LOW-FLOW HYDROLOGY OF THE SULPHUR FORK RED RIVER BASIN, ROBERTSON COUNTY, NORTH-CENTRAL TENNESSEE

By Clarence H. Robbins

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CONTENTS

ILLUSTRATIONS

TABLES

DEFINITION OF ABBREVIATIONS

Cubic foot per second (ft^3/s). The rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 449 gallons per minute or 0.02832 cubic meters per second.

Cubic foot per second per square mile (ft^3/s) mi^2). The average number of cubic feet of water per second flowing from each square mile of area drained by a stream, assuming that the runoff is distributed uniformly in time and area.

Gallons per minute (gal/min). A unit for expressing well or spring yield.

Milligrams per liter (mg/L). A unit for expressing the concentration of dissolved constituents in water as a weight of the constituent in a liter of water.

3-day, 20-year low-flow ($3Q_{20}$). The lowest average rate of flow for 3 consecutive days to or below which streamflow can be expected to decline in 1 year out of 20, on the average.

CONVERSION FACTORS

For readers who may prefer to use the International System of Units (SI, or, commonly, metric) rather than the inch-pound units used herein, the conversion factors for the terms used in this report are listed below:

Inch-pound	Multiply by	SI
ft^3 (cubic feet)	0.02832	m^2 (cubic meters)
ft^3/s (cubic feet per second)	0.02832	m^3/s (cubic meters per second)
$(ft^3/s)/mi^2$ (cubic feet per second per square mile)	0.0109	$(m^3/s)/km^2$ (cubic meters per second per square kilometer)
gal/min (gallons per minute)	0.06309	L/s (liters per second)
mi^2 (square mile)	2.590	km^2 (square kilometer)

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ABSTRACT

The objectives of this study were to define (1) the average 3-day natural low-flow with a 20-year recurrence interval for five low-flow partial-record sites and one continuous record station, (2) losing and gaining reaches of the main stem of the Sulphur Fork Red River and major tributaries, and (3) the quality of water during low-flow. An additional objective was the collection of continuous streamflow and temperature data at selected sites for development of a thermal model for use as a guide in design and management of a small reservoir.

The quantity of surface water during low-flow varies considerably throughout the basin. Streamflow during periods of drought is groundwater discharging through numerous springs and seeps. The average 3-day, 20-year low-flow of the six study sites range from 0.1 to 2.2 cubic feet per second.

Seepage investigations in October 1976 show that as much as 4.4 cubic feet per second are lost from the Sulphur Fork Red River within a reach of 1.7 miles between river mile 30.8 and 29.1. Seepage investigations in July 1977 show that as much as 3.7 cubic feet per second are gained in the Sulphur Fork Red River within a reach of 0.8 miles between river mile 42.6 and 41.8.

Measured discharges from the 12 major springs in the basin ranged from less than 1 to 1660 gallons per minute during low-flow.

Water quality of streams varies in time and space. Specific conductance ranged from 200 to 1,800 micromhos per centimeter at 25° centigrade during the 1976 seepage investigation on the Sulphur Fork Red River. During the two-year study the specific conductance of water from the springs ranged from 230 to 675 micromhos per centimeter at 25° centigrade.

INTRODUCTION

Watershed protection, waste disposal, and flood prevention guidelines have been established by State and Federal regulatory agencies to aid in optimum water use. Streamflow regulation for water use, diversion, impoundment, or waste disposal actuely affects streamflow during periods of low-flow. To conform to the guidelines set forth by the regulatory agencies low-flow data are needed for adequate management of this vital resource.

The Soil Conservation Service entered into a two-year cooperative program with the U.S. Geological Survey to study the low-flow hydrology of the Sulphur Fork Red River and its tributaries. The Soil Conservation Service has proposed a multi-purpose impoundment for flood prevention, sediment storage, municipal water supply, and recreation in the basin.

The drainage basin is underlain by St. Louis Limestone, Warsaw and Fort Payne Formations of Mississippian Age. The St. Louis Limestone caps the highlands and the Fort Payne is exposed only in the deeply incised stream valleys. The Warsaw Formation crops out between the St. Louis Limestone and the Fort Payne Formation.

The area consists of a 124 mi^2 drainage basin in the Highland Rim physiographic province in north-central Tennessee (fig. 1). All of the area is within Robertson County and surrounds Springfield, the county seat. The area is approximately 35 mi north of Nashville.

The principal objective of this study was to define the low-flow hydrology of the Sulphur Fork Red River basin and its tributaries. To attain this objective, a stream profile showing the average 3-day, 20-year low-flow values was drawn; data on water quality in the basin was evaluated; and losing and gaining reaches of various portions of the stream network were identified. An additional objective was to provide continuous streamflow and temperature data at selected sites for development of a thermal model. The study began in June 1975 with a reconnaissance of the Sulphur Fork Red River basin to select locations suitable for data collection.

STREAMFLOW DATA COLLECTION

To determine the availability of surface water during periods of low-flow, a continuous-record streamflow site and four low-flow partial-record sites on the main stem of Sulphur Fork Red River; a low-flow partial-record site on Beaver Dam Creek, the largest tributary above Springfield; and 55 seepage investigation sites were established. All sites except seepage sites are shown on Figure 2. Data collection and analysis began in mid-1975.

CONTINUOUS-RECORD STATION

The continuous record streamflow station, (03435770), was placed in operation August 22, 1975, by the U.S. Geological Survey. The station is on the left bank, 150 ft downstream from the new State Highway 49 bridge at Springfield, Robertson County, and at river mile 30.8 (Youngville Quadrangle). The basin upstream from the station has a drainage area of 65.6 square miles.

The gage consists of a digital water-stage recorder, with a 15-min punch interval, driven by a 35-foot range manometer, housed in a 5 ft x 5 ft metal shelter. The outside gages are three staff sections set in the left bank.

The streambed is composed of cherty limestone rock and chert gravel. The low-water control is a gravel shoal approximately 100 ft downstream from the gage and is subject to frequent scour and fill. The high-water control is the channel and flood plain lined with trees and undergrowth.

From August 1975 to November 1977, 30 discharge measurements were made to develop a stage-discharge relationship. The continuous-record streamflow station furnished satisfactory record during the two-year study.

Maximum streamflow generally occurs from December to April when precipitation increases and evapotranspiration decreases. As rainfall increases and evapotranspiration decreases the ground-water system becomes recharged and is capable of sustaining a high-base streamflow. Also, overland flow from precipitation increases because of saturated soil conditions, thus, peak streamflow for the year generally occurs during the rainy season. The maximum instantaneous peak discharge recorded at this site was 4,800 ft^3/s (73.2 $(ft^3/s)/mi^2$) on March 21, 1976. Streamflow decreases from May to November due to increased evapotranspiration losses and decreases in ground-water discharge with annual low usually occurring during August, September, or October. The minimum daily discharge recorded at this site for the period of record was 3.12 ft^3/s (.048 $(ft^3/s)/mi^2$) on September 12, 1977. Records of mean daily discharge are given in table 1.

LOW-FLOW PARTIAL-RECORD STATIONS WITH WATER QUALITY

A low-flow partial-record station is a site where limited streamflow and/or water-quality data are collected systematically over a period of time for use in hydrologic analyses. As previously stated, five such sites were established in the basin. Accessibility and measuring conditions at each site, as well as adequate areal coverage of the basin, were criteria used in site selection.

Data collected at low-flow partial-record sites, when correlated with appropriate long-term continuous records, can be used to derive certain statistical data at the sites. In this particular study, low-flow frequency - specifically, the 3-day, 20-year value - was the principal output desired. Sulphur Fork Red River near Adams, a 36-year record (1940-75), was the correlation, or index, station used in this study. The $3Q_{20}$ for the index station was obtained from the statewide frequency analysis by Gold (1978).

Eleven discharge measurements were made at each of the five low-flow partial-record sites as streamflow conditions permitted. All measurements were made not less than four days after a rainfall to assure base flow conditions. Corrections to measured discharge were applied as needed to account for pumpage from the stream by the Springfield water treatment plant and/or return flow to the stream from the Springfield sewage treatment plant. Logarithmic plots of corrected discharge measurements at a specific site versus mean daily discharge at the index station on the date of measurement were made. There was considerable disparity, or scatter, between the points, which might have resulted from differences in precipitation, recharge, and evapotranspiration between the sites. Further, the difference between minimum and maximum measured discharge values was not as great as was desired. Nonetheless, a general correlation line was indicated, and a straight line correlation was drawn, by graphical means, through the points. The line was then extended through the 3-day, 20-year low-flow frequency value for the index station (3.4 ft^3/s), and the corresponding value for the low-flow partial-record site was read directly from the ordinate of the curve. It should be noted that the accuracy of the 3-day, 20-year low-flow value at a partial-record site depends principally on (1) how the base flow relation is defined; (2) how far that relation must be extrapolated; and (3) the reliability of the estimate at the correlation station. In this study, the measurement range was so small that extrapolation of the curve was considerably greater than that normally used, and consequently, the values are of lower accuracy than that usually ascribed. Further, the low-flow estimates given in this report may be revised in a few years after more data have been collected at the partial-record site.

A similar procedure was used in making low-flow correlations for the continuous record station above Springfield because the station is downstream from the proposed Soil Conservation Service dam site and the data could be useful in the overall evaluation of a dam in this vicinity. Low-flow characteristics of all seven sites, that is, four low-flow partial-record stations on the main stem; one on the major tributary; the short-term continuous record station; and the index station,--are given in table 2. Detailed data and correlation graphs are given on page 21.

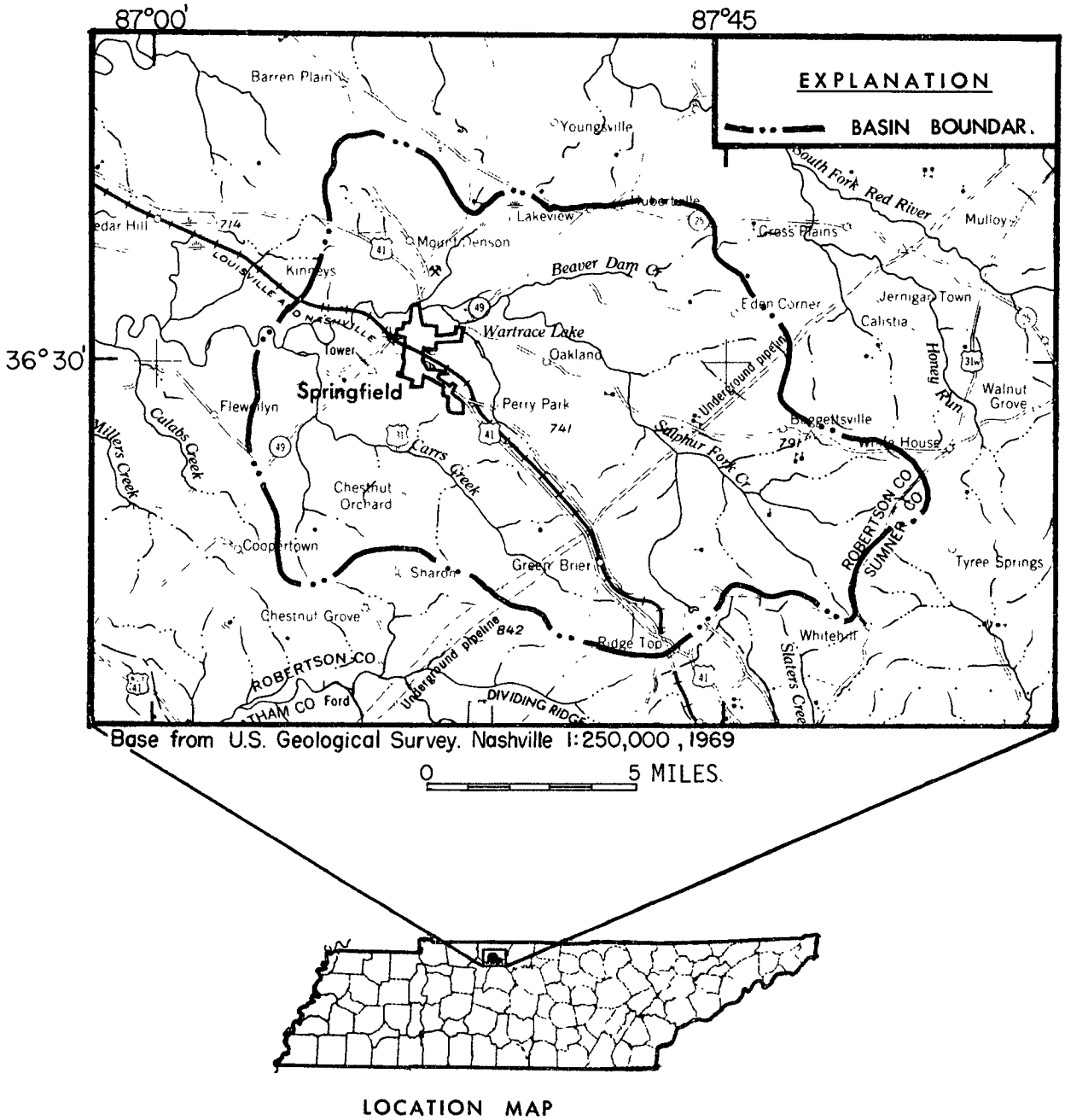

Figure 1.--Location of Sulphur Fork Red River Basin.

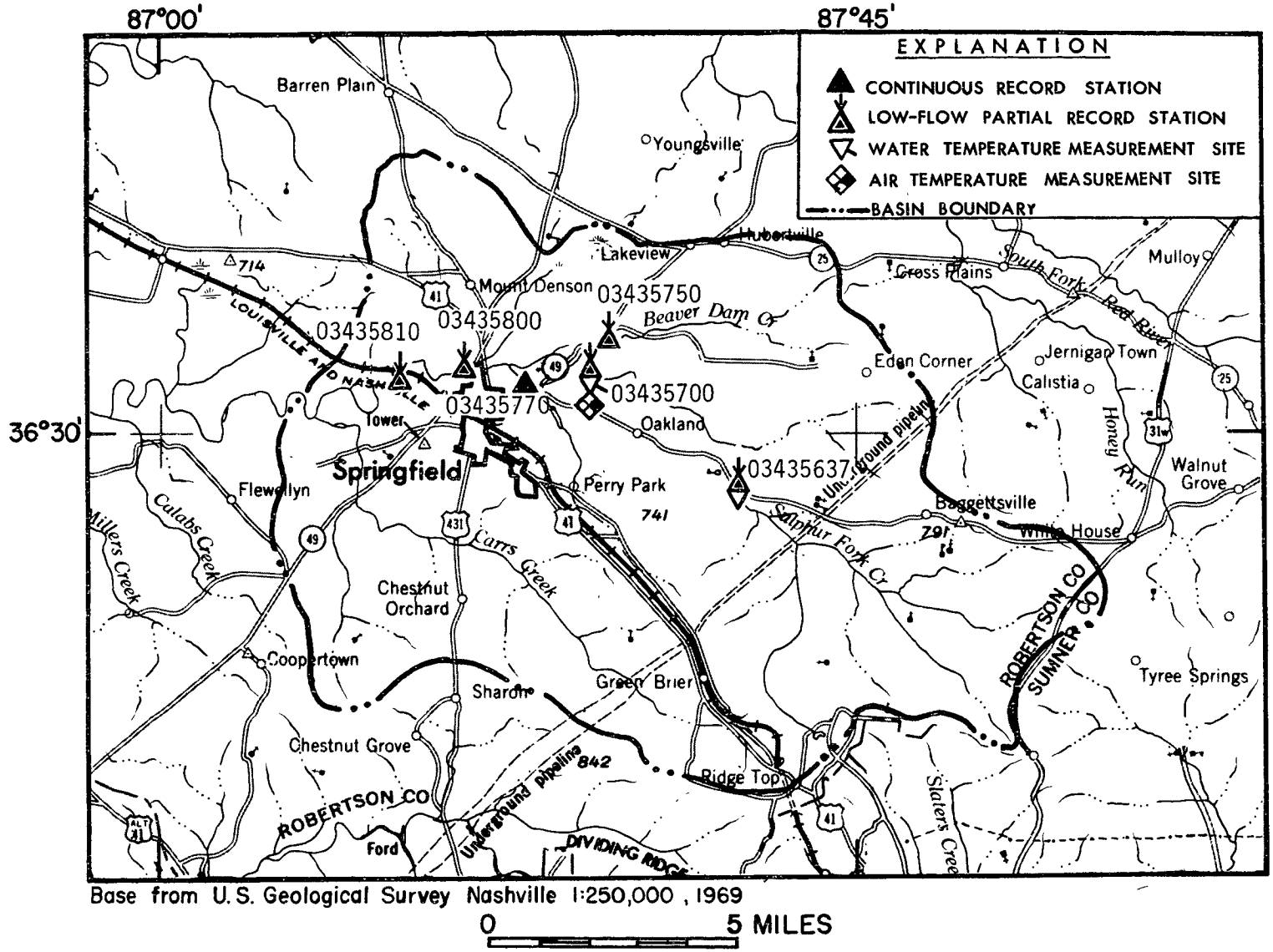

Figure 2.-- Location of continuous-record gaging station, five low-flow partial-record stations, water temperature, and air temperature stations.

Table 1.--Discharge records for Sulphur Fork Red River above Springfield, Tennessee

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-24-79

STATION NUMBER 03435770 SULPHUR FORK RED RIVER ABOVE SPRINGFIELD, TENN STREAM SOURCE AGENCY USGS
LATITUDE 363047 LONGITUDE 0865144 DRAINAGE AREA 65.60 DATUM STATE 47 COUNTY 147

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1											---	6.6
2											---	5.4
3											---	5.0
4											---	5.0
5											---	4.7
6											---	5.0
7											---	5.8
8											---	4.7
9											---	12
10											---	33
11											---	11
12											---	6.6
13											---	6.2
14											---	5.4
15											---	5.0
16											---	5.8
17											---	8.0
18											---	18
19											---	18
20											---	167
21											---	31
22											6.6	18
23											6.2	18
24											6.2	123
25											6.6	83
26											5.4	49
27											6.6	36
28											4.7	29
29											4.7	25
30											5.0	21
31											5.4	---
TOTAL	---	---	---	---	---	---	---	---	---	---	---	771.2
MEAN	---	---	---	---	---	---	---	---	---	---	---	25.7
MAX	---	---	---	---	---	---	---	---	---	---	---	167
MIN	---	---	---	---	---	---	---	---	---	---	---	4.7
CFSM	---	---	---	---	---	---	---	---	---	---	---	.39
IN.	---	---	---	---	---	---	---	---	---	---	---	.44

NO DATA AVAILABLE

NO DATA AVAILABLE

NO DATA AVAILABLE

NO DATA AVAILABLE

Table 1.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-24-79

STATION NUMBER 03435770 SULPHUR FORK RED RIVER ABOVE SPRINGFIELD, TENN STREAM SOURCE AGENCY USGS
LATITUDE 363047 LONGITUDE 0865144 DRAINAGE AREA 65.60 DATUM STATE 47 COUNTY 147

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	29	353	452	116	73	374	35	83	67	80	8.5
2	16	27	197	332	93	67	256	33	296	48	46	14
3	14	26	133	699	83	64	202	30	391	322	39	10
4	13	26	97	368	76	59	169	28	259	483	34	8.5
5	13	25	79	250	74	67	140	27	226	252	30	8.5
6	12	24	96	192	82	61	125	27	158	165	29	7.1
7	12	99	103	247	69	52	109	27	123	123	36	5.9
8	22	64	86	268	66	48	96	26	97	92	28	5.9
9	21	52	80	164	63	110	82	25	77	206	25	5.9
10	16	167	69	144	60	100	72	25	64	172	24	9.2
11	14	115	61	162	56	78	69	28	51	88	23	8.5
12	13	83	57	146	51	71	67	26	47	80	22	7.1
13	13	63	50	240	50	65	57	24	43	74	21	6.5
14	12	52	46	293	48	56	51	64	41	47	20	6.5
15	13	46	73	213	46	53	47	167	39	43	20	5.9
16	13	41	133	186	45	51	46	117	37	39	26	5.9
17	1140	37	90	137	72	46	44	136	37	37	20	5.4
18	446	34	71	102	1480	43	42	158	33	32	16	5.9
19	229	32	59	87	444	41	41	115	35	30	14	5.9
20	147	34	59	81	275	219	41	78	33	27	12	7.8
21	97	36	52	74	367	1920	41	61	31	26	9.2	22
22	76	30	46	67	346	452	38	48	41	25	8.5	7.1
23	63	27	42	64	228	263	36	45	29	23	8.5	4.9
24	52	26	39	63	181	196	35	42	29	21	8.5	4.9
25	50	25	275	455	149	162	43	38	340	20	10	4.4
26	46	25	582	1010	123	140	37	35	178	16	20	4.4
27	40	72	264	414	101	131	33	32	87	113	16	20
28	37	49	186	278	88	103	31	45	64	70	10	29
29	35	41	142	219	79	1520	30	101	117	43	9.2	19
30	32	544	133	174	---	812	30	50	130	43	7.1	21
31	30	---	547	136	---	542	---	45	---	155	6.5	---
TOTAL	2756	1951	4300	7717	5011	7665	2484	1738	216	2982	678.5	285.6
MEAN	88.9	65.0	139	249	173	247	82.8	56.1	107	96.2	21.9	9.52
MAX	1140	544	582	1010	1480	1920	374	167	391	483	80	29
MIN	12	24	39	63	45	41	30	24	29	16	6.5	4.4
CFSM	1.36	.99	2.12	3.80	2.64	3.77	1.26	.86	1.63	1.47	.33	.15
IN.	1.56	1.11	2.44	4.38	2.84	4.35	1.41	.99	1.82	1.69	.38	.16

WTR YR 1976 TOTAL 40784.1 MEAN 111 MAX 1920 MIN 4.4 CFSM 1.69 IN 23.13

Table 1.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-24-79

STATION NUMBER 03435770 SULPHUR FORK RED RIVER ABOVE SPRINGFIELD, TENN STREAM SOURCE AGENCY USGS
LATITUDE 363047 LONGITUDE 0865144 DRAINAGE AREA 65.60 DATUM STATE 47 COUNTY 147

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	45	11	10	20	149	44	45	21	40	37	7.1
2	9.2	38	14	8.9	16	121	57	43	21	31	29	6.5
3	7.8	33	13	15	21	427	102	44	20	25	26	19
4	6.5	29	13	20	26	2220	754	43	20	23	24	9.2
5	6.5	26	11	22	39	590	484	41	19	21	22	6.5
6	33	25	10	25	27	325	243	39	18	20	20	7.8
7	30	24	26	27	39	220	179	352	13	18	16	20
8	21	22	32	33	28	175	147	179	13	13	20	8.5
9	24	22	26	27	21	148	125	114	15	306	20	6.5
10	24	21	25	29	21	131	107	84	14	70	19	5.4
11	20	20	27	23	22	119	92	68	13	43	20	4.4
12	12	20	42	25	113	1560	80	54	14	37	10	3.5
13	9.2	19	45	25	99	577	72	47	18	32	8.5	9.2
14	7.1	19	40	78	65	305	68	44	20	28	29	27
15	7.1	13	37	189	49	218	62	42	19	26	35	28
16	6.5	14	33	115	42	171	54	40	35	24	28	21
17	6.5	12	30	103	39	146	50	38	22	22	24	19
18	6.5	11	28	111	38	139	47	36	20	21	22	12
19	6.5	12	26	74	36	116	45	34	27	20	19	174
20	24	10	26	55	33	103	44	32	22	19	16	50
21	26	9.8	24	47	31	90	43	30	19	19	12	29
22	20	8.6	20	41	30	84	60	30	125	57	19	23
23	14	8.5	22	37	129	73	108	28	124	41	32	19
24	26	8.6	24	36	898	67	164	28	45	26	21	17
25	85	8.8	22	33	267	63	115	27	54	37	12	27
26	72	13	24	29	178	57	86	27	75	32	10	39
27	39	26	22	30	303	53	70	26	67	24	38	48
28	30	21	22	36	188	57	59	25	40	22	20	42
29	28	20	21	36	---	56	53	24	32	53	12	30
30	53	12	18	25	---	48	47	24	28	155	9.2	26
31	78	---	21	22	---	45	---	23	---	43	8.5	---
TOTAL	757.4	571.3	755	1386.9	2818	8653	3661	1711	993	1348	638.2	744.6
MEAN	24.4	19.0	24.4	44.7	101	279	122	55.2	33.1	43.5	20.6	24.8
MAX	85	45	45	189	898	2220	754	352	125	306	38	174
MIN	6.5	8.5	10	8.9	16	45	43	23	13	13	8.5	3.5
CFSM	.37	.29	.37	.68	1.54	4.25	1.86	.84	.51	.66	.31	.38
IN.	.43	.32	.43	.79	1.60	4.91	2.08	.97	.56	.76	.36	.42

CAL YR 1976 TOTAL 33860.8 MEAN 92.5 MAX 1920 MIN 4.4 CFSM 1.41 IN 19.20
WTR YR 1977 TOTAL 24037.4 MEAN 65.9 MAX 2220 MIN 3.5 CFSM 1.01 IN 13.63

Table 2.--Low-flow characteristics of low-flow partial-record stations and one continuous-record station in the Sulphur Fork Red River basin.

Station No.	Stations downstream order	Drainage area in square miles	River mile	Streamflow for indicated period, in cubic feet per second, and recurrence interval	3-day, 20-year low flow
				3-day 20-year	$\frac{(ft^3/s)}{mi^2}$
03435637	Sulphur Fork Red River near Greenbrier	34.9	38.0	0.4	.013
03435700	Sulphur Fork Red River above Beaver Dam Creek near Springfield	49.1	32.9	1.0	.021
03435750	Beaver Dam Creek near Springfield	14.2	32.0	0.1	.007
03435770	*Sulphur Fork Red River above Springfield	65.6	30.8	2.0	.030
03435800	Sulphur Fork Red River at Springfield	79.9	29.1	2.0	.025
03435810	Sulphur Fork Red River near Springfield	84.5	26.7	2.2	.026
03436000	**Sulphur Fork Red River near Adams --correlation station--	186	10.2	3.4	.020

*Continuous-record network station 1975-77; previously low-flow partial-record station.

**Continuous-record network station.

SULPHUR FORK RED RIVER NEAR GREENBRIER

The low-flow station, Sulphur Fork Red River near Greenbrier (03435637), is located where the stream channel is well incised. An abundance of weathered chert rubble from the Fort Payne Formation exists in the stream banks and channel bottom indicating that a fairly high sustained base flow is possible from ground-water storage. The 3-day, 20-year low-flow determined for this site is 0.4 ft^3/s (.013 $(ft^3/s)/mi^2$) (fig. 3). All discharge measurements for this site and water quality data are listed in the following table.

Station	Drainage area (mi^2)	Date	Discharge (ft^3/s)	Date	Discharge (ft^3/s)
03435637	34.9	6-10-75	11.9	10-13-76	4.84
		7-10-75	3.2	4-18-77	15.8
		8-11-75	3.4	6-8-77	5.8
		8-21-75	3.7	7-21-77	4.11
		10-7-75	6.2	8-30-77	5.15
		7-27-76	8.0	11-15-77	14.6

Date	Water temp (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved oxygen (mg/L)
11-15-77	9.0	320	7.7	10.0

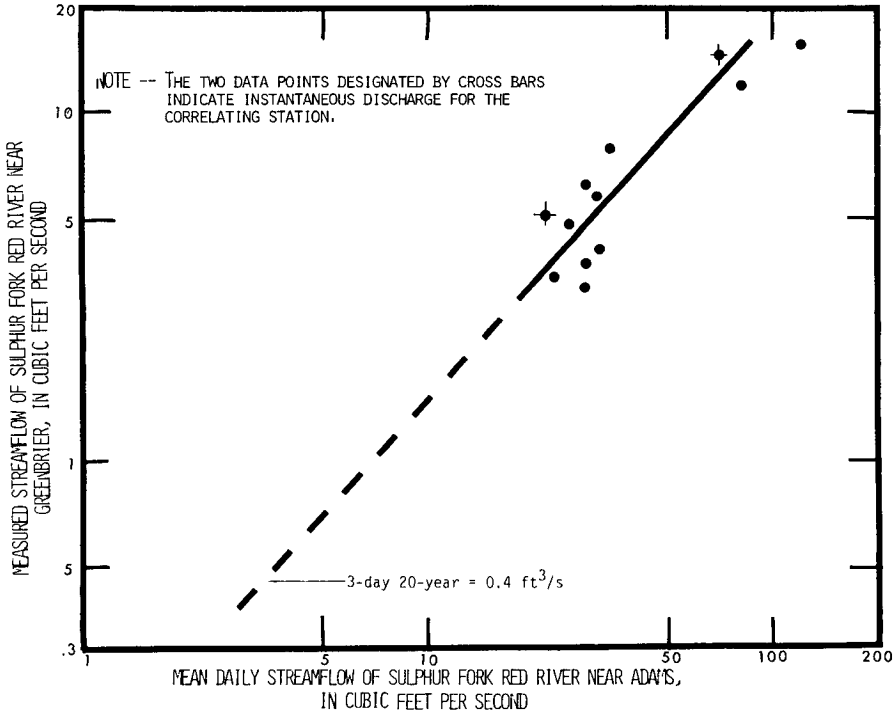

Figure 3.--Low-flow correlation curve for Sulphur Fork Red River near Greenbrier.

SULPHUR FORK RED RIVER ABOVE BEAVER DAM CREEK

Sulphur Fork Red River above Beaver Dam Creek (03435700) has a well-defined channel cut into the Fort Payne bedrock containing numerous vertical joints and horizontal solution openings. The solution openings indicate that a good sustained base flow is possible from numerous springs throughout the reach above and below the site. The 3-day, 20-year low-flow calculated for this site is 1.0 ft^3/s (.021 $(ft^3/s)/mi^2$) (fig. 4).

All discharge measurements for this site and water quality data are listed in the following table.

Station	Drainage area (mi^2)	Date	Discharge (ft^3/s)	Date	Discharge (ft^3/s)
03435700	49.1	7-16-75	5.1	4-18-77	22.8
		8-21-75	5.7	6-8-77	9.2
		10-8-75	24.8	7-21-77	9.8
		7-26-76	16.1	8-30-77	6.6
		10-13-76	8.24	11-15-77	21.8

Date	Water temp (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved oxygen (mg/L)
11-15-77	9.0	280	7.9	10.0

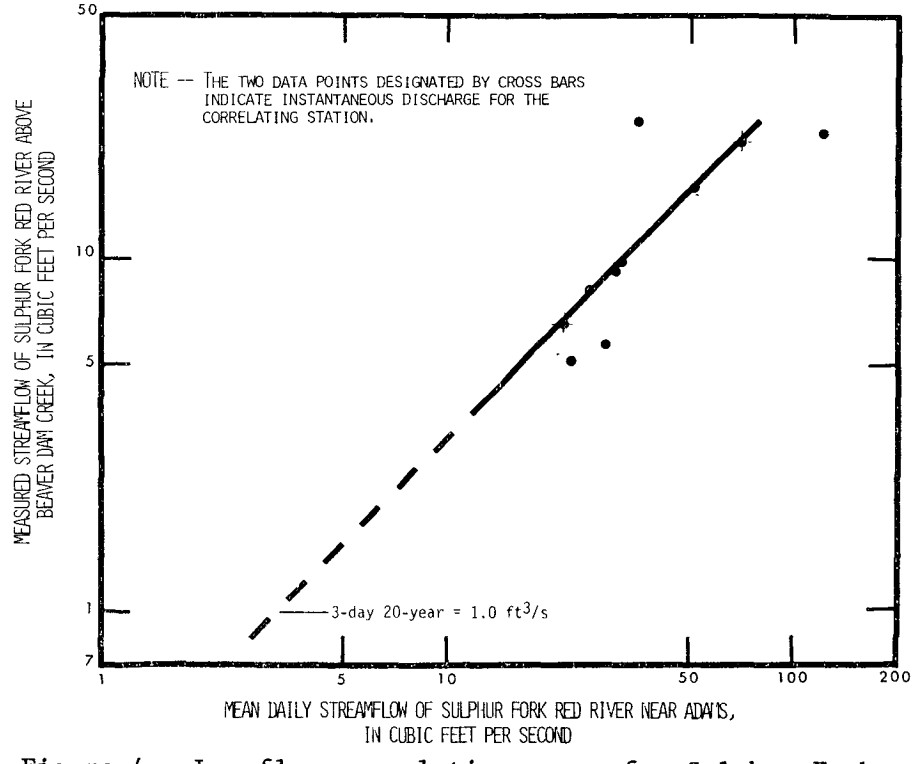

Figure 4.--Low-flow correlation curve for Sulphur Fork Red River above Beaver Dam Creek.

BEAVER DAM CREEK NEAR SPRINGFIELD

The upper two-thirds of Beaver Dam Creek basin has very little relief in topography resulting in a poorly-defined stream channel. Much of this basin may be non-contributing to surface drainage due to an abundance of sinkholes within the basin. At the measuring site, Beaver Dam Creek near Springfield (03435750) has a well-incised channel and a gravel and rock channel bottom. A poorly-sustained base flow can be expected at this site due to the lack of topographic relief and the stream channel which is too shallow to tap the ground-water system during periods of low flow. The 3-day, 20-year low-flow calculated for this site is 0.1 ft^3/s (.007 (ft^3/s) mi^2) (fig. 5). All discharge measurements for this site and water quality data are listed in the following table.

Station	Drainage area (mi^2)	Date	Discharge (ft^3/s)	Date	Discharge (ft^3/s)
03435750	14.2	7-16-75	1.3	4-18-77	7.24
		8-21-75	1.4	6-8-77	2.65
		10-7-75	1.7	7-21-77	2.16
		7-26-76	3.6	8-30-77	1.39
		10-13-76	1.34	11-15-77	5.84

Date	Water temp (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved oxygen (mg/L)
11-15-77	10	375	8.1	10.0

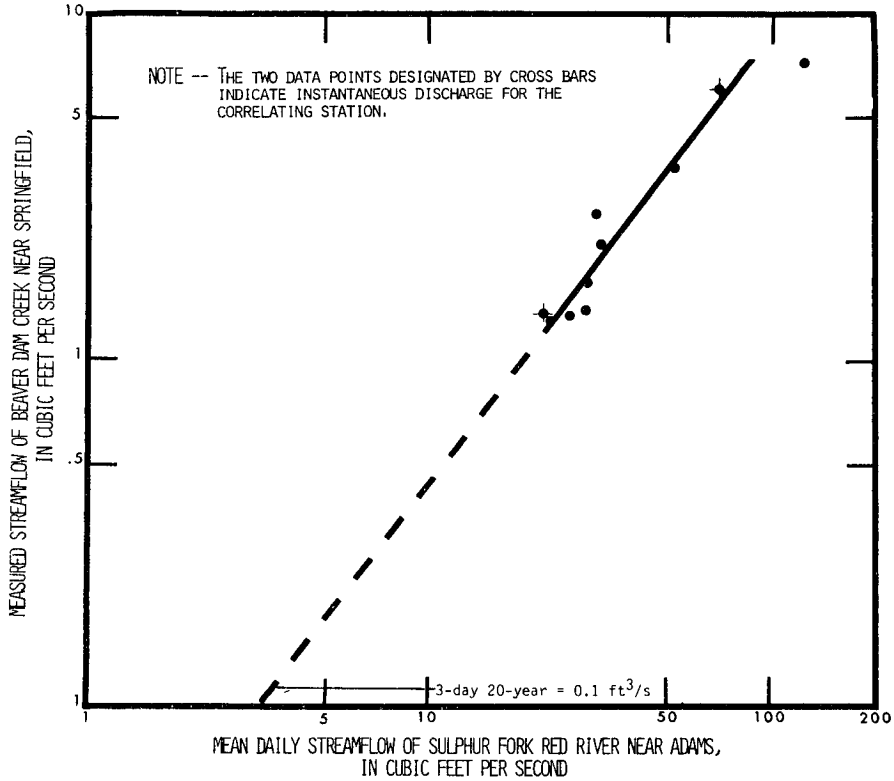

Figure 5.--Low-flow correlation curve for Beaver Dam Creek near Springfield.

SULPHUR FORK RED RIVER ABOVE SPRINGFIELD

The low-flow site at Sulphur Fork Red River above Springfield (03435770) has a deeply-incised channel in a sand-to-clay size material with a distinct absence of chert rubble and no visible vertical jointing or horizontal solution openings. The 3-day, 20-year low-flow determined for this site is 2.0 ft^3/s (.030 $(ft^3/s)/mi^2$) (fig. 6). All discharge measurements for this site and water quality data are listed in the following table.

Station	Drainage area (mi^2)	Date	Discharge (ft^3/s)	Date	Discharge (ft^3/s)
03435770	65.6	6-10-75	24.3	7-21-77	12.9
		10-7-75	11.7	8-30-77	8.70
		7-26-76	17.5	10-18-77	15.6
		6-8-77	13.8	11-15-77	26.4

Date	Water temp (^oC)	Specific conductance (umhos/cm)	pH (units)	Dissolved oxygen (mg/L)
11-15-77	10.5	350	7.9	8.1

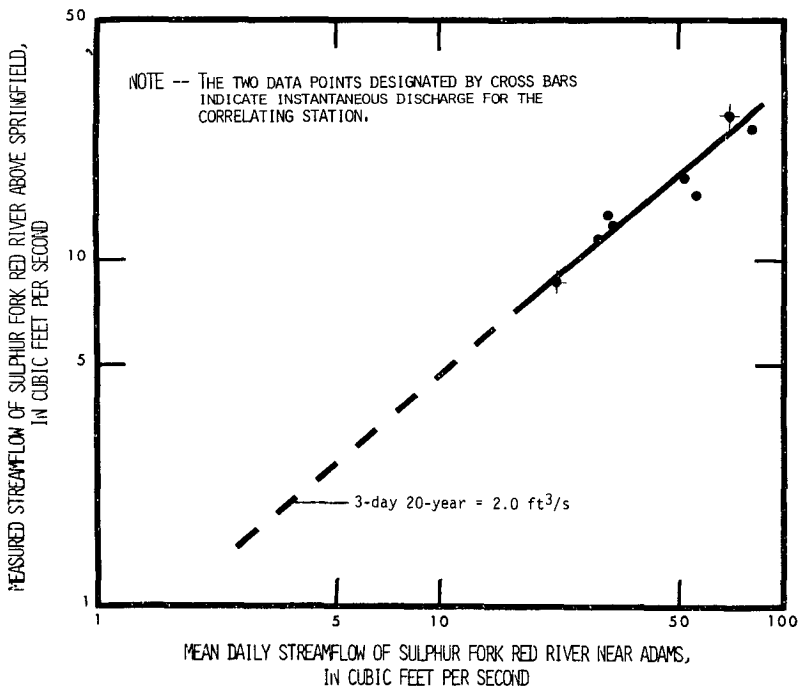

Figure 6.--Low-flow correlation curve for Sulphur Fork Red River above Springfield.

SULPHUR FORK RED RIVER AT SPRINGFIELD

Sulphur Fork Red River at Springfield (03435800) has a deeply incised channel with clay banks and channel bottom overlain by a thin layer of gravel. This could indicate a fairly low sustained base flow if the clay material extends very far up the basin. Discharge measurements made at this site are affected by pumpage at the Springfield water treatment plant. All discharge measurements were adjusted for pumpage before the correlation graph was plotted. The natural 3-day, 20-year low-flow determined for this site is 2.0 ft^3/s (.025 $(ft^3/s)/mi^2$) (fig. 7). All discharge measurements for this site and water quality data are listed in the following table.

Station	Drainage area (mi^2)	Date	Discharge (ft^3/s)	Date	Discharge (ft^3/s)
03435800	79.9	6-10-75	29.7*	10-13-76	11.4*
		7-16-75	11.3*	4-18-77	39.5*
		8-21-75	12.5*	6-8-77	13.8*
		10-8-75	22.9*	7-21-77	13.2*
		8-11-76	22.8*	8-30-77	11.8*
				11-15-77	29.4*

Date	Water temp (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved oxygen (mg/L)
11-15-77	11	290	7.9	8.5

*Adjusted for pumpage of 3.57 ft^3/s at water treatment plant.

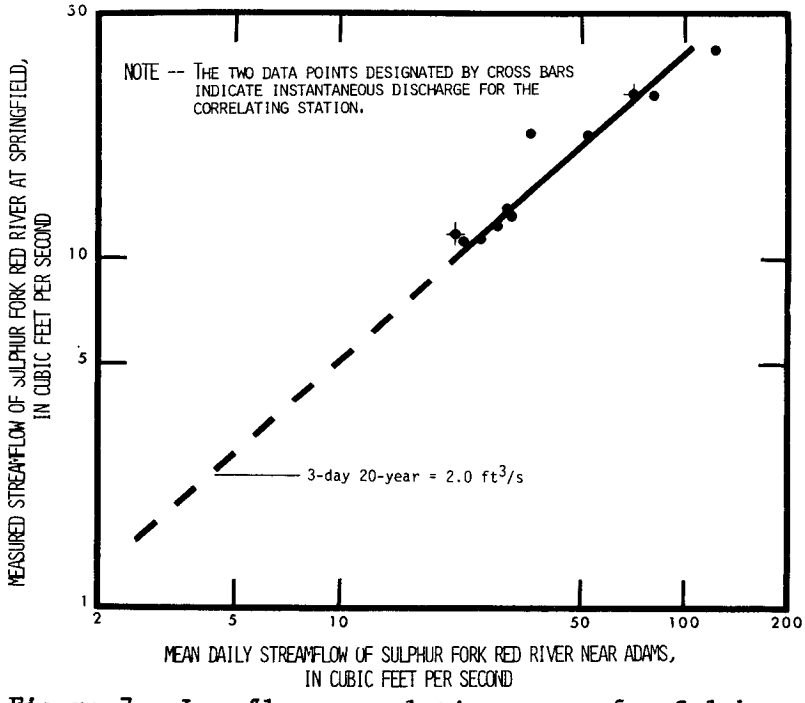

Figure 7.--Low-flow correlation curve for Sulphur Fork Red River at Springfield.

SULPHUR FORK RED RIVER NEAR SPRINGFIELD

A deeply incised channel with outcroppings of chert gravel under clay material typifies the river reach near Sulphur Fork Red River near Springfield (03435810). This site may have a fairly high sustained base flow compared to other sites in the basin due to the incising of the stream channel into water-bearing materials. Discharge at this site is affected by pumpage at the Springfield water treatment plant and return flow from the Springfield sewage treatment plant. All discharge measurements were adjusted for return flow and pumpage before the correlation graph was plotted. The natural 3-day, 20-year low-flow determined for this site is 2.2 ft^3/s (.026 $(ft^3/s)/mi^2$) (fig. 8). All discharge measurements for this site and water-quality data are listed in the following table.

Station	Drainage area (mi^2)	Date	Discharge (ft^3/s)	Date	Discharge (ft^3/s)
03435810	84.5	6-10-75	32.1*	4-20-77	35.9*
		7-16-75	9.4*	6-9-77	13.6*
		8-21-75	10.1*	7-21-77	14.3*
		10-8-75	14.5*	8-30-77	9.15*
		10-13-76	11.5*	11-15-77	33.0 *

Date	Water temp (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved oxygen (mg/L)
11-15-77	12	340	7.8	7.1

*Adjusted for return flow of 1.40 ft^3/s to 1.85 ft^3/s from waste treatment plant and pumpage of 3.57 ft^3/s.

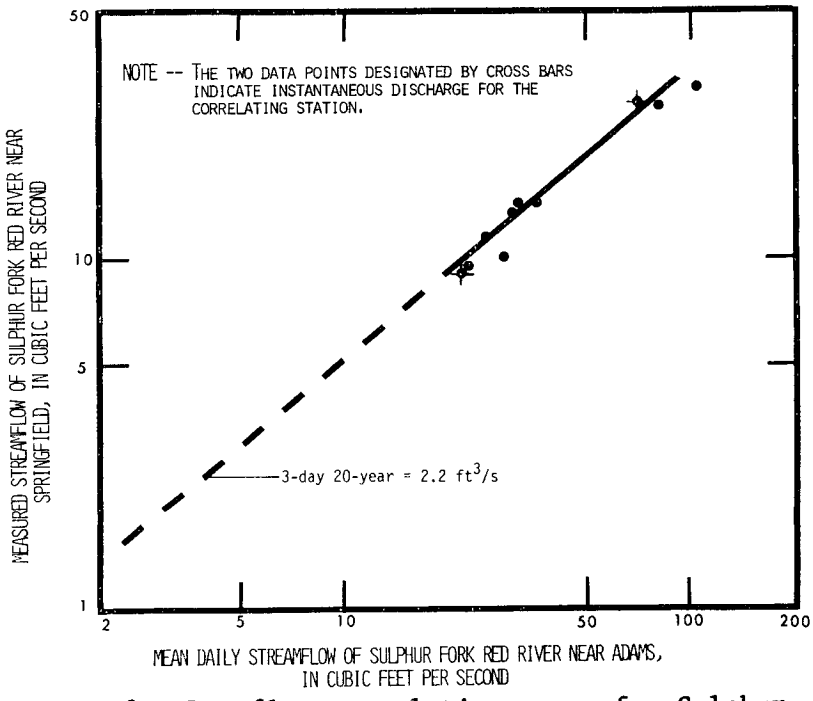

Figure 8.--Low-flow correlation curve for Sulphur Fork Red River near Springfield.

LOW-FLOW PROFILE OF SULPHUR FORK RED RIVER BASIN

A low-flow profile of an entire basin, main stem and tributaries, is an excellent graphical summary of low-flow conditions in the basin. In this particular geologic setting, with many short gaining and losing reaches, seepage investigations were required before appropriate values could be assigned to the tributaries. Details concerning these seepage investigations are given in a subsequent section of the report, pages 20 and 21. Data obtained during the seepage runs was used in conjunction with measured discharge (corrected for pumpage and/or return flow as previously described) at the low-flow partial-record sites in calculating low-flow values for the tributaries. Procedure used in making this calculation was to determine the ratio of measured tributary discharge to the next downstream low-flow partial-record station discharge for each seepage run (1976 and 1977); compute the drainage area ratio of the same sites; and then average the three ratios to determine a streamflow factor. This factor was multiplied by the 3-day, 20-year low-flow value for the partial-record station to determine the corresponding value for the tributary. Low-flow magnitudes determined by this method are only defined to the nearest tenth of a cubic foot per second. Following is an example of this calculation.

(Sample calculation for $3Q_{20}$ in tributaries)

Mill Branch (03435600)

(1) $F_1 = \frac{Q^{Trib}_{Inst}}{Q^{LFPR}_{Inst}}$ -1976 $\quad F_2 = \frac{Q^{Trib}_{Inst}}{Q^{LFPR}_{Inst}}$ -1977 $\quad F_3 = \frac{\text{D.A. trib}}{\text{D.A. LFPR}}$

(2) $F_1 = \frac{.45 \text{ ft}^3/\text{s}}{4.84 \text{ ft}^3/\text{s}} \quad F_2 = \frac{.324 \text{ ft}^3/\text{s}}{4.11 \text{ ft}^3/\text{s}} \quad F_3 = \frac{3.50 \text{ mi}^2}{34.9 \text{ mi}^2}$

(3) $F_1 = .09 \quad F_2 = .08 \quad F_3 = .10$

(4) $\frac{F_1 + F_2 + F_3}{3} = \overline{F}_{123} = .09$

(5) $(\overline{F}_{123})$ $(Q^{LFPR}_{3-20}$ of Sulphur Fork Red River near Greenbrier) =

(Q_{3-20} of Mill Branch)

$(.09)$ $(.45 \text{ ft}^3/\text{s}) = .04 \text{ ft}^3/\text{s}$

The results of the calculations for all 17 tributaries are shown in table 3. These data, together with that previously developed for the low-flow partial-record stations, were used to draw the 3-day, 20-year profile for the entire basin (Figure 9). This profile can be used to determine the flow that can be expected at any point on the main stem of Sulphur Fork Red River, and the contribution from each tributary, during a 3-day, 20-year low-flow situation.

Four parameters of water quality were determined when the November 15, 1977, low-flow measurements were made. The results of these determinations are published in this report with the characteristic analysis and list of discharge measurements for each site. The overall water quality at each of the low-flow sites was similar to the water quality at the other sites.

Table 3.--Low-flow characteristics of tributaries

in the Sulphur Fork Red River Basin

Station No.	Station Name	Drainage area in square miles	Streamflow for indicated period, in cubic feet per second, and recurrence interval	
			3-day 20-year	
03435600	Mill Branch	3.50	<.1	
03435606	Moss Branch	1.98	<.1	
03435618	Peyton Branch	2.36	<.1	
03435627	Pole Bridge Branch	3.21	<.1	
03435634	Long Branch	9.56	.1	
03435635	Savage Branch	1.76	<.1	
03435650	Santee Creek	5.13	.1	
03435750	Beaver Dam Creek*	14.2	.1	
03435761	Sulphur Fork Red River Trib. 1	.75	<.1	
03435787	Wartrace Creek	7.43	.2	
03435788	Sulphur Fork Red River Trib. 2	.69	0	
03435789	Black Branch	1.02	<.1	
03435796	Sulphur Fork Red River Trib. 3	4.10	.1	
03435805	Sulphur Fork Red River Trib. 4	1.54	0	
03435808	Sulphur Fork Red River Trib. 5	.43	0	
03435893	Browns Fork	8.12	0	
03435910	Carr Creek	36.8	1.2	

* Low-flow partial-record station

SEEPAGE INVESTIGATIONS WITH WATER QUALITY

Seepage measurements were made at 55 sites distributed throughout the drainage basin. Two sets of measurements were made at each of the sites, one each in 1976 and 1977. The 1976 and 1977 investigations were each completed in a two-day period of base flow conditions. The measurements were corrected for pumpage and return flow as needed. The seepage measurements were made to identify reaches of gains or losses in the main stem of Sulphur Fork Red River.

Measured flows of Sulphur Fork Red River and its tributaries on October 12, and 13, 1976, ranged from 1.18 ft^3/s at the headwaters to 9.45 ft^3/s at the mouth of the basin and on July 21, 1977 ranged from 0.62 to 11.1 ft^3/s at headwaters and mouth, respectively (fig. 10).

Using the seepage investigation of July 21, 1977 as a representative sample, an increase of 3.66 ft^3/s occurred between river mile 42.6 and 42.1. Streamflow decreased by 2.82 ft^3/s between river mile 41.8 and 40.0. There was an increase in streamflow of 7.1 ft^3/s from river mile 40.0 to 30.8. Streamflow decreased 1.86 ft^3/s between river mile 30.8 and 29.1 and increased only 1.1 ft^3/s between river mile 29.1 and 26.7. A decrease of 3.2 ft^3/s occurred between river mile 26.7 and 23.4. The maximum streamflow increase between measuring points was 4.84 ft^3/s between river mile 38.0 and 32.9. Both seepage investigations showed an overall net gain in streamflow from the head waters to the mouth of the basin (fig. 10).

Water quality was more variable in the tributaries than in the main stem of Sulphur Fork Red River. Specific conductance of tributaries ranged from 200 to 1,800 micromhos while the specific conductance of the main stem ranged from 260 to 480 micromhos. Results of the two seepage investigations including four parameters of water quality are given in tables 4 and 5.

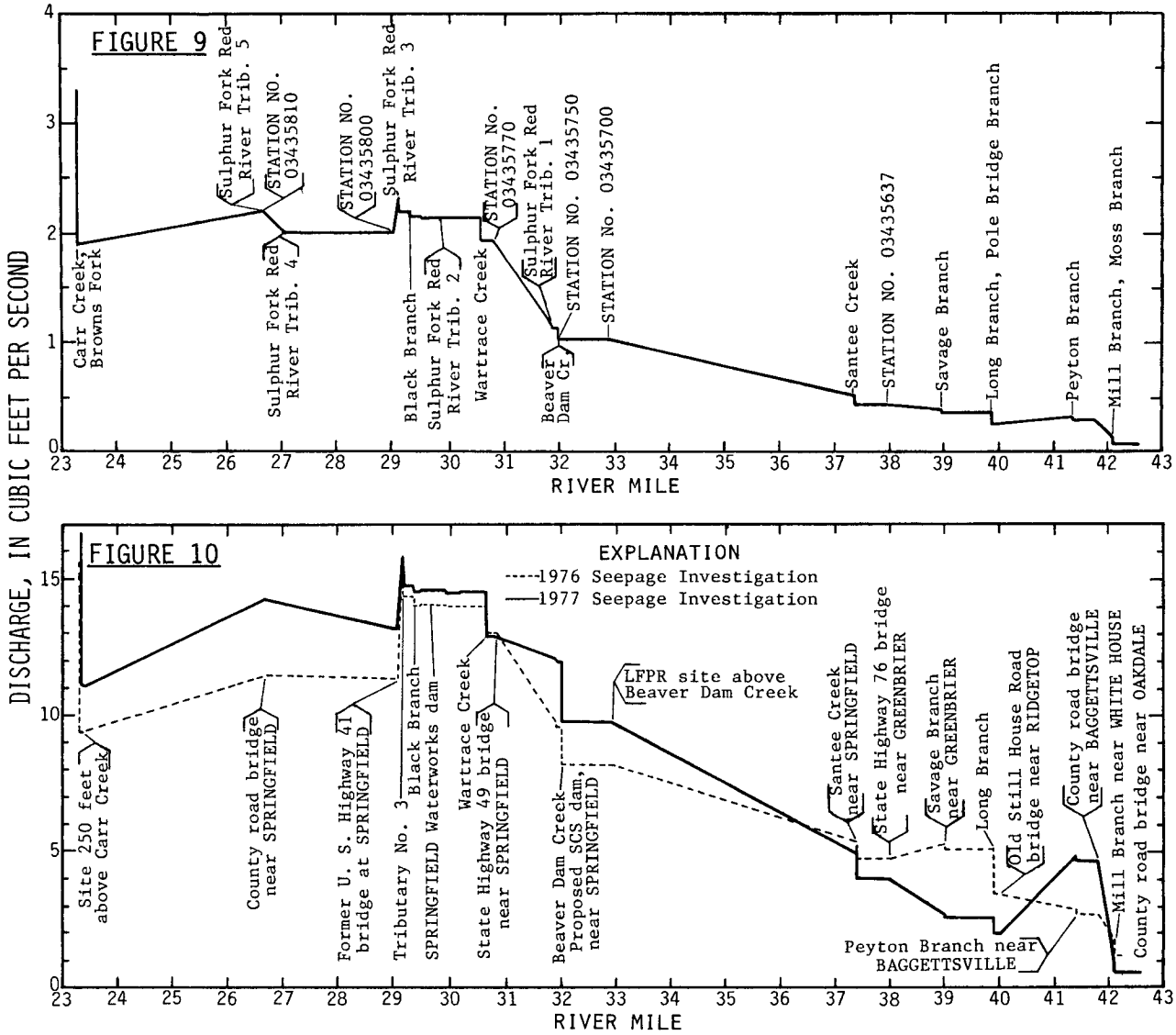

Figure 9.-- 3-day, 20-year low-flow profile of the Sulphur Fork main stem and tributaries.

Figure 10.-- Seepage investigation profiles of the Sulphur Fork Red River main stem showing streamflow gains and losses.

SPRINGS WITH WATER QUALITY

The major springs in the Sulphur Fork Red River basin were measured during the two seepage investigations. Originally 19 springs were located; however, measurements in seven were discontinued because they frequently are dry or not flowing. The 12 springs selected for study are distributed throughout the basin (fig. 11). The measured discharge of the 12 springs ranged from less than 1 gal/min at Park Spring No. 1 (03435113) to 1,660 gal/min at State Fish Hatchery Spring (03435731). Spring flow data is given in Table 6.

The quality of spring water was variable depending upon the quantity of water being discharged at the time of the sampling. As shown in table 6, the range in pH of spring water was neutral to slightly basic (6.6 to 8.3); temperatures ranged from 13.5°C (56°F) to 19°C (66°F), specific conductance 245 to 675 micromhos; dissolved oxygen 3.5 to 9.3 mg/L. Springs discharging less than 40 gal/min had the highest specific conductance. The water from the 12 springs sampled may be similar in quality to most ground water in the area. However, because of variations in the movement of ground water, it is likely that the spring water will be lower in total dissolved solids than water supplied to wells.

Results of the determination of four parameters of water quality (temperature, specific conductance, pH, and dissolved oxygen) are shown in table 6.

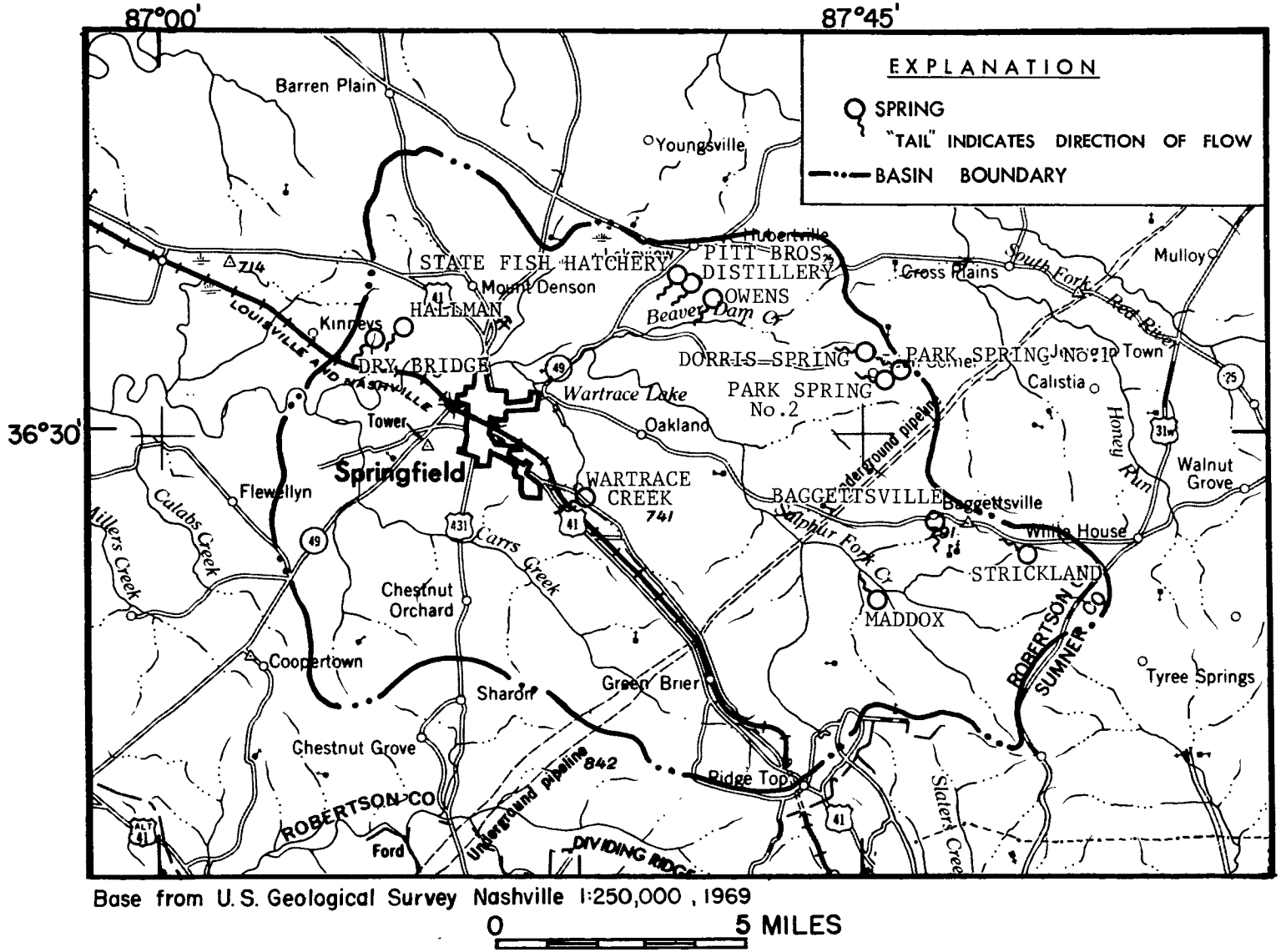

Figure 11.-- Location and name of springs.

Table 6.--Water quality and discharge records for springs

Site number and name	Location	Tributary to--	Date	Discharge (gal/mir)	(°C) Water	Specific conductance (umhos at 25°C)	pH (units)	Dissolved Oxygen (mg/l)
		Robertson County						
03435619 Baggettsville	Lat 36°28'35", long 86°43'32", 50 ft south of State Highway 76, at Baggettsville, 0.8 mile west of Oakdale. 4.1 miles west of Cross Plains.	Sulphur Fork tributary to Sulphur Fork	7- 6-76	400	-	-	-	-
			8-19-76	105	14.5	345	-	-
			10-13-76	27	14.5	310	8.0	8.6
			7-21-77	68	-	-	-	-
			10-30-77	-	14.5	320	6.7	8.5
03435114 Dorris Spring	Lat 36°30'44", long 86°42'49", 200 ft west of Red Factory Road in Chote Hollow, 2.7 miles southwest of Cross Plains.	Empson Branch tributary to Empson Branch to Honey Run to South Fork Red River	7- 7-76	470	14.5	340	-	-
			8-20-76	50	15.5	460	-	-
			10-13-76	14	15.5	500	7.9	6.4
			7-21-77	23	16.0	675	8.1	7.6
			8-31-77	-	17.5	440	8.1	6.7
03435792 Dry Bridge	Lat 36°32'05", long 86°52'22", 200 ft south of county road, 1.7 miles north of Springfield.	Sulphur Fork Creek tributary to Sulphur Fork Creek	7- 7-76	310	15.5	335	-	-
			8-19-76	5	15.5	360	-	-
			10-12-76	40	15.0	440	7.3	7.3
			7-21-77	36	14.5	420	7.0	7.0
			8-30-77	-	15.5	340	6.9	6.6
03435755 Hallman	Lat 36°32'08", long 86°51'29", 100 ft north of county road, 1.3 miles southwest of Beards Chapel, 2.0 miles northwest of Springfield.	Nearby Sinkhole	7- 7-76	560	14.5	245	-	-
			8-19-76	40	16.5	380	-	-
			10-12-76	18	13.5	320	7.8	6.8
			7-21-77	36	14.0	640	7.1	6.0
			8-30-77	-	14.5	320	7.1	5.2
03435612 Maddox	Lat 36°27'14", long 86°44'49", 400 ft south of county road, 1.9 miles southwest of Mount Pleasant School, 3.2 miles northeast of Greenbrier.	Sulphur Fork Creek	7- 6-76	40	16.5	-	-	-
			8-19-76	7	17.5	280	-	-
			10-13-76	5	13.5	245	7.8	8.5
			7-21-77	0.5	-	-	-	-
			8-30-77	-	17.5	260	7.4	8.5
03435728 Owens	Lat 36°32'12", long 86°47'34", 400 ft south of county road, leading westward from I-65 to State Fish Hatchery, 4.5 miles northwest of Springfield.	Beaver Dam Creek to Sulphur Fork Creek	7- 7-76	1270	14.5	280	-	-
			8-20-76	290	14.5	360	-	-
			10-13-76	130	15.0	450	7.0	6.4
			7-21-77	247	18.0	-	7.2	6.1
			8-30-77	-	15.5	350	7.2	7.1
03435113 Park No. 1	Lat 36°30'25", long 86°41'36", 100 ft south of county road, 0.2 mile upstream from Frey Branch, 2.9 miles south of Cross Plains.	Empson Branch tributary to Empson Branch to Honey Run to South Fork Red River	7- 7-76	70	16.0	360	-	-
			8-20-76	0.3	16.0	370	-	-
			10-13-76	0.8	14.5	320	7.0	7.7
			7-21-77	0.3	-	-	-	-
			8-30-77	-	-	-	-	-
03435112 Park No. 2	Lat 36°30'24", long 86°41'38", 100 ft south of county road, 0.3 mile upstream from Frey Branch, 2.9 miles south of Cross Plains.	Empson Branch tributary to Empson Branch to Honey Run to South Fork Red River	7- 7-76	200	16.0	360	-	-
			8-20-76	13	16.0	370	-	-
			10-13-76	27	14.5	360	7.2	7.3
			7-21-77	9	14.5	600	7.2	7.0
			10-31-77	-	14.5	290	7.2	7.4

Table 6.--Continued

Site number and name	Location	Tributary to--	Date	Discharge (gal/min)	(°C) Water	Specific conductance (umhos at 25°C)	pH (units)	Dissolved Oxygen (mg/l)
		Robertson County						
03435732 Pitt Bros. Distillery	Lat 36°32'28", long 86°48'43", 100 ft behind abandoned distillery, 400 ft east of State Fish Hatchery, 3.9 miles northeast of Springfield.	Beaver Dam Creek tributary to Beaver Dam Creek to Sulphur Fork Creek	7- 7-76	480	14.0	320	-	-
			8-20-76	90	14.5	420	-	-
			10-12-76	63	14.5	300	8.2	6.8
			7-21-77	60	14.5	400	7.3	7.1
			8-30-77	-	15.5	360	7.4	6.5
03435731 State Fish Hatchery	Lat 36°32'33", long 86°48'58", 100 ft north of State Fish Hatchery, 200 ft south of county road, 3.8 miles northeast of Springfield.	Beaver Dam Creek tributary to Beaver Dam Creek to Sulphur Fork Creek	7- 7-76	1660	14.0	285	-	-
			8-20-76	420	14.0	370	-	-
			10-12-76	160	17.0	380	7.8	8.5
			7-21-77	190	18.0	560	7.5	-
			8-30-77	-	17.5	300	7.5	9.3
03435605 Strickland	Lat 36°27'56", long 86°41'37", 200 ft west of county road, 1.3 miles southeast of Oakdale, 2.5 miles west of White House.	Sulphur Fork Creek tributary to Sulphur Fork Creek	7- 6-76	135	15.5	-	-	-
			8-19-76	17	16.5	445	-	-
			10-13-76	9	15.0	410	6.9	7.5
			7-21-77	0	-	-	-	-
			8-30-77	-	16.5	440	6.6	8.1
03435773 Wartrace Creek	Lat 36°27'52", long 86°49'52", near intersection of county road and Greenbrier Pike, on left bank of Wartrace Creek, 2.1 miles southeast of Springfield.	Wartrace Creek to Sulphur Fork Creek	10- 8-75	220	16.5	320	-	-
			7-16-76	445	18.0	380	-	-
			8-19-76	185	16.6	380	7.8	3.5
			10-13-76	150	-	-	-	-
			7-22-77	120	17.0	320	8.3	6.4
			8-30-77	-	19.0	440	-	7.4

WATER TEMPERATURE

Continuous water temperature records were obtained at Sulphur Fork Red River near Greenbrier, Tennessee (03435637) (fig. 2), from October 8, 1975 to September 30, 1977, by the U.S. Geological Survey. A digital recorder with 1-hr punch interval activated by a servo programmer recorded the water temperature. The metal shelter which housed the recorder was set in the highway fill 5 ft from the downstream end of the Highway 76 bridge and 15 ft from the edge of the pavement. The temperature probe was attached to the downstream side of the first main channel pier from the left end of the bridge and approximately 0.5 ft from the channel bottom. Water temperatures ranged from 0°C (32°F) in December through early February to 29.5°C (85°F) in mid July. Temperature records of daily maximum, minimum, and mean are given in table 7 (p. 44).

Continuous water temperature was also recorded at Sulphur Fork Red River above Beaver Dam Creek near Springfield, Tennessee (03435700) (fig. 2). The digital recorder, with 1-hr punch interval, was housed in a metal shelter on the left stream bank 30 ft from the edge of low water, 100 ft downstream from the ford. The temperature probe was mounted approximately 0.5 ft from the channel bottom. Water temperatures at this site ranged from 0°C (32°F) in January and February to 27.5°C (81°F) in mid July. Maximum, minimum, and mean water temperatures from this site are given in table 8 (p. 50).

AIR TEMPERATURE

Continuous air temperatures were recorded at Sulphur Fork Red River above Beaver Dam Creek near Springfield, Tennessee (03435700) (fig. 2). The air temperature recorder also had a 1-hr punch interval. A standard shelter fabricated and located according to National Weather Service specifications housed the recorder, probe, batteries, and a standard max-min thermometer. The maximum air temperature recorded at this site was 39.0°C (102°F) in July 1977 and a minimum air temperature of -22.5°C (-8.5°F) in February 1977. Missing record during some periods was due to instrument failure and vandalism. Maximum, minimum, and mean air temperatures are given in table 9 (p. 57).

SUMMARY OF CONCLUSIONS

The maximum instantaneous and minimum daily streamflow recorded at the continuous-record streamflow station were 4,800 ft^3/s on March 21, 1976, and 3.12 ft^3/s on September 12, 1977, respectively. Low-flow extremes usually occur from August to October.

Continuous water temperature records were collected at two sites in the basin. Maximum water temperatures occur in July during low-base flow and minimum water temperatures occur from December through February. Water temperatures ranged from 0°C (32°F) to 29.5°C (85°F) during the two-year study. Maximum and minimum air temperatures ranged from -22.5°C (-8.5°F) to 39.0°C (102°F), respectively, at the continuous record air temperature station.

Low-flow analyses of five low-flow partial-record sites and one continuous-record station were made using Sulphur Fork Red River near Adams as the correlating station. For each site a 3-day, 20-year low-flow was computed from correlation curves. The 3-day, 20-year low-magnitudes are as follows:

Sulphur Fork Red River near Greenbrier	0.4 ft^3/s
Sulphur Fork Red River above Beaver Dam Creek	1.0 ft^3/s
Beaver Dam Creek near Springfield	0.1 ft^3/s
Sulphur Fork Red River above Springfield	2.0 ft^3/s
Sulphur Fork Red River at Springfield	2.0 ft^3/s
Sulphur Fork Red River near Springfield	2.2 ft^3/s

The quality of water at the low-flow sites was fairly constant from site to site. Water quality was most variable in the tributaries.

Discharge of the 12 springs ranged from less than 1 gal/min to 1,660 gal/min when measured during base flow conditions. The water from the springs may be similar in quality to most ground water in the area.

During the 1977 seepage investigation increases in measured streamflow of 3.67 ft^3/s and 4.84 ft^3/s occurred between river mile 42.6 to 42.1 and 38.0 to 32.9, respectively. A decrease of 3.2 ft^3/s occurred between river mile 26.7 and 23.4.

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Riggs, H.C., 1972, Low-flow Investigations: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 4, Chap. B1, 18 p.

HYDROLOGIC DATA

Table 4.--Water quality and discharge data for 1976 seepage investigation

Sulphur Fork Red River seepage investigation--Headwaters to Carr Creek

A series of discharge measurements was made Oct. 12, 13, 1976, on Sulphur Fork Red River and tributaries in the vicinity of Springfield to define the low-flow hydrology, the losing and gaining reaches, and the quality of water at base flow conditions. The reach studied included the main-stem and major tributaries from mile 23.3 (37.5 km) to the headwaters of Sulphur Fork Red River. The measurements were made during a period of constant base flow. Tributary flow was considered a contribution and not a gain.

Sulphur Fork Red River mile	Stream	Location	Drainage Area (mi^2)	Meas. disch. (ft^3/s)	Tributary gain or loss	Sulphur Fork Red River gain or loss	Water temp. (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved Oxygen (mg/l)
42.6	03435570 Sulphur Fork Red River	Lat 36°26'49", long 86°44'13", Robertson County, at county road bridge 2.3 miles southwest of Oakdale.	4.55	1.18	-	-	14.0	300	8.3	10.2
42.1	03435580 Mill Branch	Lat 36°27'07", long 86°40'29", Robertson County, just downstream from U.S. Highway 31-W bridge, 1.8 miles southwest of White House, and at mile 4.5.	.43	.001[a]	-	-	-	-	-	-
42.1	03435590 Mill Branch	Lat 36°26'50", long 86°41'27", Robertson County, at county road bridge 2.2 miles southeast of Oakdale, and at mile 3.4.	1.53	.11	+.11	-	16.0	280	8.0	8.5
42.1	03435600 Mill Branch	Lat 36°26'53", long 86°42'53", Robertson County, at county road bridge 3.7 miles southwest of White House, and at mile 1.7.	3.50	.45	+.34	-	15.5	285	8.1	9.8
42.1	03435602 Moss Branch	Lat 36°27'32", long 86°41'35", Robertson County, at county road bridge 2.4 miles west of White House, and at mile 2.9.	.48	0	-	-	-	-	-	-
42.1	03435604 Moss Branch	Lat 36°28'07", long 86°41'32", Robertson County, at county road bridge at Warren Cemetery, 2.2 miles west of White House.	.17	0	-	-	-	-	-	-
42.1	03435606 Moss Branch	Lat 36°26'37", long 86°42'56", Robertson County, at county road bridge, 1.0 miles south of Oakdale, 3.6 miles west of White House, and at mile 1.5.	1.98	.15	+.15	-	14.0	450	8.3	9.1
41.8	03435610 Sulphur Fork Red River	Lat 36°27'24", long 86°44'44", Robertson County, at county road bridge 1.7 miles southwest of Baggettsville and 5.2 miles west of White House.	12.5	2.74	-	+.96	12.5	315	8.0	8.1
41.4	03435614 Peyton Branch	Lat 36°26'40", long 86°45'09", Robertson County, at county road bridge 3.4 miles north of Ridgetop, and at mile 1.3.	1.68	.20	-		21.0	250	8.8	9.6

a Estimated.

Table 4.--Continued

Sulphur Fork Red River seepage investigation--Headwaters to Carr Creek--Continued

Sulphur Fork Red River mile	Stream	Location	Drainage Area (mi^2)	Meas. disch. (ft^3/s)	Tributary gain or loss	Sulphur Fork Red River gain or loss	Water temp. (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved Oxygen (mg/l)
41.4	03435616 Peyton Branch Tributary	Lat 36°26'39", long 86°45'07", Robertson County, just above mouth 2.4 miles north of Ridgetop.	.39	.025	-	-	16.0	250	8.2	9.1
41.4	03435618 Peyton Branch	Lat 36°27'09", long 86°44'58", Robertson County, 300 feet east of county road 2.0 miles southwest of Baggettsville, and at mile .6.	2.36	.22	0	-	13.0	285	8.1	8.2
40.0	03435620 Sulphur Fork Red River	Lat 36°28'00", long 86°46'12", Robertson County, 200 ft above Long Branch and 4.8 miles north of Ridgetop.	19.1	3.54	-	+.58	14.0	295	8.3	9.5
39.9	03435623 Pole Bridge Branch Tributary No. 3	Lat 36°24'44", long 86°45'37", Robertson County, at bridge on Lake Road, 1.2 miles northeast of Ridgetop, and at mile 0.3.	.43	.1[a]	-	-	14.0	270	8.0	6.2
39.9	03435625 Pole Bridge Branch	Lat 36°24'50", long 86°46'02", Robertson County, at county road bridge below Ridgetop Lake, 1.2 miles north of Ridgetop, and at mile 1.8.	1.34	.174	-	-	21.0	200	7.7	5.5
39.9	03435627 Pole Bridge Branch	Lat 36°25'18", long 86°46'46", Robertson County, at bridge on Kelley Willis Road, 1.4 miles east of Greenbrier, and at mile 0.9.	3.21	.43	+.26	-	17.5	260	8.5	9.1
39.9	03435629 Pole Bridge Branch Tributary No. 2	Lat 36°26'08", long 86°47'12", Robertson County, at bridge on Old Still House Road, 1.1 miles northeast of Greenbrier and 150 ft above the mouth.	.10	0	-	-	-	-	-	-
39.9	03435631 Long Branch[b]	Lat 36°26'08", long 86°46'50", Robertson County, 600 ft below dam of Greenbrier Lake, 1.4 miles east of Greenbrier, and at mile 2.6.	.52	.37	-.06	-	19.5	275	8.2	8.2
39.9	03435634 Long Branch	Lat 36°27'59", long 86°46'24", Robertson County, 200 ft above mouth, 100 ft west of Old Still House Road, 3.2 miles northeast of Greenbrier, and at mile 0.	9.56	1.18	+.81	-	13.5	280	8.1	8.9

a Estimated.

b Same stream as Pole Bridge Branch.

Table 4.--Continued

Sulphur Fork Red River seepage investigation--Headwaters to Carr Creek--Continued

Sulphur Fork Red River mile	Stream	Location	Drainage Area (mi^2)	Meas. disch. (ft^3/s)	Tributary gain or loss	Sulphur Fork Red River gain or loss	Water temp (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved Oxygen (mg/l)
39.0	03435635 Savage Branch	Lat 36°28'38", long 86°46'04", Robertson County, 250 ft south of junction of State Highway 76 and Bethlehem Road, 3.9 miles northeast of Greenbrier, and at mile 0.8.	1.76	.16	-	-	14.0	375	8.4	8.2
38.0	03435637 Sulphur Fork Red River	Lat 36°29'05", long 86°47'33", Robertson County, at bridge on State Highway 76, 0.8 miles upstream from Santee Creek, 5.2 miles east of courthouse at Springfield.	34.9	4.84	-	-.04	-	-	-	-
37.4	03435644 Santee Creek	Lat 35°30'10", long 86°45'46", Robertson County, at county road bridge, 4.1 miles southeast of Hubertville, and at mile 1.9.	2.60	.24	-	-	13.0	480	7.8	7.3
37.4	03435647 Santee Creek	Lat 36°30'05", long 86°45'48", Robertson County, at county road bridge 250 ft above mouth and 4.2 miles southeast of Hubertville, and at mile 0.1.	.91	.13	-.11	-	13.0	500	7.7	7.5
37.4	03435650 Santee Creek	Lat 36°29'51", long 86°46'41", Robertson County, at county road bridge, 6.0 miles east of Springfield and 5.0 miles north of Greenbrier, and at mile 0.8.	5.13	.57	+.44	-	14.5	365	8.5	8.6
32.9	03435700 Sulphur Fork Red River	Lat 36°30'53", long 86°50'46", Robertson County, at ford on private road on the Will Irons farm, 1.0 miles upstream from the mouth of Beaver Dam Creek, and 2.4 miles northeast of Springfield.	49.1	8.24	-	+2.83	-	-	-	-
32.0	03435705 Beaver Dam Creek	Lat 36°31'25", long 86°44'43", Robertson County, at county road bridge, 0.4 miles north of Eden Corner and 3.2 miles southwest of Cross Plains, and at mile 6.7.	.83	0	-	-	-	-	-	-
32.0	03435709 Beaver Dam Creek	Lat 36°31'28", long 86°45'47", Robertson County, at county road bridge, 0.3 miles north of Owens Chapel, and at mile 5.6.	1.92	.60	+.60	-	13.5	280	7.4	7.4

Table 4.--Continued

Sulphur Fork Red River seepage investigation--Headwaters to Carr Creek--Continued

Sulphur Fork Red River mile	Stream	Location	Drainage Area (mi^2)	Meas. disch. (ft^3/s)	Tributary gain or loss	Sulphur Fork Red River gain or loss	Water temp. (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved Oxygen (mg/l)
32.0	03435713 Beaver Dam Creek	Lat 36°31'47", long 86°47'25", Robertson County, beside private road, 1.8 miles south of Hubertville, and at mile 3.8.	4.17	.18	-.42	-	13.5	320	7.4	5.7
32.0	03435721 Beaver Dam Creek Tributary No. 1	Lat 36°33'15", long 86°45'06", Robertson County, at county road bridge, 2.5 miles east of Hubertville.	.17	0	-	-	-	-	-	-
32.0	03435724 Beaver Dam Creek Tributary No. 1	Lat 36°32'25", long 86°45'57", Robertson County, at county road bridge, 1.4 miles north of Owens Chapel.	1.27	0	-	-	-	-	-	-
32.0	03435727 Beaver Dam Creek Tributary No. 1	Lat 36°31'59", long 86°47'04", Robertson County, at private bridge 2.0 miles southeast of Lakeview.	3.09	0	-	-	-	-	-	-
32.0	03435729 Beaver Dam Creek	Lat 36°31'53", long 86°48'46", Robertson County, at county road bridge 0.6 miles south of State Fish Hatchery and 1.6 miles south of Lakeview, 4.4 miles northeast of Springfield, and at mile 2.4.	9.73	.66	+.48	-	14.0	360	8.0	6.4
32.0	03435734 Fish Hatchery Branch	Lat36°31'54", long 86°48'46", Robertson County, just above mouth, 0.6 miles south of fish hatchery and 4.4 miles northeast of Springfield.	2.42	.50	-	-	15.5	410	8.0	8.3
32.0	03435739 Beaver Dam Creek	Lat 36°31'40", long 86°49'29", Robertson County, at county road bridge, 3.6 miles northeast of Springfield, and at mile 1.6.	12.9	1.59	+.43	-	14.5	360	8.0	6.8
32.0	03435750 Beaver Dam Creek	Lat 36°31'32", long 86°50'32", Robertson County, at private drive 150 ft east of Hwy. 49, 1.7 miles northeast of Springfield, and at mile 0.4.	14.2	1.34	-.25	-	-	-	-	-
31.9	03435754 Sulphur Fork Red River Tributary No. 1	Lat 36°32'21", long 86°50'49", Robertson County, at county road bridge, 2.3 miles southwest of Lakeview.	.38	.07	-	-	-	-	-	-

Table 4.--Continued

Sulphur Fork Red River seepage investigation--Headwaters to Carr Creek--Continued

Sulphur Fork Red River mile	Stream	Location	Drainage Area (mi^2)	Meas. disch. (ft^3/s)	Tributary gain or loss	Sulphur Fork Red River gain or loss	Water temp. (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved Oxygen (mg/l)
31.9	03435761 Sulphur Fork Red River Tributary No. 1	Lat 36°31'28", long 86°51'00", Robertson County, at bridge on State Highway 49, 2.2 miles northeast of Springfield, and at mile 0.1.	.75	.11	+.04	-	15.5	400	8.0	5.4
30.8	03435770 Sulphur Fork Red River	Lat 36°30'47", long 86°51'44", Robertson County, on left bank 150 ft downstream from new bridge on State Highway 49, 1.3 mi northeast of Springfield, and at mile 30.8.	65.6	13.0	-	+3.31	-	-	-	-
30.6	03435772 Wartrace Creek	Lat 36°27'52", long 86°49'52", Robertson County, at bridge on county road, just east of Greenbrier Pike, 0.8 miles east of Courtland, 2.9 miles northwest of Greenbrier, and at mile 4.4.	1.65	0	-	-	-	-	-	-
30.6	03435775 Wartrace Creek	Lat 36°28'54", long 86°51'00", Robertson County, at bridge on Old Greenbrier Pike, 0.9 miles north of Courtland, 4.5 miles northwest of Greenbrier, and at mile 2.7.	4.08	.50	+.50	-	16.5	370	8.2	9.4
30.6	03435780 Wartrace Creek	Lat 36°29'44", long 86°51'35", Robertson County, beside county road 2.3 miles southeast of Springfield, and at mile 1.7.	5.61	.86	+.36	-	15.0	385	8.4	8.8
30.6	03435785 Wartrace Creek	Lat 36°30'26", long 86°52'00", Robertson County below Wartrace Lake Dam, 1.4 miles east of Springfield, and at mile 0.6.	6.92	.54	-.32	-	21.0	220	8.0	5.8
30.6	03435787 Wartrace Creek	Lat 36°30'46", long 86°52'00", Robertson County, 200 ft above mouth, 1.1 miles east of Springfield, and at mile 0.0.	7.43	1.07	+.53	-	17.5	370	7.9	5.4
29.9	03435788 Sulphur Fork Red River Tributary No. 2	Lat 36°31'07", long 86°52'09", Robertson County, at end of private road, 1.1 miles northeast of Springfield.	.69	.03	-	-	18.0	420	7.9	5.0
29.4	03435789 Black Branch	Lat 36°31'05", long 86°52'57", Robertson County, at culvert on road to waterworks, and at mile 0.0.	1.02	.271	-	-	10.5	680	7.6	7.4

Table 4.--Continued

Sulphur Fork Red River seepage investigation--Headwaters to Carr Creek--Continued

Sulphur Fork Red River mile	Stream	Location	Drainage Area (mi^2)	Meas. disch. (ft^3/s)	Tributary gain or loss	Sulphur Fork Red River gain or loss	Water temp. (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved Oxygen (mg/l)
29.2	03435791 Sulphur Fork Red River Tributary No. 3	Lat 36°32'06", long 86°52'19", Robertson County, at county road bridge, 1.9 miles northeast of Youngville.	2.22	0	-	-	-	-	-	-
29.2	03435793 Sulphur Fork Red River Tributary No. 3	Lat 36°32'04", long 86°52'18", Robertson County, 150 ft downstream from county road bridge, 100 ft downstream from spring Number 11, 1.9 miles northeast of Springfield and 2.0 miles west of Beards Chapel.	3.08	.05	+.05	-	14.5	500	7.6	7.0
29.2	03435796 Sulphur Fork Red River Tributary No. 3	Lat 36°31'20", long 86°53'03", Robertson County, culvert under side road off U. S. Highway 41, 0.9 miles north of Springfield, 1.5 miles south of Mount Denson, and at mile 0.2.	4.10	1.43	+1.38	-	12.5	1800	7.6	8.4
29.1	03435800 Sulphur Fork Red River	Lat 36°31'15", long 86°53'11", Robertson County, at Old Hwy. 41 bridge 0.85 miles northwest of courthouse in Springfield, and at mile 29.1.	79.9	11.4	-	-4.40	-	-	-	-
27.1	03435805 Sulphur Fork Red River Tributary No. 4	Lat 36°31'13", long 86°54'36", Robertson County, at first bridge above mouth, 2.0 miles east of Kinneys and 1.6 miles northwest of Springfield, and at mile 0.1.	1.54	0	-	-	-	-	-	-
26.7	03435808 Sulphur Fork Red River Tributary No. 5	Lat 36°31'01", long 86°54'45", Robertson County, 200 ft above mouth, 1.6 miles west of Springfield, and at mile 0.0.	.43	0	-	-	-	-	-	-
26.7	03435810 Sulphur Fork Red River	Lat 36°30'59", long 86°54'46", Robertson County, at county road bridge 1.3 miles northwest of Springfield, and at mile 26.7.	84.5	11.5	-	+.10	-	-	-	-
23.4	03435820 Sulphur Fork Red River	Lat 36°30'20", long 86°56'38", Robertson County, 250 ft above Carr Creek, 3.5 miles west of Springfield.	87.2	9.45	-	-2.05	11.0	-	7.3	5.2

Table 4.--Continued

Sulphur Fork Red River seepage investigation--Headwaters to Carr Creek--Continued

Sulphur Fork Red River mile	Stream	Location	Drainage Area (mi^2)	Meas. disch. (ft^3/s)	Tributary gain or loss	Sulphur Fork Red River gain or loss	Water temp. (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved Oxygen (mg/l)
23.3	03435898 Browns Fork	Lat 36°28'42", long 86°56'06", Robertson County, at county road bridge 100 ft southeast of State Highway 49, 3.5 miles southwest of Springfield, and at mile 0.5.	8.12	-	-	-	-	-	-	-
23.3	03435900 Carr Creek	Lat 36°28'54", long 86°55'45", Robertson County, at bridge on State Highway 49, 300 ft downstream from Browns Fork, and 3.1 miles southwest of courthouse at Springfield.	32.0	4.31	-	-	12.5	305	8.5	8.0
23.3	03435910 Carr Creek	Lat 36°30'12", long 86°56'28", Robertson County, 2.8 miles west of Springfield, and at mile 0.2.	36.8	6.29	+1.98	-	10.0	-	7.7	8.2
		Overall net gain or loss				+1.29				

Table 5.--Water quality and discharge data for 1966 seepage investigation

Sulphur Fork Red River seepage investigation--Headwaters to Carr Creek

A series of discharge measurements was made July 21, 1977, on Sulphur Fork Red River and tributaries in the vicinity of Springfield to define the low-flow hydrology, the losing and gaining reaches, and the quality of water at base flow conditions. The reach studied included the main-stem and major tributaries from mile 23.3 (37.5 km) to the headwaters of Sulphur Fork Red River. The measurements were made during a period of constant base flow. Tributary flow was considered a contribution and not a gain.

Sulphur Fork Red River mile	Stream	Location	Drainage Area (mi^2)	Meas. disch. (ft^3/s)	Tributary gain or loss	Sulphur Fork Red River gain or loss	Water temp. (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved Oxygen (mg/l)
42.6	03435570 Sulphur Fork Red River	Lat 36°26'49", long 86°44'13", Robertson County, at county road bridge 2.3 miles southwest of Oakdale.	4.55	.62	-	-	-	-	-	-
42.1	03435580 Mill Branch	Lat 36°27'07", long 86°40'29", Robertson County, just downstream from U.S. Highway 31-W bridge, 1.8 miles southwest of White House, and at mile 4.5.	.43	0	-	-	-	-	-	-
42.1	03435590 Mill Branch	Lat 36°26'50", long 86°41'27", Robertson County, at county road bridge 2.2 miles southeast of Oakdale, and at mile 3.4.	1.53	.04	+.04	-	-	-	-	-
42.1	03435600 Mill Branch	Lat 36°26'53", long 86°42'53", Robertson County, at county road bridge 3.7 miles southwest of White House, and at mile 1.7.	3.50	.32	+.28	-	-	-	-	-
42.1	03435602 Moss Branch	Lat 36°27'32", long 86°41'35", Robertson County, at county road bridge 2.4 miles west of White House, and at mile 2.9.	.48	0	-	-	-	-	-	-
42.1	03435604 Moss Branch	Lat 36°28'07", long 86°41'32", Robertson County, at county road bridge at Warren Cemetery, 2.2 miles west of White House.	.17	0	-	-	-	-	-	-
42.1	03435606 Moss Branch	Lat 36°26'37", long 86°42'56", Robertson County, at county road bridge, 1.0 miles south of Oakdale, 3.6 miles west of White House, and at mile 1.5.	1.98	.13	+.13	-	-	-	-	-
41.8	03435610 Sulphur Fork Red River	Lat 36°27'24", long 86°44'44", Robertson County, at county road bridge 1.7 miles southwest of Baggettsville and 5.2 miles west of White House.	12.5	4.74	-	+3.66	-	-	-	-

Table 5.--Continued

Sulphur Fork Red River seepage investigation--Headwaters to Carr Creek--Continued

Sulphur Fork Red River mile	Stream	Location	Drainage Area (mi^2)	Meas. disch. (ft^3/s)	Tributary gain or loss	Sulphur Fork Red River gain or loss	Water temp. (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved Oxygen (mg/1)
41.4	03435614 Peyton Branch	Lat 36°26'40", long 86°45'09", Robertson County, at county road bridge 3.4 miles north of Ridgetop, and at mile 1.3.	1.68	.09	-	-	-	-	-	-
41.4	03435616 Peyton Branch Tributary	Lat 36°26'39", long 86°45'07", Robertson County, just above mouth 2.4 miles north of Ridgetop.	.39	.02	-	-	-	-	-	-
41.4	03435618 Peyton Branch	Lat 36°27'09", long 86°44'58", Robertson County, 300 feet east of county road 2.0 miles southeast of Baggettsville, and at mile .6.	2.36	.12	+.01	-	-	-	-	-
40.0	03435620 Sulphur Fork Red River	Lat 36°28'00", long 86°46'12", Robertson County, 200 ft above Long Branch and 4.8 miles north of Ridgetop.	19.1	2.04	-	-2.82	-	-	-	-
39.9	03435623 Pole Bridge Branch Tributary No. 3	Lat 36°24'44", long 86°45'37", Robertson County, at bridge on Lake Road, 1.2 miles northeast of Ridgetop, and at mile 0.3.	.43	.02[a]	-	-	-	-	-	-
39.9	03435625 Pole Bridge Branch	Lat 36°24'50", long 86°46'02", Robertson County, at county road bridge below Ridgetop Lake, 1.2 miles north of Ridgetop, and at mile 1.8.	1.34	.07[a]	-	-	-	-	-	-
39.9	03435627 Pole Bridge Branch	Lat 36°25'18", long 86°46'46", Robertson County, at bridge on Kelley Willis Road, 1.4 miles east of Greenbrier, and at mile 0.9.	3.21	.11	+.04	-	-	-	-	-
39.9	03435629 Pole Bridge Branch Tributary No. 2	Lat 36°26'08", long 86°46'50", Robertson County, at bridge an Old Still House Road, 1.1 miles northeast of Greenbrier and 150 ft above the mouth.	.10	.01[a]	-	-	-	-	-	-
39.9	03435631 Long Branch[b/]	Lat 36°26'08", long 86°46'50", Robertson County, 600 ft below dam of Greenbrier Lake, 1.4 miles east of Greenbrier, and at mile 2.6.	.52	.18	-	-	-	-	-	-
39.9	03435634 Long Branch	Lat 36°27'59", long 86°46'24", Robertson County, 200 ft above mouth, 100 ft west of Old Still House Road, 3.2 miles northeast of Greenbrier, and at mile 0.	9.56	.44	+.26	-	-	-	-	-

a Estimated.

b Same stream as Pole Bridge Branch.

Table 5.--Continued

Sulphur Fork Red River seepage investigation--Headwaters to Carr Creek--Continued

Sulphur Fork Red River mile	Stream	Location	Drainage Area (mi^2)	Meas. disch. (ft^3/s)	Tributary gain or loss	Sulphur Fork Red River gain or loss	Water temp. (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved Oxygen (mg/l)
39.0	03435635 Savage Branch	Lat 36°28'38", long 86°46'04", Robertson County, 250 ft south of junction of State Highway 76 and Bethlehem Road, 3.9 miles northeast of Greenbrier, and at mile 0.8.	1.76	.09	-	-	-	-	-	-
38.0	03435637 Sulphur Fork Red River	Lat 36°29'05", long 86°47'33", Robertson County, at bridge on State Highway 76, 0.8 miles upstream from Santee Creek, 5.2 miles east of courthouse at Springfield.	34.9	4.11	-	+1.54	-	-	-	-
37.4	03435644 Santee Creek	Lat 35°30'10", long 86°45'46", Robertson County, at county road bridge, 4.1 miles southeast of Hubertville, and at mile 1.9.	2.60	.37	-	-	23.0	560	8.0	6.4
37.4	03435647 Santee Creek	Lat 36°30'05", long 86°45'48", Robertson County, at county road bridge 250 ft above mouth and 4.2 miles southeast of Hubertville, and at mile 0.1.	.91	.08	-.29	-	23.0	650	7.9	6.5
37.4	03435650 Santee Creek	Lat 36°29'51", long 86°46'41", Robertson County, at county road bridge, 6.0 miles east of Springfield and 5.0 miles north of Greenbrier, and at mile 0.8.	5.13	.85	+.77	-	-	-	-	-
32.9	03435700 Sulphur Fork Red River	Lat 36°30'53", long 86°50'46", Robertson County, at ford on private road on the Will Irons farm, 1.0 miles upstream from the mouth of Beaver Dam Creek, and 2.4 miles northeast of Springfield.	49.1	9.8	-	+4.84	-	-	-	-
32.0	03435705 Beaver Dam Creek	Lat 36°31'25", long 86°44'43", Robertson County, at county road bridge, 0.4 miles north of Eden Corner and 3.2 miles southwest of Cross Plains, and at mile 6.7.	.83	0	-	-	-	-	-	-
32.0	03435709 Beaver Dam Creek	Lat 36°31'28", long 86°45'47", Robertson County, at county road bridge, 0.3 miles north of Owens Chapel, and at mile 5.6.	1.92	.04	+.04	-	26.0	440	7.7	4.5

Table 5.--Continued

Sulphur Fork Red River seepage investigation--Headwaters to Carr Creek--Continued

Sulphur Fork Red River mile	Stream	Location	Drainage Area (mi^2)	Meas. disch. (ft^3/s)	Tributary gain or loss	Sulphur Fork Red River gain or loss	Water temp. (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved Oxygen (mg/l)
32.0	03435713 Beaver Dam Creek	Lat 36°31'47", long 86°47'25", Robertson County, beside private road, 1.8 miles south of Hubertville, and at mile 3.8.	4.17	.31	+.27	-	24.5	480	7.7	5.9
32.0	03435721 Beaver Dam Creek Tributary No. 1	Lat 36°33'15", long 86°45'06", Robertson County, at county road bridge, 2.5 miles east of Hubertville.	.17	0	-	-	-	-	-	-
32.0	03435724 Beaver Dam Creek Tributary No. 1	Lat 36°32'25", long 86°45'57", Robertson County, at county road bridge, 1.4 miles north of Owens Chapel.	1.27	0	-	-	-	-	-	-
32.0	03435727 Beaver Dam Creek Tributary No. 1	Lat 36°31'59", long 86°47'04", Robertson County, at private bridge, 2.0 miles southeast of Lakeview.	3.09	0	-	-	-	-	-	-
32.0	03435729 Beaver Dam Creek	Lat 36°31'53", long 86°48'46", Robertson County, at county road bridge 0.6 miles south of State Fish Hatchery and 1.6 miles south of Lakeview, 4.4 miles northeast of Springfield, and at mile 2.4.	9.73	.97	+.66	-	25.5	480	8.1	7.9
32.0	03435734 Fish Hatchery Branch	Lat 36°31'54", long 86°48'46", Robertson County, just above mouth, 0.6 miles south of fish hatchery and 4.4 miles northeast of Springfield.	2.42	.60	-	-	24.5	560	8.1	5.0
32.0	03435739 Beaver Dam Creek	Lat 36°31'40", long 86°49'29", Robertson County, at county road bridge, 3.6 miles northeast of Springfield, and at mile 1.6.	12.9	1.59	+.02	-	25.0	540	8.2	8.0
32.0	03435750 Beaver Dam Creek	Lat 36°31'32", long 86°50'32", Robertson County, at private drive 150 ft east of Hwy. 49, 1.7 miles northeast of Springfield, and at mile 0.4.	14.2	2.16	+.57	-	-	-	-	-
31.9	03435754 Sulphur Fork Red River Tributary No. 1	Lat 36°32'21", long 86°50'49", Robertson County, at county road bridge, 2.3 miles southwest of Lakeview.	.38	0	-	-	-	-	-	-

Table 5.--Continued

Sulphur Fork Red River seepage investigation--Headwaters to Carr Creek--Continued

Sulphur Fork Red River mile	Stream	Location	Drainage Area (mi^2)	Meas. disch. (ft^3/s)	Tributary gain or loss	Sulphur Fork Red River gain or loss	Water temp. (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved Oxygen (mg/1)
31.9	03435761 Sulphur Fork Red River Tributary No. 1	Lat 36°31'28", long 86°51'00", Robertson County, at bridge on State Highway 49, 2.2 miles northeast of Springfield, and at mile 0.1.	.75	.11	+.11	-	23.0	530	8.2	6.0
30.8	03435770 Sulphur Fork Red River	Lat 36°30'47", long 86°51'44", Robertson County, on left bank 150 ft downstream from new bridge on State Highway 49, 1.3 mi northeast of Springfield, and at mile 30.8.	65.6	12.9	-	+.83	-	-	-	-
30.6	03435772 Wartrace Creek	Lat 36°27'52", long 86°49'52", Robertson County, at bridge on county road, just east of Greenbrier Pike, 0.8 miles east of Courtland, 2.9 miles northwest of Greenbrier, and at mile 4.4.	1.65	0	-	-	29.0	290	8.5	7.6
30.6	03435775 Wartrace Creek	Lat 36°28'54", long 86°51'00", Robertson County, at bridge on Old Greenbrier Pike, 0.9 miles east of Courtland, 2.9 miles northwest of Greenbrier, and at mile 4.4.	4.08	.49	+.49	-	25.0	320	8.4	8.1
30.6	03435780 Wartrace Creek	Lat 36°29'44", long 86°51'35", Robertson County, beside county road 2.3 miles southeast of Springfield, and at mile 1.7.	5.61	1.06	+.57	-	-	-	-	-
30.6	03435785 Wartrace Creek	Lat 36°30'26", long 86°52'00", Robertson County below Wartrace Lake Dam, 1.4 miles east of Springfield, and at mile 0.6.	6.92	1.07	+.01	-	35.5	375	9.2	8.0
30.6	03435787 Wartrace Creek	Lat 36°30'46", long 86°52'00", Robertson County, 200 ft above mouth, 1.1 miles east of Springfield, and at mile 0.0.	7.43	1.66	+.59	-	25.5	440	7.8	5.5
29.9	03435788 Sulphur Fork Red River Tributary No. 2	Lat 36°31'07", long 86°52'09", Robertson County, at end of private road, 1.1 miles northeast os Springfield.	.69	.05	-	-	30.0	375	8.1	4.5
29.4	03435789 Black Branch	Lat 36°31'05", long 86°52'57", Robertson County, at culvert on road to waterworks, and at mile 0.0.	1.02	.27	-	-	22.5	700	7.9	4.9

Table 5.--Continued

Sulphur Fork Red River seepage investigation--Headwaters to Carr Creek--Continued

Sulphur Fork Red River mile	Stream	Location	Drainage Area (mi^2)	Meas. disch. (ft^3/s)	Tributary gain or loss	Sulphur Fork Red River gain or loss	Water temp. (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved Oxygen (mg/l)
29.2	03435791 Sulphur Fork Red River Tributary No. 3	Lat 36°32'06", long 86°52'19", Robertson County, at county road bridge, 1.9 miles northeast of Youngville.	2.22	0	-	-	23.0	540	8.1	7.3
29.2	03435793 Sulphur Fork Red River Tributary No. 3	Lat 36°32'04", long 86°52'18", Robertson County, 150 ft downstream from county road bridge, 100 ft downstream from spring Number 11, 1.9 miles northeast of Springfield and 2.0 miles west of Beards Chapel.	3.08	.19	+.19	-	18.5	440	7.4	8.0
29.2	03435796 Sulphur Fork Red River Tributary No. 3	Lat 36°31'20", long 86°53'03", Robertson County, culvert under side road off U. S. Highway 4., 0.9 miles north of Springfield, 1.5 miles south of Mount Denson, and at mile 0.2.	4.10	.18	-.01	-	24.0	1000	8.2	7.2
29.1	03435800 Sulphur Fork Red River	Lat 36°31'15", long 86°53'11", Robertson County, at Old Hwy. 41 bridge 0.85 miles northwest of courthouse in Springfield, and at mile 29.1.	79.9	13.2	-	-1.86	-	-	-	-
27.1	03435805 Sulphur Fork Red River Tributary No. 4	Lat 36°31'13", long 86°54'36", Robertson County, at first bridge above mouth, 2.0 miles east of Kinneys and 1.6 miles northwest of Springfield, and at mile 0.1.	1.54	0	-	-	-	-	-	-
26.7	03435808 Sulphur Fork Red River Tributary No. 5	Lat 36°31'01", long 86°54'45", Robertson County, 200 ft above mouth, 1.6 miles west of Springfield, and at mile 0.0.	.43	0	-	-	-	-	-	-
26.7	03435810 Sulphur Fork Red River	Lat 36°30'59", long 86°54'46", Robertson County, at county road bridge 1.3 miles northwest of Springfield, and at mile 26.7.	84.5	14.3	-	+1.1	-	-	-	-
23.4	03435820 Sulphur Fork Red River	Lat 36°30'20", long 86°56'38", Robertson County, 250 ft above Carr Creek, 3.5 miles west of Springfield.	87.2	11.1	-	-3.2	25.5	480	7.8	3.8

Table 5.--Continued

Sulphur Fork Red River seepage investigation--Headwaters to Carr Creek--Continued

Sulphur Fork Red River mile	Stream	Location	Drainage Area (mi^2)	Meas. disch. (ft^3/s)	Tributary gain or loss	Sulphur Fork Red River gain or loss	Water temp. (°C)	Specific conductance (umhos/cm)	pH (units)	Dissolved Oxygen (mg/l)
23.3	03435898 Browns Fork	Lat 36°28'42", long 86°56'06", Robertson County, at county road bridge 100 ft southeast of State Highway 49, 3.5 miles southwest of Springfield, and at mile 0.5.	8.12	1.07	-	-	24.5	370	8.3	8.2
23.3	03435900 Carr Creek	Lat 36°28'54", long 86°55'45", Robertson County, at bridge on State Highway 49, 300 ft downstream from Browns Fork, and 3.1 miles southwest of courthouse at Springfield.	32.0	7.43	-	-	26.5	330	8.2	7.1
23.3	03435910 Carr Creek	Lat 36°30'12", long 86°56'28", Robertson County, 2.8 miles west of Springfield, and at mile 0.2.	36.8	9.75	+2.32	-	24.5	260	8.0	6.8
		Overall net gain or loss				+4.10				

Table 7.--Water temperature records for Sulphur Fork Red River near Greenbrier, Tennessee

Period of record October 9, 1975, to September 30, 1977.

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-24-79

STATION NUMBER 03435637 SULPHUR FORK RED RIVER NEAR GREENBRIER, TENN STREAM SOURCE AGENCY USGS
LATITUDE 362905 LONGITUDE 0864733 DRAINAGE AREA 34.90 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	14.5	11.5	13.0	10.0	8.5	9.0	9.0	9.0	9.0
2	---	---	---	15.5	12.0	14.0	9.0	7.0	8.5	9.5	9.0	9.0
3	---	---	---	16.0	12.5	14.5	9.5	7.0	8.5	9.0	7.0	8.0
4	---	---	---	17.5	14.5	16.0	10.0	7.5	9.0	7.0	5.0	6.0
5	---	---	---	17.5	14.5	16.0	11.0	8.5	10.0	5.5	4.0	4.5
6	---	---	---	16.0	15.5	16.0	11.5	11.0	11.0	6.5	3.5	5.0
7	---	---	---	17.5	16.0	16.5	11.0	9.0	9.5	7.0	5.0	6.5
8	---	---	---	17.5	15.5	16.5	9.0	9.0	9.0	4.5	2.0	3.5
9	20.0	16.0	17.5	16.5	15.5	16.0	9.0	7.0	8.0	3.0	.5	1.5
10	20.5	16.5	18.5	17.0	13.5	16.0	7.5	6.5	7.0	5.5	2.0	3.5
11	21.0	17.0	19.0	15.0	11.5	13.5	8.5	5.5	7.0	7.0	5.0	6.0
12	21.5	18.0	20.0	15.5	12.5	14.5	10.5	7.5	9.0	6.0	3.5	5.0
13	21.5	18.0	20.0	12.5	9.0	10.5	11.0	9.0	10.0	9.5	6.0	7.5
14	21.5	18.5	20.0	9.5	7.5	8.5	13.0	10.5	11.5	8.0	6.5	7.0
15	20.5	18.0	19.5	9.5	7.0	8.0	13.5	10.5	12.5	7.0	4.5	6.0
16	19.5	17.0	18.5	11.0	7.5	9.0	10.0	7.0	8.5	7.0	5.5	6.5
17	17.0	15.0	16.0	11.5	8.5	9.5	7.0	4.5	6.0	5.0	3.0	4.0
18	15.0	13.5	14.0	12.0	8.5	10.0	4.5	2.0	3.0	3.5	1.5	2.5
19	14.0	13.0	13.5	12.0	9.0	10.5	3.5	1.0	2.5	4.0	2.0	2.5
20	14.5	12.0	13.5	12.0	10.5	11.0	5.0	2.5	4.0	5.0	4.0	4.5
21	16.0	12.5	14.5	10.0	8.0	9.0	5.0	3.0	4.5	5.5	2.5	4.0
22	16.5	14.0	15.0	8.0	7.5	7.5	4.0	2.0	2.5	5.5	2.5	4.0
23	17.0	14.0	15.5	9.0	7.0	7.5	3.5	1.0	2.0	7.0	3.0	5.0
24	18.5	15.0	16.5	7.0	6.0	6.5	4.0	1.5	3.0	8.5	6.0	7.0
25	16.5	14.5	15.5	7.5	6.0	6.5	7.0	3.5	4.5	10.0	8.5	9.0
26	15.0	13.0	14.0	7.0	5.0	6.0	7.5	7.0	7.0	9.5	8.0	9.0
27	14.0	12.0	13.0	7.0	5.5	6.0	7.5	7.0	7.0	8.0	7.0	7.5
28	16.0	14.0	15.0	7.0	4.5	6.0	8.5	7.0	7.5	8.0	4.5	6.0
29	16.0	14.5	15.5	10.0	6.5	8.5	8.5	7.0	8.0	8.5	6.5	7.5
30	15.0	12.5	13.5	12.5	10.0	11.5	9.5	8.5	9.0	8.0	5.5	6.5
31	13.5	10.5	12.0	---	---	---	9.5	9.0	9.0	7.0	5.0	6.0
MONTH	21.5	10.5	16.0	17.5	4.5	11.0	13.5	1.0	7.5	10.0	.5	6.0

Table 7.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-24-79

STATION NUMBER 03435637 SULPHUR FORK RED RIVER NEAR GREENBRIER, TENN STREAM SOURCE AGENCY USGS
LATITUDE 362905 LONGITUDE 0864733 DRAINAGE AREA 34.90 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	7.0	5.5	6.5	14.5	11.5	13.0	14.0	10.5	12.0	17.5	14.5	15.5
2	5.5	2.0	3.0	16.0	13.0	14.5	15.0	10.0	12.5	18.5	13.5	16.0
3	5.0	2.5	3.5	17.5	14.5	16.0	16.5	11.0	14.0	17.5	14.0	15.5
4	6.5	4.0	5.0	19.0	15.0	17.0	16.0	13.5	14.5	17.0	12.5	14.5
5	9.0	6.5	8.0	16.5	13.0	14.5	15.5	11.0	13.5	18.0	13.0	15.5
6	9.0	5.0	7.0	13.5	10.0	12.0	16.0	11.5	13.5	18.0	15.5	16.5
7	5.0	2.0	3.5	12.5	8.5	10.5	16.5	12.0	14.0	16.5	14.5	15.5
8	6.0	2.5	4.0	10.5	9.5	10.0	17.0	13.0	14.5	17.5	13.0	15.0
9	7.0	3.0	5.5	9.5	8.5	9.0	15.5	11.5	13.0	17.5	13.0	15.5
10	10.0	6.0	8.5	12.0	7.0	9.5	16.0	10.5	13.0	18.0	13.5	16.0
11	11.0	7.0	9.5	13.0	9.0	11.0	13.5	12.0	12.5	20.5	15.5	18.0
12	9.5	6.0	8.0	12.5	11.5	12.0	15.5	11.0	13.0	21.0	16.5	18.5
13	12.5	9.5	11.5	11.5	8.5	10.0	16.5	10.5	13.5	20.0	17.0	18.5
14	13.0	10.5	12.0	12.0	7.5	9.5	18.5	12.5	15.5	18.5	17.5	18.0
15	13.5	10.5	12.5	13.5	9.0	11.0	20.0	14.5	17.0	20.0	16.5	18.0
16	13.5	12.5	13.0	12.0	8.5	10.5	20.5	16.0	18.0	17.0	15.5	16.0
17	14.0	12.5	13.5	10.5	6.5	8.5	21.5	15.5	18.5	16.0	15.0	15.5
18	12.5	10.5	12.0	12.0	7.0	9.5	21.5	16.0	19.0	16.0	13.5	15.0
19	13.0	9.5	11.0	14.0	10.5	12.0	22.0	16.5	19.0	17.0	12.5	14.5
20	12.5	8.5	11.0	15.5	12.5	13.5	22.0	16.5	19.5	18.5	13.5	16.0
21	12.5	11.0	12.0	15.0	11.5	13.0	20.5	17.5	19.0	20.0	14.5	17.0
22	10.5	8.5	9.5	14.0	10.0	12.0	21.0	15.5	18.5	20.5	16.0	18.0
23	10.5	7.0	9.0	14.5	10.0	12.5	21.5	16.0	19.0	20.0	17.5	18.5
24	12.0	7.0	10.0	13.0	10.5	12.0	18.5	16.5	17.5	19.5	16.5	18.0
25	12.0	9.0	10.5	14.0	12.0	13.0	17.0	14.5	16.0	20.0	15.0	17.5
26	14.0	10.0	12.0	14.5	12.5	13.5	15.5	12.5	14.0	20.0	15.0	17.5
27	12.5	9.0	11.0	16.0	13.0	14.5	16.0	12.0	14.0	17.5	16.0	17.0
28	13.0	9.0	11.0	15.5	11.0	13.5	14.5	13.0	14.0	17.5	16.5	17.0
29	13.5	10.0	12.0	13.5	12.5	13.0	16.0	12.5	14.5	19.0	17.0	18.0
30	---	---	---	16.5	13.0	15.0	17.0	12.5	15.0	21.0	17.0	19.0
31	---	---	---	13.5	11.5	12.5	---	---	---	21.5	19.0	20.0
MONTH	14.0	2.0	9.0	19.0	6.5	12.0	22.0	10.0	15.5	21.5	12.5	17.0

Table 7.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-24-79

STATION NUMBER 03435637 SULPHUR FORK RED RIVER NEAR GREENBRIER, TENN STREAM SOURCE AGENCY USGS
LATITUDE 362905 LONGITUDE 0864733 DRAINAGE AREA 34.90 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	20.5	18.5	19.5	23.5	19.5	21.5	23.0	20.5	21.5	---	---	---
2	19.5	17.0	18.0	22.0	19.0	20.5	23.5	19.0	21.5	---	---	---
3	17.0	16.0	16.5	21.0	19.5	20.5	23.5	19.0	21.5	---	---	---
4	18.5	15.5	17.0	20.5	18.5	19.5	24.5	20.0	22.5	24.0	21.5	22.5
5	19.0	16.5	17.5	20.5	17.0	19.0	24.0	21.5	22.5	23.5	21.5	22.5
6	19.5	15.5	17.5	20.5	18.0	19.5	23.0	21.5	22.0	23.0	19.5	21.5
7	20.0	15.5	18.0	21.5	17.5	19.5	23.5	20.0	21.5	23.5	19.5	21.5
8	21.0	17.0	19.0	22.0	19.0	20.5	23.0	19.0	21.5	24.0	21.0	22.5
9	21.5	18.0	19.5	23.5	20.0	21.5	23.5	19.0	21.5	23.5	22.0	23.0
10	22.5	18.5	20.5	23.0	20.0	21.5	---	---	---	22.0	20.0	21.0
11	22.5	19.0	20.5	24.5	21.0	22.5	---	---	---	21.0	17.0	19.5
12	23.5	19.5	21.5	26.0	22.0	23.5	---	---	---	21.5	17.0	19.0
13	24.0	20.0	22.0	25.0	22.0	23.0	---	---	---	22.0	17.5	20.0
14	24.5	21.0	22.5	25.5	21.0	23.0	---	---	---	22.0	18.5	20.5
15	25.5	21.5	23.0	26.5	22.0	24.0	---	---	---	22.0	18.5	20.5
16	23.0	21.0	22.0	24.0	22.5	23.0	---	---	---	22.0	19.0	20.5
17	23.5	19.5	21.5	25.0	21.0	22.5	---	---	---	21.5	17.5	19.5
18	23.5	20.5	22.0	24.5	20.0	22.0	---	---	---	21.5	17.5	19.5
19	23.0	21.0	22.0	24.5	20.0	22.0	---	---	---	22.0	18.0	20.0
20	22.5	20.0	21.5	25.0	21.0	23.0	---	---	---	21.0	20.0	20.5
21	22.5	19.5	21.0	26.0	21.5	23.5	---	---	---	21.0	18.5	20.0
22	23.0	19.0	21.0	27.0	22.5	25.0	---	---	---	20.0	16.0	18.0
23	21.0	19.5	20.5	27.0	23.0	25.0	---	---	---	19.5	16.0	18.0
24	23.0	20.0	21.5	28.0	23.5	25.5	---	---	---	21.0	17.0	19.0
25	22.0	21.0	21.5	27.5	24.0	25.5	---	---	---	21.5	17.5	19.5
26	23.0	20.5	21.5	26.0	22.0	23.5	---	---	---	22.0	20.0	21.0
27	24.0	20.5	22.5	24.0	21.5	22.5	---	---	---	21.0	19.5	20.5
28	25.5	21.5	23.0	25.0	22.0	23.0	---	---	---	20.5	18.5	19.5
29	25.5	22.0	23.0	25.5	22.5	23.5	---	---	---	18.5	17.0	18.0
30	23.5	21.0	22.0	23.5	21.5	22.5	---	---	---	18.0	16.0	17.0
31	---	---	---	23.5	22.0	22.5	---	---	---	---	---	---
MONTH	25.5	15.5	20.5	28.0	17.0	22.5	24.5	19.0	22.0	24.0	16.0	20.0
YEAR	28.0	.5	14.5									

Table 7.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-24-79

STATION NUMBER 03435637 SULPHUR FORK RED RIVER NEAR GREENBRIER, TENN STREAM SOURCE AGENCY USGS
LATITUDE 362905 LONGITUDE 0864733 DRAINAGE AREA 34.90 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	19.0	15.5	17.0	10.5	8.0	9.5	3.5	.5	2.5	.5	.0	.0
2	19.5	15.5	17.5	10.5	7.0	8.5	4.0	2.0	2.5	.5	.0	.0
3	19.5	15.5	17.5	11.5	9.0	10.0	3.5	.5	2.5	.5	.0	.5
4	20.0	16.0	18.0	9.0	7.0	8.0	4.0	1.5	3.0	1.0	.5	.5
5	20.5	17.5	19.0	8.0	5.0	6.5	4.5	1.5	3.0	1.0	.5	1.0
6	19.5	15.5	17.0	8.5	4.5	6.5	5.0	2.0	3.5	.5	.5	.5
7	16.0	15.0	15.5	9.0	6.0	7.5	5.0	3.0	4.0	1.5	.0	.5
8	14.5	14.0	14.5	7.0	4.5	6.0	3.0	1.0	2.0	1.0	.0	.0
9	15.0	13.0	14.0	8.5	5.0	7.0	3.0	.0	1.5	.5	.0	.5
10	15.5	12.0	14.0	10.0	7.5	8.5	5.0	2.0	3.5	.5	.0	.0
11	15.5	12.0	14.0	7.5	5.5	6.5	7.0	5.0	6.0	.0	.0	.0
12	16.0	12.5	14.5	6.5	4.0	5.0	7.5	6.0	7.0	.5	.0	.0
13	17.5	14.0	15.5	5.0	2.5	4.0	6.0	3.5	5.0	.5	.0	.0
14	16.0	13.5	15.0	4.5	4.0	4.5	5.0	2.0	3.5	.5	.0	.0
15	16.5	13.0	15.0	6.0	4.5	5.0	6.5	4.0	5.5	2.5	.5	1.5
16	15.5	13.5	14.5	6.5	3.5	5.0	6.0	3.5	4.5	2.5	.0	1.0
17	14.0	12.0	13.0	7.0	4.0	5.5	6.0	3.0	4.5	.0	.0	.0
18	13.5	10.5	12.0	8.0	4.5	6.5	6.5	3.5	5.0	.0	.0	.0
19	13.0	11.0	12.0	9.0	6.5	8.0	7.5	4.5	6.0	.5	.0	.0
20	12.5	10.5	11.5	8.5	6.5	7.5	7.5	3.0	6.0	.5	.0	.0
21	12.0	9.0	10.5	7.5	5.5	6.5	2.5	.0	1.5	.5	.0	.5
22	12.0	8.5	10.5	6.5	3.5	5.0	1.5	.0	.5	1.0	.0	.5
23	11.5	9.5	10.5	5.0	2.0	4.0	2.5	.0	1.0	.5	.0	.0
24	12.5	11.5	12.0	7.0	4.5	5.5	2.0	.0	.5	.5	.0	.5
25	13.0	12.5	13.0	8.0	4.5	6.5	2.0	.5	1.5	1.5	.0	1.0
26	12.0	10.5	11.5	9.5	8.0	8.5	3.0	.5	2.0	2.5	.0	1.5
27	10.5	8.5	9.5	10.0	8.5	9.5	4.0	.5	2.5	3.5	.5	2.0
28	10.0	7.0	8.5	8.5	3.0	6.0	4.5	2.0	3.5	1.5	.0	1.0
29	9.5	6.0	8.5	3.5	1.0	2.5	2.0	.0	1.5	.5	.0	.0
30	10.0	9.0	9.5	2.5	.0	1.5	2.5	.0	1.0	1.0	.0	.5
31	10.5	9.5	10.0	---	---	---	.5	.0	.0	1.0	.0	.5
MONTH	20.5	6.0	13.5	11.5	.0	6.5	7.5	.0	3.0	3.5	.0	.5

Table 7.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-24-79

STATION NUMBER 03435637 SULPHUR FORK RED RIVER NEAR GREENBRIER, TENN STREAM SOURCE AGENCY USGS
LATITUDE 362905 LONGITUDE 0864733 DRAINAGE AREA 34.90 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	1.5	.0	.5	8.5	6.5	7.0	14.5	11.5	13.5	19.5	15.0	17.0
2	1.5	.0	.5	8.0	4.5	7.0	16.0	13.5	15.0	19.5	16.0	17.5
3	1.5	.5	1.0	8.5	8.0	8.0	15.0	12.5	13.5	19.5	17.0	18.0
4	3.5	.0	1.5	12.0	8.5	10.0	13.5	12.0	13.0	20.5	17.0	18.5
5	3.0	.5	1.5	11.5	8.0	10.0	12.0	9.5	11.0	22.5	18.0	20.0
6	1.5	.0	1.0	11.5	8.5	10.0	13.0	8.5	11.0	22.0	18.5	20.5
7	1.5	.0	.5	10.5	6.5	9.0	15.5	9.5	12.5	20.0	18.0	19.0
8	1.5	.0	1.0	11.5	7.0	9.5	15.0	11.5	13.5	20.0	16.5	18.0
9	3.0	.0	1.5	11.0	8.0	10.0	15.0	10.5	13.0	18.0	14.5	16.5
10	4.5	.0	2.5	13.0	9.0	11.0	18.0	12.0	14.5	17.0	13.0	14.5
11	5.5	1.0	3.5	13.0	11.0	12.0	19.5	14.0	16.5	17.5	12.5	14.5
12	5.5	3.0	4.5	14.0	11.5	13.0	19.0	14.5	17.0	18.5	13.0	15.5
13	6.5	3.5	5.0	14.0	10.5	12.0	20.0	15.0	17.0	19.5	13.5	16.5
14	6.0	3.5	4.5	14.5	9.5	12.0	20.0	15.0	17.5	19.5	14.5	17.0
15	4.0	2.0	3.0	15.0	10.5	13.0	20.5	15.0	18.0	21.0	15.0	18.0
16	4.0	.5	2.0	14.0	11.5	12.5	21.0	15.5	18.0	21.5	16.5	19.0
17	4.0	.0	2.0	11.5	9.5	10.5	21.0	15.5	18.5	22.5	17.5	20.0
18	7.0	2.5	4.5	15.5	11.0	13.0	20.0	16.5	18.5	22.5	18.0	20.5
19	6.0	4.0	5.0	12.5	10.5	11.5	20.0	16.5	18.0	23.0	18.5	21.0
20	5.0	2.5	4.0	13.5	9.5	11.5	21.0	16.5	20.0	23.0	18.5	21.0
21	6.0	1.5	4.0	12.5	10.0	11.0	19.0	17.5	18.5	23.5	19.5	21.5
22	9.5	3.5	6.5	12.0	9.0	10.5	18.0	17.0	17.5	22.0	20.0	21.0
23	10.0	7.5	8.5	12.5	7.0	9.5	19.0	16.0	17.5	22.0	19.0	20.5
24	11.0	7.5	9.0	13.0	8.0	10.5	18.0	15.0	16.0	22.5	19.0	21.0
25	11.5	8.0	9.5	14.0	8.0	11.0	15.5	13.5	14.5	22.5	20.0	21.0
26	13.0	8.0	10.5	14.0	9.0	12.0	15.0	12.0	13.5	23.0	19.5	21.5
27	12.0	7.5	9.0	14.5	11.5	13.0	17.0	12.0	14.5	24.0	19.0	21.5
28	9.5	6.0	8.0	16.5	13.5	14.5	16.0	14.0	15.0	23.5	20.5	22.0
29	---	---	---	17.0	13.0	15.0	15.5	14.0	14.5	24.0	20.5	22.5
30	---	---	---	20.0	15.0	17.0	17.0	13.0	15.0	25.0	21.0	23.0
31	---	---	---	17.0	13.5	15.0	---	---	---	25.5	22.0	23.5
MONTH	13.0	.0	4.0	20.0	4.5	11.5	21.0	8.5	15.5	25.5	12.5	19.5

Table 7.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-24-79

STATION NUMBER 03435637 SULPHUR FORK RED RIVER NEAR GREENBRIER, TENN STREAM SOURCE AGENCY USGS
LATITUDE 362905 LONGITUDE 0864733 DRAINAGE AREA 34.90 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	24.5	21.0	22.5	25.0	23.0	24.0	25.0	22.0	23.5	28.0	25.0	26.5
2	24.0	20.5	22.0	26.0	21.5	24.0	25.0	21.0	23.0	28.0	24.5	26.0
3	23.5	19.5	22.0	26.0	22.0	24.0	25.5	21.0	23.5	27.5	24.0	25.5
4	24.0	19.5	22.0	27.0	22.0	25.0	25.5	22.5	24.0	28.0	24.0	26.0
5	24.5	20.0	22.5	27.5	23.5	25.5	27.0	23.0	25.0	28.0	24.0	26.0
6	25.0	21.0	23.0	28.0	23.5	26.0	28.0	24.0	26.0	26.0	25.0	25.0
7	20.5	19.5	20.0	29.0	24.0	26.5	28.0	24.5	26.0	26.5	23.5	24.5
8	21.0	17.5	19.5	29.0	25.0	27.0	28.0	23.5	26.0	26.0	23.5	25.0
9	22.5	19.0	20.5	27.0	22.5	24.0	28.0	24.5	26.0	26.0	22.5	24.5
10	21.5	18.0	19.5	26.0	22.0	24.0	27.5	24.5	25.5	25.5	23.0	24.5
11	23.5	18.5	21.5	25.5	22.5	24.0	28.0	24.0	26.0	24.5	20.0	22.0
12	24.5	20.5	22.5	27.0	23.0	25.0	27.5	24.5	26.0	24.0	20.5	22.0
13	25.0	22.0	23.5	28.5	23.5	26.0	27.0	24.5	25.5	24.5	21.5	22.5
14	23.0	21.5	22.5	29.0	24.5	27.0	25.0	23.5	24.0	22.5	21.5	22.0
15	24.0	21.0	22.5	29.0	25.0	27.0	26.5	23.0	24.5	24.5	21.0	22.5
16	24.5	21.0	23.0	29.5	24.5	27.0	27.0	23.5	25.0	23.5	22.0	22.5
17	23.0	22.0	22.5	29.5	25.0	27.0	25.0	23.5	24.5	24.5	21.0	22.5
18	25.5	21.5	23.5	29.0	25.0	27.0	25.0	22.0	23.5	25.0	21.0	23.0
19	25.5	22.5	24.0	29.0	24.5	26.5	24.5	21.0	23.0	23.5	20.0	22.0
20	25.0	22.5	23.5	28.0	25.0	26.5	25.5	21.5	23.5	22.5	19.5	21.0
21	26.0	22.5	24.0	28.5	25.0	27.0	25.5	21.5	23.5	22.0	17.5	20.0
22	25.5	22.5	23.5	26.5	24.0	25.0	26.5	23.0	24.0	22.5	18.0	20.0
23	26.0	22.5	24.0	27.0	23.0	25.0	26.5	22.0	24.5	22.5	18.5	20.5
24	26.5	22.5	24.0	26.5	24.0	25.0	26.5	24.0	25.0	21.5	20.0	20.5
25	24.5	22.5	23.5	26.5	24.0	25.0	26.0	23.0	24.5	20.0	19.0	19.5
26	24.5	21.5	23.0	26.5	23.5	25.0	27.0	23.5	25.0	23.5	19.0	20.5
27	25.0	21.0	23.0	25.5	22.5	24.0	27.0	24.0	25.5	22.0	19.5	20.5
28	26.5	22.0	24.5	24.5	23.0	23.5	27.5	24.0	25.5	21.0	18.0	19.5
29	26.0	23.0	24.5	25.0	22.0	23.5	26.5	24.0	25.5	19.0	17.5	18.0
30	27.5	23.0	25.5	25.5	21.5	23.5	28.0	24.0	26.0	20.0	17.5	18.5
31	---	---	---	26.0	22.0	24.0	28.5	24.5	26.5	---	---	---
MONTH	27.5	17.5	22.5	29.5	21.5	25.5	28.5	21.0	25.0	28.0	17.5	22.5
YEAR	29.5	.0	14.0									

Table 8.--Water temperature records for Sulphur Fork Red River above Beaver Dam Creek

Period of record August 23, 1975, to September 30, 1977

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-25-79

STATION NUMBER 03435700 SULPHUR FK RED R AB BEAVER DAM C,NR SPRINGFLD,TN STREAM SOURCE AGENCY USGS
LATITUDE 363053 LONGITUDE 0865046 DRAINAGE AREA 49.10 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1							---	---	---	26.0	24.5	25.0
2							---	---	---	25.5	24.5	25.0
3							---	---	---	25.0	23.0	24.0
4							---	---	---	25.5	22.5	24.0
5							---	---	---	26.0	23.5	25.0
6							---	---	---	26.5	24.0	25.0
7							---	---	---	25.5	24.0	24.5
8							---	---	---	24.0	22.0	23.0
9							---	---	---	22.5	20.5	21.5
10							---	---	---	22.5	19.5	21.0
11							---	---	---	23.0	21.0	22.0
12							---	---	---	22.5	21.5	22.0
13							---	---	---	23.5	22.0	22.5
14							---	---	---	23.0	20.0	21.5
15							---	---	---	20.0	17.0	18.0
16							---	---	---	17.0	15.5	16.5
17							---	---	---	18.0	17.0	17.5
18							---	---	---	19.0	17.5	18.5
19							---	---	---	19.0	18.0	18.5
20							---	---	---	19.5	18.5	19.0
21							---	---	---	20.0	18.5	19.0
22							26.0	24.5	25.5	20.0	19.0	19.5
23							26.5	24.0	25.5	19.5	17.5	18.0
24							26.5	24.5	25.5	18.0	17.0	17.5
25							26.5	24.5	25.5	17.0	15.5	16.0
26							26.5	24.5	25.5	15.5	15.0	15.5
27							26.5	24.5	25.5	15.5	15.0	15.0
28							27.0	25.0	26.0	15.0	14.5	15.0
29							26.5	24.5	25.5	15.0	14.0	14.5
30							26.5	24.5	25.5	14.5	14.0	14.0
31							26.0	24.0	25.0	---	---	---
MONTH							27.0	24.0	25.5	26.5	14.0	20.0
YEAR	27.0	14.0	21.5									

NO DATA FOR THIS MONTH

NO DATA FOR THIS MONTH

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

Table 8.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-25-79

STATION NUMBER 03435700 SULPHUR FK RED R AB BEAVER DAM C,NR SPRINGFLD,TN STREAM SOURCE AGENCY USGS
LATITUDE 363053 LONGITUDE 0865046 DRAINAGE AREA 49.10 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	13.0	11.5	12.0				---	---	---
2	15.0	13.0	14.0	13.5	12.0	13.0				---	---	---
3	13.0	11.5	12.5	14.5	12.5	13.5				---	---	---
4	13.0	11.5	12.5	16.0	14.5	15.5				---	---	---
5	14.5	13.0	14.0	16.0	15.0	15.5				---	---	---
6	15.5	14.0	14.5	16.0	15.5	15.5				---	---	---
7	16.0	15.0	15.5	17.0	15.5	16.0				---	---	---
8	17.5	16.0	16.5	17.0	15.5	16.0				---	---	---
9	17.5	16.0	16.5	16.0	15.0	15.5				---	---	---
10	18.0	16.0	17.0	16.0	14.0	15.5				7.0	4.0	5.0
11	19.0	17.0	18.0	14.0	11.5	13.0				8.0	7.0	7.5
12	19.5	18.0	19.0	14.5	13.0	14.0				7.0	5.5	6.5
13	19.5	18.0	19.0	12.5	8.5	10.5				10.5	7.0	8.5
14	20.0	18.5	19.0	8.5	7.5	8.0				9.0	7.5	8.5
15	19.5	18.5	19.0	8.0	6.0	7.5				8.5	6.5	7.5
16	19.0	17.0	18.0	9.5	7.5	8.5				8.5	7.0	8.0
17	17.0	14.5	15.5	10.0	8.0	9.0				7.0	5.0	5.5
18	14.5	13.0	13.5	10.0	8.0	9.0				5.0	3.5	4.5
19	13.0	13.0	13.0	10.5	8.5	9.5				5.5	4.0	4.5
20	14.0	12.0	13.0	11.5	10.0	11.0				6.5	5.5	6.0
21	15.0	12.5	13.5	10.0	8.0	8.5				6.5	4.5	5.5
22	15.5	13.5	14.5	7.5	7.0	7.5				6.5	4.5	5.5
23	15.5	13.5	15.0	8.0	6.5	7.0				8.0	5.0	6.5
24	16.5	15.0	15.5	6.5	6.0	6.0				9.5	7.5	8.5
25	16.5	14.0	15.0	6.5	6.0	6.0				11.0	9.5	10.5
26	13.5	13.0	13.5	6.0	5.5	5.5				10.5	9.0	9.5
27	13.0	12.0	12.5	---	---	---				9.0	8.0	8.5
28	15.0	13.0	14.0	---	---	---				9.0	6.5	7.5
29	15.0	14.0	14.5	---	---	---				9.0	8.5	9.0
30	14.0	12.0	13.0	---	---	---				9.0	7.5	8.5
31	12.0	11.0	11.5	---	---	---				8.5	7.0	7.5
MONTH	20.0	11.0	15.0	17.0	5.5	11.0				11.0	3.5	7.0

NO DATA FOR THIS MONTH

Table 8.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-25-79

STATION NUMBER 03435700 SULPHUR FK RED R AB BEAVER DAM C,NR SPRINGFLD,TN STREAM SOURCE AGENCY USGS
LATITUDE 363053 LONGITUDE 0865046 DRAINAGE AREA 49.10 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	8.0	7.0	7.5	15.5	12.5	14.0	14.0	11.5	13.0	16.5	15.0	15.5
2	6.5	4.5	5.0	16.0	14.0	15.0	15.0	11.5	13.5	17.0	15.0	16.0
3	6.5	4.5	5.5	17.5	15.5	16.0	16.5	12.5	14.5	16.5	15.0	15.5
4	8.0	5.5	6.5	18.5	16.0	17.5	16.0	14.5	15.0	15.0	13.5	14.0
5	10.5	8.0	9.0	17.5	14.5	16.0	15.5	12.5	14.0	16.5	14.0	15.0
6	9.5	6.0	8.0	14.0	12.0	13.0	16.0	12.5	14.0	17.5	16.0	17.0
7	6.0	4.0	5.0	12.5	10.0	11.5	16.0	13.0	14.5	17.0	15.0	16.0
8	7.0	4.0	5.5	12.0	10.5	11.0	16.0	14.0	15.0	15.5	14.0	14.5
9	8.0	5.0	6.5	10.5	9.5	10.0	15.0	13.0	14.0	15.5	14.0	15.0
10	11.5	7.5	9.0	12.0	8.5	10.5	15.0	12.0	13.5	16.5	14.5	15.5
11	11.5	10.0	11.0	13.5	10.5	12.0	14.5	13.0	13.5	19.0	16.5	17.5
12	10.5	7.5	9.0	13.0	12.5	13.0	14.5	12.5	13.5	19.5	17.5	18.5
13	13.0	10.5	12.0	13.0	10.0	11.0	15.0	12.5	13.5	19.0	18.0	18.5
14	13.5	12.5	13.0	12.0	9.0	10.5	17.0	14.5	15.5	19.0	18.0	18.5
15	14.0	12.0	13.0	13.5	10.0	12.0	18.0	16.0	17.0	19.0	17.5	18.5
16	14.5	13.5	14.0	13.0	10.0	12.0	19.0	17.5	18.0	18.5	16.5	17.0
17	14.5	14.0	14.0	10.5	8.0	9.5	19.5	17.5	18.5	16.5	16.0	16.0
18	14.0	12.5	13.0	12.5	9.0	10.5	20.0	18.0	19.0	16.0	14.5	15.5
19	13.5	11.0	12.0	13.5	11.5	12.5	19.5	18.0	19.0	16.0	13.5	15.0
20	13.0	10.0	11.5	15.5	13.5	14.5	20.0	18.0	19.0	17.5	14.5	16.0
21	13.0	12.5	12.5	15.0	13.0	14.0	20.0	19.0	19.5	18.5	16.0	17.0
22	12.5	10.5	11.0	14.5	11.5	13.0	19.0	17.0	18.0	19.0	17.5	18.0
23	11.0	9.0	10.0	15.0	11.5	13.0	19.5	17.5	18.5	19.0	18.5	19.0
24	12.5	9.0	10.5	14.0	12.0	13.0	19.0	17.5	18.0	18.5	18.0	18.0
25	12.5	11.0	12.0	14.5	13.0	13.5	17.5	15.5	16.5	18.0	16.0	17.0
26	14.0	11.5	12.5	15.0	13.5	14.5	15.0	14.0	14.5	18.5	16.0	17.0
27	13.0	10.5	12.0	16.0	14.0	15.0	14.5	13.5	14.0	18.0	17.0	17.5
28	13.5	10.5	12.0	15.5	12.5	14.0	14.5	13.5	14.0	17.5	17.0	17.5
29	14.0	11.0	13.0	15.0	13.0	14.0	14.5	13.0	14.0	19.0	17.5	18.0
30	---	---	---	16.5	13.5	15.0	15.5	13.5	14.5	20.5	18.0	19.0
31	---	---	---	14.5	13.0	13.5	---	---	---	21.0	20.0	20.5
MONTH	14.5	4.0	10.0	18.5	8.0	13.0	20.0	11.5	15.5	21.0	13.5	17.0

Table 8.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-25-79

STATION NUMBER 03435700 SULPHUR FK RED R AB BEAVER DAM C,NR SPRINGFLD,TN STREAM SOURCE AGENCY USGS
LATITUDE 363053 LONGITUDE 0865046 DRAINAGE AREA 49.10 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	20.5	19.5	20.0	21.0	19.5	20.5				---	---	---
2	20.5	18.0	19.0	20.5	20.0	20.5				---	---	---
3	18.0	16.5	17.0	21.0	19.5	20.5				---	---	---
4	18.0	16.0	17.0	20.5	19.0	19.5				---	---	---
5	18.5	17.0	18.0	20.0	17.5	19.0				---	---	---
6	19.0	16.5	18.0	20.0	18.5	19.0				---	---	---
7	19.5	17.0	18.0	21.0	18.5	19.5				---	---	---
8	20.5	18.0	19.0	21.0	19.5	20.5				22.5	20.5	21.5
9	20.5	18.5	20.0	---	---	---				22.5	21.5	22.0
10	21.0	19.5	20.0	---	---	---				21.5	19.0	20.5
11	21.0	20.0	20.5	---	---	---				19.0	17.5	18.0
12	22.0	20.5	21.0	---	---	---				19.0	16.0	17.5
13	22.5	21.0	22.0	---	---	---				19.5	16.5	18.0
14	23.0	22.0	22.5	---	---	---				20.0	17.5	18.5
15	23.5	22.5	23.0	---	---	---				20.0	18.0	19.0
16	23.0	21.5	22.5	---	---	---				20.0	18.0	19.0
17	22.0	20.5	21.0	---	---	---				19.0	17.0	18.0
18	22.0	21.5	22.0	---	---	---				19.0	17.0	18.0
19	22.5	21.5	22.0	---	---	---				19.5	17.0	18.0
20	21.5	20.5	21.5	---	---	---				19.5	18.5	19.0
21	21.5	20.0	20.5	---	---	---				19.5	18.5	19.0
22	21.0	19.5	20.5	---	---	---				18.5	16.5	17.5
23	21.0	20.0	20.5	---	---	---				17.5	15.0	16.5
24	22.0	20.5	21.0	---	---	---				18.5	16.0	17.0
25	22.5	21.5	22.0	---	---	---				19.0	17.0	18.0
26	21.5	20.0	21.0	---	---	---				20.5	19.0	19.5
27	22.0	21.0	21.5	---	---	---				21.0	20.5	20.5
28	23.0	22.0	22.5	---	---	---				20.5	19.0	19.5
29	22.5	21.5	22.0	---	---	---				18.5	17.5	18.0
30	22.0	20.5	21.5	---	---	---				17.5	17.0	17.0
31	---	---	---	---	---	---				---	---	---
MONTH	23.5	16.0	20.5	21.0	17.5	20.0				22.5	15.0	18.5
YEAR	23.5	3.5	14.5									

NO DATA FOR THIS MONTH

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

Table 8.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-25-79

STATION NUMBER 03435700 SULPHUR FK RED R AB BEAVER DAM C,NR SPRINGFLD,TN STREAM SOURCE AGENCY USGS
LATITUDE 363053 LONGITUDE 0865046 DRAINAGE AREA 49.10 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	17.0	16.0	16.5	10.5	9.0	9.5	2.5	1.5	2.0	.5	.0	.5
2	17.0	15.5	16.5	10.0	8.5	9.0	3.0	2.5	3.0	.5	.0	.5
3	17.0	15.5	16.5	10.5	9.5	10.0	3.0	2.5	2.5	.5	.5	.5
4	18.0	16.0	17.0	10.5	8.0	8.5	3.0	3.0	3.0	.5	.0	.5
5	19.0	17.5	18.0	8.0	6.5	7.0	3.0	3.0	3.0	.5	.0	.5
6	19.0	16.5	17.5	7.5	6.0	6.5	4.0	3.0	3.5	.5	.0	.0
7	16.5	15.0	15.5	7.5	7.0	7.5	4.5	4.0	4.5	.5	.0	.0
8	15.0	14.0	14.5	7.5	6.0	6.5	4.0	2.5	3.0	.5	.0	.0
9	14.0	13.5	14.0	8.0	5.5	7.0	2.5	1.5	2.0	.0	.0	.0
10	13.5	13.0	13.5	9.0	8.0	8.5	5.0	2.5	3.5	.0	.0	.0
11	13.5	13.0	13.5	9.0	6.5	7.5	7.0	5.0	6.0	.0	.0	.0
12	14.0	13.0	13.5	6.5	5.0	5.5	7.5	7.0	7.5	.0	.0	.0
13	15.0	14.0	14.5	5.0	4.0	4.5	7.0	5.5	6.0	.0	.0	.0
14	15.0	14.0	14.5	4.5	4.0	4.5	5.0	3.5	4.5	.0	.0	.0
15	15.0	13.5	14.0	5.5	4.5	5.0	6.5	5.0	5.5	.0	.0	.0
16	15.0	13.5	14.5	5.5	4.5	5.0	6.0	5.0	5.5	.5	.0	.0
17	13.5	12.0	12.5	6.0	5.0	5.5	5.5	4.5	5.0	.0	.0	.0
18	11.5	10.5	11.0	7.0	6.0	6.5	6.0	5.0	5.5	.0	.0	.0
19	12.0	10.5	11.0	8.5	7.0	8.0	7.5	5.5	6.5	.0	.0	.0
20	12.0	11.0	11.5	9.0	8.0	8.5	8.0	5.5	7.5	.0	.0	.0
21	11.0	10.0	10.5	8.0	6.5	7.0	5.0	1.5	3.0	.0	.0	.0
22	10.0	9.5	10.0	6.0	4.5	5.5	1.5	1.0	1.0	.0	.0	.0
23	11.0	9.5	10.5	4.5	4.0	4.0	1.5	1.0	1.0	.0	.0	.0
24	13.0	11.0	12.0	5.0	4.0	5.0	1.5	1.0	1.0	.0	.0	.0
25	13.5	13.0	13.5	7.0	5.0	6.0	2.0	1.0	1.5	.0	.0	.0
26	13.0	11.5	12.5	9.5	7.0	8.5	2.5	1.5	2.0	.0	.0	.0
27	11.5	10.0	10.5	11.0	10.0	10.5	3.5	2.0	2.5	1.0	.0	.5
28	9.5	8.0	8.5	10.0	5.5	8.0	4.0	3.5	3.5	1.0	.0	.5
29	9.0	7.5	8.0	5.0	2.5	3.5	3.5	1.5	2.5	.0	.0	.0
30	10.0	9.0	9.5	2.5	2.0	2.0	1.5	1.0	1.0	.0	.0	.0
31	10.5	10.0	10.0	---	---	---	1.0	.5	.5	.0	.0	.0
MONTH	19.0	7.5	13.0	11.0	2.0	6.5	8.0	.5	3.5	1.0	.0	.0

Table 8.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-25-79

STATION NUMBER 03435700 SULPHUR FK RED R AB BEAVER DAM C,NR SPRINGFLD,TN STREAM SOURCE AGENCY USGS
LATITUDE 363053 LONGITUDE 0865046 DRAINAGE AREA 49.10 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	8.5	7.0	8.0	14.5	13.5	14.0	16.0	14.0	15.0
2	.0	.0	.0	8.5	6.0	7.5	16.0	14.5	15.0	16.5	15.5	16.0
3	.0	.0	.0	9.0	8.5	9.0	15.0	13.5	14.0	16.5	15.5	16.0
4	1.0	.0	.5	12.0	9.0	10.5	14.0	13.0	13.5	17.0	16.0	16.5
5	1.0	.5	1.0	12.0	9.0	10.5	13.5	11.0	12.0	18.5	16.0	17.0
6	.0	.0	.0	11.5	9.5	10.5	13.0	10.0	11.5	18.0	17.0	17.5
7	.0	.0	.0	11.0	8.0	9.5	15.5	11.0	13.0	17.5	16.5	17.0
8	.0	.0	.0	12.0	8.5	10.0	15.5	13.0	14.0	---	---	---
9	.5	.0	.0	11.5	9.5	10.5	15.0	12.0	13.5	---	---	---
10	2.0	.0	1.0	13.0	10.0	11.5	17.0	12.5	15.0	---	---	---
11	4.5	1.5	3.0	13.0	12.0	12.5	18.5	15.0	17.0	---	---	---
12	5.5	4.0	4.5	---	---	---	18.5	15.5	17.5	---	---	---
13	6.0	4.0	5.5	---	---	---	19.0	16.0	17.5	---	---	---
14	5.5	4.0	5.0	---	---	---	18.5	16.5	18.0	---	---	---
15	5.0	3.0	3.5	---	---	---	19.0	16.5	18.0	---	---	---
16	3.5	1.5	2.5	---	---	---	19.5	17.0	18.5	---	---	---
17	3.5	1.0	2.5	---	---	---	19.5	17.5	18.5	---	---	---
18	6.5	3.5	4.5	---	---	---	19.0	18.0	18.5	---	---	---
19	6.0	5.0	5.5	---	---	---	19.0	18.0	18.5	---	---	---
20	5.0	4.0	4.5	---	---	---	19.0	18.0	18.5	21.5	20.0	21.0
21	5.0	3.0	4.0	---	---	---	18.5	17.5	18.0	22.0	20.5	21.5
22	8.5	4.5	6.0	---	---	---	17.5	17.0	17.0	21.5	21.0	21.5
23	9.5	8.0	9.0	---	---	---	17.5	16.5	17.0	21.5	20.0	20.5
24	11.0	7.5	9.5	---	---	---	16.5	15.0	15.5	21.5	20.0	21.0
25	11.0	8.5	10.0	---	---	---	15.5	13.5	14.0	21.5	20.5	21.0
26	12.5	9.0	11.0	---	---	---	13.5	12.0	13.0	22.0	20.5	21.0
27	12.5	8.5	10.0	---	---	---	15.0	12.0	13.5	22.0	20.0	21.0
28	9.5	7.0	8.0	---	---	---	14.5	14.0	14.5	22.5	21.0	21.5
29	---	---	---	16.5	14.5	16.0	14.5	13.0	14.0	22.5	21.0	22.0
30	---	---	---	19.0	16.0	17.5	14.0	12.5	13.5	23.5	21.5	22.5
31	---	---	---	17.0	15.0	16.0	---	---	---	24.0	22.5	23.0
MONTH	12.5	.0	4.0	19.0	6.0	11.5	19.5	10.0	15.5	24.0	14.0	19.5

Table 8.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-25-79

STATION NUMBER 03435700 SULPHUR FK RED R AB BEAVER DAM C,NR SPRINGFLD,TN STREAM SOURCE AGENCY USGS
LATITUDE 363053 LONGITUDE 0865046 DRAINAGE AREA 49.10 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	23.0	21.5	22.5	24.5	23.5	24.0	23.5	22.5	23.0	26.0	24.0	25.0
2	22.5	21.0	21.5	24.0	22.5	23.0	23.0	21.0	22.0	25.0	24.0	24.5
3	22.0	20.0	21.0	24.0	22.0	23.0	23.0	21.0	22.0	24.5	23.5	24.0
4	22.5	19.5	21.0	24.5	22.5	23.5	24.0	22.0	23.0	25.5	23.5	24.5
5	23.0	20.0	21.5	25.5	23.5	24.5	25.0	23.0	24.0	25.5	23.5	24.5
6	24.0	21.5	22.5	26.0	24.0	25.0	26.0	24.0	25.0	24.0	24.0	24.0
7	21.5	20.0	20.5	26.5	24.5	25.5	26.0	24.5	25.0	24.5	23.5	24.0
8	19.5	17.5	18.5	27.5	25.0	26.0	26.0	24.0	25.0	24.5	23.0	24.0
9	20.5	18.5	19.5	26.0	22.0	23.5	26.0	24.5	25.5	24.0	22.0	23.0
10	20.0	17.5	18.5	23.0	21.5	22.0	26.0	24.5	25.0	23.5	21.5	22.5
11	21.5	18.0	20.0	23.5	22.0	22.5	26.0	23.5	24.5	21.5	19.5	20.5
12	23.0	20.0	21.5	24.0	22.5	23.5	25.5	24.0	25.0	21.5	19.5	20.5
13	23.5	21.5	22.5	25.0	23.5	24.0	25.5	24.0	24.5	22.0	21.0	21.5
14	22.5	22.0	22.5	26.0	24.0	25.0	24.5	23.5	24.0	21.5	21.0	21.0
15	23.0	21.5	22.0	26.5	24.5	25.5	24.5	23.5	24.0	22.5	21.0	21.5
16	23.5	22.5	23.0	26.5	24.5	25.5	25.5	24.0	24.5	22.5	22.0	22.5
17	23.0	22.5	22.5	26.5	24.5	25.5	24.5	23.5	24.5	23.0	21.0	22.0
18	24.0	22.0	23.0	26.5	24.5	25.5	23.5	22.5	23.0	23.0	21.0	22.0
19	24.5	23.0	23.5	26.5	24.5	25.5	23.0	21.5	22.0	22.5	21.0	21.5
20	24.5	23.0	23.5	26.5	25.0	25.5	23.0	21.0	22.0	22.0	21.0	21.5
21	25.0	23.0	23.5	26.5	24.5	25.5	23.5	21.0	22.0	20.5	19.0	20.0
22	24.5	22.0	23.5	25.5	24.0	24.5	24.0	21.5	23.0	19.5	18.5	19.0
23	23.5	22.0	23.0	24.5	23.5	24.0	24.5	23.0	23.5	21.0	19.0	20.0
24	24.5	22.5	23.5	25.0	24.0	24.5	25.0	24.0	24.5	21.0	20.5	20.5
25	23.5	22.5	23.0	24.5	24.0	24.5	24.5	23.0	23.5	20.5	19.5	20.0
26	22.5	22.0	22.5	24.5	23.0	24.0	24.5	23.0	24.0	21.0	19.5	20.0
27	22.5	21.5	22.0	23.5	22.5	23.0	25.5	24.5	25.0	21.5	20.5	21.0
28	24.0	22.0	23.0	23.0	22.5	22.5	25.5	24.0	25.0	21.0	19.0	20.0
29	24.0	22.5	23.5	23.5	22.5	23.0	25.5	24.0	24.5	19.0	18.0	18.5
30	25.0	23.0	24.0	23.5	21.5	22.5	26.0	24.0	25.0	19.5	18.0	18.5
31	---	---	---	24.0	23.0	23.5	26.0	24.0	25.0	---	---	---
MONTH	25.0	17.5	22.0	27.5	21.5	24.0	26.0	21.0	24.0	26.0	18.0	21.5
YEAR	27.5	.0	14.0									

Table 9.--Air temperature records for Sulphur Fork Red River above Beaver Dam Creek

Period of record October 1, 1975, to September 30, 1977.

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-24-79

STATION NUMBER 03435700 SULPHUR FK RED R AB BEAVER DAM C,NR SPRINGFLD,TN STREAM SOURCE AGENCY USGS
LATITUDE 363053 LONGITUDE 0865046 DRAINAGE AREA 49.10 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF AIR, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	19.5	7.0	13.5	---	---	---	6.0	5.0	5.5			
2	16.0	2.5	8.0	---	---	---	---	---	---			
3	18.0	1.5	7.0	25.0	5.0	14.5	---	---	---			
4	22.5	2.0	11.0	25.0	9.5	17.0	---	---	---			
5	22.0	7.5	13.5	25.0	7.0	14.0	---	---	---			
6	22.0	8.0	14.0	17.5	10.5	13.0	8.5	5.5	8.0			
7	18.0	10.5	15.0	21.5	10.5	16.0	4.5	2.5	3.0			
8	24.0	9.5	17.0	---	---	---	2.5	2.0	2.0			
9	25.5	7.5	14.5	18.0	7.5	14.0	---	---	---			
10	27.0	9.0	16.5	19.0	1.0	10.5	---	---	---			
11	27.5	10.5	17.5	---	---	---	---	---	---			
12	27.5	13.5	18.5	14.5	2.0	10.0	---	---	---			
13	28.5	13.0	19.0	---	---	---	17.5	3.0	8.5			
14	29.0	11.0	17.5	---	---	---	20.0	10.5	16.5			
15	25.5	11.5	17.0	---	---	---	---	---	---			
16	15.0	12.5	14.0	---	---	---	---	---	---			
17	13.5	7.0	11.0	---	---	---	---	---	---			
18	7.0	5.0	5.5	---	---	---	---	---	---			
19	5.0	2.5	5.0	---	---	---	---	---	---			
20	---	---	---	---	---	---	---	---	---			
21	---	---	---	---	---	---	---	---	---			
22	---	---	---	---	---	---	---	---	---			
23	---	---	---	---	---	---	---	---	---			
24	26.5	9.5	18.5	---	---	---	---	---	---			
25	18.0	7.5	10.5	---	---	---	---	---	---			
26	7.0	3.0	6.0	---	---	---	---	---	---			
27	---	---	---	---	---	---	---	---	---			
28	21.5	12.0	16.0	---	---	---	---	---	---			
29	18.5	7.5	12.5	---	---	---	---	---	---			
30	7.0	.5	3.0	18.5	4.5	12.5	---	---	---			
31	---	---	---	---	---	---	---	---	---			
MONTH	29.0	.5	13.0	25.0	1.0	13.5	20.0	2.0	7.5			

NO DATA FOR THIS MONTH

Table 9.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-24-79

STATION NUMBER 03435700 SULPHUR FK RED R AB BEAVER DAM C,NR SPRINGFLD,TN STREAM SOURCE AGENCY USGS
LATITUDE 363053 LONGITUDE 0865046 DRAINAGE AREA 49.10 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF AIR, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1							---	---	---	20.0	7.0	13.5
2							---	---	---	23.5	3.5	14.0
3							---	---	---	16.0	1.5	8.5
4							---	---	---	20.0	-0.5	10.0
5							---	---	---	26.5	6.5	17.5
6							---	---	---	25.0	13.5	18.5
7							---	---	---	15.5	6.5	11.0
8							---	---	---	17.5	3.5	10.5
9							---	---	---	21.5	.5	11.0
10							---	---	---	23.5	3.5	15.0
11							---	---	---	24.5	12.0	17.0
12							---	---	---	25.5	8.0	16.5
13							---	---	---	27.0	10.5	19.0
14							---	---	---	21.0	17.0	18.5
15							---	---	---	24.5	13.0	17.5
16							---	---	---	18.0	10.5	14.5
17							---	---	---	---	---	---
18							---	---	---	---	---	---
19							---	---	---	---	---	---
20							---	---	---	---	---	---
21							---	---	---	---	---	---
22							26.0	6.5	16.5	---	---	---
23							29.5	8.0	19.0	---	---	---
24							22.5	10.0	17.0	---	---	---
25							17.0	5.5	12.5	---	---	---
26							14.0	3.5	8.0	---	---	---
27							16.0	3.0	10.5	---	---	---
28							13.5	6.5	9.5	---	---	---
29							17.5	5.0	11.5	---	---	---
30							22.0	2.0	13.0	---	---	---
31							---	---	---	---	---	---
MONTH							29.5	2.0	13.0	27.0	-0.5	14.5

NO DATA FOR THIS MONTH

NO DATA FOR THIS MONTH

Table 9.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-24-79

STATION NUMBER 03435700 SULPHUR FK RED R AB BEAVER DAM C,NR SPRINGFLD,TN STREAM SOURCE AGENCY USGS
LATITUDE 363053 LONGITUDE 0865046 DRAINAGE AREA 49.10 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF AIR. WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	26.0	12.0	18.5				---	---	---
2	---	---	---	26.5	11.0	20.0				---	---	---
3	---	---	---	24.0	18.0	20.0				---	---	---
4	---	---	---	24.5	15.0	19.5				28.0	18.0	22.5
5	---	---	---	26.0	12.0	18.5				27.0	11.0	20.0
6	---	---	---	25.0	14.5	20.0				25.5	8.5	16.5
7	---	---	---	28.0	12.5	20.5				30.0	11.0	20.5
8	---	---	---	29.0	15.0	22.5				30.5	15.5	22.5
9	---	---	---	31.5	17.0	23.0				27.0	16.0	21.5
10	---	---	---	31.0	17.5	24.5				22.5	6.0	15.0
11	---	---	---	32.5	18.0	26.0				24.5	3.5	13.5
12	31.5	15.0	23.5	32.5	19.5	24.5				27.0	5.0	15.5
13	32.0	17.0	24.5	29.0	16.5	22.5				28.5	7.5	17.5
14	31.5	18.5	25.5	33.0	16.0	24.0				28.0	11.0	18.5
15	30.5	21.0	25.5	32.0	19.0	25.5				27.5	9.5	18.0
16	24.0	15.5	21.0	27.0	18.5	22.5				26.5	9.5	17.5
17	29.5	14.0	21.5	---	---	---				26.0	6.0	15.5
18	30.0	16.5	22.5	---	---	---				28.5	8.0	17.0
19	26.5	17.0	22.0	---	---	---				29.5	9.5	18.5
20	23.5	15.5	19.5	---	---	---				24.5	13.5	19.5
21	24.0	12.0	18.5	---	---	---				22.5	8.0	16.0
22	25.0	11.0	18.0	---	---	---				22.0	3.5	12.0
23	24.5	15.0	19.5	---	---	---				26.5	5.0	15.5
24	28.5	20.5	24.0	---	---	---				27.5	9.5	17.5
25	28.0	19.0	22.0	---	---	---				28.0	9.5	19.0
26	29.0	19.0	23.5	---	---	---				28.5	19.0	23.0
27	31.0	19.0	25.0	---	---	---				23.0	16.0	19.5
28	31.5	19.0	24.5	---	---	---				19.5	12.0	16.0
29	32.0	16.5	22.5	---	---	---				16.5	12.0	14.0
30	26.0	14.5	21.0	---	---	---				19.5	10.0	14.0
31	---	---	---	---	---	---				---	---	---
MONTH	32.0	11.0	22.5	33.0	11.0	22.0				30.5	3.5	17.5
YEAR	33.0	-0.5	16.5									

NO DATA FOR THIS MONTH

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

Table 9.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-24-79

STATION NUMBER 03435700 SULPHUR FK RED R AB BEAVER DAM C,NR SPRINGFLD,TN STREAM SOURCE AGENCY USGS
LATITUDE 363053 LONGITUDE 0865046 DRAINAGE AREA 49.10 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF AIR, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	24.0	7.5	14.0	12.5	-2.5	5.0	8.0	-6.5	1.0	-5.0	-21.0	-13.0
2	26.0	6.0	15.0	15.5	.0	5.5	2.5	-8.5	-3.0	-3.0	-18.5	-10.5
3	27.0	6.0	15.0	16.0	-1.0	7.5	9.5	-9.5	.0	1.5	-4.5	-1.5
4	27.0	9.0	17.0	6.5	-3.0	.5	8.5	-6.0	1.5	3.0	-1.0	1.0
5	26.0	16.5	21.0	9.0	-7.5	1.0	10.5	-7.5	1.5	3.0	.0	1.5
6	17.5	9.5	12.0	15.5	-5.5	5.0	9.0	-4.5	2.0	.5	-0.5	.0
7	13.5	9.0	10.5	10.5	-1.0	5.0	6.0	-4.0	1.0	-0.5	-14.0	-7.5
8	11.5	8.5	10.0	5.5	-8.5	-1.5	-3.0	-10.0	-6.5	2.5	-15.0	-6.5
9	16.0	3.0	9.5	16.5	2.0	9.0	8.0	-10.0	-1.0	.5	-2.0	-1.0
10	20.0	1.5	9.5	13.5	-2.5	5.5	12.5	.0	6.5	-6.0	-21.0	-13.5
11	21.0	1.5	10.0	3.0	-9.0	-3.0	8.5	6.5	7.5	---	---	---
12	25.0	3.0	13.0	3.5	-8.0	-2.5	7.0	-2.0	2.5	---	---	---
13	25.0	7.5	15.0	4.5	-9.0	-2.5	2.5	-7.0	-2.5	---	---	---
14	21.0	1.0	10.0	2.0	-3.0	-0.5	12.0	-9.0	1.5	---	---	---
15	17.0	4.0	7.5	5.0	-0.5	.5	13.0	-3.5	5.0	---	---	---
16	12.5	5.0	9.5	11.5	-7.0	2.0	6.5	-6.0	.0	---	---	---
17	12.5	-1.0	6.0	14.5	-6.0	4.5	16.5	-6.0	5.5	---	---	---
18	15.0	-1.5	7.0	20.0	-2.0	9.0	18.0	-0.5	6.5	---	---	---
19	16.0	7.5	11.5	15.0	3.5	9.0	16.5	-2.0	7.5	---	---	---
20	9.0	5.0	7.0	11.0	-4.0	3.5	12.5	-6.0	3.0	---	---	---
21	12.5	-1.0	5.5	7.5	-5.0	1.0	-5.0	-13.5	-9.0	---	---	---
22	14.5	-2.0	6.0	3.5	-9.5	-3.0	1.0	-14.0	-6.5	---	---	---
23	17.0	.5	10.5	6.5	-10.5	-2.0	5.5	-10.5	-2.5	---	---	---
24	16.0	11.5	14.0	12.5	-4.0	4.0	6.5	-14.0	-3.5	---	---	---
25	15.0	8.5	11.5	15.0	-1.0	7.0	4.5	.0	2.0	---	---	---
26	10.0	-0.5	5.0	14.0	1.0	7.5	8.0	-8.0	.0	---	---	---
27	8.5	-2.5	3.0	15.0	3.0	9.0	15.0	-8.0	3.5	---	---	---
28	9.5	-6.0	2.0	2.0	-7.5	-2.5	6.5	-8.0	-1.0	---	---	---
29	12.5	-6.0	3.5	-4.5	-15.0	-10.0	.0	-13.0	-6.5	---	---	---
30	12.5	5.5	8.5	1.0	-16.0	-7.5	12.5	-11.5	.5	---	---	---
31	10.0	.5	6.5	---	---	---	-5.0	-18.5	-12.0	---	---	---
MONTH	27.0	-6.0	10.0	20.0	-16.0	2.0	18.0	-18.5	.0	3.0	-21.0	-5.0

Table 9.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-24-79

STATION NUMBER 03435700 SULPHUR FK RED R AB BEAVER DAM C,NR SPRINGFLD,TN STREAM SOURCE AGENCY USGS
LATITUDE 363053 LONGITUDE 0865046 DRAINAGE AREA 49.10 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF AIR, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	-1.0	-15.0	-8.0	20.5	1.0	10.5	28.5	14.5	21.5
2	---	---	---	3.5	-16.0	-6.0	23.0	11.5	17.5	28.5	17.5	22.0
3	---	---	---	.5	-1.5	-0.5	13.0	6.5	10.5	25.0	18.0	21.0
4	---	---	---	6.0	-6.5	-0.5	18.0	4.5	14.0	27.5	20.5	23.0
5	---	---	---	4.0	-12.0	-4.0	7.5	1.5	4.5	31.0	18.5	24.5
6	---	---	---	1.5	-10.5	-4.5	12.0	.5	5.5	29.0	17.5	23.0
7	---	---	---	3.0	-15.0	-6.0	24.0	2.5	14.0	26.5	17.5	21.5
8	---	---	---	11.5	-13.5	-1.0	17.5	2.0	10.5	27.0	15.5	21.0
9	---	---	---	10.5	-10.0	.0	19.5	.0	10.5	17.5	9.0	13.5
10	---	---	---	12.0	-6.5	2.5	28.0	5.5	17.0	19.5	3.0	11.0
11	8.0	-7.5	.5	7.5	2.5	5.0	29.0	7.0	18.0	22.0	3.5	13.0
12	.0	-5.0	-2.5	9.5	-1.5	4.0	29.0	8.0	18.5	25.0	5.0	16.0
13	1.5	-14.0	-6.0	10.0	-5.5	2.0	27.0	9.0	17.5	28.0	6.5	17.0
14	3.0	-15.0	-6.0	16.5	-8.5	4.0	29.0	8.5	19.0	28.5	7.5	18.0
15	-11.0	-18.0	-14.5	17.5	-6.5	5.5	28.5	11.0	20.0	29.0	10.5	19.5
16	-10.0	-19.5	-15.0	6.5	-6.5	.0	32.5	12.0	22.0	28.0	11.5	19.5
17	-3.5	-22.5	-13.0	7.5	-9.5	-1.0	28.5	10.5	18.5	29.0	13.5	21.0
18	5.0	-11.5	-3.5	11.0	-3.0	4.0	28.0	11.5	19.5	29.5	15.5	22.5
19	1.5	-12.0	-5.0	1.0	-5.5	-2.0	26.5	16.0	20.5	29.5	14.5	22.0
20	-6.5	-16.0	-11.0	3.0	-8.5	-3.0	28.5	21.0	22.5	30.0	14.5	22.0
21	-2.0	-15.5	-9.0	11.0	-8.5	1.0	22.0	15.0	17.5	30.5	15.5	23.0
22	18.0	-5.5	6.5	1.0	-11.5	-5.0	17.5	12.0	15.0	30.0	18.0	24.0
23	8.5	-0.5	4.0	7.5	-15.0	-3.5	19.0	11.0	14.5	24.5	14.5	19.5
24	7.5	-3.0	2.0	5.0	-12.0	-3.5	18.0	6.5	12.0	28.5	15.0	21.5
25	11.5	-5.0	3.5	11.5	-3.5	4.0	13.0	2.0	7.5	28.5	17.0	22.5
26	14.5	-6.5	4.0	14.5	-2.0	6.5	15.5	1.0	8.0	28.0	16.5	22.0
27	-1.0	-8.5	-4.5	14.5	.0	7.5	21.0	2.5	14.0	30.0	14.5	22.0
28	-0.5	-14.0	-7.0	11.5	5.0	8.5	26.0	14.5	19.5	30.0	14.5	22.0
29	---	---	---	26.5	17.5	22.5	17.0	10.0	13.5	30.0	14.5	22.0
30	---	---	---	27.5	13.5	21.0	24.0	9.0	17.5	30.5	17.0	23.5
31	---	---	---	15.5	3.5	9.0	---	---	---	32.5	18.0	25.0
MONTH	18.0	-22.5	-4.5	27.5	-16.0	2.0	32.5	.0	15.0	32.5	3.0	20.5

Table 9.--Continued

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY PROCESS DATE IS 07-24-79

STATION NUMBER 03435700 SULPHUR FK RED R AB BEAVER DAM C,NR SPRINGFLD,TN STREAM SOURCE AGENCY USGS
LATITUDE 363053 LONGITUDE 0865046 DRAINAGE AREA 49.10 DATUM STATE 47 COUNTY 147

TEMPERATURE (DEG. C) OF AIR, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	31.5	14.5	23.0	28.0	17.5	23.0	29.0	13.5	21.5	36.0	19.0	26.5
2	29.0	15.0	22.0	28.5	13.0	22.0	28.0	12.0	19.5	34.5	20.5	25.5
3	30.0	12.0	21.0	31.5	15.0	23.0	31.5	13.0	22.0	33.0	19.5	24.5
4	29.0	11.0	20.0	35.0	18.0	27.0	31.5	18.5	25.5	33.0	18.5	26.0
5	31.5	11.5	21.5	36.5	20.5	28.5	33.0	19.5	26.5	35.5	20.0	26.5
6	34.0	15.0	24.5	37.5	21.0	29.0	35.0	20.5	28.0	29.0	23.0	25.0
7	32.5	10.0	21.0	39.0	21.0	30.5	34.5	21.0	26.5	30.5	20.5	25.0
8	25.5	5.0	18.0	38.5	24.5	31.0	36.5	20.5	28.5	32.5	18.5	24.0
9	25.0	7.0	18.5	32.0	23.5	27.5	33.5	21.5	27.0	34.0	16.5	24.5
10	27.5	6.0	16.5	33.5	23.0	28.0	34.5	21.0	25.5	28.5	13.0	23.0
11	28.5	14.5	21.5	33.5	23.5	27.5	34.5	20.5	27.0	26.0	10.0	18.0
12	36.0	17.0	26.0	35.0	25.5	29.5	33.0	20.5	27.0	29.0	14.5	22.0
13	35.5	18.5	25.5	37.0	24.0	30.0	34.0	23.5	27.5	33.0	21.5	24.5
14	34.0	17.0	25.5	38.0	24.0	30.5	30.0	22.0	25.5	25.5	20.5	23.0
15	26.0	16.5	21.0	37.5	24.5	30.5	34.0	22.5	27.5	29.0	20.0	23.5
16	30.5	19.5	25.0	38.5	20.5	29.0	35.5	22.5	27.5	25.5	19.5	22.5
17	31.0	20.0	25.0	38.5	22.0	30.0	29.0	20.0	26.0	29.5	16.0	21.5
18	25.5	20.0	25.5	36.0	22.5	27.5	26.5	12.5	20.5	32.0	14.0	22.5
19	34.5	21.5	22.5	36.0	22.5	27.5	27.5	16.0	19.0	27.0	20.5	23.5
20	33.5	18.5	25.5	35.0	20.5	27.0	27.5	13.5	20.0	26.5	13.5	19.0
21	33.5	20.0	26.5	36.5	22.5	29.0	29.0	13.0	21.5	26.0	11.5	17.5
22	33.0	22.0	25.5	34.0	23.5	26.5	33.0	16.5	23.5	27.5	11.0	18.0
23	34.0	20.5	26.0	35.5	21.5	28.5	33.5	19.0	26.5	28.5	11.0	20.0
24	34.5	23.0	27.5	35.0	24.5	28.5	28.0	20.5	25.5	22.5	14.0	18.5
25	29.5	21.0	24.5	33.5	26.0	28.5	28.5	17.0	21.0	20.5	15.0	18.0
26	31.5	20.0	24.0	30.5	17.0	25.5	32.5	18.0	25.0	28.5	15.5	21.5
27	32.5	20.5	26.0	27.5	14.5	21.5	31.5	20.5	25.0	28.0	15.5	22.0
28	35.0	22.5	28.5	28.0	17.0	22.5	29.0	19.0	24.0	21.5	9.0	15.0
29	29.0	20.5	24.5	29.0	18.5	22.5	33.5	18.0	25.0	20.0	10.5	15.0
30	33.0	20.0	26.5	33.5	18.0	25.0	34.5	20.5	27.0	23.0	15.5	19.0
31	---	---	---	32.0	19.0	26.0	34.5	21.0	26.5	---	---	---
MONTH	36.0	5.0	23.5	39.0	13.0	27.0	36.5	12.0	25.0	36.0	9.0	22.0
YEAR	39.0	-22.5	13.0									

*U.S. GOVERNMENT PRINTING OFFICE: 1979-645-331/4984. Region 4.