DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
MISSOURI GEOLOGICAL SURVEY AND WATER RESOURCES

HYDROLOGIC INVESTIGATIONS
ATLAS HA-550 (SHEET 3 OF 4)

SURFACE-WATER AVAILABILITY

EXPLANATION

Stream-gaging station
Number corresponds to map number in streamflow summary and chemical analysis table

Water-quality station
Number corresponds to map number in streamflow summary and chemical analysis table

Basin or stream reach in which significant quantities of flow are known to be lost to subsurface drainage

Drainage divide

Base from U.S. Geological Survey,
State base map, 1:500,000, 1971

THE MEAN FLOW OF A STREAM DETERMINES THE MAXIMUM AMOUNT OF WATER AVAILABLE FOR DEVELOPMENT FROM THE STREAM.—

The mean flow of a stream is affected by natural factors such as climate, topography, geology, and vegetation and by manmade factors such as impoundments, diversions, effluent discharges, and land-use changes. In general, the natural flow of principal streams in the area increases with increasing size of drainage area. Many tributary streams, however, contribute significant quantities of flow to subsurface drainage. The mean flow of such tributaries is less than normal for the area and cannot be reliably estimated in the absence of streamflow records. Flow that is lost by tributary streams often reappears as springs in downstream parts of principal stream basins. In the table below, for example, the mean flow of Eleven Point River near Thomasville (36) is only 0.23 (ft³/s)/mi² or 0.00251 (m³/s)/km², whereas the mean flow of the same stream farther downstream below several large springs (31) is 0.92 (ft³/s)/mi²

or 0.0100 (m³/s)/km². The relatively low mean flow per square mile of the Missouri and Mississippi Rivers is thus attributed largely to the drier climate in the upper part of the Missouri River basin.

Seepage runs have been made in the Gasconade, Meramec, Black, Current, James, Eleven Point, and North Fork River basins. A seepage run consists of measurements of discharge, specific conductance, and temperature at intervals along a stream reach or throughout a basin during a period of base flow. Such measurements are helpful in pointing out significant channel gains or losses and in identifying losing areas which contribute flow to aquifers and springs.

Losing areas shown on the above map were defined primarily by seepage runs and streamflow data. Consideration was also given to dye-tracing data (sheet 2), field observations following rains, and interpretation of radar and thermal imagery. Other losing areas are certain to exist, but there is a lack of sufficient information to define them.

SUMMARY OF STREAMFLOW DATA
FOR STATIONS SHOWN ON MEAN DISCHARGE MAP

Map number	Station number	Station name	Drainage area (mi²)	Period of record (water years)	Discharge (ft³/s) Maximum	Discharge (ft³/s) Minimum	Discharge (ft³/s) Mean	Mean annual runoff for period of record Inches	Mean annual runoff for period of record (ft³/s)/mi²
1	06928000	Gasconade River near Hazelgreen	1,250	1929–71	76,400	18	965	10.48	0.77
2	06928500	Gasconade River near Waynesville	1,690	1915–71	89,800	44	1,393	11.20	.82
3	06930000	Big Piney River near Big Piney	560	1922–71	32,700	69	528	12.79	.94
4	06932000	Little Piney Creek at Newburg	200	1929–71	32,500	24	148	10.04	.74
5	06933500	Gasconade River at Jerome	2,840	1904–05	101,000	254	2,477	11.84	.87

(duration hydrographs and flow-duration graphs and tables of this sheet are not fully legible)

DURATION HYDROGRAPHS SUMMARIZE THE VARIABILITY OF DAILY FLOWS FOR THE 49-YEAR PERIOD, 1925–71, AT CURRENT RIVER NEAR EMINENCE.

FLOW-DURATION CURVES SHOW THE INTEGRATED EFFECTS OF THE VARIOUS FACTORS THAT AFFECT STREAMFLOW.

EXPLANATION
3. Gasconade River at Jerome Water years 1924–47
13. Missouri River near Eureka Water years 1904–05, 1922–47
17. St. Francis River near Patterson Water years 1922–47
19. James River at Galena Water years 1922–47
29. Current River at Doniphan Water years 1923–47
     Mean flow
     7-day Q_2

BASE-FLOW RECESSION CURVES PROVIDE FORECASTS OF THE AMOUNT OF WATER THAT WILL BE FLOWING IN A STREAM DURING RAINLESS PERIODS OF LESS THAN ABOUT 30 DAYS.

LOW-FLOW FREQUENCY DATA ARE USEFUL IN EVALUATING THE ABILITY OF STREAMS AND SPRINGS TO SUPPLY WATER FOR MUNICIPAL AND INDUSTRIAL SUPPLIES, FISH HATCHERIES, WATER-BASED RECREATION, AND DISPOSAL OF LIQUID WASTES.

REGIONAL DRAFT-STORAGE RELATIONS PROVIDE ESTIMATES OF STORAGE REQUIRED TO MAINTAIN VARIOUS DRAFT RATES FOR A 5-PERCENT CHANCE OF RESERVOIR DEFICIENCY.

SURFACE-WATER QUALITY

WATER-QUALITY SUMMARY

Water in most streams in the area is a calcium magnesium bicarbonate type with a dissolved-solids concentration less than 300 mg/l. Water in streams in the James River basin, which flows on limestone of Mississippian age, is a calcium bicarbonate type with a dissolved-solids concentration of about 200 mg/l. Water from the Missouri and Mississippi Rivers is a calcium magnesium bicarbonate and sodium sulfate type with a dissolved-solids concentration less than about 500.

CHEMICAL ANALYSES
[Analyses by U.S. Geological Survey]
Milligrams per liter

HORIZONTAL GRAPHS SUMMARIZE THE VARIATION OF SELECTED WATER-QUALITY PARAMETERS FOR SAMPLING SITES GIVEN IN TABLE.

EXPLANATION
Estimated range of sediment yield for drainage area larger than 10 square miles

ESTIMATES OF AVERAGE ANNUAL SEDIMENT YIELD HELP TO DEFINE THE EROSIVE CHARACTERISTICS OF WATERSHEDS.

SUMMARY OF SEDIMENTATION DATA

Map number	Sediment station	Drainage area (mi²)	Base period (water yr)	Estimated average annual sediment yield for base period (tons/mi²)
1	Gasconade River at Jerome	2,840	1948–63	136
2	Meramec River at Sullivan	1,497	1945–64	117
3	Bourbeuse River at Union	808	1948–64	152
4	Meramec River at Roberts-ville	2,073	1945–64	333
5	Big River at Byrnesville	916	1948–63	99
6	James River at Galena	987	1922–67	94
7	North Fork River near Tecumseh	561	1945–67	39
8	Current River near Tecumseh	570	1945–67	135
9	Black River near Annapolis	484	1948–67	110
10	Current River near Tecumseh			
11	Current River at Van Buren	1,272	1922–67	47
12	Current River at Doniphan	1,667	1923–67	106
13	Eleven Point River near Bardley	780	1923–67	75

WATER RESOURCES OF SOUTH-CENTRAL MISSOURI

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