ANNUAL YIELD AND SELECTED HYDROLOGIC DATA FOR

THE ARKANSAS RIVER BASIN COMPACT

ARKANSAS—OKLAHOMA

1984 WATER YEAR

By M. A. Moore and T. E. Lamb

U.S. GEOLOGICAL SURVEY

Open-File Report 85-179

Prepared in cooperation with the

ARKANSAS SOIL AND WATER CONSERVATION COMMISSION

Little Rock, Arkansas
1985

UNITED STATES DEPARTMENT OF THE INTERIOR

DONALD PAUL HODEL, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

For additional information
write to:

District Chief
U.S. Geological Survey
2301 Federal Office Building
Little Rock, Arkansas 72201-3287

Copies of this report can
be purchased from:

Open-File Services Section
Western Distribution Branch
Box 25425, Federal Center
Denver, Colorado 80225
(Telephone: (303) 236-7476)

CONTENTS

ILLUSTRATION

TABLES

CONVERSION FACTORS

For use of readers who prefer to use metric units, conversion factors for terms used in this report are listed below:

Multiply	By	To obtain
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
acre	4047	square meter (m^2)
	0.004047	square kilometer (km^2)
square mile (mi^2)	2.590	square kilometer (km^2)
cubic foot (ft^3)	0.02832	cubic meter (m^3)
acre-foot (acre-ft)	1233	cubic meter (m^3)
	1.233×10^{-6}	cubic kilometer (km^3)
cubic foot per second (ft^3/s)	28.32	liter per second (L/s)
	0.02832	cubic meter per second (m^3/s)

ANNUAL YIELD AND SELECTED HYDROLOGIC DATA FOR THE ARKANSAS RIVER BASIN COMPACT ARKANSAS-OKLAHOMA 1984 WATER YEAR

By M. A. Moore and T. E. Lamb

ABSTRACT

The computed annual yield and deficiency of the subbasins as defined in the Arkansas River Compact, Arkansas-Oklahoma, are given in tables. Actual runoff from the subbasins and depletion caused by major reservoirs in the compact area are also given in tabular form. Monthly, maximum, minimum, and mean discharges are shown for the 14 streamflow stations used in computing annual yield. Results of water-quality analyses are shown for the Arkansas River at Dam No. 13, near Van Buren, Arkansas.

INTRODUCTION

The computed annual yields for subbasins in the Arkansas River basin as defined in the Arkansas River Basin Compact, Arkansas-Oklahoma, 1972, are presented in this report. The area included in the Compact is shown in figure 1. Results of water-quality analyses for the most downstream Compact station on the Arkansas River (Arkansas River at Dam No. 13 near Van Buren, Arkansas) are included.

This report was prepared by the U.S. Geological Survey in cooperation with the Arkansas Soil and Water Conservation Commission. Streamflow data were furnished by the Arkansas and Oklahoma Districts, U.S. Geological Survey and the U.S. Army Corps of Engineers, Tulsa District. The Tulsa District also provided data from the Webbers Falls, Tenkiller Ferry, Robert S. Kerr and Wister Reservoirs. Water-quality data were provided by the U.S. Geological Survey.

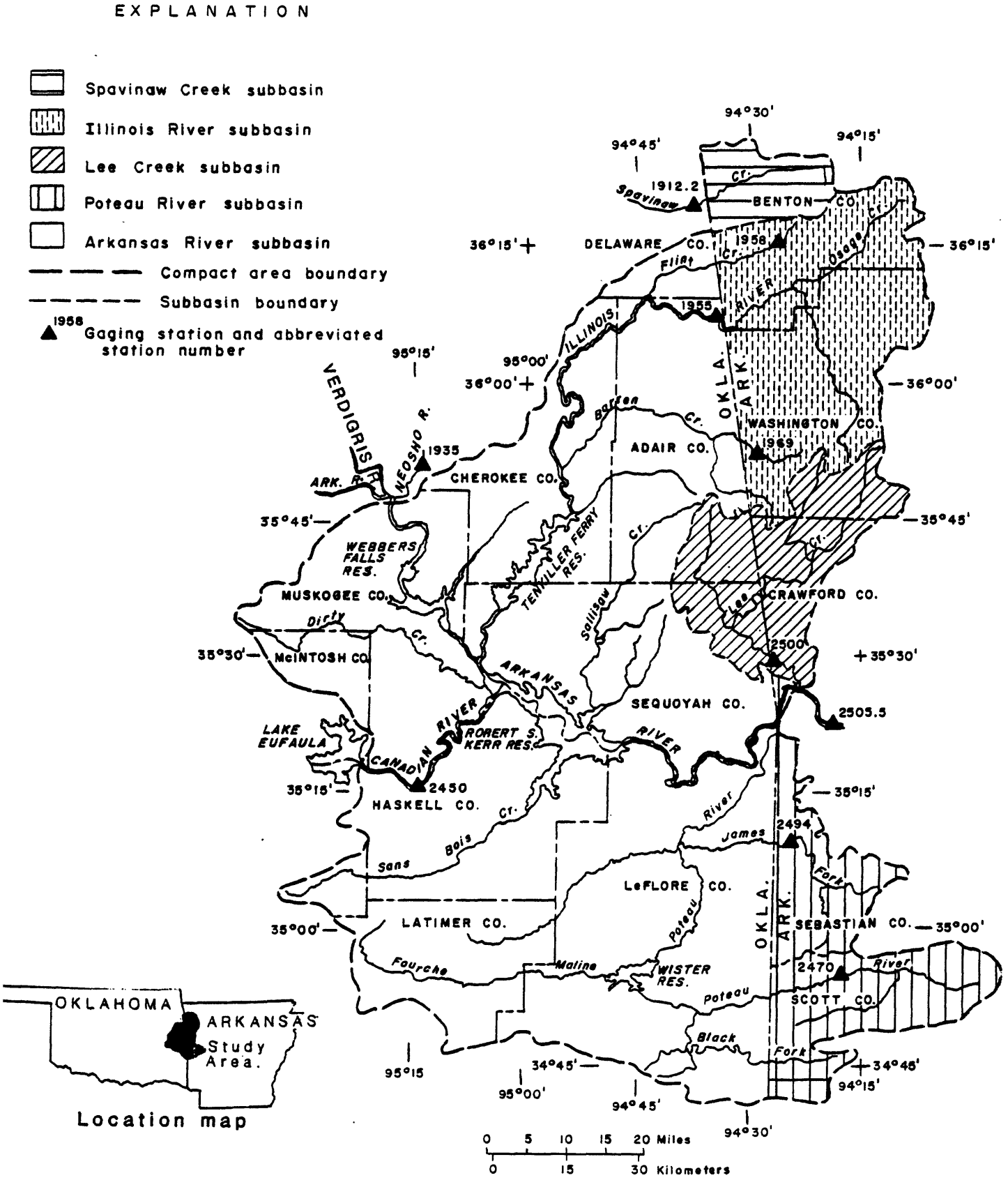

Figure 1.--Arkansas-Oklahoma Arkansas River Basin Compact area and subbasins.

DEFINITION OF TERMS

The following terms used in this report are taken from Article II of the Arkansas River Basin Compact, Arkansas-Oklahoma, 1972.

The term "Arkansas River Basin" means all of the drainage basin of the the Arkansas River and its tributaries from a point immediately downstream from the confluence of the Neosho River with the Arkansas River (fig. 1) to a point immediately downstream from the confluence of Lee Creek with the Arkansas River, together with the drainage basin of Spavinaw Creek in Arkansas (top of fig. 1), but excludes that part of the drainage basin of the Canadian River upstream from Lake Eufaula Dam.

The term "Spavinaw Creek Subbasin" means the drainage area of Spavinaw Creek in the State of Arkansas.

The term "Illinois River Subbasin" means the drainage area of Illinois River in the State of Arkansas.

The term "Lee Creek Subbasin" means the drainage area of Lee Creek in the State of Arkansas and in the State of Oklahoma.

The term "Poteau River Subbasin" means the drainage area of Poteau River in the State of Arkansas.

The term "Arkansas River Subbasin" means all areas of the Arkansas River Basin except the four subbasins described previously.

The term "water year" means a 12-month period beginning on October 1 and ending September 30.

The term "annual yield" means the computed annual gross runoff from any specified subbasin. The runoff would have passed any certain point on a stream and would have originated within any specified area under natural conditions, without any manmade depletion or accretion during the water year.

Other hydrologic terms used in this report are defined as follows:

Acre-foot is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Fecal coliform bacteria are present in the intestines or feces of warm-blooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory, they are defined as all the organisms that produce blue colonies within 24 hours when incubated at 44.5°C 0.2°C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal streptoccocal bacteria also are present in intestines of warm-blooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as gram-positive, coccoid bacteria that are capable of growth in brain-heart infusion broth. These bacteria are also defined as all the organisms that produce red or pink colonies within 48 hours at 35°C 0.5°C on KF-streptococcus agar (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Cells/volume refers to the number of cells of any organism, which are counted by using a microscope and grid of counting cell. Many planktonic organisms are multicelled and are counted according to the number of contained cells per sample, usually milliliters (mL) or liters (L).

Code numbers have been assigned for agencies collecting and analyzing samples, and are listed in water-quality tables of this report as follows:

1028 U.S. Geological Survey

80513 Arkansas District, WRD, USGS

80010 Atlanta Central Laboratory, WRD, USGS

85113 Headquarters Tritium Laboratory, WRD, USGS

Contents is the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

Cubic foot per second is the rate of discharge representing a volume of 1 cubic foot passing a specified point during 1 second.

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

Instantaneous discharge is the discharge at a particular instant of time.

Mean discharge is the arithmetic average of individual daily mean discharges during a specific period.

Dissolved refers to the material in a representative water sample that passes through a 0.45- micrometer membrane filter. This is a convenient operational definition used by Federal agencies that collect water data. Determinations of "dissolved" constituents are made on subsamples of the filtrate.

Dissolved oxygen content of water in equilibrium with air is a function of atmospheric pressure and temperature and the dissolved-solids concentration of the water. The ability of water to retain oxygen decreases with increasing temperature or dissolved solids, with small temperature changes having the more significant effect. Photosynthesis and respiration may cause diurnal variations in dissolved-oxygen concentration in water of some streams.

Drainage area of a stream at a specified point on the stream is that area enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the stream upstream from the specified point. Figures of drainage area given herein include all closed basins, or noncontributing areas within the area, unless otherwise noted.

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of gage height or discharge are obtained.

Hardness of water is a physical-chemical characteristic that is commonly recognized by the increased quantity of soap required to produce lather. It is attributable to the presence of alkaline earths (principally calcium and magnesium) and is expressed as equivalent calcium carbonate ($CaCO_3$).

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

Suspended-sediment discharge (tons/day) is the rate at which dry weight of sediment passes a section of a stream or is the quantity of

sediment, as measured by dry weight or volume, that passes a section in a given time. It is computed by multiplying discharge by milligrams per liter by 0.0027.

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

Sodium-absorption-ratio (SAR) is the expression of relative activity of sodium ions in exchange reactions with soil and is an index of sodium or alkali hazard to the soil. Water varies, in respect to sodium hazard, from that which can be used for irrigation on almost all soils to that which generally is unsatisfactory for irrigation.

Specific conductance is a measure of the abiility of a water to conduct an electrical current. It is expressed in microsiemens per centimeter at 25°C. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the dissolved-solids concentration of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is about 65 percent of the specific conductance (in microsiemens). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

Stage-discharge relation is the relation between gage height and the amount of water flowing past the gage in a channel.

Total is the total amount of a given constituent in a representative water-suspended sediment sample, regardless of the constituent's physical or chemical form. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent present in both the dissolved and suspended phases of the sample. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as "total." (Note that the work "total" does double duty here, indicating that the sample

consists of a water-suspended-sediment mixture and that the analytical method determines all of the constituent in the sample.)

COMPUTATION OF ANNUAL YIELD

The annual yield and deficiency (table 1) for each subbasin were computed as described in Appendix I to the Arkansas River Basin Compact Arkansas-Oklahoma, 1972, supplement No. 1. Actual runoff for the subbasins (table 2) was computed as described in the Compact except for the stations Arkansas River at Muskogee, which has been discontinued, and Arkansas River at Van Buren, which has been moved 7.9 miles downstream.

Annual depletion caused by major reservoirs (table 3) was computed for the four major reservoirs in the basin as described in Appendix I to the Compact. Depletion caused by small reservoirs and minor diversion for municipal and agricultural use are insignificant at this time and data are not included in tables 1 and 3.

A compilation of the areas of lakes and ponds in the Poteau River, Lee Creek, Spavinaw Creek, and Illinois River Subbasins was conducted by the Arkansas Soil and Water Conservation Commission in the early 1970's. This information was used to partially evaluate depletions caused by small reservoirs. Analysis showed that their impact on the depletion in any Subbasin was less than 1 percent, and further consideration was not necessary at that time.

Streamflow data used in the computations are given in hydrologic station records (p. 16 to 32). The station description under "Remarks" states the degree of accuracy of the records. "Excellent" means that about 95 percent of the daily discharges are within 5 percent of the actual discharge, "good" means within 10 percent, and "fair" means within 15 percent. "Poor" means that daily discharges have less than "fair" accuracy.

Table 1.--Annual yield and deficiency for the subbasins as defined in the Arkansas-Oklahoma Arkansas River Basin Compact

[Average annual flow in cubic feet per second for 1984 water year]

Subbasin	Actual runoff from the subbasins	Total depletions (+) or accretions (-)	Annual yield	Percent depletion allowed	Minimum required flow	Deficiency
Spavinaw Creek	85	0	85	50	42	0
Illinois River	466	0	466	60	186	0
Lee Creek	483	0	483	100	0	0
Poteau River	410	0	410	60	164	0
Arkansas River	1,376	+217	1,593	60	637	0

Table 2.--Actual runoff from the subbasins

[Mean discharge in cubic feet per second for the 1984 water year; D.A. = drainage area]

Month	Spavinaw Creek D.A.=135 square miles[a]	Illinois River D.A.=744 square miles[b]	Lee Creek D.A.=464 square miles[c]	Poteau River D.A.=536 square miles[d]	Arkansas River D.A.=4,553 square miles[e]
October	18	111	0	9	-1,260[f]
November	27	252	121	44	-2,730[f]
December	34	214	186	299	-1,070[f]
January	30	144	79	130	-1,190[f]
February	28	251	594	949	1,650
March	302	1,720	1,900	1,390	5,890
April	271	1,420	1,420	436	4,220
May	162	813	1,220	1,440	7,120
June	80	290	158	68	1,830
July	32	113	5	20	1,290
August	22	136	84	22	761
September	16	111	42	80	70
1984 water year	85	466	483	410	1,380
1984 water year (acre-feet)	61,710	338,300	350,600	297,600	1,002,000

[a] Includes 31 square miles ungaged.
[b] Includes 63 square miles ungaged.
[c] Includes 38 square miles ungaged.
[d] Includes 186 square miles ungaged.
[e] Computed by subtracting drainage area at Arkansas River at Muskogee, Canadian River near Whitefield, Illinois River Subbasin, Lee Creek Subbasin, and Poteau River Subbasin from drainage area at Arkansas River at Dam No. 13, near Van Buren, Ark.
[f] Negative discharge caused by storage in reservoirs, seepage into ground water, and evaporation from reservoirs.

Table 3.--Annual depletion caused by major reservoirs

[1984 water year]

Reservoir	Year-end contents (acre-feet)	Change in contents in water year (acre-feet)	Precipitation on reservoir surface (inch)[a]	Evaporation from reservoir (inch)[b]	Depletion (acre-feet)	Depletion (Average annual cubic feet per second)
Webbers Falls-----	165,607	+14,540	37.87	54.49	+37,200	+51.3
Tenkiller Ferry---	555,500	+11,770	43.03	41.04	+22,400	+30.9
Robert S. Kerr----	523,500	+15,050	39.33	50.32	+85,200	+118
Wister----------	64,360	+7,670	46.67	39.80	+12,500	+17.3

[a] From U.S. Corps of Engineers, Tulsa District.
[b] Adjusted for pan coefficient of 0.70 (from Wisler and Brater, 1949).

REFERENCES

Arkansas River Compact Committee, March 1972, Arkansas River Basin Compact Arkansas-Oklahoma, 1972, with Supplemental Interpretive Comments, Supplement No. 1: Austin, Tex., 31 p.

Wisler, C. D., and Brater, E. F., 1949, Hydrology: New York, N.Y., John Wiley & Sons, Inc., 150 p.

HYDROLOGIC STATION RECORDS

07165570 Arkansas River near Haskell, Okla.

LOCATION.--Lat 35°49'23", long 95°38'39", in NE 1/4 sec.31, T.16 N., R.16 E., Muskogee County, near right bank on downstream side of bridge on State Highway 104, 2.0 mi east of Haskell, 23.5 mi upstream from Verdigris River, and at mile 483.7.

DRAINAGE AREA.--75,473 mi^2, of which 12,541 mi^2 probably is noncontributing.

AVERAGE DISCHARGE.--12 years, 8,767 ft^3/s.

EXTREMES.--June 1972 to current year: Maximum discharge, 108,000 ft^3/s Nov. 6, 1974; minimum daily, 139 ft^3/s Nov. 18, 1982.

REMARKS.--Records good. Flow regulated by Keystone Lake, 55.1 mi upstream.

COOPERATION.--Gage-height record and discharge measurements furnished by Corps of Engineers; records computed by Geological Survey.

Monthly and yearly discharge

Month	Total (ft^3/s)	Maximum daily (ft^3/s)	Minimum daily (ft^3/s)	Mean (ft^3/s)	Runoff in acre-feet
October	192,040	21,900	570	6,195	380,900
November	146,908	10,900	718	4,897	291,400
December	97,452	6,740	772	3,144	193,300
January	76,950	5,650	804	2,482	152,600
February	103,220	6,770	1,260	3,559	204,700
March	532,230	63,800	1,350	17,170	1,056,000
April	1,115,700	54,500	13,100	37,190	2,213,000
May	489,270	33,100	6,970	15,780	970,500
June	198,660	10,700	2,610	6,622	394,000
July	85,208	5,940	499	2,749	169,000
August	36,314	3,320	396	1,171	72,030
September	36,591	4,870	457	1,220	72,580
Water Year 1984	3,110,543	63,800	396	8,499	6,170,000

07176000 Verdigris River near Claremore, Okla.

LOCATION.--Lat 36°18'26", long 95°41'52", in SE 1/4 SW 1/4 sec.10, T.21 N., R.15 E., Rogers County, near left bank on downstream side of bridge on State Highway 20, 2.3 mi downstream from Caney River, 4.5 mi west of Claremore, 12.4 mi upstream from Bird Creek, and at mile 76.0.

DRAINAGE AREA.--6,534 mi^2.

AVERAGE DISCHARGE.--27 years (water years 1936-62), 3,723 ft^3/s; 20 years (water years 1965-84), 3,836 ft^3/s.

EXTREMES.--October 1935 to current year: Maximum discharge, 182,000 ft^3/s May 21, 1943; no flow at times in 1936, 1939-40, 1956.

REMARKS.--Records fair. Flow regulated since May 1963 by Oologah Lake 14.3 mi upstream; some regulation by dams in Kansas since 1949 and by Hulah Lake since 1950.

COOPERATION.--Gage-height record and discharge measurements furnished by Corps of Engineers; records computed by Geological Survey.

Monthly and yearly discharge

Month	Total (ft^3/s)	Maximum daily (ft^3/s)	Minimum daily (ft^3/s)	Mean (ft^3/s)	Runoff in acre-feet
October	81,131	10,300	84	2,617	160,900
November	22,822	4,920	128	761	45,270
December	40,161	4,080	180	1,296	79,660
January	18,947	2,900	164	611	37,580
February	53,614	11,200	536	1,849	106,300
March	409,610	22,100	5,900	13,210	812,500
April	592,500	25,000	10,900	19,750	1,175,000
May	274,450	22,300	3,610	8,853	544,400
June	293,480	20,900	2,000	9,783	582,100
July	36,715	8,500	246	1,184	72,820
August	5,547	278	136	179	11,000
September	4,766	314	131	159	9,450
Water Year 1984	1,833,743	25,000	84	5,010	3,637,000

07177500 Bird Creek near Sperry, Okla.

LOCATION.--Lat 36°16'42", long 95°57'14", in NW 1/4 NW 1/4 sec.29, T.21 N., R.13 E., Tulsa County, on downstream side of county road bridge, 1.5 mi upstream from Delaware Creek, 2.4 mi downstream from Hominy Creek, 2.5 mi southeast of Sperry, and at mile 25.0

DRAINAGE AREA.--905 mi^2.

AVERAGE DISCHARGE.--46 years, 484 ft^3/s.

EXTREMES.--October 1938 to current year: Maximum discharge, 90,000 ft^3/s Oct. 3, 1959; no flow at times in 1939, 1954-57, 1964-66, 1970.

REMARKS.--Records good.

COOPERATION.--Gage-height record and discharge measurements furnished by Corps of Engineers; records computed by Geological Survey.

Monthly and yearly discharge

Month	Total (ft^3/s)	Maximum daily (ft^3/s)	Minimum daily (ft^3/s)	Mean (ft^3/s)	Runoff in acre-feet
October	26,038	9,400	14	840	51,650
November	3,174	393	26	106	6,300
December	2,240	200	28	72.3	4,440
January	1,568	76	33	50.6	3,110
February	5,637	2,030	38	194	11,180
March	83,505	9,490	210	2,694	165,600
April	46,573	4,950	297	1,552	92,380
May	43,680	7,840	137	1,409	86,640
June	6,905	1,400	47	230	13,700
July	923.9	240	6.1	29.8	1,830
August	581.7	114	3.6	18.8	1,150
September	355.6	80	3.5	11.9	705
Water Year 1984	221,181.2	9,490	3.5	604	438,700

07191220 Spavinaw Creek near Sycamore, Okla.

LOCATION.--Lat 36°20'07", long 94°38'24", in NE 1/4 NW 1/4 sec.4, T.21 N., R.25 E., Delaware County, on right bank 1.8 mi upstream from Cherokee Creek, 4.8 mi northeast of Row, 6.5 mi southeast of Sycamore, and at mile 35.0.

DRAINAGE AREA.--133 mi^2.

AVERAGE DISCHARGE.--23 years, 101 ft^3/s.

EXTREMES.--October 1961 to current year: Maximum discharge, 39,800 ft^3/s July 27, 1975; minimum, 1.2 ft^3/s Aug. 9, 1964.

REMARKS.--Records good.

Monthly and yearly discharge

Month	Total (ft^3/s)	Maximum daily (ft^3/s)	Minimum daily (ft^3/s)	Mean (ft^3/s)	Runoff in acre-feet
October	534	30	10	17.2	1,060
November	791	39	19	26.4	1,570
December	1,033	46	24	33.3	2,050
January	890	34	24	28.7	1,770
February	820	135	21	28.3	1,630
March	9,250	905	91	298	18,350
April	8,013	510	122	267	15,890
May	4,924	539	91	159	9,770
June	2,355	161	53	78.5	4,670
July	1,001	51	21	32.3	1,990
August	680	32	17	21.9	1,350
September	492	29	14	16.4	976
Water Year 1984	30,783	905	10	84.1	61,060

07193500 Neosho River below Fort Gibson Lake, near Fort Gibson, Okla.

LOCATION.--Lat 35°51'15", long 95°13'45", in SE 1/4 NW 1/4 sec.19, T.16 N., R.19 E., Cherokee County, on left bank 1.1 mi downstream from Fort Gibson Dam, 4.5 mi north of Fort Gibson, and at mile 6.6.

DRAINAGE AREA.--12,495 mi^2.

AVERAGE DISCHARGE.--34 years (1950-84), 7,681 ft^3/s.

EXTREMES.--May 1950 to current year: Maximum discharge, 223,000 ft^3/s May 26, 1957; minimum, 12 ft^3/s Oct. 10, 1957, Aug. 23, 1964.

REMARKS.--Records fair. Flow completely regulated by Fort Gibson Lake.

COOPERATION.--Gage-height record and discharge measurements furnished by Corps of Engineers; records computed by Geological Survey.

Monthly and yearly discharge

Month	Total (ft^3/s)	Maximum daily (ft^3/s)	Minimum daily (ft^3/s)	Mean (ft^3/s)	Runoff in acre-feet
October	61,436	9,630	15	1,982	121,900
November	161,322	16,300	21	5,377	320,000
December	250,482	15,700	100	8,080	496,800
January	86,335	5,290	24	2,785	171,200
February	118,083	17,700	753	4,072	234,200
March	757,100	43,100	14,800	24,420	1,502,000
April	1,144,900	46,600	27,100	38,160	2,271,000
May	405,856	23,300	15	13,090	805,000
June	272,330	17,000	2,590	9,078	540,200
July	50,139	4,110	15	1,617	99,450
August	32,413	4,170	15	1,046	64,290
September	24,512	4,120	15	817	48,620
Water Year 1984	3,364,908	46,600	15	9,194	6,674,000

STREAMFLOW

07194500 Arkansas River near Muskogee, Okla.

LOCATION.--Lat 35°46'10", long 95°17'55", in NW 1/4 sec.21, T.15 N., R.19 E., Muskogee County, at bridge on U.S. Highway 62, 1.7 mi downstream from Neosho River, 3.5 mi northeast of Muskogee.

DRAINAGE AREA.--96,674 mi^2 of which 12,541 mi^2 probably is noncontributing.

REMARKS.--Gaging station discontinued Sept. 30, 1970, due to backwater conditions. Streamflow computed by combining flow at station 07165570 Arkansas River near Haskell, station 07176000 Verdigris River near Claremore, station 07177500 Bird Creek near Sperry, station 07193500 Neosho River below Fort Gibson Lake near Fort Gibson, and adjusting the total for the ungaged intervening drainage area.

Monthly and yearly discharge

Month	Mean (ft^3/s)	Runoff in acre-feet
October	12,810	787,700
November	11,290	671,800
December	12,690	780,300
January	6,005	369,200
February	9,940	571,800
March	61,270	3,767,000
April	98,820	5,880,000
May	41,110	2,528,000
June	26,030	1,549,000
July	5,618	345,400
August	2,440	150,000
September	2,221	132,200
Water Year 1984	24,160	17,540,000

07195500 Illinois River near Watts, Okla.

LOCATION.--Lat 36°07'48", long 94°34'12", in NE 1/4 sec.18, T.19 N., R.26 E., Adair County, near right bank on downstream side of bridge on U.S. Highway 59, 1.5 mi north of Watts, 4.5 mi downstream from Cincinnati Creek, and at mile 106.2.

DRAINAGE AREA.--635 mi^2.

AVERAGE DISCHARGE.--29 years, 553 ft^3/s.

EXTREMES.--August 1955 to current year: Maximum discharge, 68,000 ft^3/s July 25, 1960; minimum, 8.6 ft^3/s Oct. 26, 1955, Sept. 19, Oct. 14, 1956.

REMARKS.--Records good. Some regulation at low flow by Lake Francis Dam, 0.8 mi above station. Since July 2, 1957, small diversion above station for municipal water supply for city of Siloam Springs, Ark.

COOPERATION.--Gage-height record and discharge measurements furnished by Corps of Engineers; records computed by Geological Survey.

Monthly and yearly discharge

Month	Total (ft^3/s)	Maximum daily (ft^3/s)	Minimum daily (ft^3/s)	Mean (ft^3/s)	Runoff in acre-feet
October	3,642	237	66	117	7,220
November	4,803	405	119	160	9,530
December	5,900	281	147	190	11,700
January	4,124	144	126	133	8,180
February	5,718	860	126	197	11,340
March	46,290	6,750	373	1,493	91,820
April	36,946	4,900	452	1,232	73,280
May	22,537	2,750	393	727	44,700
June	8,092	510	170	270	16,050
July	3,409	162	32	110	6,760
August	3,947	359	77	127	7,830
September	3,236	238	79	108	6,420
Water Year 1984	148,644	6,750	32	406	294,800

07195855 Flint Creek near West Siloam Springs, Okla.

LOCATION.--Lat 36°12'58", long 94°36'15", in NE 1/4 NE 1/4 sec.14, T.20 N., R.25 E., Delaware County, on left bank 180 ft downstream from county bridge, 2.5 mi from Arkansas-Oklahoma State line, northwest of Siloam Springs, Okla.

DRAINAGE AREA.--59.8 mi^2.

AVERAGE DISCHARGE.--5 years, 21 ft^3/s.

EXTREMES.--June 1979 to current year: Maximum discharge, 309 ft^3/s Mar. 19, 1984; minimum daily, 0.40 ft^3/s Aug. 7, 1980.

REMARKS.--Records good.

Monthly and yearly discharge

Month	Total (ft^3/s)	Maximum daily (ft^3/s)	Minimum daily (ft^3/s)	Mean (ft^3/s)	Runoff in acre-feet
October	230.8	26	3.2	7.45	458
November	238.3	20	4.8	7.94	473
December	388.4	18	5.3	12.5	770
January	206.5	14	3.5	6.66	410
February	248.3	45	3.8	8.56	493
March	2,415	222	21	77.9	4,790
April	2,356	161	34	78.5	4,670
May	1,134	94	21	36.6	2,250
June	657	43	14	21.9	1,300
July	369.1	14	7.7	11.9	732
August	236.2	12	6.2	7.62	469
September	265.4	18	6.4	8.85	526
Water Year 1984	8,745.0	222	3.2	23.9	17,350

07196900 Baron Fork at Dutch Mills, Ark.

LOCATION.--Lat 35°52'48", long 94°29'11", on line between secs.21 and 22, T.14 N., R.33 W., Washington County, near right bank on downstream side of bridge on State Highway 59 at Dutch Mills, 2.2 mi downstream from Fly Creek, and 2.9 mi upstream from Arkansas-Oklahoma State line.

DRAINAGE AREA.--46.0 mi^2.

AVERAGE DISCHARGE.--26 years, 36.9 ft^3/s.

EXTREMES.--April 1958 to current year: Maximum discharge, 17,100 ft^3/s July 13, 1972; no flow at times in 1963, 1967, 1980, 1981.

REMARKS.--Records good.

Monthly and yearly discharge

Month	Total (ft^3/s)	Maximum daily (ft^3/s)	Minimum daily (ft^3/s)	Mean (ft^3/s)	Runoff in acre-feet
October	20.65	5.7	0.18	0.67	41
November	1,184.2	138	1.9	39.5	2,350
December	372.0	28	6.0	12.0	738
January	216.1	9.0	5.0	6.97	429
February	751.8	146	5.2	25.9	1,490
March	3,607	596	23	116	7,150
April	2,792	560	25	93.1	5,540
May	1,521	221	13	49.1	3,020
June	281.0	26	2.6	9.37	557
July	56.28	3.6	.86	1.82	112
August	171.4	47	1.2	5.53	340
September	74.17	13	.86	2.47	147
Water Year 1984	11,047.60	596	.18	30.2	21,910

07245000 Canadian River near Whitefield, Okla.

LOCATION.--Lat 35°15'45", long 95°14'19", in SE 1/4 SE 1/4 sec.12, T.9 N., R.19 E., Haskell County, near right bank on downstream side of bridge on State Highway 2, 0.8 mi north of Whitefield, 5.5 mi upstream from Taleka (Snake) Creek, 8.2 mi downstream from Eufaula Dam, and at mile 18.8.

DRAINAGE AREA.--47,576 mi^2, of which 9,700 mi^2 is probably noncontributing.

AVERAGE DISCHARGE.--25 years (water years 1939-63), 6,005 ft^3/s; 17 years (water years 1968-84), 5,009 ft^3/s.

EXTREMES.--July 1938 to current year: Maximum discharge, 281,000 ft^3/s May 10, 1943; minimum daily, 0.4 ft^3/s Oct. 8, 1956.

REMARKS.--Records good. Prior to February 1964, occasional slight regulation by Conchas Lake in New Mexico and except for 54 mi^2 of intervening area, completely regulated thereafter by Eufaula Lake.

COOPERATION.--Gage-height record and discharge measurements furnished by Corps of Engineers; records computed by Geological Survey.

Monthly and yearly discharge

Month	Total (ft^3/s)	Maximum daily (ft^3/s)	Minimum daily (ft^3/s)	Mean (ft^3/s)	Runoff in acre-feet
October	71,497	10,900	61	2,306	141,800
November	446,960	29,400	2,090	14,900	886,500
December	74,805	7,790	96	2,413	148,400
January	12,310	2,340	56	397	24,420
February	5,132	762	38	177	10,180
March	78,458	7,370	99	2,531	155,600
April	305,410	14,900	3,870	10,180	605,800
May	133,236	7,880	786	4,298	264,300
June	118,540	7,240	1,280	3,951	235,100
July	106,412	10,300	691	3,433	211,100
August	97,325	5,740	636	3,140	193,000
September	44,969	6,710	54	1,499	89,200
Water Year 1984	1,495,054	29,400	38	4,085	2,965,000

07247000 Poteau River at Cauthron, Ark.

LOCATION.--Lat 34°55'08", long 94°17'55", in NW 1/4 SW 1/4 sec.16, T.3 N., R.31 W., Scott County, on right bank at downstream side of highway bridge at Cauthron, 2.9 mi downstream from Cross Creek, 7.8 mi downstream from Jones Creek, and at mile 109.0.

DRAINAGE AREA.--203 mi^2.

AVERAGE DISCHARGE.--45 years, 214 ft^3/s.

EXTREMES.--February 1939 to current year: Maximum discharge, 32,200 ft^3/s May 20, 1960; no flow at times in most years.

REMARKS.--Records fair. As of September 1974, flow from 92.2 mi^2 above this station is controlled by 16 floodwater-detention reservoirs with a total combined capacity of 39,082 acre-ft below the flood spillway crests, of which 33,524 acre-ft is flood-detention capacity, 2,100 acre-ft is water-supply storage, and 3,458 acre-ft is sediment-storage capacity.

Monthly and yearly discharge

Month	Total (ft^3/s)	Maximum daily (ft^3/s)	Minimum daily (ft^3/s)	Mean (ft^3/s)	Runoff in acre-feet
October	38.07	5.4	0.18	1.23	76
November	615.3	165	1.0	20.5	1,220
December	5,115	1,060	15	165	10,150
January	1,893	180	18	61.1	3,750
February	12,819	2,600	29	442	25,430
March	15,600	1,400	200	503	30,940
April	4,577	390	37	153	9,080
May	19,709	5,390	38	636	39,090
June	536.8	96	4.1	17.9	1,060
July	243.8	37	2.3	7.86	484
August	362.2	184	1.0	11.7	718
September	1,285.5	387	1.7	42.9	2,550
Water Year 1984	62,794.67	5,390	.18	172	124,600

07249400 James Fork near Hackett, Ark.

LOCATION.--Lat 35°09'45", long 94°24'25", in NW 1/4 NW 1/4 sec.34, T.6 N., R.32 W., Sebastian County, near left bank on downstream side of bridge on State Highway 45, 1.7 mi south of Hackett, 2.0 mi downstream from Elder Branch, 2.0 mi upstream from small tributary, and 3.6 mi upstream from Arkansas-Oklahoma State line.

DRAINAGE AREA.--147 mi^2.

AVERAGE DISCHARGE.--26 years, 129 ft^3/s.

EXTREMES.--April 1958 to current year: Maximum discharge, 30,000 ft^3/s May 14, 1968; no flow at times.

REMARKS.--Records good.

Monthly and yearly discharge

Month	Total (ft^3/s)	Maximum daily (ft^3/s)	Minimum daily (ft^3/s)	Mean (ft^3/s)	Runoff in acre-feet
October	136.35	25	0.00	4.40	270
November	238.06	71	.19	7.94	472
December	521.7	85	4.7	16.8	1,030
January	634.7	84	2.9	20.5	1,260
February	4,426	1,100	12	153	8,780
March	12,776	1,190	135	412	25,340
April	4,088	503	34	136	8,110
May	8,613	1,670	33	278	17,080
June	828.7	84	9.7	27.6	1,640
July	148.37	9.0	.70	4.79	294
August	27.19	3.0	.00	.88	54
September	193.25	27	.30	6.44	383
Water Year 1984	32,631.32	1,670	.00	89.2	64,720

07250000 Lee Creek near Van Buren, Ark.

LOCATION.--Lat 35°29'40", long 94°26'58", in SE 1/4 sec.21, T.12 N., R.27 E., Indian Meridian, Sequoyah County, Okla., on right bank 300 ft west of Arkansas-Oklahoma State line, 3.2 mi downstream from Webbers Creek, 6.8 mi northwest of Van Buren, and at mile 7.8.

DRAINAGE AREA.--426 mi^2.

AVERAGE DISCHARGE.--40 years (1930-36, 1950-84), 484 ft^3/s.

EXTREMES.--September 1930 to June 1937, October 1950 to current year: Maximum discharge, 80,600 ft^3/s (2,280 m^3/s) May 6, 1960; no flow at times.

REMARKS.--Records good.

Monthly and yearly discharge

Month	Total (ft^3/s)	Maximum daily (ft^3/s)	Minimum daily (ft^3/s)	Mean (ft^3/s)	Runoff in acre-feet
October	3.68	0.77	0.00	.12	7.3
November	3,374.17	824	.11	112	6,690
December	5,280	256	66	170	10,470
January	2,240	94	48	72.3	4,440
February	15,837	4,670	72	546	31,410
March	54,030	4,030	582	1,743	107,200
April	39,058	3,500	396	1,302	77,470
May	34,794	5,550	190	1,122	69,010
June	4,308	634	10	144	8,540
July	74.25	8.7	.39	2.40	147
August	2,398.65	721	.28	77.4	4,760
September	1,188.3	286	2.5	39.6	2,360
Water Year 1984	162,586.05	5,550	0.00	444	322,500

07250550 Arkansas River at Dam No. 13, near Van Buren, Ark.

LOCATION.--Lat 35°20'56", long 94°17'54", in sec.28, T.8 N., R.31 W., Sebastian County, in Dam No. 13 control house on right bank, and at mile 308.9.

DRAINAGE AREA.--150,547 mi^2, of which 22,241 mi^2 is probably noncontributing.

AVERAGE DISCHARGE.--57 years, 30,790 ft^3/s.

EXTREMES.--October 1927 to current year: Maximum discharge, 850,000 ft^3/s (24,100 m^3/s) May 12, 1943; no flow Nov. 2, 1975, Feb. 1, 1981.

REMARKS.--Records good. Prior to October 1969, published as 07250500 Arkansas River at Van Buren. Beginning Apr. 26, 1970, daily discharge computed from relation between discharge, head, and gate openings. Flow regulated by many locks, dams, and reservoirs upstream.

Monthly and yearly discharge

Month	Total (ft^3/s)	Maximum daily (ft^3/s)	Minimum daily (ft^3/s)	Mean (ft^3/s)	Runoff in acre-feet
October	433,336	42,700	80	13,980	859,500
November	716,520	36,500	6,220	23,880	1,421,000
December	456,500	28,900	1,440	14,730	905,500
January	172,381	14,800	64	5,561	341,900
February	393,390	51,300	1,680	13,560	780,300
March	2,315,700	132,000	27,700	74,700	459,300
April	3,495,000	133,000	57,500	116,500	6,932,000
May	1,735,700	123,000	23,600	56,000	3,443,000
June	969,800	62,100	19,000	32,300	1,924,000
July	324,820	23,300	2,400	10,480	644,300
August	204,080	14,100	1,310	6,583	404,800
September	120,678	13,800	31	4,023	239,400
Water Year 1984	11,337,905	133,000	31	30,980	22,490,000

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1969 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1969 to September 1981.
WATER TEMPERATURES: October 1969 to September 1972, March 1974 to September 1981.
SUSPENDED SEDIMENT DISCHARGE: October 1970 to September 1981.

INSTRUMENTATION.--Water-quality monitor December 1969 to September 1981.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

[Five-digit numbers in parenthesis are STORET parameter codes used for computer storage of data; UG/L = micrograms per liter; MG/L = milligrams per liter]

DATE	TIME	AGENCY COLLECTING SAMPLE (CODE NUMBER) (00027)	AGENCY ANALYZING SAMPLE (CODE NUMBER) (00028)	STREAMFLOW INSTANTANEOUS (CUBIC FEET PER SECOND) (00061)	SPECIFIC CONDUCTANCE (MICROUSIEMENS) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE (DEG C) (00010)	TURBIDITY (NTU) (00076)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)
OCT										
05...	1315	80513	80010	0.00	653	8.6	24.0	3.4	9.1	109
14...	1030	1028	85113	--	--	--	--	--	--	--
NOV										
18...	1000	1028	85113	--	--	--	--	--	--	--
DEC										
06...	1100	80513	80010	3400	562	8.0	10.0	13	12.0	107
06...	1200	1028	85113	--	--	--	--	--	--	--
FEB										
01...	1330	80513	80010	6800	593	8.1	5.0	8.4	18.4	145
MAR										
09...	1100	1028	85113	--	--	--	--	--	--	--
APR										
02...	1230	80513	80010	120000	646	7.4	10.0	65	10.4	94
MAY										
25...	1000	1028	85113	--	--	--	--	--	--	--
JUN										
04...	1800	80513	80010	1700	400	7.8	23.0	55	8.6	102
08...	1200	1028	85113	--	--	--	--	--	--	--
JUL										
06...	0915	1028	85113	--	--	--	--	--	--	--
AUG										
02...	0830	80513	80010	1510	699	8.4	27.0	6.5	7.5	95

DATE	TIME	BAROMETRIC PRESSURE (MM OF HG) (00025)	COLIFORM, FECAL, 0.7 UM-MF (COLS. PER 100 ML) (31625)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS NONCARBONATE (MG/L AS CACO3) (95902)	HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)
OCT											
05...	1315	759	21	6	160	50	50	46	11	67	47
DEC											
06...	1100	761	97	81	140	40	40	39	9.9	58	47
FEB											
01...	1330	756	1	29	130	38	38	37	9.2	65	51
APR											
02...	1230	748	230	140	130	44	44	39	8.9	71	53
JUN											
04...	1800	751	44	180	110	32	32	32	6.7	33	39
AUG											
02...	0830	757	23	43	160	44	44	44	11	71	49

07250550 ARKANSAS RIVER AT DAM NO. 13, NEAR VAN BUREN, AR--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER ACRE-FOOT) (70303)
OCT 05...	1315	2	3.9	110	54	110	0.30	0.7	382	360	0.52
DEC 06...	1100	2	4.0	99	49	89	.30	2.9	333	310	.45
FEB 01...	1330	3	3.3	93	51	100	<.10	.0	331	320	.45
APR 02...	1230	3	3.2	90	53	110	.20	5.2	405	340	.55
JUN 04...	1800	1	3.1	76	35	51	.20	5.0	233	210	.32
AUG 02...	0830	3	3.7	112	53	110	.20	2.4	418	360	.57

DATE	TIME	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P) (00671)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)
OCT 05...	1315	<0.100	0.040	0.50	0.090	0.070	0.070	--	--	--	--
DEC 06...	1100	.480	.090	.60	.110	.080	.070	20	2	100	<0.5
FEB 01...	1330	< .100	< .010	1.2	.110	.020	< .010	30	2	82	< .5
APR 02...	1230	.670	.150	1.2	.100	.080	.060	--	--	--	--
JUN 04...	1800	.740	.060	1.2	.170	.140	.140	60	1	71	< .0
AUG 02...	0830	.290	.140	.50	.080	.040	.060	10	2	110	< .0

DATE	TIME	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)
DEC 06...	1100	<1	1	<3	7	26	4	7	3	<0.1	<10
FEB 01...	1330	<1	<1	<3	2	27	1	<4	3	< .1	<10
JUN 04...	1800	<1	<1	<3	2	20	1	<4	1	< .1	<10
AUG 02...	0830	<1	<1	<3	2	33	1	7	2	.1	<10

07250550 ARKANSAS RIVER AT DAM NO. 13, NEAR VAN BUREN, AR--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	TRITIUM IN WATER MOLE-CULES (TU) (07012)	TRITIUM WATER MOLE-CULES COUNT ERROR (TU) (07013)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDIMENT, DIS-CHARGE, SUSPENDED (TONS PER DAY) (80155)	SEDIMENT SUSPENDED SIEVE DIAMETER PERCENT FINER THAN .062 MM (70331)
OCT											
05...	1315	--	--	--	--	--	--	--	11	0.00	53
14...	1030	--	--	--	--	--	16.0	0.8	--	--	--
NOV											
18...	1000	--	--	--	--	--	18.1	1.0	--	--	--
DEC											
06...	1100	2	<1	<1	330	9	--	--	22	1980	68
06...	1200	--	--	--	--	--	14.6	.7	--	--	--
FEB											
01...	1330	3	<1	<1	290	4	15.2	.7	16	726	77
MAR											
09...	1100	--	--	--	--	--	17.7	.9	--	--	--
APR											
02...	1230	--	--	--	--	--	14.2	.7	355	115000	26
MAY											
25...	1000	--	--	--	--	--	14.5	.7	--	--	--
JUN											
04...	1800	2	<1	<1	240	9	--	--	74	8330	88
08...	1200	--	--	--	--	--	14.9	.7	--	--	--
JUL											
06...	0915	--	--	--	--	--	14.1	.7	--	--	--
AUG											
02...	0830	3	<1	<1	400	5	--	--	8	33	65