnote. If so, that would put the discharge measurement range about 4 mi upstream of the crevasse and about 10 mi upstream of the current streamflow-gaging station.

Notes were published by USGS in the annual station description (NWIS) for the Arkansas City gage that state that the peak discharge would have been approximately 2,472,000 ft<sup>3</sup>/s if the flow had been confined between the levees. The authors could find no data or information that describe how this peak discharge was computed. Considering the controversy evident in such reports as Barry’s book “Rising Tides” (Barry, 1997), and Martin Reuss’ (U.S. Army Corps of Engineers, Office of History) review of this book, it seems apparent that if reliable engineering computations of the peak discharge were ever made they would have been referred to or quoted as a source of the peak discharge.

The crevasse resulted in a lowering of the river stage after April 20 and an apparent increase in river discharge. Some sources give the date April 20 as the date of the peak

discharge. Other sources, such as the USGS Peak-Flow File, state that the peak discharge occurred in May 1927 without specifying the exact date. Considering that the last discharge measurement made on April 20, 1927, had a discharge considerably less than the estimated peak discharge, it would follow that the peak discharge occurred on a date after April 20. The less exact date of May 1927 seems reasonable.

**Possible sources of error:** The most obvious problem is that no one seems to know how the peak discharge was computed. Even the record of river stage after April 20, 1927, seems to be missing. Without these data and computations, it is impossible to evaluate sources of error.

**Recommendations of what could have been done differently:** Better documentation and archiving of the original data and computations should have been done.

**Site visit and review:** No site visit was made.

**Recommendation:** The peak discharge is debatable because sufficient evidence does not exist to properly review the published discharge and because there is a considerable amount of published controversy regarding the peak discharge. These published reports indicate that the peak discharge could range from 2.4 to 3 million ft<sup>3</sup>/s. Most of the publications lean toward the lower end of this range. USGS publishes 2,472,000 ft<sup>3</sup>/s and refers to it as an estimate or approximation. Considering that the peak discharge is an estimate (or approximation), four significant figures is not warranted. Therefore, it is recommended that the peak discharge should be rounded to 2.47 million ft<sup>3</sup>/s, or even 2.5 million ft<sup>3</sup>/s, and continued to be considered an estimate. It also is recommended that the date of May 1927 be continued as the date of the peak discharge. The drainage area shown in the annual station description and the Peak-Flow File do not agree. This difference should be resolved.