

Figure 23. The Mississippi River and Meramec River flood-peak elevations and extent of flooding during August 1-3, 1993, in Arnold and vicinity, Missouri.

MISSISSIPPI RIVER AND MERAMEC RIVER FLOOD-PEAK ELEVATIONS—ARNOLD AND VICINITY

The 1993 flood-peak elevations of the Mississippi and the Meramec Rivers in Arnold and vicinity were determined from USGS gaging-station data and by surveying high-water flood marks after the water had receded (fig. 23). All USGS flood-elevation data on the Mississippi and the Meramec Rivers were compiled with flood-mark data collected by the U.S. Army Corps of Engineers (St. Louis District) and St. Louis County (Department of Highways and Traffic).

The water-surface elevations of the 1993 flooding of the Meramec River in Arnold and vicinity are shown in figure 24. The figure shows the June through August elevations for the Meramec River at the USGS stage-gaging station (07019300) on the downstream side of U.S. Highways 61-67 bridge at Arnold.



INDEX TO AREA COVERED BY EACH SHEET OF THIS ATLAS. Study area on this sheet, and location of selected gaging stations in St. Louis and vicinity, Missouri.

Scale: 1:24,000. TOPOGRAPHIC CONTOUR INTERVAL 10 FEET. NATIONAL GEODESIC VERTICAL DATUM OF 1929.

Based from U.S. Geological Survey, Columbia and Oakville, 1:24,000, 1991; and Maxwell, 1:24,000, 1954 (Photorevised 1982).

In river miles, upstream from the mouth of the Ohio River, and the Meramec River flood-peak elevations are plotted and referenced by distance, in river miles, upstream from its mouth.

The Columbia Drainage and Levee District No. 3 Levee system (fig. 23) protecting agricultural developments was breached on or about August 1. Flood-peak elevations in the protected area behind the Columbia Drainage and Levee District No. 3 Levee differed (about 1 to 4 ft lower) from those in the Mississippi River (fig. 25).

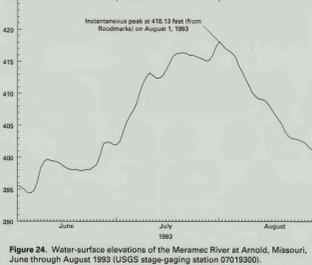
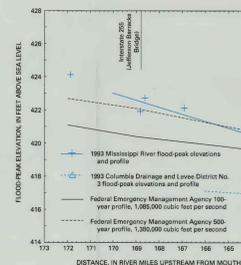


Figure 25. The 1993 flood-peak elevations and profiles and the Federal Emergency Management Agency 100- and 500-year flood profiles (U.S. Department of Housing and Urban Development, 1993b, panel 136) along the Mississippi River in Arnold and vicinity, Missouri.

INUNDATED AREA

The extent of the Mississippi and the Meramec Rivers flooding from August 1 through 3, 1993, in Arnold and vicinity was determined by using surface-water contours shown in figure 23. These elevation data were used to hand-draw the outline of the 1993 inundation boundary for each river on 1:24,000-scale (contour interval, 10 ft) topographic maps of Arnold and vicinity. By using the GIS software package ARC/INFO, the hand-drawn inundation boundaries were manually digitized from the 1:24,000-scale maps and stored. Topographic maps that have contour intervals of more than 5 ft usually are not used alone to establish flood boundaries. Therefore, a second outline of the 1993 flood inundation boundaries of the Mississippi and the Meramec Rivers was scanned from aerial photographs taken within a few days after the flood peak. The Mississippi River inundation boundary was scanned from a set of 1:24,000-scale aerial photographs taken on August 2, 1993 (Walker and Associates, Fenton, Missouri), and the Meramec River inundation boundary was scanned from a set of 1:16,000-scale aerial photographs taken on August 4, 1993 (Walker and Associates, Fenton, Missouri). These scanned inundation boundaries were manually digitized into a second ARC/INFO coverage.

A limited amount of onsite inspection was done in areas where the two outlines did not agree as to the limits of flood inundation. For example, some small areas of land within the inundation boundaries (Columbia Drainage and Levee District No. 3) may be at or slightly above the August 1 through 3 peak elevations; however, some of these small areas may not be inundated. Other discrepancies in the outlines were the result of inaccuracies in the manual delineation of the flood boundary (horizontal/vertical) on topographic maps with a 10-ft contour interval and inconsistencies in visually defining the peak-flood-water/land surface contact from the aerial photographs. The August 1 through 3, 1993, Mississippi River and Meramec River extent of flooding shown in figure 23 is considered to be

the best interpretation on the basis of both inundation outlines.

FEDERAL EMERGENCY MANAGEMENT AGENCY 100- AND 500-YEAR FLOOD PROFILES

The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 were established to encourage State and local governments to adopt wise flood-plain-management practices. The FEMA has adopted the 100-year flood as the base flood for purposes of defining the flood boundaries of the flood-insurance-rate maps. The 500-year flood can be used to identify additional areas of flood risk in a community (U.S. Department of Housing and Urban Development, 1993a, p. 34). To assist in the evaluation of the Mississippi and the Meramec Rivers flooding from August 1 through 3, 1993, in Arnold and vicinity, the FEMA 100- and 500-year flood profiles (U.S. Department of Housing and Urban Development, 1993b, panels 132, 133, 136) are provided in figures 25 and 26, respectively.

FLOOD DAMAGES

In Arnold and vicinity, a substantial part of the 1993 flood damage was related to flooding on the Meramec River caused by backwater from the Mississippi River. For example, the Meramec River flooding resulted in the closing of several roads (fig. 27), damage to about 3,000 homes and 400 businesses, and evacuation of 8,000 people as a result of concern that propane tanks floating in the backwater might leak (Jefferson City Post-Tribune, 1993b).

ADDITIONAL DATA

Additional flood-peak elevation data for the flood of August 1 through 3, 1993, in St. Louis and vicinity are available. Additional Meramec River flood-mark elevations may be obtained by writing to Francis C. O'Leary, Chief of Surveys, St. Louis County, Department of Highways and Traffic (Clayton, Missouri), and the Glasgow Project Office,

U.S. Army Corps of Engineers, Kansas City District (Glasgow, Missouri). Additional flood-mark elevations on the Mississippi River, Meramec River, and River des Peres may be obtained by writing to Francis C. O'Leary, Chief of Surveys, St. Louis County, Department of Highways and Traffic (Clayton, Missouri), and the Geodesy, Cartography, and Photogrammetry Section of the Hydrologic and Hydraulics Branch, Engineering Division, U.S. Army Corps of Engineers, St. Louis District (St. Louis, Missouri).

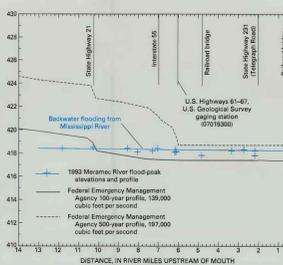


Figure 26. The 1993 flood-peak elevations and profile and the Federal Emergency Management Agency 100- and 500-year flood profiles (U.S. Department of Housing and Urban Development, 1993b, panels 132, 133) along the Meramec River in Arnold and vicinity, Missouri.



Figure 27. Aerial view of the Meramec River flooding of State Highway 231 (Telegraph Road) during August 1-3, 1993, in Arnold, Missouri, looking east (photograph from the Missouri Highway and Transportation Department).

REFERENCES CITED

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply inch-pound unit by	To obtain metric unit
inch (in.)	25.4 millimeter
foot (ft)	0.3048 meter
mile (mi)	1.609 kilometer
acre	4.047 square meter
cubic foot per second (ft ³ /s)	0.02832 cubic meter per second

Sea level in this report, "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD 1929) profiles and geoids (data derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929).