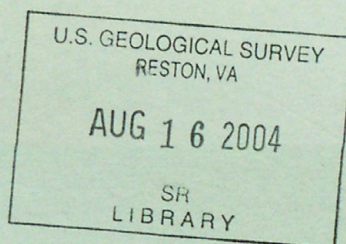
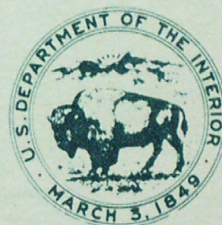


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Hydrologic Data for Little Elm Creek, Trinity River Basin Texas, 1972

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*Prepared in cooperation with the city of Dallas
and the Texas Water Development Board*

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I. D. Yost, District Chief, U.S. Geological
Survey, Federal Building, 300 East 8th Street
Austin, TX 78701

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HYDROLOGIC DATA FOR LITTLE ELM CREEK,
TRINITY RIVER BASIN, TEXAS

1972

By

B. B. Hampton
U.S. Geological Survey

INTRODUCTION

History of Small Watershed Projects in Texas

The U.S. Soil Conservation Service is actively engaged in the installation of flood- and soil-erosion reducing measures in Texas under the authority of "The Flood Control Act of 1936 and 1944" and "Watershed Protection and Flood Prevention Act" (Public Law 566), as amended. The Soil Conservation Service has found a total of approximately 3,500 floodwater-retarding structures to be physically and economically feasible in Texas. As of September 30, 1972, 1,551 of these structures had been built.

The watershed-development program will have varying but important effects on the surface- and ground-water resources of river basins, especially where a large number of the floodwater-retarding structures are built. Basic hydrologic data under natural and developed conditions are needed to appraise the effects of the structures on the yield and mode of occurrence of runoff.

Hydrologic investigations of these small watersheds were begun by the Geological Survey in 1951 and are now being made in six areas (fig. 1). Data collection in six study areas has been completed. These studies are being made in cooperation with the Texas Water Development Board, the Soil Conservation Service, the San Antonio River Authority, the city of Dallas, and the Tarrant County Water Control and Improvement District No. 1. The 12 study areas were chosen to sample watersheds having different rainfall, topography, geology, and soils. In five of the study areas (North, Little Elm, Mukewater, Little Pond-North Elm, and Pin Oak Creeks), streamflow and rainfall records were collected prior to construction of the floodwater-retarding structures, thus affording the opportunity for analyses of the conditions "before and after" development. Structures have now been built in four of these study areas. A summary of the development of the floodwater-retarding structures on each study area as of September 30, 1972, is shown in table 1.

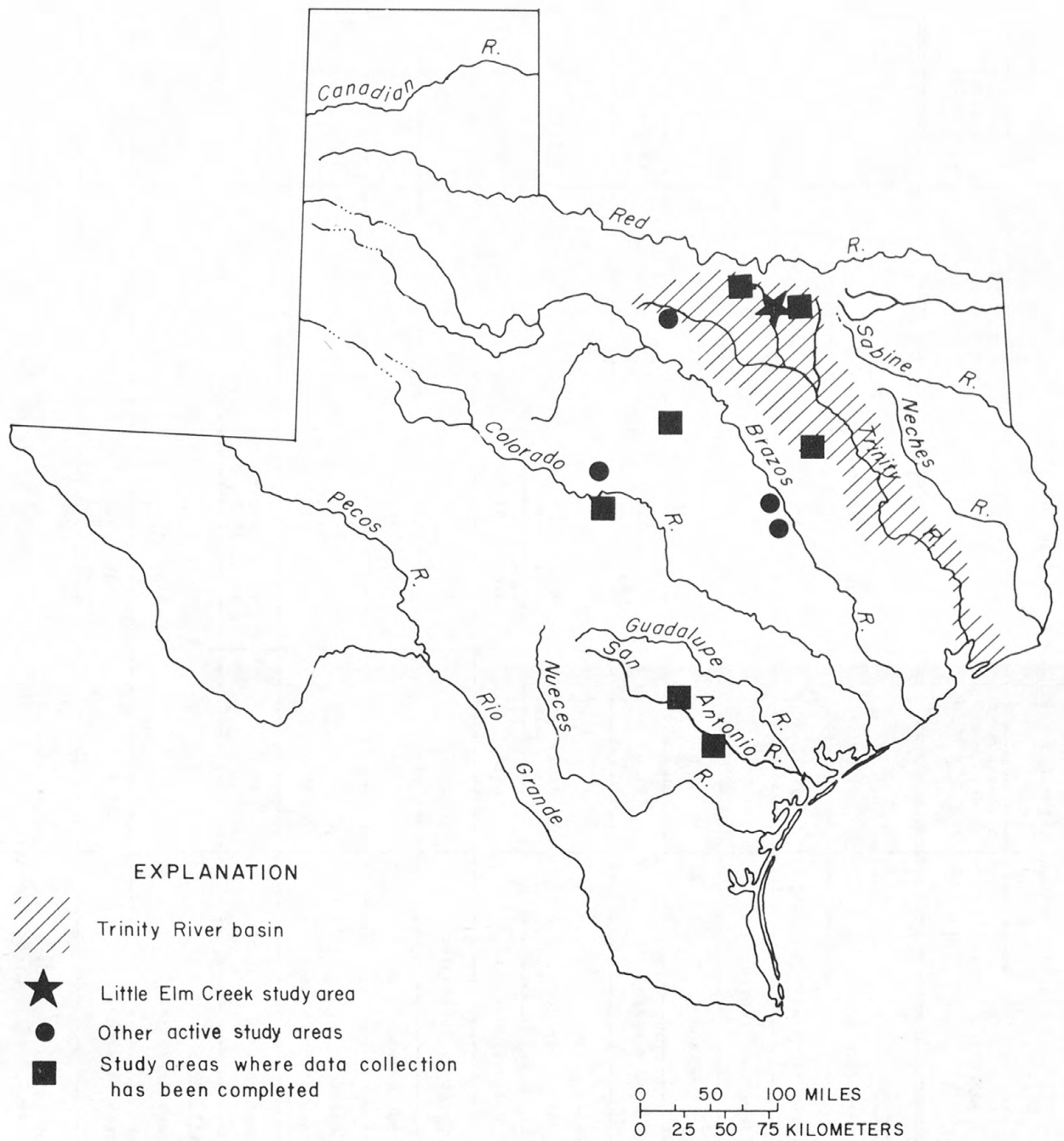


FIGURE 1.— Location of the Little Elm Creek study area and other study areas

Table 1.--Small watershed study areas in Texas as of September 30, 1972

Watershed	Drainage area above stream-gaging station (mi ²)	Data collection period	Floodwater-retarding structures above stream-gaging station	Period the structures were built
<u>Trinity River basin:</u>				
North Creek near Jacksboro	21.6	Aug. 1956 to	3	1970-72
Elm Fork Trinity River near Muenster	46.0	July 1956 to Sept. 1971	14	1954-57, 63
Little Elm Creek near Aubrey	75.5	June 1956 to	16	1966, 70-71
Honey Creek near McKinney	39.0	July 1951 to Sept. 1971	13	1951-57, 69
Pin Oak Creek near Hubbard	17.6	Sept. 1956 to Sept. 1972	6	1962-63, 65
<u>Brazos River basin:</u>				
Green Creek near Alexander	46.1	Oct. 1954 to Sept. 1971	8	1954-56
Cow Bayou at Mooreville	85.0	Sept. 1954 to	26	1955-58, 64-65
1/Little Pond Creek at Burlington	22.2	Oct. 1962 to	None	-
1/North Elm Creek near Cameron	48.6	Oct. 1962 to	None	-
<u>Colorado River basin:</u>				
Mukewater Creek at Trickham	70.0	Aug. 1951 to	6	1961-62, 65
Deep Creek near Mercury	43.9	June 1951 to Sept. 1971	5	1951-53
<u>San Antonio River basin:</u>				
Calaveras Creek near Elmendorf	77.2	Aug. 1954 to Sept. 1971	7	1954-58
Escondido Creek at Kenedy	a/72.4	July 1954 to Sept. 1971	10	1954-58

1/ Adjacent watersheds; considered as one study area.

a/ 8.43 mi² above Escondido Creek subwatershed No. 11 (Dry Escondido Creek) near Kenedy not included in this total.

For those readers interested in using the metric system, metric equivalents of English units of measurements are given in parentheses. The English units used in this report may be converted to metric units by the following conversion factors:

From		Multiply by	To obtain	
Unit	Abbreviation		Unit	Abbreviation
inch	in	25.4	millimeter	mm
foot	ft	0.3048	meter	m
mile	mi	1.609	kilometer	km
square mile	mi ²	2.590	square kilometer	km ²
cubic foot per second	ft ³ /s	28.32	cubic decimeter per second	dm ³ /s
		0.02832	cubic meter per second	m ³ /s
foot per mile	ft/mi	0.3048/1.609	meter per kilometer	m/km
acre-foot	ac-ft	1233	cubic meter	m ³
		1.233 x 10 ⁻³	cubic hectometer	hm ³

Objectives of the Texas Small Watershed Projects

The purpose of these investigations is to collect sufficient data to meet the following objectives:

1. To determine the net effect of floodwater-retarding structures on the regimen of streamflow at downstream points.
2. To determine the effectiveness of the structures as ground-water recharge facilities.
3. To determine the effect of the structures on the sediment yield at downstream points.
4. To develop relationships between maximum rates and/or volumes of runoff with rainfall in small natural watersheds.

5. To develop a stream-system model for basins for floodwater-retarding structures.
6. To determine the minimum instrumentation necessary for estimating the flood hydrographs below a system of structures, as needed for downstream water-management operation.

Purpose and Scope of this Basic-Data Report

This report, which is the thirteenth in a series of basic-data reports published annually for the Little Elm Creek study area, contains the rainfall, runoff, and storage data collected during the 1972 water year for the 75.5-square-mile (195.5-square-kilometer) area above the stream-gaging station Little Elm Creek near Aubrey, Texas. The locations of floodwater-retarding structures and hydrologic-instrument installations in the area are shown on figure 2.

The investigation is scheduled to continue through a period of both above- and below-normal precipitation to define the various factors used in the analyses of rainfall-runoff relationships.

To facilitate the publication and distribution of this report at the earliest feasible time, certain material contained herein does not conform to the formal publication standards of the U.S. Geological Survey.

DESCRIPTION OF THE WATERSHED

The headwaters of Little Elm Creek originate about 5 miles (8 kilometers) northeast of Gunter in Grayson County (fig. 2). The creek flows southwest through the northwest corner of Collin County, then into Denton County, and discharges into Garza-Little Elm Reservoir about 4 miles (6 kilometers) downstream from the stream-gaging station, Little Elm Creek near Aubrey. The length of the stream channel in the study area is about 29 miles (47 kilometers). The principal tributaries to Little Elm Creek above the Aubrey stream-gaging station are Clarks Branch and Walnut Fork. The total drainage area above the Aubrey stream-gaging station is 75.5 square miles (195.5 square kilometers). Above the Celina stream-gaging station, the total area is 46.7 square miles (121.0 square kilometers).

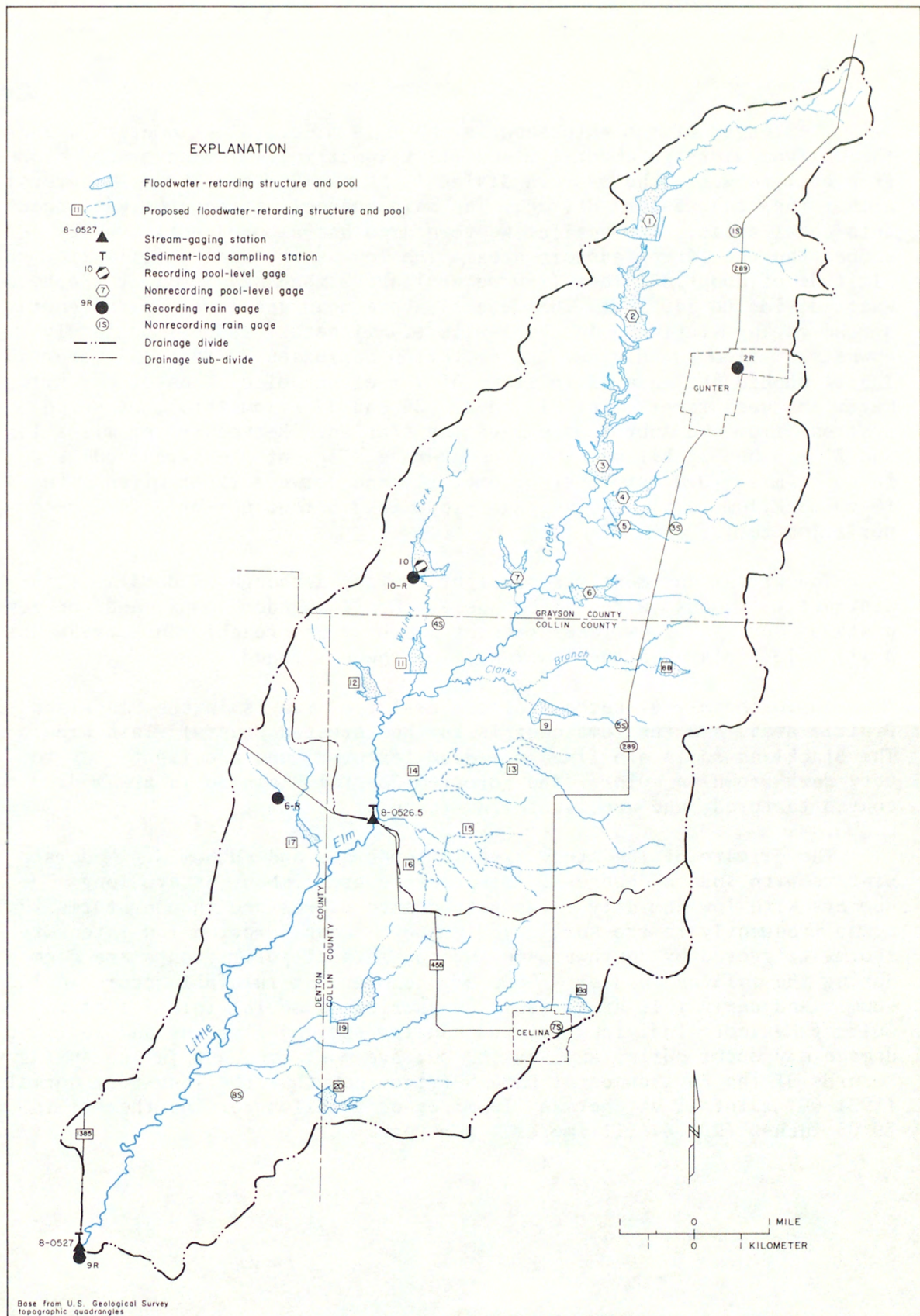


FIGURE 2.—Locations of floodwater-retarding structures (built and proposed) and hydrologic-instrument installations in the Little Elm Creek study area

The length of the watershed is about 19 miles (31 kilometers), and the maximum width is about 7 miles (11 kilometers). The watershed slopes from east to west; the eastern divide is 60 to 80 feet (18 to 24 meters) higher than the western divide. The main channel divides the watershed into equal areas. The smaller western area has a more gentle valley slope than the larger eastern area. The low-water channel falls from an altitude of about 840 feet (259 meters) above mean sea level at the head-water divide to 540 feet (165 meters) above mean sea level at the Aubrey stream-gaging station. In the 1-mile (2-kilometer) reach immediately downstream from the divide, the elevation decreases 80 feet (24 meters). The streambed has an average slope of 7 feet per mile (1 meter per kilometer) between river miles 21 and 27 (34 and 43 kilometers), measured upstream from the Aubrey stream-gaging station. Between river miles 14 and 21 (23 and 34 kilometers), the average slope of the streambed is 4 feet per mile (0.8 meter per kilometer), and between river miles 0 to 14 (0 to 23 kilometers), the average slope is 2.5 feet per mile (0.5 meter per kilometer).

The stream has mostly a straight course, although in detail it is distinctly sinuous, with old channels, cutoff meander loops, and the remnants of several oxbow lakes present in the lower reach. The stream has a wide flood plain in the lower half of the watershed.

Approximately 81 percent of the drainage area is in the Blackland Prairie area, and the remainder is in the Forested Coastal Plain area. The Blackland soils are fine to medium textured, and are light gray to very dark brown in color. The Forested Coastal Plain soils are medium to coarse textured, and are light gray in color.

The climate of the study area is temperate and subhumid. Moderate winters with sudden changes in temperature are common, as are long summers with low humidity. The most common storms are thunderstorms that occur frequently in the spring and summer. Long-duration low-intensity storms triggered by southward-moving continental polar fronts are common during the fall and winter. Some of the heaviest rainfall occurs in late summer and early fall as a result of hurricanes moving inland from the Gulf of Mexico. Individual storms causing serious flooding and sediment damage may occur during any season, but are most frequent in the spring. Records of the Environmental Data Service show that the long-term normal (1931-60) rainfall at Sherman (15 miles or 24 kilometers northeast) is 39.05 inches (991.87 millimeters) per year.

FLOODWATER-RETARDING STRUCTURES

There are 12 floodwater-retarding structures in the Little Elm Creek watershed upstream from the stream-gaging station Little Elm Creek near Celina. These structures have a combined capacity of 9,490 acre-feet (12 cubic hectometers) below the emergency spillway and control runoff from 28.4 square miles (73.6 square kilometers), or 61 percent of the area above the Celina stream-gaging station.

Four floodwater-retarding structures are located in the area between the Celina and Aubrey stream-gaging stations. The 16 floodwater-retarding structures have a combined capacity of 12,340 acre-feet (15 cubic hectometers) below the emergency spillway and control runoff from 36 square miles (93 square kilometers), or 47 percent of the area above the Aubrey stream-gaging station.

Table 2 contains a summary of the physical data at each of the 16 floodwater-retarding structures.

HYDROLOGIC INSTRUMENTS

Instruments to collect rainfall and stage data in the study area consist of a network of rain gages, staff gages at each of the 16 floodwater-retarding structures, a water-stage recorder at one of the structures, and two stream-gaging stations on Little Elm Creek. The locations of instruments are shown on figure 2.

Four recording and six nonrecording rain gages are located at points throughout the study area to define the total rainfall and rainfall intensities. Measurements of rainfall at nonrecording rain gages are made daily by local observers.

A continuous water-stage recording gage is operated at floodwater-retarding structure site 10. Data collected at this site since April 1, 1966, are used to compute the contents, surface area, inflow, and outflow. Weekly readings of the staff gages at each of the 15 remaining floodwater-retarding structures provide data to determine the quantity of water retained or released from the structures.

Two continuous water-stage recorders at the stream-gaging stations Little Elm Creek near Celina and Little Elm Creek near Aubrey provide records of the stage, which together with measurements of streamflow are used to compute the runoff from the area above each streamflow station. The station near Aubrey was established on June 8, 1956; and the Celina station was established on February 21, 1966.

Table 2.--Floodwater-retarding structure data, Little Elm Creek area

Site number	Drainage area (mi ²)	Date dam completed	Date gate established	Datum of gate above mean sea level, datum of 1929	Emergency spillway			Drop inlet			Diameter or dimensions of opening in orifice	Portholes or weir notches					Controlled opening			Discharge pipe		Range of staff gages
					Width (ft)	Gage height crest (ft)	Pool contents (ac-ft)	Inside dimensions (ft)	Gage height crest (ft)	Pool contents (ac-ft)		Number and dimensions (in)	Gage height crest (ft)	Pool contents (ac-ft)	Dimensions of dewatering notch (in)	Date dewatering notch filled	Size of valve (in)	Gage height of invert of valve (ft)	Pool contents (ac-ft)	Diameter (in)	Height of contraction plate above invert of pipe (in)	
1	3.40	6-10-66	4-8-66	674.00	90	29.0	977	2x6	19.00	179	(2) 15.5	None	--	--	None	--	12	9.50	17	24	--	13.6-30.5
2	3.95	6-10-66	7-13-66	657.30	205	25.3	1420	2½x8½	17.00	351	None	(4) 12x18	15.47	251	None	--	12	7.92	38	30	--	10.2-23.7
3	7.27	6-10-66	7-14-66	632.80	335	24.8	1840	3½x11	16.00	337	None	12 12	12.00	118	None	--	12	7.50	32	42	--	8.1-27.1
4	3.33	8-11-66	9-13-66	639.60	350	29.9	1330	2x6	17.00	265	16x14	(2) 10x12	16.12	228	None	--	12	7.50	35	24	--	7.0-30.5
5	0.50	3-16-66	4-8-66	641.20	45	28.4	204	2x4	18.00	54	None	None	--	--	None	--	12	9.50	8.2	18	--	10.2-30.5
6	1.99	3-16-66	4-7-66	625.50	145	31.2	744	2x4	19.00	158	17.25	None	--	--	None	--	12	10.50	18	24	--	10.2-37.3
7	1.28	3-16-66	4-7-66	618.30	110	23.7	464	2x4	14.00	108	14	None	--	--	None	--	12	8.50	31	24	--	10.2-27.1
8-B	1.25	2-17-71	6-7-71	676.73	100	28.3	495	2x4	17.27	109	--	None	--	--	12x36	--	12	7.77	15	18	9 5/8	6.8-32.7
9	0.58	2-17-71	6-8-71	638.25	60	23.2	220	2x4	16.25	55	--	None	--	--	12x36	--	12	7.75	2.1	18	9	3.4-29.8
10	2.10	3-16-66	4-6-66	615.50	125	29.2	868	2x4	20.00	159	16.5x18	None	--	--	None	--	12	13.50	40	24	--	10.2-27.1
11	1.17	1-20-71	6-8-71	601.10	130	20.9	400	2.5x7.5	12.20	60	--	None	--	--	12x22 3/4	--	12	7.70	15	30	--	6.7-23.7
12	1.62	1-20-71	6-8-71	595.96	140	24.7	576	2x4	12.24	110	--	None	--	--	12x24	--	12	7.74	43	18	7 3/4	3.4-29.7
13																						
14																						
15																						
16																						
17	2.17	1-20-71	6-18-71	586.16	150	26.6	809	2x4	15.84	161	--	None	--	--	12x36	7-71	12	4.34	.7	18	9 3/8	3.4-30.5
18-A	1.05	8-17-70	8-13-70	712.42	100	30.2	524	2x4	15.58	111	--	None	--	--	12x36	7-71	12	4.08	14	24	7 3/4	3.4-37.3
19	2.01	8-17-70	8-14-70	87.34	100	19.4	769	2x4	10.76	168	--	None	--	--	12x36	7-71	12	4.26	40	24	10 3/8	6.8-23.7
20	2.06	8-17-70	8-13-70	88.51	100	27.5	809	2x4	15.59	150	--	None	--	--	12x36	7-71	12	4.09	6.0	24	8 1/2	6.8-30.5

a/ Twelve 7x8 inch portholes

b/ Twelve 7x8 inch portholes

SUMMARY OF DATA FOR THE 1972 WATER YEAR

The average rainfall above the stream-gaging station Little Elm Creek near Aubrey (study area) during the 1972 water year was 35.38 inches (898.65 millimeters), or 97 percent of the 16-year (1957-72) average of 36.48 inches (926.59 millimeters) for the area. Monthly rainfall totals ranged from 0.26 inch (6.60 millimeters) in February to 6.84 inches (173.74 millimeters) in December. The weighted-mean rainfall above the stream-gaging station Little Elm Creek near Celina was 34.46 inches (875.28 millimeters). The weighted-mean rainfall above Little Elm Creek subwatershed No. 10 during the 1972 water year was 29.30 inches (744.22 millimeters).

Runoff above site 10 was 849 acre-feet (1 cubic hectometer), which represents an equivalent depth of 7.58 inches (192.53 millimeters). The yearly mean discharge was 35.5 ft³/s (cubic feet per second) or 1.0 m³/s (cubic meters per second) at the stream-gaging station near Celina and 48.7 ft³/s (1.4 m³/s) at the stream-gaging station near Aubrey. At the Celina station, the annual runoff was 25,750 acre-feet (32 cubic hectometers) or 10.34 inches (262.64 millimeters). The runoff for the year at the Aubrey station was 35,380 acre-feet (44 cubic hectometers) or 8.79 inches (223.26 millimeters).

A storm event is defined as a period of rainfall separated by at least 6 hours from other rainfall. Storms are selected for detailed rainfall-runoff computations on the basis of rainfall totals and distribution, the peak discharge produced from the rainfall at the stream-gaging station, and the assurance of good rainfall and runoff records for the storm periods selected. Data for these storms will be used later in calibrating a watershed-response model to show the effects of floodwater-retarding structures.

Two storm periods were selected for detailed computations. These computations include a time breakdown of rainfall and discharge with hydrographs and mass curves drawn for illustrations. The storms selected occurred on November 17 and December 8-10, 1971. Storm computations were not made for the storm of December 8-10 at floodwater-retarding site 10 because of mechanical difficulties with the hydrologic instruments. A summary of rainfall-runoff data for the two storms is shown in table 3.

ANNUAL STORM RAINFALL--RUNOFF SUMMARY DATA

Table 3.--Storm rainfall-runoff data, 1972 water year

Date of Storm	Duration (hours)	Rainfall (inches)			Runoff (inches)	Ratio runoff to rainfall	Maximum discharge (ft ³ /s)
		Total	Maximum increment				
			15-minute	30-minute			
Little Elm Creek subwatershed No. 10 near Gunter, Tex. (Drainage area 2.10 mi ²)							
November 17, 1971	3	2.85	0.94	1.27	1.81	0.52	1,450
Little Elm Creek near Celina, Tex. (Drainage area, 46.7 mi ² of which 28.4 mi ² is above floodwater-retarding structures)							
November 17, 1971	7	2.66	0.52	0.89	1.46	0.29	1,810
December 8-10, 1971	38	3.84	.21	.31	.46	.68	2,130

ANNUAL STORM RAINFALL--RUNOFF SUMMARY DATA

Table 3.--Storm rainfall-runoff data, 1972 water year--Concluded

-15-

COMPI LATION OF DATA

TRINITY RIVER BASIN

08052630 Little Elm Creek subwatershed No. 10 near Gunter, Tex. 1/

LOCATION.--Lat 33°24'33", long 96°48'41", Grayson County, near center of dam on Walnut Fork tributary to Little Elm Creek, 1.6 miles upstream from mouth, and 4.7 miles southwest of Gunter.

DRAINAGE AREA.--2.10 sq mi.

PERIOD OF RECORD.--April 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 615.51 ft above mean sea level (Soil Conservation Service bench mark).

AVERAGE INFLOW.--6 years, 855 acre-ft per year.

AVERAGE OUTFLOW.--6 years, 780 acre-ft per year.

EXTREMES.--Current year: Maximum outflow, 27.1 cfs Dec. 10 (gage height, 24.40 ft); no outflow most of time. Maximum inflow, 1,450 cfs (average for 5-minute interval) Nov. 17, computed and adjusted as explained below; no flow at times.
Period of record: Maximum outflow, 31.9 cfs Apr. 30, 1966 (gage height, 27.09 ft); no outflow most of time each year. Maximum inflow, 3,240 cfs (average for 5-minute interval) May 30, 1967, computed from outflow and change in pool contents and adjusted for rainfall on pool surface during time of peak inflow; no inflow at times each year.

REMARKS.--Records fair. Dam completed Mar. 16, 1966, and storage began in April 1966. Pool is formed by rolled-fill earthen dam 1,588 ft long, with a 130-foot wide emergency spillway at left end of dam, with crest at gage height 29.2 ft. Outlet structure is a 2.0- by 4.0-foot uncontrolled concrete drop-inlet structure with crest at gage height 20.00 ft and connected to a 24-inch concrete pipe with invert at gage height 13.0 ft. There is also a 12-inch controlled slide gate used as a water-supply outlet that is connected to the drop inlet at gage height 13.5 ft. Pool capacity is 868 acre-ft at spillway crest, 159 acre-ft at crest of drop inlet, and 40 acre-ft at controlled slide gate. Capacity table is based on Soil Conservation Service map prepared prior to construction and adjusted for borrow by the Geological Survey. Recording rain gage located at station. Records of precipitation and hydrologic data for selected storms are published elsewhere in supplementary basic-data report.

REVISIONS.--WRD Texas 1968: Drainage area.

POOL WATER BUDGET, IN ACRE-FEET, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.
Inflow <u>1/</u>	210	214	372	0	2.8	2.6	9.1	3.4	0	0.1	1.7	33.4
Outflow	187	212	383	1.0	0	0	23.7	15.9	50.4	6.2	0	0
(+)	25.0	3.7	-4.0	-6.4	-5.2	-8.6	-24.4	-22.8	-60.2	-9.4	-1	30.8
(++)	4.90	3.74	5.09	0	.24	1.44	2.89	1.92	1.41	.30	3.25	4.12
CAL YR 1971: Inflow	940			Outflow	843	+	16.9	++	32.60			
WTR YR 1972: Inflow	849			Outflow	879	+	-81.6	++	29.30			

PEAK INFLOW (BASE, 100 CFS)

DATE	TIME	DISCHARGE	DATE	TIME	DISCHARGE
10-18	1255	141	11-17	2010	1,450
10-19	0050	160	12- 9	unknown	a500

1/ Inflow adjusted for rainfall on pool and pool losses.
+ Change in contents, in acre-feet.
++ Weighted-mean rainfall, in inches.
a Estimated.

1/This table reproduced from U.S. Geological Survey, 1972, Water Resources Data for Texas, Part 1, Surface Water Records.

WATER RESOURCES DIVISION
Little Elm Creek
yearly weighted-mean rainfall _____ inches, _____ at _____
Monthly and annual discharge, in _____ of _____ River near _____
[Drainage area, —2.10— square miles] _____
Gunter, Tex.

[illegible]

UNITED STATES
DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

WATER RESOURCES DIVISION
Little Elm Creek

yearly net inflow _____ acre-feet
Monthly and ~~annual~~ discharge, in _____

Monthly and annual discharge, in _____ acre-feet _____, of _____ Subwatershed No. 10 River near _____ at _____ Gunter, Tex.
[Drainage area, _____ 2.10 _____ square miles] (revised)

16-20489-5 U. S. GOVERNMENT PRINTING OFFICE

[illegible]

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOL

ANNUAL SUMMARY

080526.30 Little Elm Creek watershed No. 10 near Gunter, Tex. Drainage Area 2.10 mi.²
1972 WATER YEAR

Continuous water-stage recorder: ratio 1:6. Date of last sediment survey _____.

Maxima: gage height, 24.40 ft; outflow, 27.1 ft³/s; surface area, 75.0 acres; contents, 320 acre-feet; on Dec. 10.

Minima: gage height, 10.15 ft; surface area, 3.4 acres; contents, 24.2 acre-feet; on Aug. 10.

Maximum inflow, 14.50 ft³/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on Nov. 17.

Averages: 6 water years, (1967-72); inflow, 855 acre-feet/year; outflow, 780 acre-feet/year; rainfall, 30.15 inches/year.

Pool water budget, in acre-feet, water year October 1971 to September 1972.

	Oct.	Nov.	Dec.	Calendar year 1971	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Water year 1972
Total Inflow \downarrow	210	214	372	940	0	2.8	2.6	9.1	3.4	0	0.1	1.7	33.4	849
Total Outflow	187	212	383	843	1.0	0	0	23.7	15.9	50.4	6.2	0	0	879
Total Consumption	11.8	8.2	8.4	15.2	5.4	8.7	14.6	15.6	14.3	11.6	3.5	2.8	4.4	109
†	25.0	3.7	-4.0	16.9	-6.4	-5.2	-8.6	-24.4	-22.8	-60.2	-9.4	-0.1	30.8	-81.6
†	34.7	35.5	38.2	—	31.8	31.0	29.2	26.0	23.9	13.7	4.1	3.5	6.0	—
††	4.90	3.74	5.09	32.60	0	0.24	1.44	2.89	1.92	1.41	0.30	3.25	4.12	29.30

\downarrow Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet.

† Mean surface area, in acres.

†† Weighted mean rainfall, in inches.

() Estimated

Peak inflow - (base, 100 ft³/s)

Date	Time	Discharge	Date	Time	Discharge
Oct. 18	1255	141			
Oct. 19	0050	160			
Nov. 17	2010	1,450			
Dec. 9	unknown	(500)			

TRINITY RIVER BASIN

08052650 Little Elm Creek near Celina, Tex. 1/

LOCATION.--Lat 33°21'55", long 96°49'25", Collin County, on left bank at downstream side of bridge on Farm Road 455, 3.6 miles northwest of Celina, and 10 miles upstream from Mustang Creek.

DRAINAGE AREA.--46.7 sq mi.

PERIOD OF RECORD.--February 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 582.4 ft above mean sea level (State Highway Department bench mark).

AVERAGE DISCHARGE.--6 years, 29.1 cfs (8.46 inches per year, 21,080 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 2,130 cfs Dec. 10 (gage height, 11.56 ft); no flow for many days.
Period of record: Maximum discharge, 5,340 cfs May 31, 1967 (gage height, 13.32 ft); no flow for many days each year.

REMARKS.--Records good. Small diversions for irrigation above station. Four standard and two recording rain gages are located in basin above station. At end of year, flow from 28.4 sq mi above this station was partly controlled by 12 floodwater-retarding structures with a total combined capacity of 9,490 acre-ft below the flood-spillway crests, of which 7,960 acre-ft is floodwater-retarding capacity and 1,530 acre-ft is sediment-pool capacity. The capacity in these pools allocated to sediment storage will be used for conservation storage until eliminated by sedimentation. Water-quality records for the current year are published in Part 2 of this report.

REVISIONS.--WRD Texas 1970: 1968-69, Drainage area.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.7	4.1	31	4.0	.20	0	0	13				0
2	1.8	3.1	372	4.0	.20	0	0	1.4				0
3	292	2.4	364	3.3	.10	0	0	.07				0
4	163	1.8	197	3.0	.05	0	0	0				0
5	78	1.3	663	1.9	.05	0	0	0				0
6	46	.85	362	1.4	.05	0	0	0				0
7	23	.74	266	1.4	.02	0	0	.07				0
8	14	.50	508	1.5	.02	0	0	.05				0
9	9.2	.20	1,290	1.9	.03	0	0	.02				0
10	5.5	.14	1,050	2.4	.03	0	0	.01				0
11	3.5	.07	444	1.8	.03	0	0	.01				0
12	2.3	.05	392	1.3	.20	0	0	72				0
13	1.7	.02	357	.96	.50	0	0	18				0
14	1.2	.01	388	.74	.14	0	0	7.9				0
15	.85	0	423	.20	.05	0	0	4.0				0
16	.50	0	226	.14	.02	0	0	1.1				0
17	2.2	231	149	.02	.03	0	0	.10				0
18	86	737	100	.05	.02	0	0	3.0				0
19	495	277	70	.10	.01	0	0	4.1				0
20	704	208	55	.28	0	0	0	0				0
21	281	132	38	.50	0	0	0	0				0
22	222	102	25	.38	0	0	0	0				88
23	143	138	18	.20	0	0	0	0				8.9
24	76	67	13	.14	0	.95	0	0				.74
25	48	42	10	.10	0	.96	0	0				.05
26	31	27	8.3	.05	0	.10	0	0				5.0
27	24	18	7.1	.05	0	.01	0	0				22
28	16	12	5.8	.62	0	0	0	0				.62
29	11	9.2	4.6	.50	0	0	.01	0				0
30	7.3	9.4	5.7	.38	-----	0	23	0				0
31	5.5	-----	4.6	.20	-----	0	-----	0	-----			-----
TOTAL	2,797.25	2,024.88	7,847.1	33.51	1.75	2.02	23.01	124.83	0	0	0	125.31
MEAN	90.2	67.5	253	1.08	.060	.065	.77	4.03	0	0	0	4.18
MAX	704	737	1,290	4.0	.50	.96	23	72	0	0	0	88
MIN	.50	0	4.6	.02	0	0	0	0	0	0	0	0
CFSM	1.93	1.45	5.42	.02	.001	.001	.02	.09	0	0	0	.09
IN.	2.23	1.61	6.25	.03	.001	.001	.02	.10	0	0	0	.10
AC-FT	5,550	4,020	15,560	66	3.5	4.0	46	248	0	0	0	249
CAL YR 1971	TOTAL 13,780.38	MEAN 37.8	MAX 1,290	MIN 0	CFSM .81	IN 10.98	AC-FT 27,330					
WTR YR 1972	TOTAL 12,979.66	MEAN 35.5	MAX 1,290	MIN 0	CFSM .76	IN 10.34	AC-FT 25,750					

1/This table reproduced from U.S. Geological Survey, 1972, Water Resources Data for Texas, Part 1, Surface Water Records.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

yearly weighted-mean rainfall
Monthly and ~~annual~~ discharge, in _____ inches

of Little Elm Creek River ^{at} Celina, Tex.
[Drainage area, 46.2 square miles]

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Monthly and ~~annual~~ ^{yearly mean} discharge, in ft³/s, of Little Elm Creek River ^{at} Celina, Tex.
[Drainage area, 46.2 square miles]

[illegible]

TRINITY RIVER BASIN

08052700 Little Elm Creek near Aubrey, Tex. 1/

LOCATION.--Lat 33°17'00", long 96°53'33", Denton County, on left bank at downstream side of bridge on Farm Road 1385, 1.5 miles upstream from Mustang Creek, 5.5 miles east of Aubrey, and 18 miles upstream from Lewisville Dam.

DRAINAGE AREA.--75.5 sq mi.

PERIOD OF RECORD.--June 1956 to current year.

GAGE.--Water-stage recorder. Datum of gage is 534.76 ft above mean sea level (State Highway Department bench mark).

AVERAGE DISCHARGE.--16 years, 40.3 cfs (29,200 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 2,780 cfs Dec. 10 (gage height, 15.08 ft); no flow for many days.
Period of record: Maximum discharge, 7,830 cfs Apr. 26, 1957 (gage height, 17.34 ft); no flow at times each year.
Maximum stage since about 1900, 18.2 ft in May 1941, from information by local residents.

REMARKS.--Records good. Small diversions for irrigation above station. Ten rain gages, six standard and four recording gages, are operated in basin above station. At end of year, flow from 35.7 sq mi above this station was partly controlled by 16 floodwater-retarding structures with a total combined capacity of 12,340 acre-ft below the flood-spillway crests, of which 10,260 acre-ft is floodwater-retarding capacity and 2,080 acre-ft is sediment-pool capacity. The capacity in these pools allocated to sediment storage will be used for conservation storage until eliminated by sedimentation. Water-quality records for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WRD Texas 1970: 1969.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.2	5.6	26	6.4	.56	.07	.08	15				0
2	2.5	4.2	309	6.1	.45	.04	.03	7.3				0
3	224	3.4	677	5.5	.30	.02	.02	1.1				0
4	368	2.5	262	4.6	.39	.02	.01	.06				0
5	101	1.8	650	3.7	.26	.02	0	0				0
6	52	1.0	614	3.0	.26	.02	.01	0				0
7	26	.50	366	2.7	.20	.01	.01	0				0
8	15	.23	376	3.0	.17	.02	.01	0				0
9	11	.14	2,050	3.2	.20	0	0	.01				0
10	7.3	.12	2,030	3.4	.12	0	0	0				0
11	5.1	.12	513	3.6	.12	0	0	0				0
12	3.6	.10	424	2.7	.26	0	0	95				0
13	2.6	.06	395	2.2	.63	0	0	26				0
14	1.8	.05	398	1.6	.56	0	0	7.6				0
15	.86	.04	529	.95	.56	0	0	4.1				0
16	.40	8.9	319	.70	.35	.50	0	2.0				0
17	.23	183	230	.45	.26	.56	0	.35				0
18	24	1,090	163	.40	.17	.50	0	.95				0
19	503	375	115	.50	.08	.26	0	1.2				0
20	1,080	263	80	.50	.07	.23	0	.78				0
21	424	171	50	.56	.07	.30	0	.05				8.1
22	303	112	40	.63	.08	.12	0	0				191
23	214	230	31	.56	.06	.06	0	0				134
24	114	94	25	.50	.10	.70	.02	0				18
25	56	56	21	.30	.12	.95	0	0				6.3
26	34	38	18	.26	.12	6.6	0	0				3.0
27	25	26	16	.35	.07	13	1.1	0				37
28	18	12	14	.70	.06	2.9	2.3	0				10
29	13	8.7	11	.95	.07	1.7	2.9	0				4.2
30	9.3	8.2	11	.78	-----	.40	42	0				2.1
31	7.2	-----	8.4	.56	-----	.20	-----	0	-----			-----
TOTAL	3,650.09	2,695.66	10,771.4	61.35	6.63	29.20	48.49	161.50	0	0	0	413.7
MEAN	118	89.9	347	1.98	.23	.94	1.62	5.21	0	0	0	13.8
MAX	1,080	1,090	2,050	6.4	.63	13	42	95	0	0	0	191
MIN	.23	.04	8.4	.26	.06	0	0	0	0	0	0	0
CFSM	1.56	1.19	4.60	.03	.003	.01	.02	.07	0	0	0	.18
IN.	1.80	1.33	5.31	.03	.003	.01	.02	.08	0	0	0	.20
AC-FT	7,240	5,350	21,370	122	13	58	96	320	0	0	0	821
CAL YR 1971	TOTAL 18,461.93	MEAN 50.6	MAX 2,050	MIN 0	CFSM .67	IN 9.10	AC-FT 36,620					
WTR YR 1972	TOTAL 17,838.02	MEAN 48.7	MAX 2,050	MIN 0	CFSM .65	IN 8.79	AC-FT 35,380					

1/This table reproduced from U.S. Geological Survey, 1972, Water Resources Data for Texas, Part 1, Surface Water Records.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

yearly average rainfall

Monthly and annual discharge, in _____ inches, _____ of Little Elm Creek _____ River near _____ Aubrey, Tex.
[Drainage area, _____ 15.5 _____ square miles]

Sheet 1 of Sheets
8-0527.00

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

yearly-mean
Monthly and annual discharge, in ft^3/s , of Little Elm Creek River ^{at} Aubrey, Tex.
[Drainage area, 75.5 square miles]

[illegible]

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS

ANNUAL SUMMARY

Little Elm Creek subwatershed No. 1 near Gunter, Tex. Drainage Area 3.40 mi.²
1972 WATER YEAR

Staff Gage read weekly.
Continuous water stage recorder Date of last sediment survey _____

Maxima: gage height, 27.2 ft; outflow, 44.2 ft³/s; surface area, 112 acres; contents, 749 acre-feet; on Dec. 10, 1971.

Minima: gage height, 17.0 ft; surface area, 27.0 acres; contents, 115 acre-feet; on Sept. 21, 1972

Maximum inflow, _____ ft³/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on _____.

Averages: _____ water years, (_____); inflow, _____ acre-feet/year; outflow, _____ acre-feet/year; rainfall, _____ inches/year.

Pool water budget, in acre-feet, water year October 1971 to September 1972.

	Oct.	Nov.	Dec.	Calendar year 1971	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1972
Total Inflow \downarrow	434	266	1,110	2,050	3.1	7.3	5.0	12.1	23.5	0	0.1	5.7	9.7	1,880
Total Outflow	441	266	1,130	1,950	2.6	0	0	0	0.7	0	0	0	0	1,840
Total Consumption	18.8	12.8	11.6	210	8.0	12.0	20.8	23.0	22.4	23.0	25.0	18.5	15.7	212
†	- 6.7	- 1.5	+ 0.7	27.6	- 5.7	- 3.7	- 11.9	- 2.1	8.8	- 20.6	- 21.9	- 5.1	+ 1.9	- 67.8
†	41.7	41.4	55.2	—	37.9	37.4	35.8	34.3	36.2	34.4	30.8	28.5	28.0	—
††	5.98	3.49	6.79	41.27	0.57	0.30	1.35	3.10	2.81	0.85	1.15	3.27	3.43	33.09

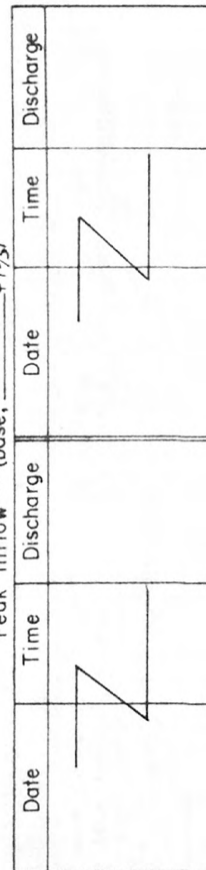
\downarrow Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet.

† Mean surface area, in acres.

†† Weighted mean rainfall, in inches.

Peak inflow - (base, _____) $f+3/4$



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS

ANNUAL SUMMARY

Little Elm Creek subwatershed No. 2 near Gunter, Tex. Drainage Area 3.95 mi.²
1972 WATER YEAR

Staff Gage read weekly.
~~Continuous water-stage recorder~~ ~~ratio~~ Date of last sediment survey _____

Maxima: gage height, 21.5 ft; outflow, 98.6 ft³/s; surface area, 132 acres; contents, 811 acre-feet; on Dec. 10, 1971.

Minima: gage height, 13.3 ft; surface area, 36.2 acres; contents, 151 acre-feet; on Aug. 10, 1972.

Maximum inflow, _____ ft³/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on _____.

Averages: _____ water years, (_____); inflow, _____ acre-feet/year; outflow, _____ acre-feet/year; rainfall, _____ inches/year.

Pool water budget, in acre-feet, water year October 1971 to September 1972.

	Oct	Nov	Dec	Calendar year 1971	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Water year 1972
Total Inflow \downarrow	985	397	2,080	4,000	9.6	10.5	1.5	3.2	28.5	3.8	0.4	14.8	10.6	3,540
Total Outflow	1,020	398	2,110	3,860	8.8	0	0	0	0	0	0	0	0	3,540
Total Consumption	24.1	17.1	14.5	30.6	11.6	16.4	23.8	28.5	34.1	38.6	35.4	32.3	20.1	296
†	-33.2	0	-5.9	24.7	-8.1	-4.5	-16.3	-12.4	6.1	-31.4	-30.5	-6.9	1.5	-142
‡	67.0	63.5	76.2	---	58.0	56.5	54.1	50.9	52.4	48.8	42.1	38.0	37.2	---
††	588	372	680	41.24	0.50	0.30	1.42	2.91	2.45	0.76	1.70	3.80	3.52	33.76

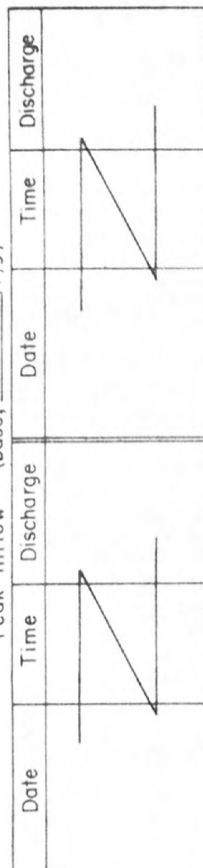
\downarrow Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet.

‡ Mean surface area, in acres.

†† Weighted mean rainfall, in inches.

Peak inflow - (base, _____ f^3/s)



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS

ANNUAL SUMMARY

1972 WATER YEAR

7.27 mi.²

Tex. Drainage Area

Gunter

near

Creek subwatershed No. 3

Date of last sediment survey

Staff gage read weekly.

Continuous water stage recorder ratio

Maxima: gage height, 22.3 ft; outflow, 229 ft³/s; surface area, 212 acres; contents, 1240 acre-feet; on Dec. 10, 1971.

Minima: gage height, 10.0 ft; surface area, 19.5 acres; contents, 68.2 acre-feet; on Sept. 21, 1972.

Maximum inflow, ft³/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on

Averages: water years, () inflow, acre-feet/year; outflow, acre-feet/year; rainfall, inches/year.

Pool water budget, in acre-feet, water year October 1971 to September 1972.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Water year 1972
Total Inflow 1/	1,830	1,210	3,340	8.0	8.6	6.6	7.5	16.1	2.5	0.7	2.4	21.6	6,450
Total Outflow	1,850	1,220	3,360	7.2	0	0	0	2.9	0	0	0	0	6,440
Total Consumption	18.2	10.9	10.5	6.2	9.3	15.3	19.9	23.0	17.6	20.2	13.3	11.6	176
†	-7.3	-1.7	-0.3	-4.3	0	-4.4	-3.6	-4.2	-13.2	-14.4	-6.6	12.5	-47.5
†	45.5	40.5	58.4	32.5	32.0	31.3	29.7	30.7	26.9	23.5	21.2	21.2	—
††	5.97	3.92	6.87	0.43	0.29	1.51	2.75	2.06	0.75	2.15	3.81	3.46	33.97

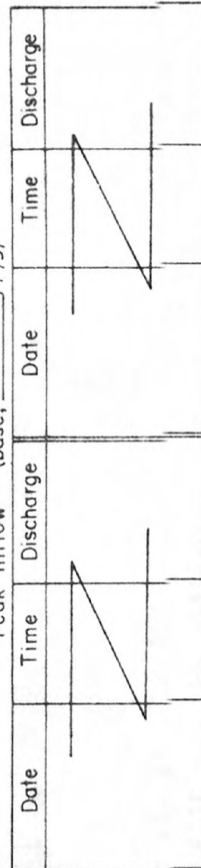
1/ Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet.

† Mean surface area, in acres.

†† Weighted mean rainfall, in inches.

Peak inflow - (base, ft³/s)



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS

ANNUAL SUMMARY

Little Elm Creek subwatershed No. 4 near Gunter, Tex. Drainage Area 3.33 mi.²
1972 WATER YEAR

Staff gage read weekly.
~~Continuous water stage recorder~~ Date of last sediment survey _____

Maxima: gage height, 24.7 ft; outflow, 54.8 ft³/s; surface area, 89.6 acres; contents, 784 acre-feet; on Dec. 10, 1971.

Minima: gage height, 13.8 ft; surface area, 30.0 acres; contents, 144 acre-feet; on Sept. 21, 1972.

Maximum inflow, _____ ft³/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on _____.

Averages: _____ water years, (_____); inflow, _____ acre-feet/year; outflow, _____ acre-feet/year; rainfall, _____ inches/year.

Pool water budget, in acre-feet, water year October 1971 to September 1972.

	Oct	Nov	Dec	Calendar year 1971	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Water year 1972
Total Inflow \downarrow	389	165	900	1,610	0.3	12.2	26.3	4.2	14.4	6.7	6.9	4.8	12.6	1,540
Total Outflow	386	170	917	1,520	2.9	0	14.3	0	0	0	0	0	0	1,500
Total Consumption	18.6	11.9	9.6	216	10.5	13.1	17.3	22.8	30.3	28.8	30.5	24.7	21.0	239
†	9.3	-3.0	6.4	31.5	-17.6	0	0	-9.7	-10.2	-19.3	-16.3	-13.3	-0.9	-74.6
‡	45.4	42.4	50.6	—	41.8	41.0	40.3	40.0	39.9	37.4	34.7	32.4	31.4	—
††	6.48	3.98	7.26	42.80	0.43	0.28	1.59	2.71	1.82	0.81	2.46	2.97	3.08	33.87

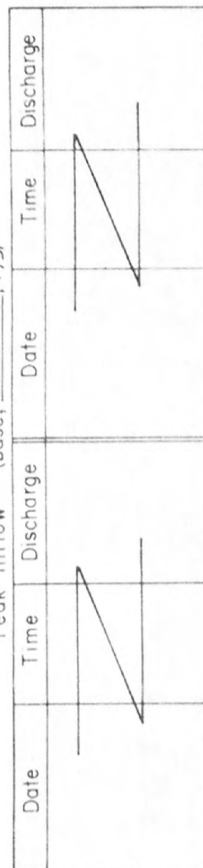
\downarrow Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet.

‡ Mean surface area, in acres.

†† Weighted mean rainfall, in inches.

Peak inflow - (base, _____ $f \pm \frac{1}{2}$)



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS

ANNUAL SUMMARY

Little Elm Creek subwatershed No. 5 near Gunter, Tex. Drainage Area 0.50 mi.²
1972 WATER YEAR

Staff gage read weekly.
~~Continuous water-stage recorder~~ tatto Date of last sediment survey _____

Maxima: gage height, 21.3 ft; outflow, 16.2 ft³/s; surface area, 11.3 acres; contents, 86.3 acre-feet; on Dec. 10, 1971.

Minima: gage height, 15.3 ft; surface area, 6.4 acres; contents, 34.2 acre-feet; on Sept. 20, 1972.

Maximum inflow, _____ ft³/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on _____.

Averages: _____ water years, (_____); inflow, _____ acre-feet/year; outflow, _____ acre-feet/year; rainfall, _____ inches/year.

Pool water budget, in acre-feet, water year October 1971 to September 1972.

	Oct.	Nov.	Dec.	Calendar year 1971	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Water year 1972
Total Inflow \downarrow	65.0	22.4	14.5	259	0.2	1.3	1.6	1.2	2.1	0.1	2.4	0.3	3.2	245
Total Outflow	66.3	22.6	14.9	240	0	0	0	0	0	.7	0	0	0	239
Total Consumption	3.3	2.4	1.5	43.3	1.6	2.4	4.4	5.3	5.0	6.4	6.1	4.3	3.6	46.3
†	0.2	0.2	0	5.0	-1.1	-.9	-1.7	-2.3	-1.8	-6.5	-2.3	-2.7	1.2	-17.7
†	8.4	8.3	8.6	—	8.3	8.2	8.1	7.9	7.8	7.3	6.9	6.6	6.6	—
††	6.75	3.99	7.44	43.96	0.43	0.27	1.62	2.70	1.72	0.87	2.54	2.45	2.87	33.65

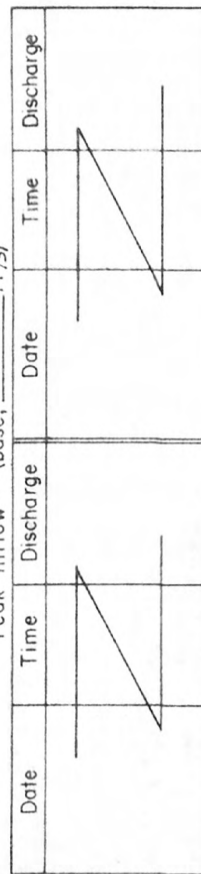
\downarrow Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet.

‡ Mean surface area, in acres.

†† Weighted mean rainfall, in inches.

Peak inflow - (base, _____, $f + \frac{3}{5}$)



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS

ANNUAL SUMMARY

1972 WATER YEAR

Little Elm Creek subwatershed No 6 near Gunter, Tex. Drainage Area 1.99 mi.²
Staff gage read weekly.
Continuous water stage recorder ratio Date of last sediment survey _____

Maxima: gage height, 26.2 ft; outflow, 30.4 ft³/s; surface area, 50.0 acres; contents, 417 acre-feet; on Dec. 10, 1971.

Minima: gage height, 17.2 ft; surface area, 23.0 acres; contents, 114 acre-feet; on Aug. 10, 1972.

Maximum inflow, _____ ft³/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on _____.

Averages: _____ water years, (_____); inflow, _____ acre-feet/year; outflow, _____ acre-feet/year; rainfall, _____ inches/year.

Pool water budget, in acre-feet, water year October 1971 to September 1972.

	Oct.	Nov.	Dec.	Calendar year 1971	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1972
Total Inflow 1/	246	78.0	552	1,070	0.6	5.1	8.4	6.4	19.0	3.8	2.1	8.8	10.3	240
Total Outflow	250	80.0	566	1,010	.5	0	6.7	0	0	0	0	0	0	903
Total Consumption	10.3	6.9	5.3	14.0	5.2	7.2	12.4	15.4	17.9	18.5	20.7	18.7	10.7	149
†	1.6	0.5	0	14.9	-4.2	-1.6	-7.3	-3.5	4.7	-12.9	-13.5	-5.1	5.1	-362
†	27.0	26.4	29.2	—	26.0	25.9	25.3	24.9	25.6	25.0	24.0	23.4	23.3	—
††	6.75	3.99	7.44	43.95	0.43	0.27	1.62	2.70	1.72	0.87	2.54	2.45	2.87	33.65

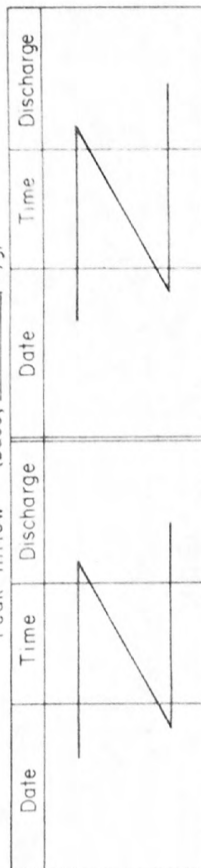
1/ Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet.

† Mean surface area, in acres.

†† Weighted mean rainfall, in inches.

Peak inflow - (base, _____ ft³/s)



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS

ANNUAL SUMMARY

1972 WATER YEAR

Little Elm Creek subwatershed No. 7 near Gunter, Tex. Drainage Area 1.28 mi.²
Staff gage read weekly.
~~Continuous water stage recorder ratio~~ Date of last sediment survey _____

Maxima: gage height, 19.6 ft; outflow, 20.0 ft³/s; surface area, 38.0 acres; contents, 268 acre-feet; on Dec. 10, 1971.

Minima: gage height, 11.9 ft; surface area, 15.1 acres; contents, 71.2 acre-feet; on Aug. 10, 1972.

Maximum inflow, _____ ft³/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on _____.

Averages: _____ water years, (_____); inflow, _____ acre-feet/year; outflow, _____ acre-feet/year; rainfall, _____ inches/year.

Pool water budget, in acre-feet, water year October 1971 to September 1972.

	Oct	Nov	Dec.	Calendar year 1971	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Water year 1972
Total Inflow 1/	179	166	254	698	6.6	5.2	1.4	6.3	8.2	0.8	0.2	4.6	4.2	636
Total Outflow	182	166	260	637	6.2	0	0	0	0	0	0	0	0	614
Total Consumption	8.1	5.7	4.6	106	4.0	7.0	9.1	12.6	12.5	12.3	13.1	10.1	8.1	107
†	-1.3	0.8	0	11.4	-3.6	-1.4	-5.4	-1.7	-1.2	-9.4	-12.5	-1.3	1.4	-35.6
‡	22.0	21.8	22.8	—	20.2	19.9	19.3	19.0	18.9	18.1	16.6	15.5	15.6	—
††	4.90	3.74	5.09	32.60	0	0.24	1.44	2.89	1.92	1.41	0.30	3.25	4.12	29.30

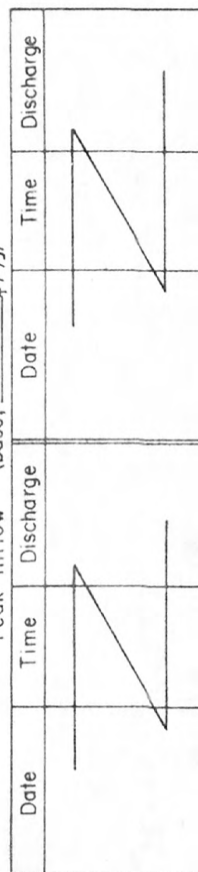
1/ Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet.

‡ Mean surface area, in acres.

†† Weighted mean rainfall, in inches.

Peak inflow - (base, _____ ft³/s)



ANNUAL SUMMARY

Little Elm Creek subwatershed No. 8-B near Gunter, Tex. Drainage Area 1,25² mi.²

Little Elm Creek watershed No 8-B near Gunter
Staff-gage read weekly
Continuous water-stage recorder ratio _____ Date of last sediment survey _____

gauge height,	23.9 ft;	outflow, 19.8 ft ³ /s;	surface area, 37.8 acres;	contents, 28.2 acre-feet; on	Dec. 10, 1971.
Maxima:					

Minima : gage height, 10.4 ft; surface area, 7.2 acres; contents, 30.3 acre-feet; on Oct. 2, 1971.

Maximum inflow, ft³/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on .

Averages: _____ water years, (_____); inflow, _____ acre-feet/year; outflow, _____ acre-feet/year; rainfall, _____ inches/year.

Pool water budget, in acre-feet, water year October 1977 to September 1977.

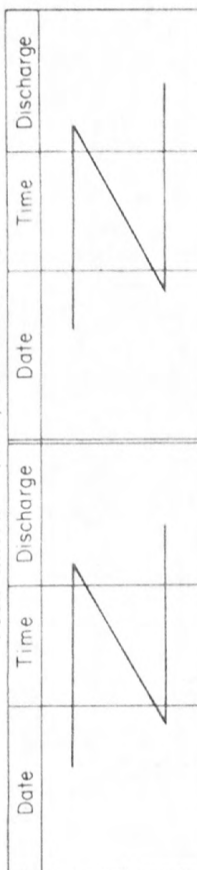
	Oct.	Nov.	Dec.	Calendar year	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year
Total Inflow I/	22.5	45.0	382	—	5.1	3.5	1.5	2.0	2.0	0	0.9	0.1	0	1972
Total Outflow	19.0	45.5	388	—	5.2	1.3	0	0	0	0	0	0	0	667
Total Consumption	3.8	3.0	2.6	—	2.1	3.2	5.5	6.3	6.7	7.2	7.6	6.4	5.1	59.5
†	38.1	— .2	0	—	— 1.7	— .7	— 2.8	— 1.6	— 2.9	— 6.0	— 5.5	— 2.2	— .8	13.7
†	10.6	11.8	15.0	—	11.6	11.5	11.3	11.0	10.9	10.4	9.9	9.3	9.1	—
††	6.97	7.34	7.45	—	0.46	0.34	1.31	2.89	1.88	1.33	1.50	4.77	5.61	37.85

 Δ Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet.

† Mean surface area, in acres.

†† Weighted mean rainfall, in inches.



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS

ANNUAL SUMMARY

Little Elm Creek subwatershed No. 9 near Gunter, Tex. Drainage Area 0.58 mi.²
Staff gage read weekly.
~~Continuous water stage recorder~~ ratio _____ Date of last sediment survey _____

Maxima: gage height, 18.4 ft; outflow, 17.4 ft³/s; surface area, 20.1 acres; contents, 91.8 acre-feet; on Dec-10, 1971.

Minima: gage height, 11.3 ft; surface area, 4.5 acres; contents, 11.7 acre-feet; on Aug-10, 1972.

Maximum inflow, _____ ft³/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on _____.

Averages: _____ water years, (_____); inflow, _____ acre-feet/year; outflow, _____ acre-feet/year; rainfall, _____ inches/year.

Pool water budget, in acre-feet, water year October 1971 to September 1972.

	Oct.	Nov.	Dec.	Calendar year 1971	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1972
Total Inflow \downarrow	54.2	31.9	152	—	1.1	0	1.2	1.4	4.4	0.4	0	2.1	14.5	263
Total Outflow	56.0	32.2	156	—	.6	0	0	0	0	0	0	0	4.2	249
Total Consumption	2.9	1.9	1.7	—	1.5	2.4	3.3	3.5	4.1	4.2	4.5	3.0	3.2	36.2
†	0	0	0	—	-.7	-2.1	-1.3	-1.6	1.3	-3.1	-3.8	1.0	10.2	0.9
†	8.1	7.0	8.7	—	7.4	7.2	6.7	6.1	6.0	6.3	5.5	4.8	6.5	—
††	6.97	3.34	7.45	—	0.46	0.34	1.31	2.89	1.88	1.33	1.50	4.77	5.61	37.85

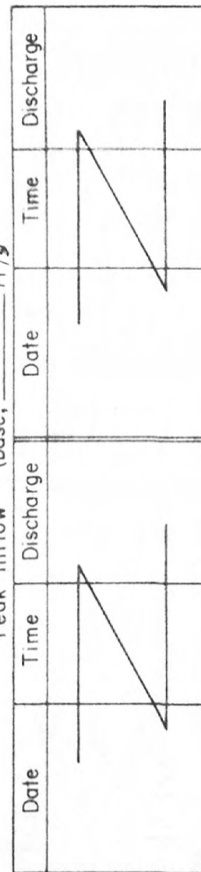
\downarrow Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet.

† Mean surface area, in acres.

†† Weighted mean rainfall, in inches.

Peak inflow - (base, _____ ft³/s)



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS

ANNUAL SUMMARY

1972 WATER YEAR

Little Elm Creek subwatershed No 11 near Gunter, Tex Drainage Area 1.17 mi²
staff gage read weekly ratio --- Date of last sediment survey ---

Maxima: gage height, 15.2; outflow, 91.6 ft³/s; surface area, 29.0 acres; contents, 130 acre-feet; on Dec. 10, 1971

Minima: gage height, Dry; surface area, 0 acres; contents, 0 acre-feet; on July 21 to Sept. 19, 1972.

Maximum inflow, --- ft³/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on ---

Averages: --- water years, (---); inflow, --- acre-feet/year; outflow, --- acre-feet/year; rainfall, --- inches/year

Pool water budget, in acre-feet, water year October 1971 to September 1972.

	Oct	Nov	Dec	Calendar year 1971	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Water year 1972
Total Inflow \downarrow	416	258	640	---	1.8	1.1	1.5	4.6	6.4	0.9	0	0	1.7	1,330
Total Outflow	418	258	649	---	.6	0	0	0	0	4.8	16.2	0	0	1,350
Total Consumption	5.9	4.9	2.8	---	3.5	3.8	6.4	9.5	10.3	7.3	.9	0	.1	55.4
†	1.0	0.7	-2.1	---	-2.3	-2.4	-3.2	-2.1	-2.3	-9.6	-17.1	0	1.7	-37.7
†	16.4	16.5	16.4	---	14.0	13.6	12.8	12.6	12.9	10.5	.9	0	.2	---
††	5.32	4.00	5.73	---	0.03	0.24	1.48	2.89	1.84	1.53	0.30	3.54	4.70	31.60

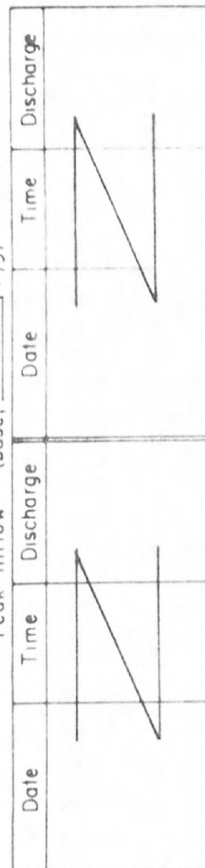
\downarrow Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet

† Mean surface area, in acres

†† Weighted mean rainfall, in inches

Peak inflow - (base, --- ft³/s)



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS

ANNUAL SUMMARY

1972 WATER YEAR
Tex Drainage Area 1.62 mi²

Little Elm Creek subwatershed No 12 near Gunter, Tex
staff gage read weekly.
Continuous water-stage-recorder: ratio — Date of last sediment survey —

Maxima: gage height, 19.6; outflow, 15.0 ft³/s; surface area, 39.2 acres; contents, 332 acre-feet; on Dec. 10, 1971.

Minima: gage height, 6.0; surface area, 8.2 acres; contents, 26.5 acre-feet; on Sept. 20, 1972.

Maximum inflow, — ft³/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on —

Averages: — water years, (—); inflow, — acre-feet/year; outflow, — acre-feet/year; rainfall, — inches/year.

Pool water budget, in acre-feet, water year October 1971 to September 1972.

	Oct	Nov	Dec	Calendar year 1971	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Water year 1972
Total Inflow 1/	250	234	302	—	10	2.7	1.9	1.7	5.7	2.8	.10	0	19.9	908
Total Outflow	245	233	405	—	0.9	0	0	0	0	0	16.4	0	0	900
Total Consumption	6.5	4.5	3.6	—	3.1	5.4	7.3	7.8	8.9	9.6	9.2	7.3	5.5	78.7
†	6.7	2.5	-3.5	—	-3.7	-2.4	-3.5	-2.7	-1.3	-7.3	-25.1	-4.1	19.4	-25.0
†	17.0	18.1	21.1	—	15.3	15.0	14.6	14.2	14.4	13.7	11.5	9.1	10.0	—
††	5.12	3.98	5.38	—	0.06	0.24	1.40	2.93	1.92	1.52	0.27	3.24	4.41	30.55

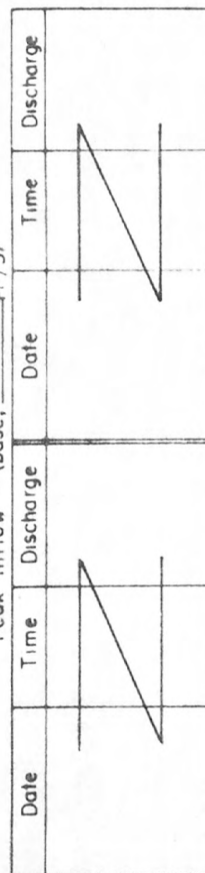
1/ Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet

† Mean surface area, in acres

†† Weighted mean rainfall, in inches

Peak inflow - (base, — ft³/s)



ANNUAL SUMMARY

Tex Drainage Area 2.17 mi^2

Date of last sediment survey _____

on Dec. 15, 1971

Apr. 18, 1971.

_____ inches/year

Pool water budget, in acre-feet, water year October 1971 to September 1972.

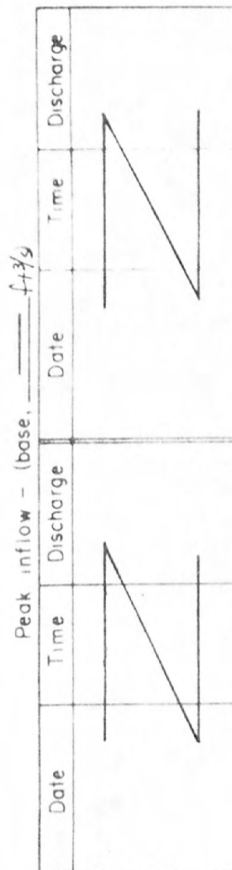
	Oct	Nov	Dec.	Calendar year 1971	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Water year 1972
Total Inflow 1/	307	143	592	—	0	0	.1	2.8	11.0	.6	.8	.4	58.3	1,140
Total Outflow	221	258	649	—	0	0	0	0	0	0	0	0	0	1,130
Total Consumption	141	84	4.2	—	.3	.2	.3	.5	3.3	4.5	3.7	2.8	3.8	46.0
†	88.9	-108	-51.2	—	-.2	-.2	-.2	2.5	8.3	-2.9	-2.8	-1.5	58.0	-9.3
†	38.0	35.0	24.5	—	1.2	.8	.6	.8	5.2	5.8	4.6	3.8	6.4	—
††	574	482	620	—	29	25	1.63	3.12	1.99	1.92	.15	3.01	5.25	34.37

1/ Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet.

† Mean surface area, in acres.

†† Weighted mean rainfall, in inches



ANNUAL SUMMARY

1972 WATER YEAR

 m_i^2

Maxima: gage height, 24.1; outflow, 23.0 ft³/s; surface area, 30.1 acres; contents, 289 acre-feet; on Dec. 10, 1971

Minima : gage height, 7.1 ; surface area, 6.6 acres; contents, 29.7 acre-feet; on Oct. 2, 1971.

Maximum inflow, $\frac{\text{ft}^3}{\text{s}}$ (averaged for 5-min. interval and adjusted for rainfall on pool surface) on _____

Averages: — water years, (—) ; inflow, — acre-feet/year; outflow, — acre-feet/year; rainfall, — inches/year.

Pool water budget, in acre-feet, water year October 1971 to September 1972.

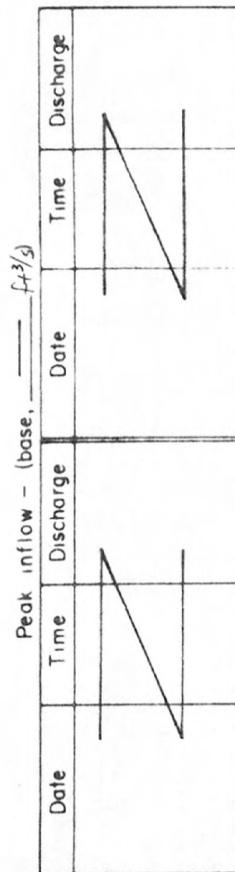
	Oct	Nov	Dec	Calendar year 1971	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Water year 1972
Total Inflow 1/	112	6.3	410	555	14.4	9.4	7.2	3.7	5.7	.2	1.4	1.3	0	572
Total Outflow	330	4.8	419	457	12.4	6.8	3.6	0	3.2	0	0	0	0	483
Total Consumption	3.8	4.1	2.5	39.5	2.3	3.6	6.4	7.0	7.0	9.0	9.6	7.3	5.0	67.6
†	81.2	0	.5	88.6	.3	-.9	-.6	-.5	-2.1	-6.7	-5.2	-4.0	0	62.0
†	9.6	12.9	14.9	—	12.9	12.9	12.8	12.6	12.7	12.1	11.7	11.3	11.2	—
††	8.09	2.44	8.09	38.01	.60	.06	2.12	2.65	2.28	2.08	3.03	2.19	4.37	38.00

1/ Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet.

† Mean surface area, in acres.

†† Weighted mean rainfall, in inches.



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS

ANNUAL SUMMARY

1972 WATER YEAR

Little Elm Creek subwatershed No 19 near Gunter, Tex Drainage Area 2.01 mi²
Staff gage read weekly
Continuous water-stage recorder ratio Date of last sediment survey

Maxima: gage height, 17.1; outflow, 25.4 ft³/s; surface area, 84.9 acres; contents, 550 acre-feet; on Dec. 9, 1971

Minima: gage height, 7.9; surface area, 19.9 acres; contents, 86.6 acre-feet; on Oct 1, 1971

Maximum inflow, ft³/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on

Averages: water years, (); inflow, acre-feet/year; outflow, acre-feet/year; rainfall, inches/year

Pool water budget, in acre-feet, water year October 1971 to September 1972

	Oct	Nov	Dec	Calendar year 1971	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Water year 1972
Total Inflow \downarrow	215	228	608	1,130	1.0	5.4	4.3	35.2	4.9	3.4	2.6	5.8	66.3	1180
Total Outflow	132	225	627	988	.5	0	0	0	4.5	0	0	0	17.6	1010
Total Consumption	18.2	15.7	14.6	136	9.6	10.3	16.8	21.2	23.2	23.7	25.4	21.7	18.0	218
†	79.8	1.2	0	91.1	-7.7	-3.9	-6.3	+23.3	-16.0	-13.4	-21.7	-8.7	52.5	79.1
†	33.1	38.3	48.8	—	36.9	35.5	34.9	33.7	36.9	34.3	31.3	26.5	29.5	—
††	71.6	3.32	7.70	37.46	52	20	21.6	29.6	2.24	2.22	1.72	2.74	62.6	39.20

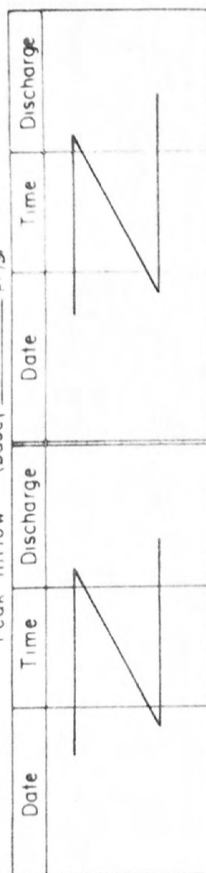
\downarrow Inflow adjusted for rainfall on pool and pool losses

† Change in contents, in acre-feet

† Mean surface area, in acres

†† Weighted mean rainfall, in inches

Peak inflow - (base,) ft³/s



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOLS

ANNUAL SUMMARY

1972 WATER YEAR
mi²

Little E/In Creek subwatershed No 20 near Guenter, Tex Drainage Area 2.06
Staff gage read weekly
Continued water stage recorder - ratio Date of last sediment survey

Maxima: gage height, 26.0; outflow, 23.2 ft³/s; surface area, 73.2 acres; contents, 695.7 acre-feet; on Dec. 10, 1971

Minima: gage height, 12.6; surface area, 17.8 acres; contents, 82.0 acre-feet; on Oct. 1, 1971

Maximum inflow, ft³/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on

Averages: water years, () inflow, acre-feet/year; outflow, acre-feet/year; rainfall, inches/year

Pool water budget, in acre-feet, water year October 1971 to September 1972

	Oct	Nov	Dec	Calendar year 1971	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Water year 1972
Total Inflow 1/	42.8	11.7	7.63	130.0	.3	3.6	50.7	9.8	5.6	15.6	7.0	2.1	92.9	139.0
Total Outflow	36.2	13.2	77.5	118.0	.3	0	37.8	.1	2.7	0	0	0	69.2	1,260
Total Consumption	12.3	7.9	13.6	11.6	6.1	7.2	12.6	15.8	17.8	19.5	21.1	17.2	12.0	163
†	66.9	.6	2.3	76.2	-5.1	-2.8	5.6	1.4	-9.7	1.4	-13.2	-8.5	28.6	67.5
†	30.1	28.2	42.5	—	27.8	27.8	27.4	27.8	28.2	27.4	26.7	24.6	25.6	—
††	7.15	3.32	7.70	37.45	.52	.20	2.16	2.96	2.24	2.22	1.72	2.74	6.26	39.19

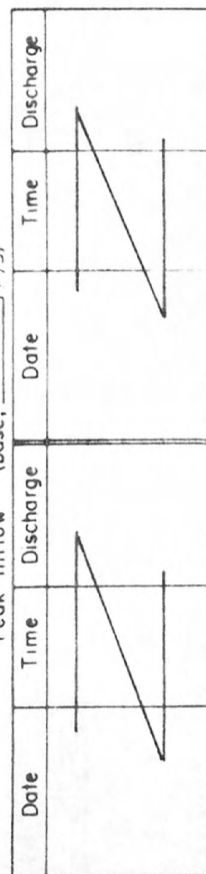
1/ Inflow adjusted for rainfall on pool and pool losses.

† Change in contents, in acre-feet.

† Mean surface area, in acres

†† Weighted mean rainfall, in inches.

Peak inflow - (base, ft³/s)



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY-AUSTIN DISTRICT

1972 WATER YEAR

RAINFALL DATA SUMMARY

STUDY AREA Little Elm Creek near Celina, Tex.

RAIN GAGES

Date of storm	1-5	2-8	3-5	4-5	5-5	6-8	7-5	10-8	wt. mean	By
Weight factor	0.160	0.130	0.200	0.140	0.190	0.040	0.020	0.120		8/10/68
Oct. 3 1971	1.89	2.07	2.18	2.20	2.35	2.10	3.14	1.76		
8	.13	.15	.13	.20	.15	.14	.12	.10		
17	.41	.55	1.32	.95	1.32	.55	.64	.50		
18	.05	.07	.05	.05	.04	.03	.04	.05		
18-19	1.85	1.42	1.47	1.46	1.70	1.78	2.60	1.50		
19	1.33	1.26	1.32	.97	1.11	.80	1.20	.79		
26-27	.32	.27	.28	.39	.30	.34	.35	.20		
October total	5.98	5.79	6.75	6.22	6.97	5.74	8.09	4.90		
October WMR	.96	.75	1.35	.87	1.32	.23	.16	.59	6.23	
Nov. 17 1971	2.34	2.80	2.75	3.35	2.05	3.68	1.30	2.85		
22	.59	.65	.67	.62	.75	.70	.64	.51		
30	.56	.50	.57	.60	.54	.44	.50	.38		
November total	3.49	3.95	3.99	4.57	3.34	4.82	2.44	3.78		
November WMR	.56	.51	.80	.64	.63	.19	.05	.45	3.83	
Dec. 2 1971	1.08	1.09	1.05	1.25	1.15	1.21	1.09	.60		
5	1.17	1.09	1.23	1.00	1.24	.98	.92	.90		
6	.17	.13	.15	.15	.19	.18	.50	.20		
8-10	3.69	3.85	4.13	3.90	4.24	3.03	4.70	2.89		
14	.57	.55	.63	.60	.45	.60	.46	.45		
29	.11	.10	.25	.20	.18	.20	.42	.05		
December total	6.79	6.81	7.44	7.10	7.45	6.20	8.09	5.09		
December WMR	1.09	.89	1.49	.99	1.42	.25	.16	.61	6.90	
1971 Calendar year total									40.45	

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY-AUSTIN DISTRICT

RAINFALL DATA SUMMARY

STUDY AREA: Little Elm Creek near Celina, Tex.

1972

RAIN GAGES

Date of storm	1-S	2-R	3-S	4-S	5-S	6-R	7-S	10-R	wt. mean	By ✓ HSH
Jan. 1, 1972	.08	.07	.19	0	.13	.10	.14	0		
4	.07	.12	.06	0	0	0	0	0		
26	.12	.09	.07	.04	.12	.07	.17	0		
27	.30	.15	.11	.06	.21	.12	.29	0		
January total	.57	.43	.43	.10	.46	.29	.60	0		
January WMR	.09	.06	.09	.01	.09	.01	.01	0	.36	
Feb. 6, 1972	0	0	0	0	0	0	.02	0		
11	.30	.30	.27	.25	.34	.25	.04	(.24)		
February total	.30	.30	.27	.25	.34	.25	.06	.24		
February WMR	.05	.04	.05	.04	.06	.01	.01	.03	.29	
Mar. 15, 1972	.05	.08	.04	0	.05	.06	0	0		
20	.55	.25	.08	.24	.20	.38	.39	(.24)		
23-24	.69	1.08	1.50	1.31	1.02	1.10	.67	(1.20)		
26	.06	.09	0	0	.04	.09	1.06	0		
March total	1.35	1.50	1.62	1.55	1.31	1.63	2.12	1.44		
March WMR	.22	.20	.32	.22	.25	.07	.04	.17	1.49	
April 14, 1972	.43	.43	.45	.50	.52	.50	.33	(.50)		
15	.28	.26	.33	.38	.24	.33	.38	(.38)		
20-21	.96	.43	.20	.24	.30	.32	.70	(.24)		
27	.88	.84	.87	.77	.94	.92	.98	(.77)		
28	.11	.32	.30	.35	.45	.30	.26	(.35)		
30	.44	.44	.55	.65	.42	.75	0	(.65)		
April total	3.10	2.72	2.70	2.89	2.89	3.12	2.65	2.89		
April WMR	.50	.35	.54	.40	.55	.12	.05	.35	2.86	

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY-AUSTIN DISTRICT

RAINFALL DATA SUMMARY

STUDY AREA Little Elm Creek near Celina, Tex.

1972 WATER YEAR

RAIN GAGES

Date of storm	1-S	2-R	3-S	4-S	5-S	6-R	7-S	10-R	Wt. mean	By
May 1, 1972	.17	.07	0	0	0	.17	0	.25		
6	.22	.26	.40	.21	.46	.25	.19	.47		
7	.54	.42	.20	.26	.20	.19	.16	0		
12	1.22	1.17	1.07	1.20	.86	1.28	1.60	1.20		
13	.42	.10	0	0	0	0	0	0		
18	.13	.07	0	0	.24	.10	.33	0		
28	.11	.11	.05	0	.12	0	0	0		
May total	2.81	2.09	1.72	1.67	1.88	1.99	2.28	1.92		
May WMR	.45	.27	.34	.23	.36	.08	.05	.23	2.01	
June 12, 1972	.10	.06	.10	.60	.18	.58	.54	.43		
13	0	0	0	.05	.05	.08	.08	0		
14	.45	.45	.47	.75	.70	.72	.72	.72		
16	0	0	0	0	0	.17	0	0		
18	.25	.05	0	0	.18	0	0	0		
21	0	0	.30	.31	.18	.37	.74	.03		
22	.05	.10	0	.09	.04	0	0	.23		
June total	.85	.66	.87	1.80	1.33	1.92	2.08	1.41		
June WMR	.14	.09	.17	.25	.25	.08	.04	.17	1.19	
July 3, 1972	.05	.06	.17	0	0	.10	.12	0		
12	.68	1.79	2.15	.30	1.45	0	2.84	(.30)		
18	.42	.39	.22	0	.05	0	0	0		
22	0	0	0	0	0	0	0	0		
29	0	0	0	0	0	.05	.07	0		
July total	1.15	2.24	2.54	.30	1.50	.15	3.03	.30		
July WMR	.18	.29	.51	.04	.28	.01	.06	.04	1.41	

REVIEW WITH SUPPLEMENT

PAIN GAGES

1972

1997

[illegible]

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY-AUSTIN DISTRICT

RAINFALL DATA SUMMARY

STUDY AREA Little Elm Creek near Aubrey, Tex.

1972

WATER YEAR

RAIN GAGES

Date of storm	1-S	2-R	3-S	4-S	5-S	6-R	7-S	8-S	9-R	10-R	Avg.	By
Oct. 3, 1971	1.89	2.07	2.18	2.20	2.35	2.10	3.14	2.98	3.29	1.76		✓
8	.13	.15	.13	.20	.15	.14	.12	0	.16	.10		
17	.41	.55	1.32	.95	1.32	.55	.64	.46	.22	.50		
18	.05	.07	.05	.05	.04	.03	.04	.05	.05	.05		
18-19	1.85	1.42	1.47	1.46	1.70	1.78	2.60	1.62	1.95	1.50		
19	1.33	1.26	1.32	.97	1.11	1.80	1.20	.76	.85	.79		
26-27	.32	.27	.28	.39	.30	.34	.35	.35	.29	.20		
October total	5.98	5.79	6.75	6.22	6.97	5.74	8.09	6.22	6.81	4.90	6.35	
Nov. 17, 1971	2.34	2.80	2.75	3.35	2.05	3.68	1.30	2.90	3.95	2.85		
22	.59	.65	.67	.62	.75	.70	.64	.74	.67	.51		
30	.56	.50	.57	.60	.54	.44	.50	.57	.47	.38		
November total	3.49	3.95	3.99	4.57	3.34	4.82	2.44	4.21	5.09	3.74	3.96	
Dec. 2, 1971	1.08	1.09	1.05	1.25	1.15	1.21	1.09	1.37	1.30	.60		
5	1.17	1.09	1.23	1.00	1.24	.98	.92	1.05	1.11	.90		
6	.17	.13	.15	.15	.19	.18	.50	.40	.17	.20		
8-10	3.69	3.85	4.13	3.90	4.24	3.03	4.70	3.59	3.15	2.89		
14	.57	.55	.63	.60	.45	.60	.46	.69	.35	.45		
28	.11	.10	.25	.20	.18	.20	.42	.20	.05	.05		
December total	6.79	6.81	7.44	7.10	7.45	6.20	8.09	7.30	6.13	5.09	6.84	
1971 Calendar year total											35.81	
Jan. 1, 1972	.08	.07	.19	0	.13	.10	.14	.20	.06	0		
4	.07	.12	.06	0	0	0	0	.11	.10	0		
26	.12	.08	.07	.04	.12	.07	.17	.05	0	0		
27	.30	.15	.11	.06	.21	.12	.29	.08	.09	0		
January total	.57	.43	.43	.10	.46	.29	.60	.44	.25	0	.36	
Feb. 6	0	0	0	0	0	0	.02	.05	0	0		
11	.30	.30	.27	.25	.34	.25	.04	.30	.23	.24		
February total	.30	.30	.27	.25	.34	.25	.06	.35	.23	.24	.26	
Mar. 15	.05	.08	.04	0	.05	.06	0	0		0		
20	.55	.25	.08	.24	.20	.38	.39	.40	.25	.24		
23-24	.69	1.08	1.50	1.31	1.02	1.10	.67	.75	.58	.20		
26	.06	.09	0	0	.04	.09	1.06	1.05	.87	0		
March total	1.35	1.50	1.62	1.55	1.31	1.63	2.12	2.20	1.70	1.44	1.64	

* Rainfall estimated on reservoir water surface

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY-AUSTIN DISTRICT

STUDY AREA Little Elm Creek near Aubrey, Tex.

RAINFALL DATA SUMMARY

1972 WATER YEAR

RAIN GAGES

Date of storm	1-S	2-R	3-S	4-S	5-S	6-R	7-S	8-S	9-R	10-R	Avg.	By
April 14, 1972	.43	.43	.45	.50	.52	.50	.33	.32	.16	(.50)		
15	.28	.26	.33	.38	.26	.33	.38	.32	.31	(.38)		
20-21	.96	.43	.20	.24	.30	.32	.70	.66	.46	(.14)		
27	.88	.84	.87	.77	.94	.92	.98	.96	1.01	(.77)		
28	.11	.32	.30	.35	.45	.30	.26	.28	.34	(.35)		
30	.44	.44	.55	.65	.42	.75	0	.73	.31	(.65)		
April totals	3.10	2.72	2.70	2.89	2.89	3.12	2.65	3.27	2.62	2.89	2.88	
May 1, 1973	.17	.07	0	0	0	.17	0	0	.08	.25		
6	.22	.26	.40	.21	.46	.25	.19	.30	.18	.47		
7	.54	.42	.20	.26	.20	.19	.16	.31	.42	0		
12	1.22	1.17	1.07	1.20	.86	1.28	1.60	1.15	1.02	1.20		
13	.42	.10	0	0	0	0	0	.25	0	0		
18	.13	.07	0	0	.24	.10	.33	.20	.62	0		
28	.11	.01	.05	0	.12	0	0	0	0	0		
May total	2.81	2.09	1.72	1.67	1.88	1.99	2.28	2.21	2.32	1.92	2.03	
June 12	.10	.06	.10	.60	.18	.58	.54	.35	.27	.43		
13	0	0	0	.05	.05	.08	.08	.10	.11	0		
14	.45	.45	.47	.75	.70	.72	.72	.93	.78	.72		
16	0	0	0	0	0	.17	0	.05	.23	0		
18	.25	.05	0	0	.18	0	0	0	0	0		
21	0	0	.30	.31	.18	.37	.74	.92	.32	.03		
22	.05	.10	0	.09	.04	0	0	0	.23	.23		
June total	.85	.66	.87	1.80	1.33	1.92	2.08	2.35	1.95	1.41	1.52	
July 3, 1973	.05	.06	.17	0	0	.10	.12	.11	.08	0		
12	.68	.79	2.15	.30	1.45	0	2.84	.10	0	(.30)		
18	.42	.39	.22	0	.05	0	0	.09	.29	0		
22	0	0	0	0	0	0	0	0	.02	0		
29	0	0	0	0	0	.05	.07	.10	0	0		
July Total	1.15	2.24	2.54	.30	1.50	.15	3.03	.40	.39	.30	1.20	

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY-AUSTIN DISTRICT

STUDY AREA Little Elm Creek near Aubrey, Tex.

RAINFALL DATA SUMMARY

1972 WATER YEAR

RAIN GAGES

Date of storm	1-S	2-R	3-S	4-S	5-S	6-R	7-S	8-S	9-R	10-R	Avg	By
Aug. 9, 1972	.24	.43	0	0	.05	.04	.02	.06	0	0		✓
10	.23	.20	.20	.17	.45	.36	.15	.25	.10	0		
11	1.50	1.32	1.22	1.35	.86	.67	.37	.30	.24	1.17		
13	.11	.06	.08	.10	.27	.05	.30	.26	.55	.05		
14	0	.03	0	0	0	0	0	.29	0	0		
15	0	.06	.35	.65	.57	.08	0	0	0	.47		
18	0	0	0	0	0	.05	0	0	0	0		
22	.10	.15	0	0	0	0	0	0	0	0		
23	0	1.25	0	.35	1.32	.26	.40	.62	0	.22		
25	.42	.30	0	.35	.33	.25	.47	.47	.86	.22		
31	.67	.52	.60	1.20	.92	1.25	.48	1.03	.96	1.12		
August total	3.27	4.32	2.45	4.17	4.77	3.01	2.19	3.28	2.65	2.25	3.34	
Sept 1, 1972	.09	.06	.05	0.85	.06	.08	0	.07	.15	0		
4	.75	1.04	1.02	1.15	1.20	.84	1.43	.90	.81	.89		
9	0	0	0	0	0	.08	0	.95	0	0		
21	.25	.35	.55	.97	1.07	1.80	1.26	3.00	2.63	.82		
22	2.23	2.17	1.25	2.20	3.07	1.90	1.16	3.15	2.21	1.78		
26	0	0	0	.75	0	.40	.52	.08	.12	.63		
29	.11	0	0	0	.21	.05	0	0	.10	0		
September total	3.43	3.62	2.87	5.92	5.61	5.25	4.37	8.15	6.02	4.12	4.94	
1972 water year total											35.38	

INFLOW AND OUTFLOW COMPUTATIONS

Storm period November 17, 1971

Creek subwatershed No. 10 near Granter, Tex. D.A. 2.10 mi²

Little Elm

Date and time	Gage height ft	Storage ac-ft	Time int. hrs	Change in storage ac-ft	Mean G. Ht. ft	Outflow ft ³ /s	Total inflow ft ³ /s	Rainfall on Pool		Net Inflow	
								area in ac	Storage ac-ft	Rate ft ³ /s	Acc in
November 17, 1971											
0000	19.92	156.48			19.92						
1200	19.92	156.48	12	0	19.92	0	0	0			0
1700	19.92	156.48	5	0	19.92	0	0	0			0
30	19.92	156.48	5	0	19.92	0	0	0.03	31.5	1.9	0
45	19.95	157.44	25	96	19.94	0	46.5	40	31.6	50.8	0
1800	20.00	159.02	25	158	19.98	0	76.5	37	31.9	98	47.4
15	20.02	159.67	25	65	20.01	0	31.5	01	32.1	0.3	1.4
30	20.05	160.64	25	97	20.04	0.02	47.0	04	32.3	1.1	5.3
45	20.10	162.26	25	162	20.08	0.09	78.5	42	32.6	1.4	55.2
1900	20.13	163.26	25	100	20.12	2.2	48.6	12	33.0	3.3	16.0
15	20.18	164.92	25	166	20.16	3.9	80.7	33	33.3	9.2	44.5
30	20.32	169.68	25	476	20.25	98	231	94	34.0	2.66	129
45	20.65	181.52	25	1184	20.48	3.8	577	14	35.8	4.2	20.3
50	20.87	189.90	083	838	20.76	9.9	1230	03	38.1	10	14.5
55	21.02	195.83	083	593	20.94	12.4	873	02	39.5	0.7	10.2
2000	21.18	202.39	083	656	21.10	13.5	966	0			
05	21.38	210.95	083	856	21.28	14.6	1260	0			
10	21.60	220.82	083	987	21.49	15.6	1450				
15	21.78	229.27	083	845	21.69	16.6	1240				
30	22.16	248.16	25	1887	21.97	18.0	932				
45	22.42	261.91	25	1375	22.29	19.6	686				
2115	22.68	276.34	50	1443	22.55	20.8	360				
2200	22.85	286.14	75	980	22.76	21.6	180				
2300	23.00	295.02	1	888	22.92	22.3	129				
2400	23.06	298.66	1	364	23.05	22.8	67.0				
			24			89.3308			7.89		
						3.72					
Comp. by:											
Checked by:											

Storm period November 17, 1971

Creek subwatershed No. 10 near Gunter, Tex. D.A. 2.10 mi²

Comp. by:	BBH
Checked by:	JMT

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

TEXAS DISTRICT

WEIGHTED-PRECIPITATION RECORD

[illegible]

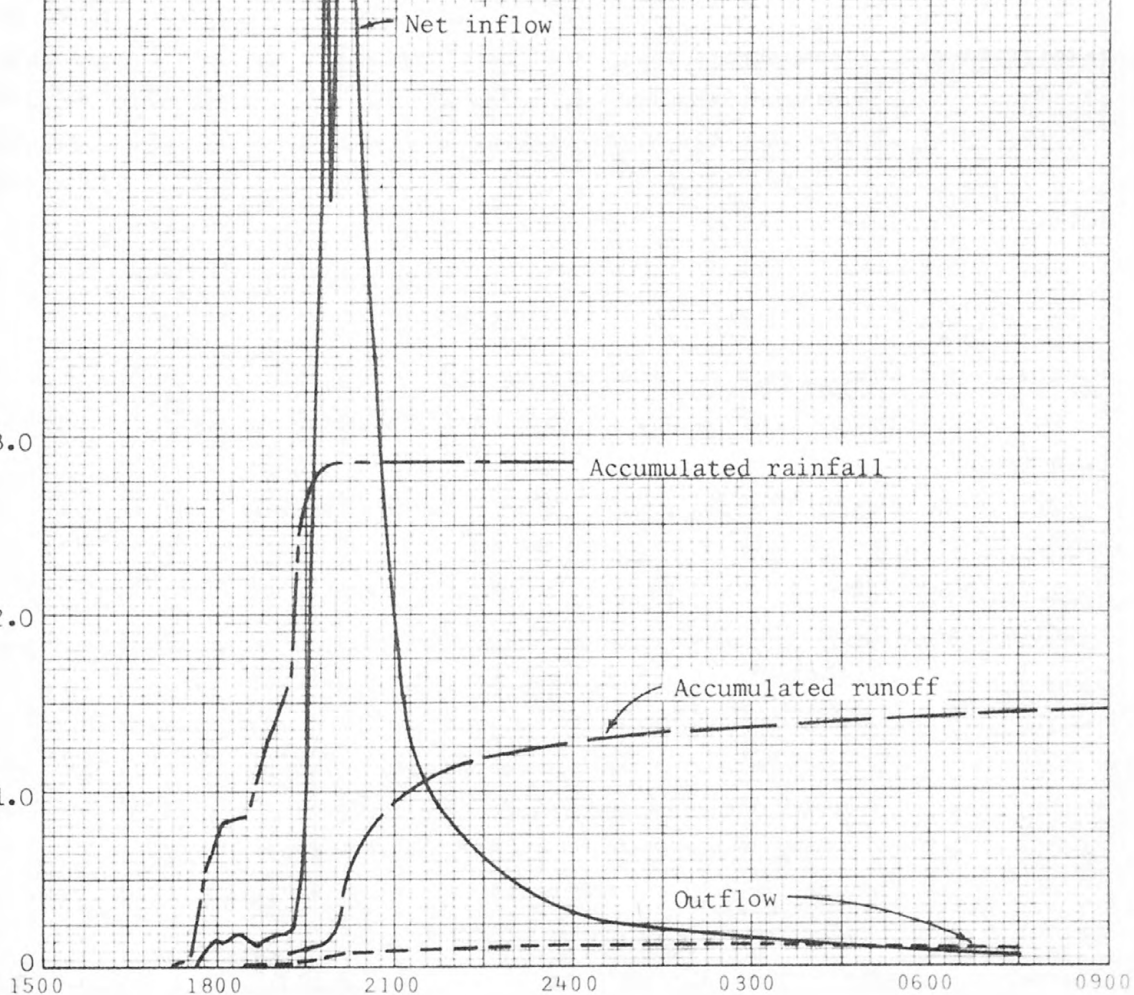
DISCHARGE, IN CUBIC FEET PER SECOND

ACCUMULATED RAINFALL AND RUNOFF, IN INCHES

HYDROGRAPH and MASS CURVES
for
STORM OF NOVEMBER 17, 1971
at
LITTLE ELM CREEK SUBWATERSHED NO. 10
NEAR GUNTER, TEXAS

Drainage Area 2.10 mi²
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT

Storm runoff for period = 165 ac-ft.



November 17

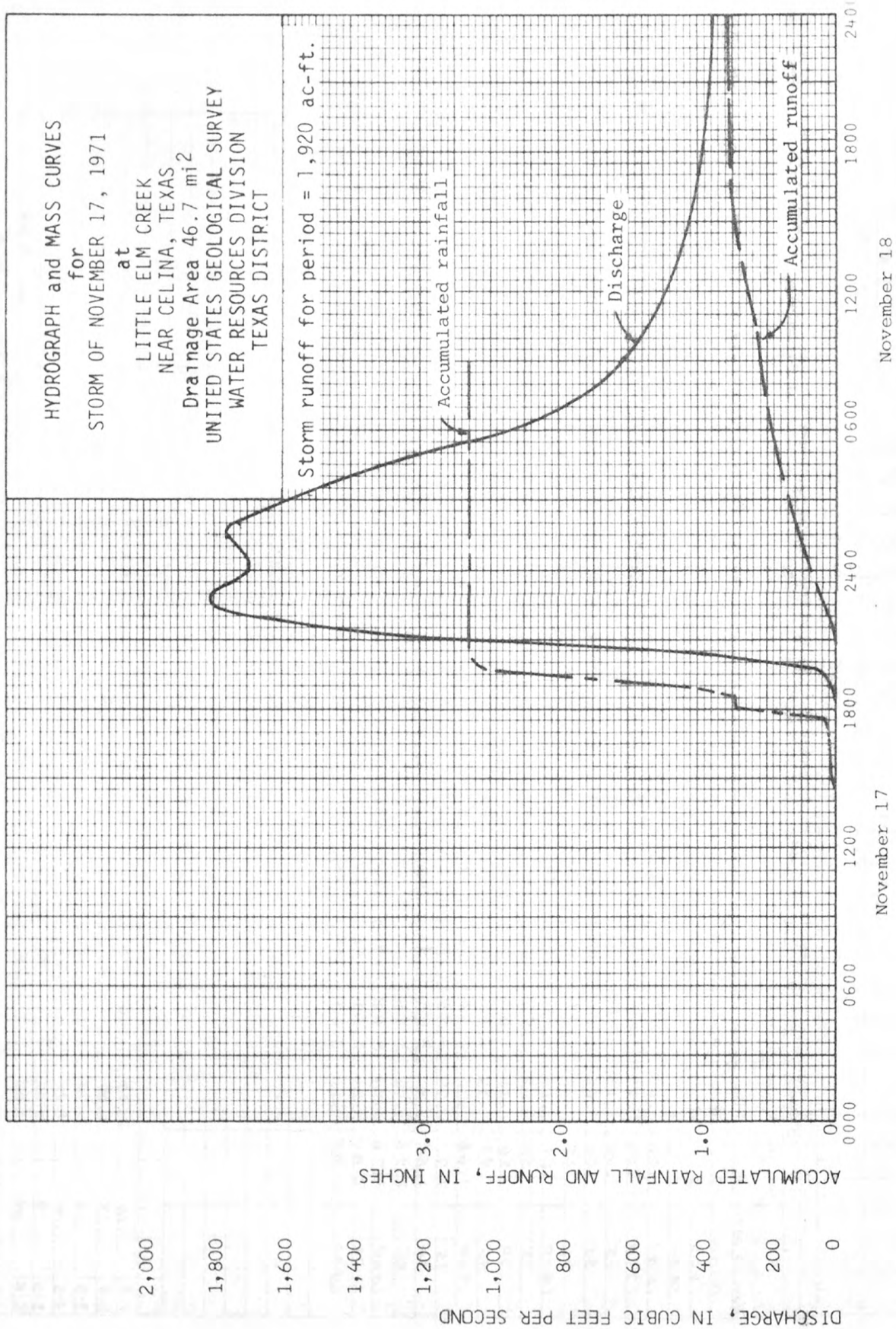
November 18

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION
TEXAS DISTRICT

WEIGHTED-PRECIPITATION RECORD

Study Area Little Elm Creek near Celina, Tex. Date of storm November 17, 1971

[illegible]



UNITED STATES DEPARTMENT OF THE INTERIOR
 GEOLOGICAL SURVEY - TEXAS DISTRICT

RUNOFF COMPUTATIONS

Station Little Elm Creek near Aubrey, Tex.Period of Record November 17, 1971 Drainage Area 75.5 mi.²

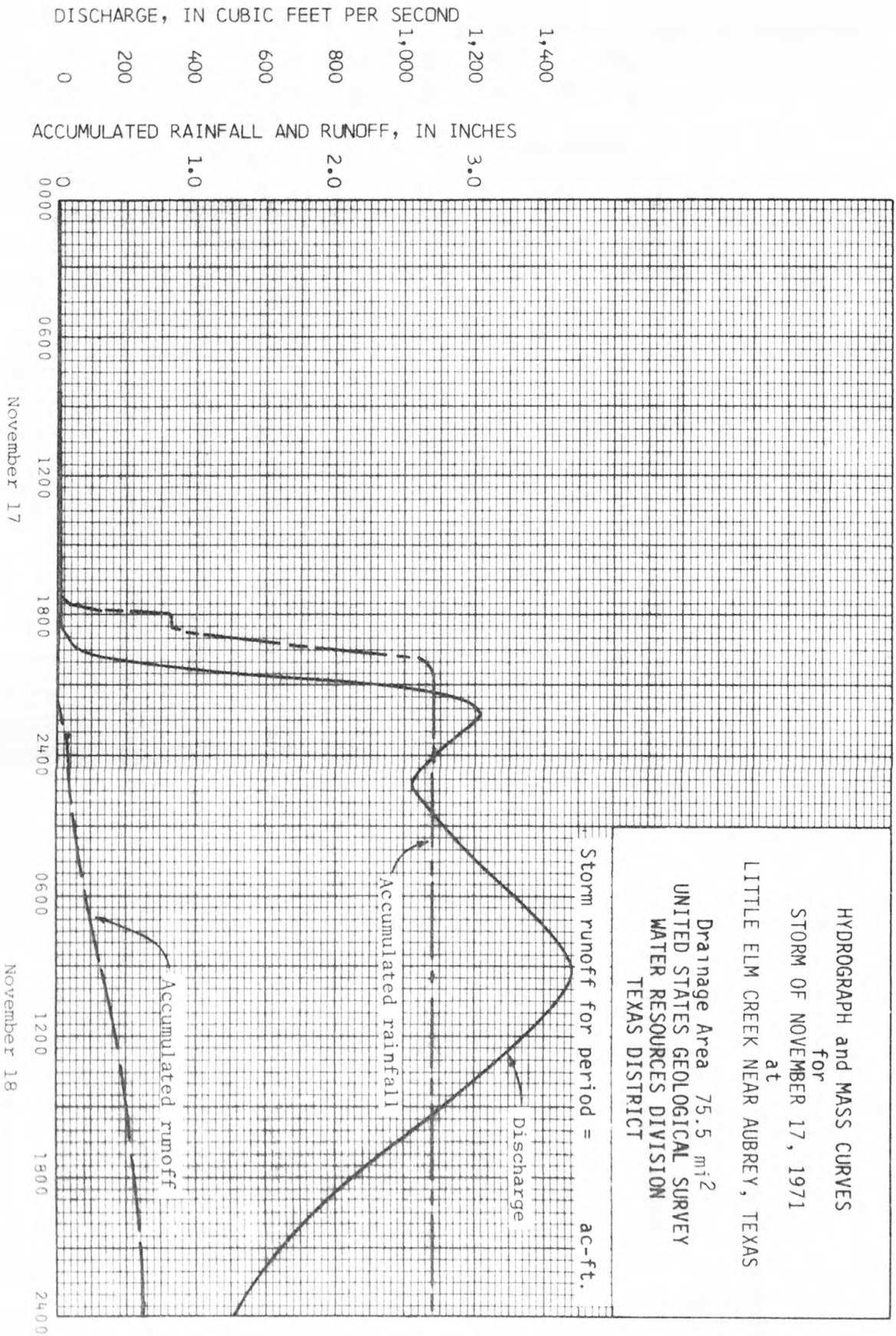
Time	G. Ht. Feet	Sh. Adj.	Discharge			Runoff	
			ft ³ /s	Inc.	In/Hr	Inches	Acc. In.
Nov. 17, 1971							
0000	5.43	+07	14.65	.0003	.0020	.0020	
1300	5.40		13.85	.0003	.0026	.0046	
1700	5.40		13.21	.0003	.0006	.0052	
15	5.40		13.25	.0003	.0001	.0053	
30	5.41	+07	13.25	.0003	.0001	.0054	
45	5.53	+05	15.25	.0003	.0001	.0055	
1800	5.57	+04	16.25	.0003	.0001	.0056	
15	5.59	+04	16.25	.0003	.0001	.0057	
30	5.65	+03	17.25	.0003	.0001	.0058	
45	6.04	+01	28.25	.0006	.0002	.0060	
1900	6.42	0	39.25	.0008	.0002	.0062	
15	6.70		50.25	.0010	.0002	.0064	
30	7.50		85.25	.0017	.0004	.0068	
45	8.85		156.25	.0032	.0008	.0076	
2000	10.60		281.25	.0058	.0014	.0090	
15	11.75		402.25	.0083	.0021	.0111	
30	12.55		525.25	.0108	.0027	.0138	
45	13.35		748.25	.0154	.0038	.0176	
2100	13.85		955.375	.0196	.0074	.0250	
30	14.22		1,170.5	.0240	.0120	.0370	
2200	14.28		1,220.5	.0250	.0125	.0495	
30	14.26		1,200.1	.0246	.0246	.0741	
2400	14.07	0	1,080.75	.0222	.0166	.0907	
			4393.25	24			
			183				
Nov. 18, 1971							
0000	14.07	0	1,080.5	.0222	.0111	.1018	
0100	13.98		1,020.25	.0209	.0209	.0522	.1540
0500	14.33		1,250.35	.0257	.0257	.0900	.2440
0800	14.56		1,460.2	.0300	.0300	.0600	.3040
0900	14.58		1,480.1	.0304	.0304	.0304	.3344
1000	14.57		1,470.3	.0302	.0302	.0906	.4250
1500	14.12		1,110.4	.0228	.0228	.0912	.5162
1800	13.64		858.45	.0176	.0176	.0792	.5954
2400	12.50	0	515.3	.0106	.0106	.0318	.6272
			2612.1	24			
			1,090				
Nov. 19, 1971							
0000	12.50	0	515.15	.0106	.0106	.0159	.6431
0300	12.12		458.3	.0094	.0094	.0282	.6713
0600	11.86		419.45	.0086	.0086	.0387	.7100
1200	11.38		358.6	.0073	.0073	.0438	.7538
1800	11.02		322.6	.0066	.0066	.0396	.7934
2400	10.78	0	298.3	.0061	.0061	.0183	.8117
			9006.24				
			375				
Nov. 20, 1971							
0000	10.78	0	298.6	.0061	.0061	.0366	.8483
1200	10.42		266.12	.0055	.0055	.0460	.9143
2400	9.84	0	223.6	.0046	.0046	.0276	.9419
			6318.24				
			263				

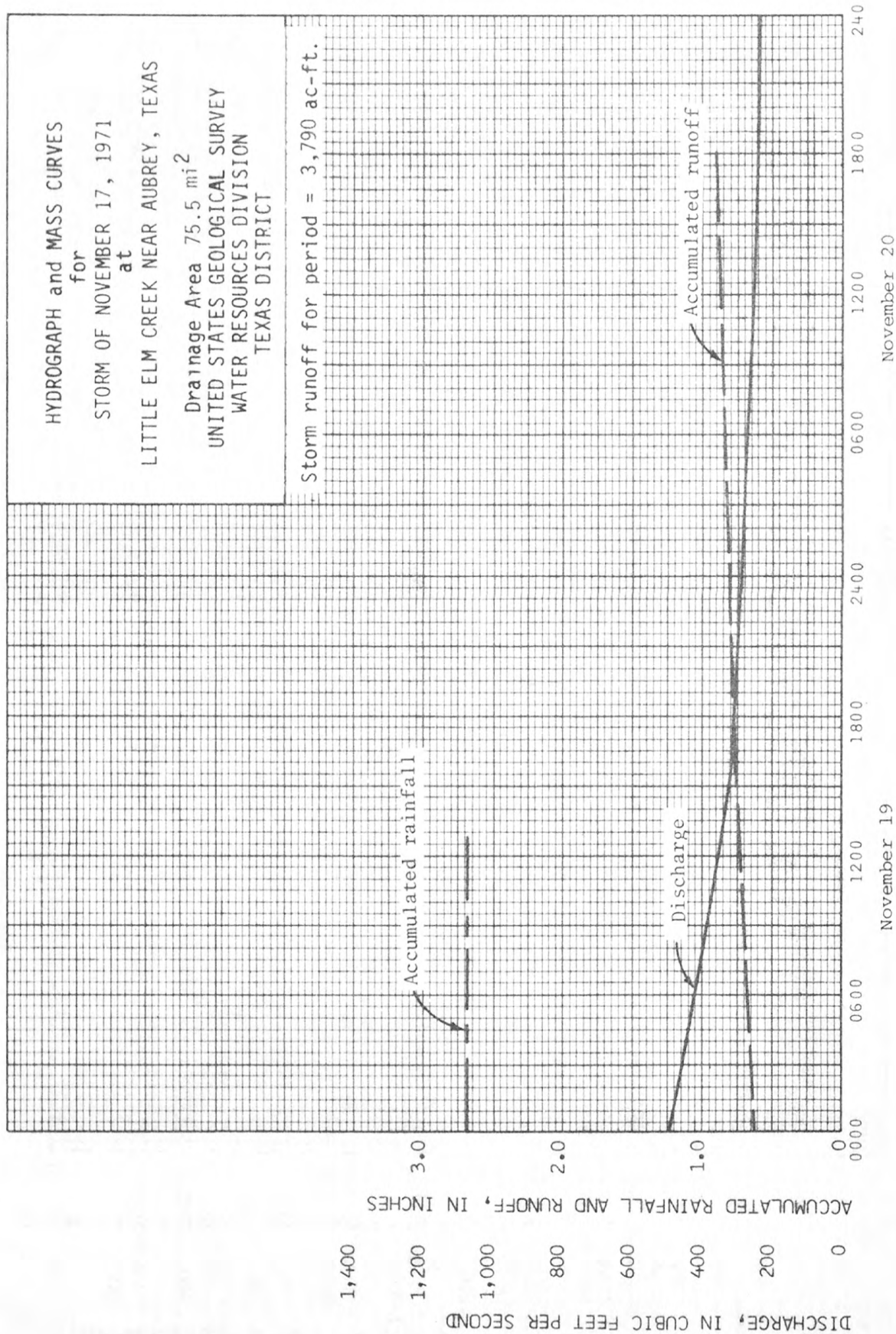
Computed by JMT Date 10/24/72 Checked by RDH Date 12/4/72

WEIGHTED-PRECIPITATION RECORD

STUDY AREA Little Elm Creek near Aubrey, Tex. Date of storm November 17, 1971

[illegible]





UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

RUNOFF COMPUTATIONS

Station Little Elm Creek near Celina, Tex.Period of Record Storm period Dec. 8-10, 1971 Drainage Area 46.7 mi.²

Time	G. Ht. Feet	Sh. Adj.	Discharge			Runoff		Time	G. Ht. Feet	Sh. Adj.	Discharge			Runoff	
			ft ³ /s	Inc.	In./Hr	Inches	Acc. In				ft ³ /s	Inc.	In./Hr	Inches	Acc. In
	Dec. 8, 1971														
0000	6.59	0	218	1.5	.0072	.0108	.0108	0100	11.06	0	1,610	.75	.0534	.0400	.4868
0300	6.48		207	3	.0069	.0207	.0315	0200	10.84		1,410	1	.0468	.0468	.5336
0600	6.35		199	3	.0066	.0198	.0513	0300	10.57		1,170	1	.0388	.0388	.5724
0900	6.20		187	3	.0062	.0186	.0699	0400	10.28		948	1	.0314	.0314	.6038
1200	6.04		174	2	.0058	.0116	.0815	0500	10.02		810	1	.0269	.0269	.6307
1300	6.00		171	.875	.0057	.0050	.0865	0600	9.81		719	1	.0238	.0238	.6545
45	5.96		168	.5	.0056	.0028	.0893	0700	9.63		656	1.125	.0218	.0245	.6790
1400	5.99		170	.375	.0056	.0021	.0914	0815	9.46		605	1	.0201	.0201	.6991
30	6.03		173	.5	.0057	.0028	.0942	0900	9.59		642	.875	.0213	.0186	.7177
1500	6.17		186	.75	.0062	.0046	.0988	1000	10.13		865	1	.0287	.0287	.7464
1600	7.46		300	1	.0100	.0100	.1088	1100	10.57		1,170	1	.0388	.0388	.7852
1700	8.52		418	1	.0139	.0139	.1227	1200	10.88		1,440	1	.0478	.0478	.8330
1800	9.19		538	1	.0178	.0178	.1405	1300	11.24		1,790	1	.0594	.0594	.8924
1900	9.94		773	.75	.0256	.0192	.1597	1400	11.46		2,020	1	.0670	.0670	.9594
30	10.28		948	.5	.0314	.0157	.1754	1500	11.41		1,960	1	.0650	.0650	1.0244
2000	10.66		1,280	.75	.0411	.0308	.2062	1600	11.34		1,890	1.5	.0627	.0940	1.1184
2100	11.07		1,620	1	.0537	.0537	.2599	1800	10.98		1,530	1.5	.0508	.0762	1.1946
2200	11.18		1,730	1	.0574	.0574	.3173	1900	10.73		1,310	1	.0435	.0435	1.2381
2300	11.20		1,750	.75	.0580	.0435	.3608	2000	10.49		1,100	1	.0365	.0365	1.2746
30	11.20		1,750	.5	.0580	.0290	.3898	2100	10.34		988	1	.0328	.0328	1.3074
2400	11.19	0	1,740	.25	.0577	.0144	.4042	2200	10.50		1,170	.75	.0388	.0291	1.3365
			12189.625	24				30	10.88		1,440	.5	.0478	.0239	1.3604
			508					2300	11.11		1,660	.75	.0551	.0413	1.4017
								2400	11.31	0	1,860	.5	.0617	.0308	1.4325
											30999.75	24			
											1,290				
	Dec. 9, 1971														
0000	11.19	0	1,740	.25	.0577	.0144	.4186								
30	11.15	0	1,700	.5	.0564	.0282	.4468								

Computed by JMT Date 10/19/72 Checked by JDB Date 12/4/72

UNITED STATES DEPARTMENT OF THE INTERIOR
 GEOLOGICAL SURVEY - TEXAS DISTRICT

RUNOFF COMPUTATIONS

Station Little Elm Creek near Calina, Tex.Period of Record Storm period Dec. 8-10, 1971 Drainage Area 46.7 mi.²

Time	G. Ht. Feet	Sh. Adj.	Discharge			Runoff	
			ft ³ /s	Inc.	In./Hr.	Inches	Acc. In.
	Dec. 10, 1971						
0000	11.31	0	1,860	.5	.0617	.0308	1.4633
0100	11.50		2,060	.75	.0683	.0512	1.5145
30	11.55		2,120	.375	.0703	.0264	1.5409
45	11.56		2,130	.25	.0707	.0177	1.5586
0200	11.55		2,120	.625	.0703	.0439	1.6025
0300	11.54		2,110	1	.0700	.0700	1.6785
0400	11.44		1,990	2	.0660	.1320	1.8045
0700	10.79		1,360	2.5	.0451	.1128	1.9173
0900	10.32		974	1.5	.0323	.0484	1.9657
1000	10.12		860	1.5	.0285	.0428	2.0085
1200	9.82		723	4	.0240	.0960	2.1045
1800	9.29		563	6	.0187	.1122	2.2167
2400	9.06	0	512	3	.0170	.0510	2.2677
			25174.5	24			
			1,050				
	Dec. 11, 1971						
0000	9.06	0	512	3	.0170	.0510	2.3187
0600	8.82		464	6	.0154	.0924	2.4111
1200	8.60		430	6	.0143	.0858	2.4969
1800	8.53		420	6	.0139	.0834	2.5803
2400	8.48	0	412	3	.0137	.0411	2.6214
			10656	24			
			444				

Computed by JMT Date 10/19/72 Checked by JOB Date 12/4/72

UNITED STATES DEPARTMENT OF INTERIOR
 GEOLOGICAL SURVEY - WATER RESOURCES DIVISION
 TEXAS DISTRICT

 Sheet 1 of 3
 Comp. by: HSB
 Date: 10/11/73
 Check by: JMT
 Date: 10/15/73

WEIGHTED-PRECIPIATION RECORD

Study Area Little Elm Creek near Celina, Tex.		Accumulated Precipitation in Inches for Recording Rain Gages										Date of storm December 8-10, 1971		Accumulated	
Weight Factor	Date & Time	Gage 2-R		Gage 6-R		Gage 10-R		Gage 12-R		Gage 14-R		Gage 16-R		Gage 18-R	
		Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor
	Dec. 8, 1971														
	0002	0	0	0	0									0	0
	1200	0	0	0	0									0	0
	30	.02	.01	.02	.01									.02	.02
	1300	.08	.05	.03	.01									.06	.07
	45	.08	.05	.08	.03									.08	.09
	1400	.15	.09	.17	.06									.15	.16
	15	.30	.19	.22	.08									.27	.29
	30	.31	.19	.23	.09									.28	.30
	1500	.39	.24	.25	.10									.34	.37
	1600	.40	.25	.27	.10									.35	.38
	30	.43	.27	.33	.13									.40	.43
	1700	.56	.35	.44	.17									.52	.56
	30	.60	.37	.50	.19									.56	.61
	45	.63	.39	.53	.20									.59	.64
	1800	.68	.42	.64	.24									.66	.72
	15	.79	.49	.72	.27									.76	.82
	30	.82	.51	.79	.30									.81	.88
	45	.92	.57	.82	.31									.88	.95
	1900	1.08	.67	1.04	.40									1.07	1.16
	15	1.22	.76	1.05	.40									1.16	1.26
	30	1.30	.81	1.06	.40									1.21	1.31
	45	1.35	.84	1.07	.41									1.25	1.36
	2000	1.36	.84	1.07	.41									1.25	1.36
	15	1.40	.87	1.07	.41									1.28	1.39
	30	1.41	.87	1.07	.41									1.28	1.39
	2100	1.41	.87	1.07	.41									1.28	1.39
	2400	1.42	.88	1.13	.43									1.31	1.42
Rain Gage	Weight	Factor	Precipitation	Weight	Factor	Precipitation	Weight	Factor	Precipitation	Weight	Factor	Precipitation	Weight	Factor	Precipitation
1-5	.16		3.69	.59		7-5	.02		4.70	.09					
2-8	.13		3.85	.50		10-R	.12		2.89	.35					
3-5	.20		4.13	.83											
4-5	.14		3.90	.55											
5-5	.19		4.24	.81											
6-R	.04		3.03	.12											
WMR - Sum of Precipitation x Weight Factor												K - WMR / Total Recording Gages - Weighted Precipitation		3.84 / 3.54 = 1.085	
												AMH		3.84	

WEIGHTED-PRECIPITATION RECORD

Study Area Little Elm Creek near Celina, Tex. Date of storm December 8-10, 1971

[illegible]

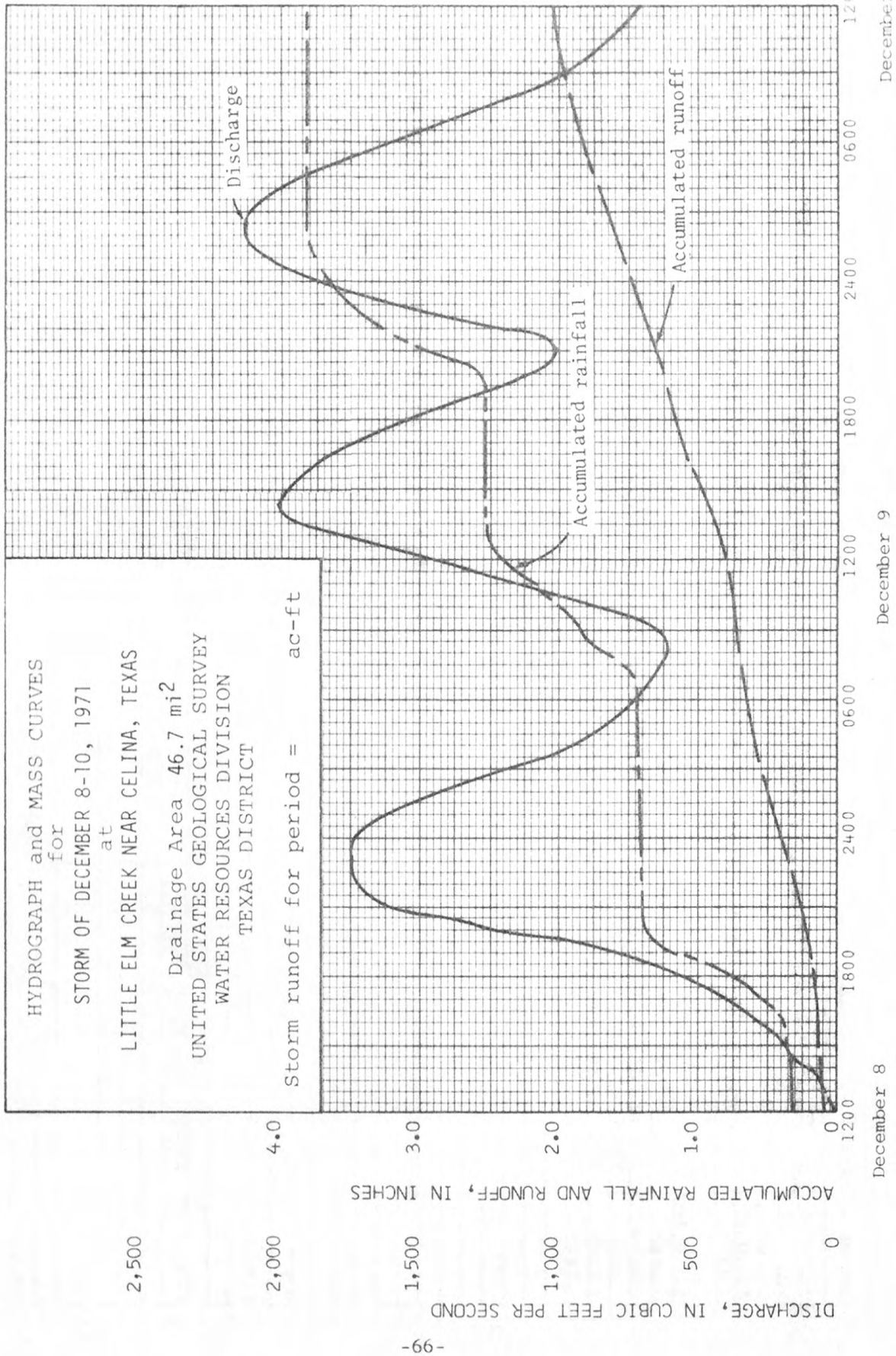
UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION
TEXAS DISTRICT

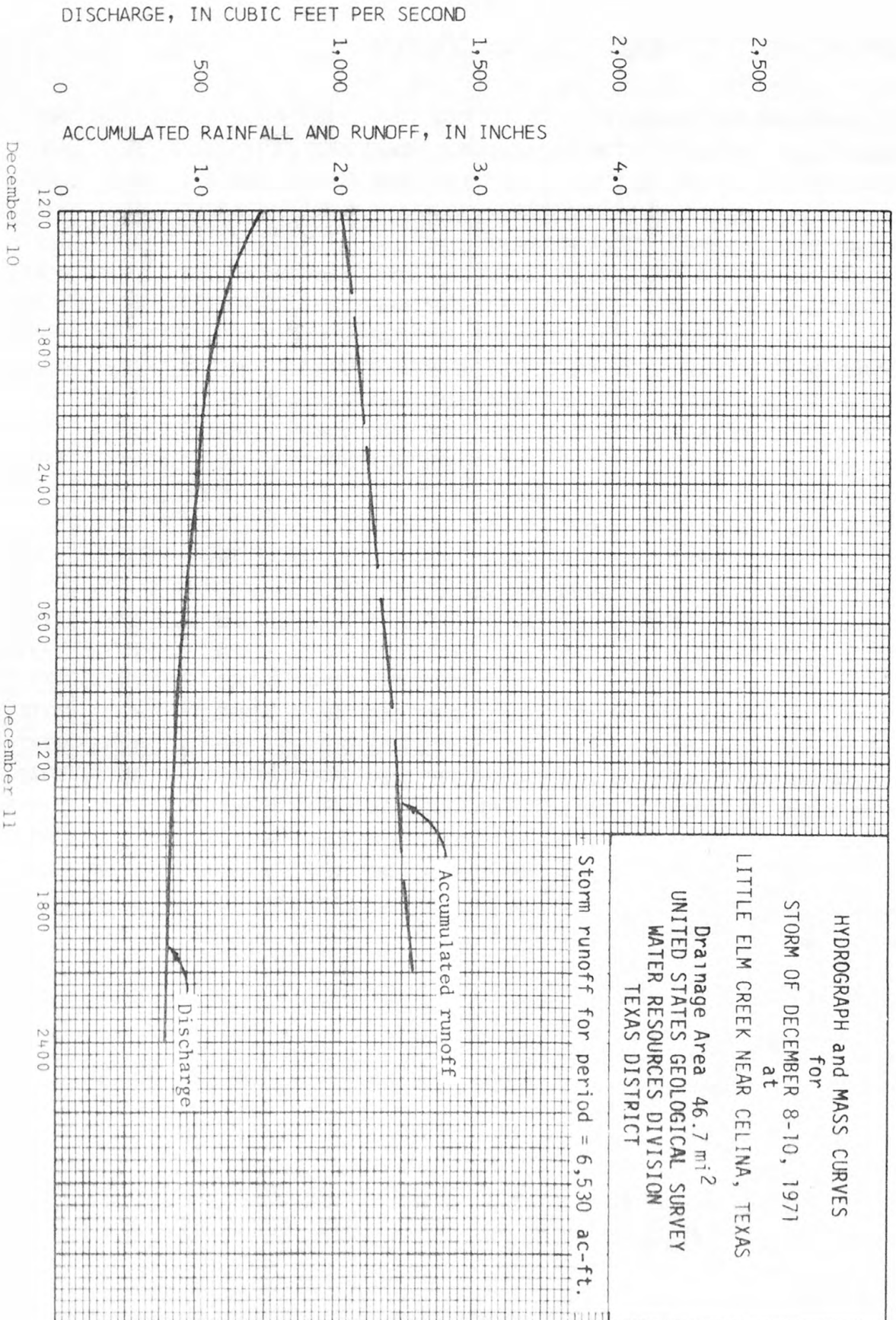
WEIGHTED-PRECIPITATION RECORD

Study Area Little Elm Creek near Celina, Tex.

Date of storm December 8-10, 1971

[illegible]





UNITED STATES DEPARTMENT OF THE INTERIOR
 GEOLOGICAL SURVEY - TEXAS DISTRICT

RUNOFF COMPUTATIONS

Station Little Elm Creek near Aubrey, Tex.Period of Record Storm period Dec 8 to 10, 1971 Drainage Area 75.5 mi.²

Time	G. Ht. Feet	Sh. Adj.	Discharge			Runoff		Time	G. Ht. Feet	Sh. Adj.	Discharge			Runoff	
			ft ³ /s	Inc.	In./Hr	Inches	Acc. In.				ft ³ /s	Inc.	In./Hr.	Inches	Acc. In.
Dec. 8, 1971															
0000	10.90	0	310	7.635	.0063	.00480	.0480	1800	14.82	+42	2,280	2	.0468	.0936	.9368
1515	10.22		250	8	.0057	.0408	.0888	2000	14.90		2,420	1.5	.0497	.0746	1.0114
1600	10.26		253	8.25	.0052	.0046	.0934	2100	14.92		2,460	1	.0505	.0505	1.0619
1700	10.45		268	1.5	.0055	.0082	.1016	2200	14.95		2,510	1	.0515	.0515	1.1134
1900	11.87		420	15	.0086	.0129	.1145	2300	15.01		2,630	1	.0540	.0540	1.1674
2000	12.82		585	1	.0120	.0120	.1265	2400	15.06	+42	2,740	.5	.0562	.0281	1.1955
2100	13.34		744	1	.0153	.0153	.1418				49,280	24			
2200	13.51		804	1	.0165	.0165	.1583				2,050				
2300	13.58		832	1	.0171	.0171	.1754	Dec. 10, 1971							
2400	13.69	0	880	.5	.0181	.0090	.1844	0000	15.06	+42	2,740	.5	.0562	.0281	1.2236
			9022.125	24				0100	15.08		2,780	1	.0571	.0571	1.2807
			376					0200	15.06		2,740	1	.0562	.0562	1.3369
Dec. 9, 1971								0300	15.05		2,720	1	.0558	.0558	1.3927
0000	13.69	0	880	.5	.0181	.0090	.1934	0400	15.01		2,630	1	.0540	.0540	1.4467
0100	13.86	0	960	1	.0197	.0197	.2131	0500	15.01		2,630	1.5	.0540	.0810	1.5277
0200	14.11	+42	1,430	1	.0293	.0293	.2424	0700	14.99		2,590	1.5	.0532	.0798	1.6075
0300	14.31		1,630	1	.0335	.0335	.2759	0800	14.99		2,590	1	.0532	.0532	1.6607
0400	14.47		1,810	1	.0371	.0371	.3130	0900	14.99		2,590	1.5	.0532	.0798	1.7405
0500	14.57		1,920	2	.0394	.0788	.3918	1100	14.93		2,480	2	.0569	.1018	1.8423
0800	14.63		2,000	2.5	.0410	.1025	.4943	1300	14.78		2,210	1.5	.0454	.0681	1.9104
1000	14.65		2,020	1.5	.0415	.0622	.5565	1400	14.69		2,080	1	.0427	.0427	1.9531
1100	14.70		2,090	1	.0429	.0429	.5994	1500	14.57		1,920	1	.0394	.0394	1.9925
1200	14.74		2,150	2	.0441	.0882	.6876	1600	14.45		1,790	1.5	.0367	.0550	2.0475
1500	14.75		2,160	2	.0443	.0886	.7762	1800	14.15	+42	1,470	2	.0302	.0604	2.1079
1600	14.76	+42	2,180	1.5	.0447	.0670	.8432	2000	13.84	0	950	2	.0195	.0390	2.1469
(continued on next page)															

Computed by JMT Date 1/22/73 Checked by BBH Date 1/22/73

UNITED STATES DEPARTMENT OF THE INTERIOR
 GEOLOGICAL SURVEY - TEXAS DISTRICT

RUNOFF COMPUTATIONS

Station Little Elm Creek near Aubrey, Tex.Period of Record Storm period Dec 8-10, 1971 Drainage Area 75.5 mi.²

Time	G. Ht. Feet	Sh. Adj.	Discharge			Runoff	
			ft ³ /s	Inc.	In/Hr	Inches	Acc. In.
Dec. 10, 1971 (cont.)							
2200	13.53	0	812	2	.0167	.0334	2.1803
2400	13.53	0	706	1	.0145	.0145	2.1948
			48675	24			
			3030				
Dec. 11, 1971							
0000	13.23	0	706	1.5	.0145	.0218	2.2166
0300	12.85		593	3	.0122	.0366	2.2532
0600	12.62		539	4.5	.0111	.0500	2.3032
1200	12.34		491	6	.0101	.0606	2.3638
1800	12.15		462	6	.0095	.0570	2.4208
2400	12.02	0	443	3	.0091	.0273	2.4481
			12310.524				
			513				

Computed by JMT Date 1/22/73 Checked by BBH Date 1/22/73

UNITED STATES DEPARTMENT OF INTERIOR
 GEOLOGICAL SURVEY - WATER RESOURCES DIVISION
 TEXAS DISTRICT

WEIGHTED-PRECIPIATION RECORD

Study Area Little Elm Creek near Aubrey, Tex. Date of storm December 8-10, 1971

Weight Factor Date & Time	Accumulated Precipitation in Inches for Recording Rain Gages				Weighted Precipitation			
	Gage 2-R Recorded x Factor	Gage 6-R Recorded x Factor	Gage 9-R Recorded x Factor	Gage 10-R Recorded x Factor	Gage Recorded x Factor	Recording Gages All Gages	Rec. Gages x K	All Gages
<u>Dec. 8, 1971</u>								
0000	0	0	0	0	0	0	0	0
1200	0	0	0	0	0	0	0	0
30	.02	.01	.03	0		.02	.02	.02
1300	.08	.04	.05	0		.05	.05	.06
45	.08	.04	.10	.01		.09	.09	.10
1400	.15	.07	.11	.01		.16	.16	.18
15	.30	.14	.14	.01		.25	.25	.28
30	.31	.14	.15	.01		.25	.25	.28
1500	.39	.18	.18	.02		.31	.31	.34
1600	.40	.18	.18	.02		.32	.32	.35
30	.43	.19	.23	.02		.36	.36	.40
1700	.56	.26	.38	.03		.49	.49	.54
30	.60	.27	.51	.04		.54	.54	.60
45	.63	.29	.53	.05		.58	.58	.64
1800	.68	.31	.63	.06		.66	.66	.72
15	.79	.36	.72	.06		.75	.75	.83
30	.82	.38	.79	.07		.81	.81	.90
45	.92	.42	.88	.07		.86	.86	.95
1900	1.08	.49	1.03	.09		1.05	1.05	1.16
15	1.22	.56	1.05	.09		1.13	1.13	1.25
30	1.30	.60	1.08	.09		1.17	1.17	1.30
45	1.35	.62	1.07	.10		1.21	1.21	1.34
2000	1.36	.62	1.07	.10		1.21	1.21	1.34
15	1.40	.64	1.07	.10		1.23	1.23	1.36
30	1.41	.65	1.07	.10		1.24	1.24	1.38
2100	1.41	.65	1.07	.10		1.24	1.24	1.38
2400	1.42	.65	1.13	.10		1.26	1.26	1.40
Rain Gage	Weight Factor	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation x Weight Factor	Weight Factor	Precipitation	Precipitation x Weight Factor
1-S	.10	3.69	7-S	.11	4.70	.52		
2-R	.09	3.85	8-S	.12	3.59	.43		
3-S	.13	4.13	9-R	.03	3.15	.09		
4-S	.09	3.90	10-R	.08	2.69	.23		
5-S	.13	4.24			7.61	3.79		
6-R	.12	3.03						
WMR - Sum of Precipitation x Weight Factor			K - WMR					
					Total Recording Gages Weighted Precipitation		3.79/1.25 = 1.109	

WEIGHTED-PRECIPITATION RECORD

Study Area Little Elm Creek near Aubrey, Tex Date of storm December 8-10, 1971

[illegible]

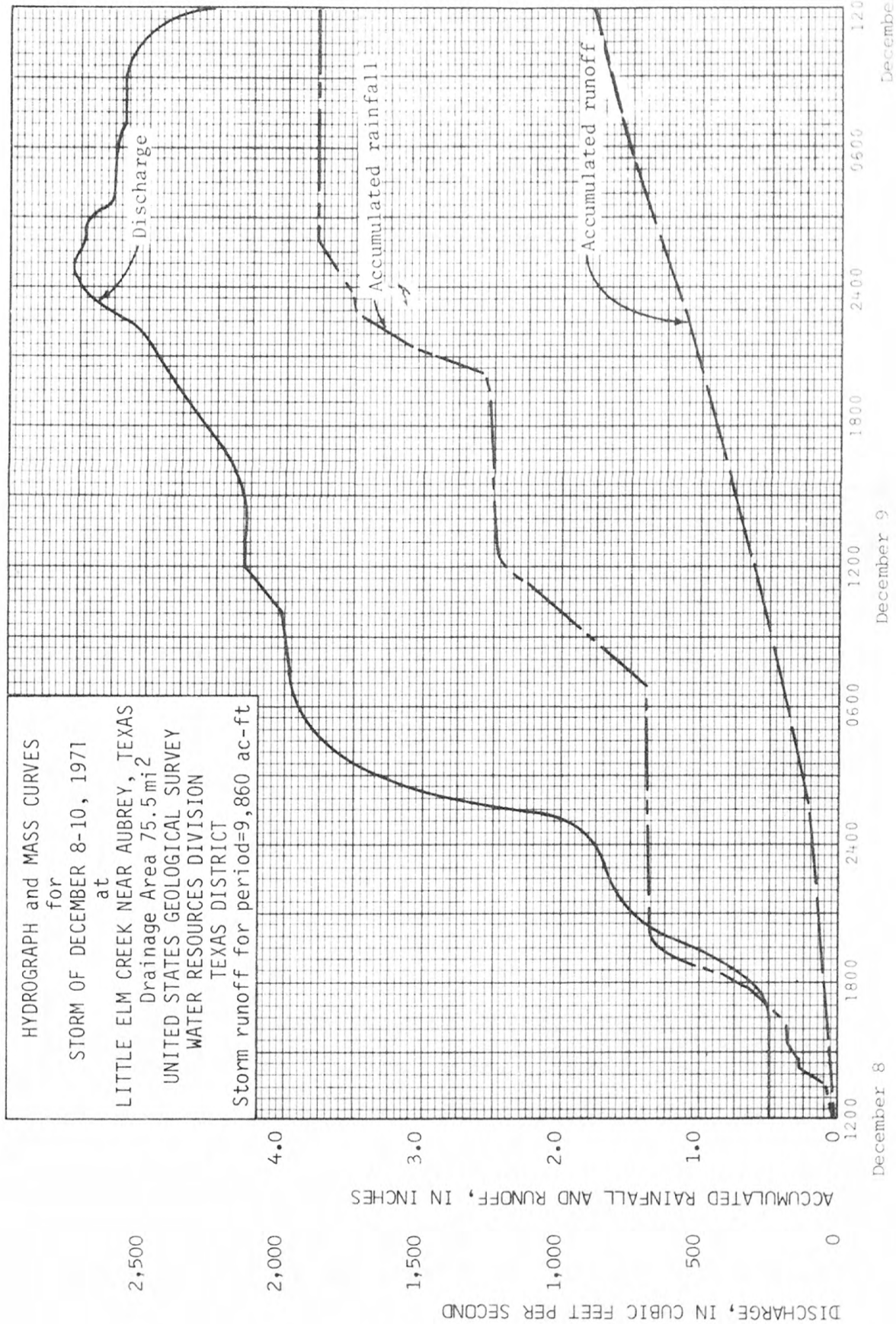
Comp. by BBH
Date 10/11/73
Check by JmT
Date 10/18/73

WEIGHTED-PRECIPITATION RECORD

Study Area Little Elm Creek near Aubrey, Tex.

Date of storm December 8-10, 1971

[illegible]



HYDROGRAPH and MASS CURVES

for
STORM OF DECEMBER 8-10, 1971

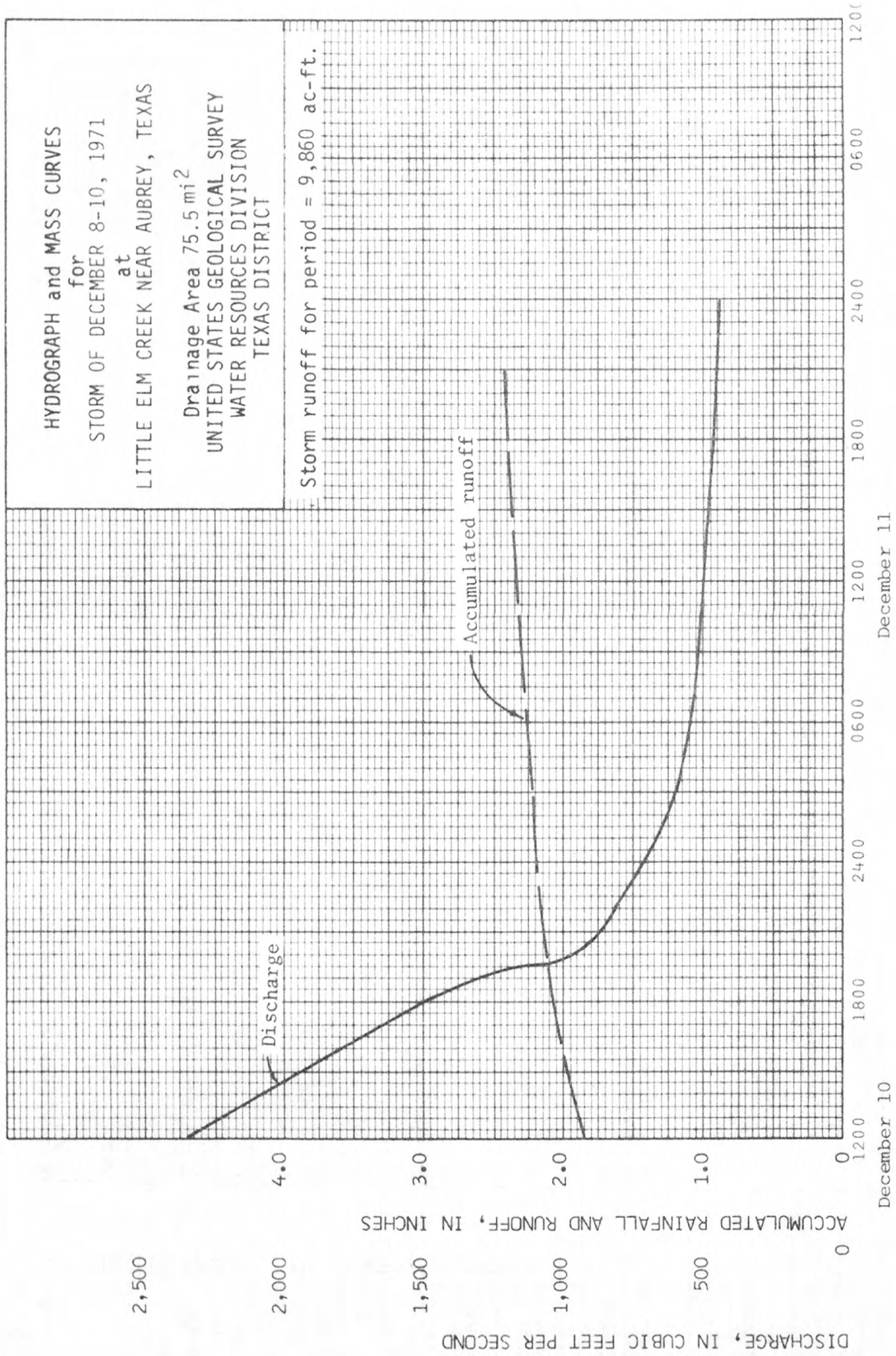
at

LITTLE ELM CREEK NEAR AUBREY, TEXAS

Drainage Area 75.5 mi²

UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT

Storm runoff for period = 9,860 ac-ft.



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