Hydrologic Data for Little Elm Creek, Trinity River Basin Texas, 1976

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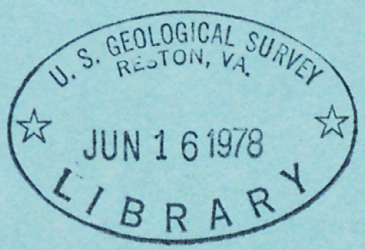

Prepared in cooperation with the city of Dallas and the Texas Department of Water Resources

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By R. M. Slade, Jr., T. H. Hays, and C. T. Schoultz

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April 1978

UNITED STATES DEPARTMENT OF THE INTERIOR

CECIL D. ANDRUS, Secretary

GEOLOGICAL SURVEY

H. William Menard, Director

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U.S. Geological Survey
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Austin, TX 78701

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TRINITY RIVER BASIN, TEXAS

1976

By

R. M. Slade, Jr., T. H. Hays, and C. T. Schoultz
U.S. Geological Survey

INTRODUCTION

History of Small Watershed Projects in Texas

The U.S. Soil Conservation Service is actively engaged in the implementation 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 that approximately 3,500 floodwater-retarding structures would be physically and economically feasible in Texas. As of September 30, 1976, 1,673 (corrected figure) 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 (1976) being made in two areas (fig. 1). Data collection in ten study areas has been completed. These studies are being made in cooperation with the Texas Department of Water Resources, 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. A summary of the development of the floodwater-retarding structures on each study area as of September 30, 1976, is shown in table 1.

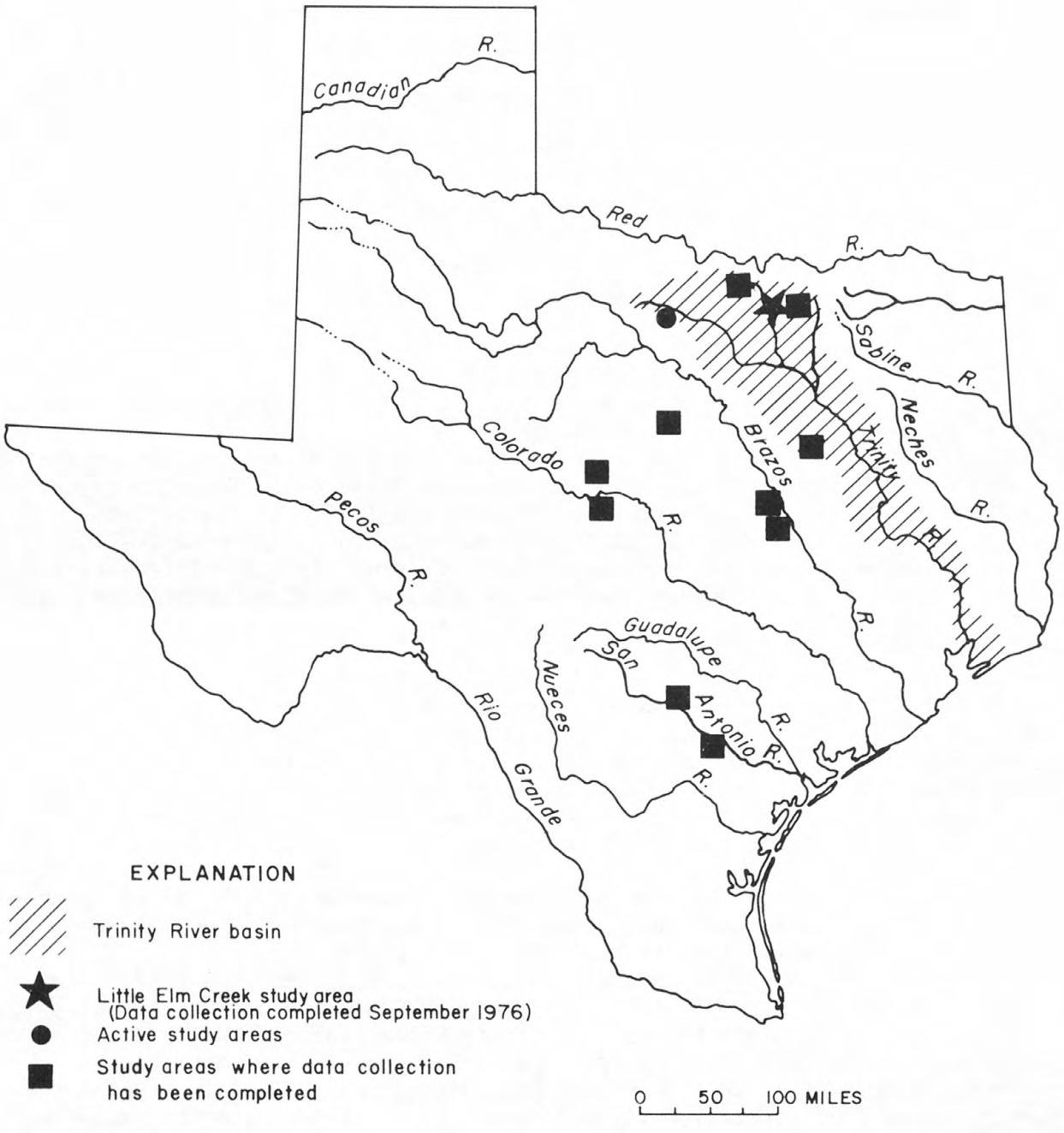

FIGURE 1.— Location of the Little Elm Creek study area and other study areas

Table 1.--Small watershed study areas in Texas as of September 30, 1976

Watershed	Drainage area above stream-gaging station (mi^2)	Data collection period	Floodwater-retarding structures above stream-gaging station	Period the structures were built
Trinity River basin:				
North Creek near Jacksboro	21.6	Aug. 1956 to	5	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 Sept. 1976	17	1966, 70-71, 76
Honey Creek near McKinney	39.0	July 1951 to Sept. 1971	14	1951-57, 69, 73
Pin Oak Creek near Hubbard	17.6	Sept. 1956 to Sept. 1972	6	1962-63, 65
Brazos River basin:				
Green Creek near Alexander	46.1	Oct. 1954 to Sept. 1971	8	1954-56
Cow Bayou at Mooreville	85.0	Sept. 1954 to Sept. 1975	26	1955-58, 64-65
1/Little Pond Creek at Burlington	22.2	Oct. 1962 to Sept. 1972	None	-
1/North Elm Creek near Cameron	48.6	Oct. 1962 to Sept. 1972	None	-
Colorado River basin:				
Mukewater Creek at Trickham	70.0	Aug. 1951 to Sept. 1973	6	1961-62, 65
Deep Creek near Mercury	43.9	June 1951 to Sept. 1971	5	1951-53
San Antonio River basin:				
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	11	1954-58, 73

1/ Adjacent watersheds; considered as one study area.
a/ 8.43 mi^2 above Escondido Creek subwatershed No. 11 (Dry Escondido Creek) near Kenedy not included in this total.

A complete tabulation of data for the 1976 water year for the Trinity River basin is given in Water resources data for Texas, 1976, TX-76-1.

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

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

From		Multiply by	To obtain	
Unit	Abbreviation		Unit	Abbreviation
inch	--	25.4	millimeter	mm
foot	--	.3048	meter	m
mile	--	1.609	kilometer	km
square mile	mi^2	2.590	square kilometer	km^2
cubic foot per second	ft^3/s	.02832	cubic meter per second	m^3/s
foot per mile	ft/mi	.189	meter per kilometer	m/km
acre-foot	--	1233	cubic meter	m^3
		.001233	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 groundwater recharge facilities.

3. To determine the effect of the structures on the sediment yield at downstream points.

4. To develop relationships between maximum rates or volumes of runoff with rainfall in small natural watersheds.

5. To develop a stream-system model for basins with 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 seventeenth and last 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 1976 water year for the 75.5-mi^2 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. Investigations in this watershed were discontinued on September 30, 1976.

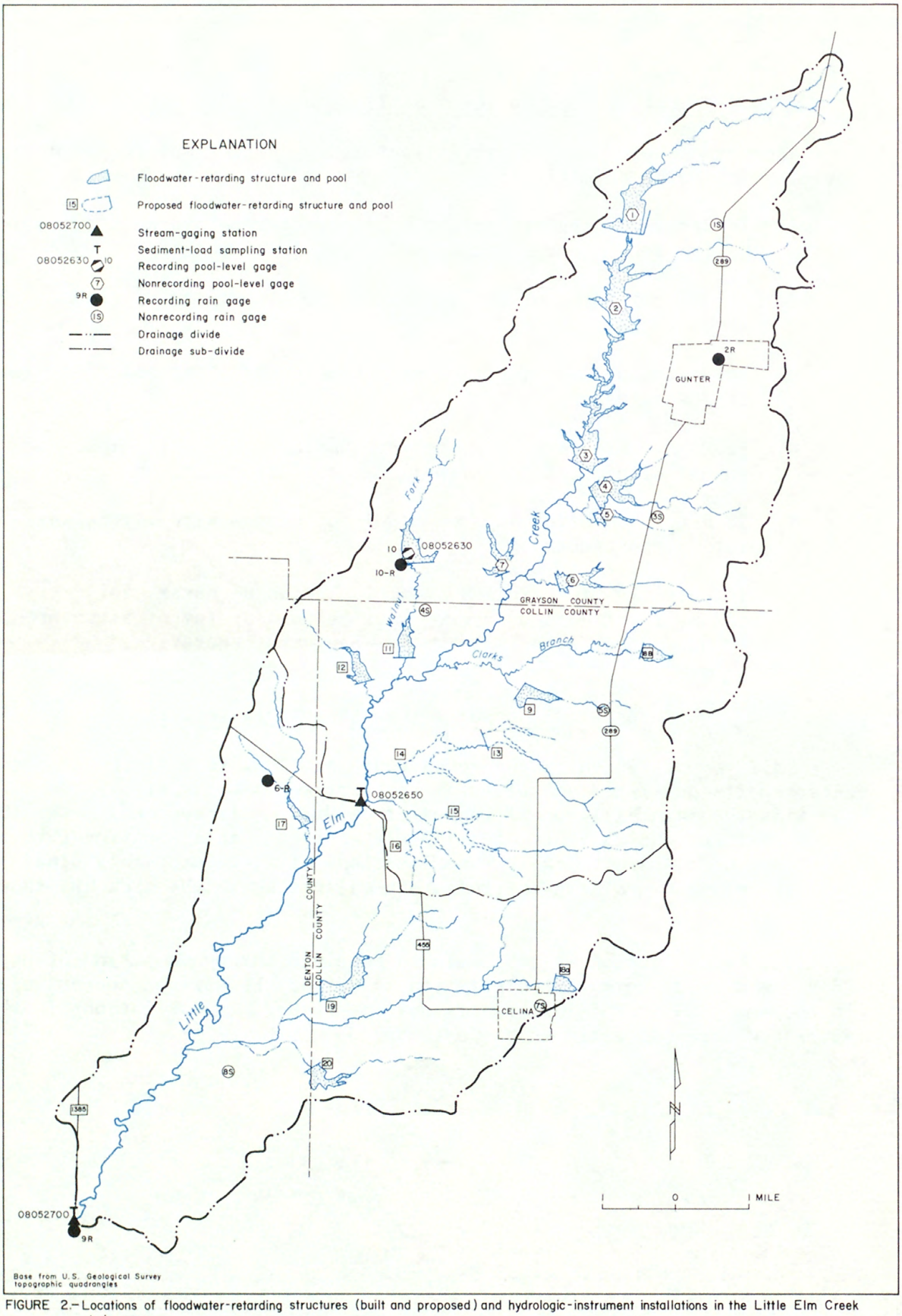

FIGURE 2.—Locations of floodwater-retarding structures (built and proposed) and hydrologic-instrument installations in the Little Elm Creek study area

DESCRIPTION OF THE WATERSHED

The headwaters of Little Elm Creek originate about 5 miles 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 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. 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 mi^2. The total drainage area above the Celina stream-gaging station is 46.7 mi^2.

The length of the watershed is about 19 miles and the maximum width is about 7 miles. The watershed slopes from east to west; the eastern divide is 60 to 80 feet higher than the western divide. The main channel divides the watershed into unequal 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 above mean sea level at the headwater divide to 540 feet above mean sea level at the Aubrey stream-gaging station. In the 1-mile reach immediately downstream from the divide, the elevation decreases 80 feet. The streambed has an average slope of 7 ft/mi between river miles 21 and 27, measured upstream from the Aubrey stream-gaging station. Between river miles 14 and 21, the average slope of the streambed is 4 ft/mi, and between river miles 0 to 14, the average slope is 2.5 ft/mi.

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, the remainder is in the Forested Coastal Plain area. The Blackland soils are fine to medium textured and light gray to very dark brown in color. The Forested Coastal Plain soils are medium to course textured and 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 (1941-70) rainfall at Sherman (15 miles northeast) is 39.83 inches 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 below the emergency spillway and control runoff from 28.4 mi^2, 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 below the emergency spillway and control runoff from 35.7 mi^2, 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 2 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.

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

Site number	Drainage area (mi^2)	Date dam completed	Date gage established	Datum of gage above mean sea level, datum of 1929	Emergency spillway			Drop inlet			Diameter or dimensions of opening in orifice plate (in)	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 constriction 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	1,420	2.5x8.3	17.00	351	None	(4) 12x18	15.47	251	"	--	12	7.92	38	30	--	10.2-23.7
3	7.27	6-10-66	7-14-66	632.80	335	24.8	1,840	3.5x11	16.00	337	"	a/ b/	12.00 14.00	118 203	"	--	12	7.50	32	42	--	8.1-27.1
4	3.33	8-11-66	9-13-66	639.60	350	29.9	1,330	2x6	17.00	265	16x14	(2) 10x12	16.12	228	"	--	12	7.50	35	24	--	7.0-30.5
5	.50	3-16-66	4- 8-66	641.20	45	28.4	204	2x4	18.00	54	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	"	--	--	"	--	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	"	--	--	"	--	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	--	"	--	--	12x36		12	7.77	15	18	9.63	6.8-32.7
9	.58	2-17-71	6- 8-71	638.25	60	23.2	220	2x4	16.25	55	--	"	--	--	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	--	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	--	"	--	--	12x22.75		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	--	"	--	--	12x24		12	7.74	43	18	7.75	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	9.38	3.4-30.5
18-A	1.05	8-17-70	8-13-70	712.42	100	30.2	524	2x4	15.58	111	--	"	--	--	12x36	7-71	12	4.08	14	24	7.75	3.4-37.3
19	2.01	8-17-70	8-14-70	87.34	100	19.4	769	2x4	10.76	168	--	"	--	--	12x36	7-71	12	4.26	40	24	10.38	6.8-23.7
20	2.06	8-17-70	8-13-70	88.51	100	27.5	809	2x4	15.59	150	--	"	--	--	12x36	7-71	12	4.09	6.0	24	8.50	6.8-30.5

a/ Twelve 7x8-inch portholes
b/ Twelve 7x8-inch portholes

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 upstream from each streamflow station. The station near Aubrey was established on June 8, 1956; and the Celina station was established on February 21, 1966.

SUMMARY OF DATA FOR THE 1976 WATER YEAR

The average rainfall above the stream-gaging station Little Elm Creek near Aubrey (study area) during the 1976 water year was 31.43 inches, or 84 percent of the 20-year (1957-76) average of 37.45 inches for the area. Monthly rainfall totals ranged from 0.08 inch in January to 7.73 inches in May. The weighted-mean rainfall above the stream-gaging station Little Elm Creek near Celina was 32.11 inches. The weighted-mean rainfall above Little Elm Creek subwatershed No. 10 during the 1976 water year was 30.90 inches.

Runoff above site 10 was 458 acre-feet, which represents an equivalent depth of 4.09 inches. The yearly mean discharge was 12.8 ft^3/s at the stream-gaging station near Celina and 20.4 ft^3/s at the stream-gaging station near Aubrey. At the Celina station, the annual runoff was 9,260 acre-feet or 3.72 inches. The runoff for the year at the Aubrey station was 14,820 acre-feet or 3.68 inches.

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 period selected. These storms will be used later in calibrating a watershed response model to show the effects of floodwater-retarding structures.

Three storm periods were selected for detailed computations. These computations include a time breakdown for rainfall and discharge with hydrographs and mass curves drawn for illustrations. The storms selected for the Celina and Aubrey stations occurred April 18-20, 1976, May 26, 1976, and May 30-June 1, 1976. The storms selected for site 10 occurred April 19-20, 1976 and May 6, 1976. A summary of rainfall-runoff data for the selected storms is shown in tables 3 and 4.

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY-TEXAS DISTRICT

ANNUAL STORM RAINFALL-RUNOFF SUMMARY DATA

Table 3.--Storm rainfall-runoff data, Little Elm Creek Subwatershed No. 10 near Gunter, Tex., 1976 water year

Date of Storm	Rainfall (inches)					Runoff (inches)	Ratio runoff to rainfall	Maximum discharge (ft^3/s)
	Duration (hours)	Total	Maximum increment					
			15-minute	30-minute	60-minute			
Little Elm Creek subwatershed No. 10 near Gunter Tex. (Drainage area 2.10 mi^2)								
April 19-20, 1976	8.0	2.13	1.01	1.36	1.60	1.27	0.60	1,020
May 6, 1976	4.0	1.04	.31	.43	.49	.54	.52	217

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY-TEXAS DISTRICT

ANNUAL STORM RAINFALL-RUNOFF SUMMARY DATA

Table 4.--Storm rainfall-runoff data, at streamflow stations, 1976 water year

Date of Storm	Rainfall (inches)					Runoff (inches)	Ratio runoff to rainfall	Maximum discharg (ft^3/s
	Duration (hours)	Total	Maximum increment					
			15-minute	30-minute	60-minute			
Little Elm Creek near Celina, Tex.								
Drainage area, 46.7 mi^2 of which 28.4 mi^2 is above floodwater-retarding structures								
April 18-20, 1976	26	3.32	0.65	1.08	1.34	1.00	0.30	1,140
May 26, 1976	2.0	.90	.40	.64	.82	.35	.39	1,060
May 30-June 1, 1976	30	1.84	.45	.73	.92	.55	.30	675
Little Elm Creek near Aubrey, Tex.								
Drainage area, 75.5 mi^2 of which 35.7 mi^2 is above floodwater-retarding structures								
April 18-20, 1976	26	3.15	.57	.97	1.21	.72	.23	807
May 26, 1976	2.8	.95	.33	.58	.84	.58	.61	1,720
May 30-June 1, 1976	30	2.07	.50	.81	1.02	.81	.39	1,140

COMPILATION OF DATA

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

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 (2.6 km) upstream from mouth, and 4.7 miles (7.6 km) southwest of Gunter.

DRAINAGE AREA.--2.10 mi^2 (5.44 km^2).

PERIOD OF RECORD.--April 1966 to September 1976 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 615.51 ft (187.607 m) above mean sea level (Soil Conservation Service bench mark).

AVERAGE INFLOW.--10 years, 1,070 acre-ft/yr (1.32 hm^3/yr).

AVERAGE OUTFLOW.--10 years, 976 acre-ft/yr (1.20 hm^3/yr).

EXTREMES.--Current year: Maximum outflow, 22.7 ft^3/s (0.64 m^3/s) Apr. 20 (gage height, 22.48 ft or 6.852 m); no outflow for many days. Maximum inflow, 1,020 ft^3/s (28.9 m^3/s), average for 5-minute interval, Apr. 19, computed and adjusted as explained below; no inflow at times.

Period of record: Maximum outflow, 31.9 ft^3/s (0.90 m^3/s) Apr. 30, 1966, and Oct. 31, 1974; maximum gage height, 28.24 ft (8.608 m) Oct. 31, 1974; no flow at times each year. Maximum inflow, 3,240 ft^3/s (91.8 m^3/s), 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 good. Dam was completed Mar. 16, 1966, and storage began in April 1966. Pool is formed by rolled earthfill dam 1,588 ft (484 m) long, with a 130-foot-wide (40-meter) spillway at left end of dam with crest at gage height 29.2 ft (8.90 m). Outlet structure is a 2.0- by 4.0-foot (0.6- by 1.2-meter) uncontrolled concrete drop-inlet structure with crest at gage height 20.00 ft (6.096 m) and connected to a 24-inch (610-millimeter) concrete pipe with invert at gage height 13.0 ft (3.96 m). There is also a 12-inch (305-millimeter) controlled slide gate used as a water-supply outlet that is connected to the drop inlet at gage height 13.5 ft (4.11 m). Pool capacity is 868 acre-ft (1.07 hm^3) at spillway crest, 159 acre-ft (0.196 hm^3) at crest of drop inlet, and 40 acre-ft (0.049 hm^3) 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 basic-data report.

REVISIONS.--WSP 2122: Drainage area.

POOL WATER BUDGET, IN ACRE-FEET, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976

	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.
Inflow 1/	0	2.6	1.6	0	0.3	1.0	211	183	26.9	23.8	2.3	6.0
Outflow	0	0	0	0	0	0	148	162	39.8	11.4	0	0
(+)	-10.6	-4.2	-1.8	-4.5	-5.2	-3.5	+68.1	+22.0	-29.4	+.3	-14.0	-6.0
(++)	.04	1.33	1.22	.08	.55	1.84	8.01	7.23	2.05	3.92	2.36	2.27

CAL YR 1975: Inflow 890 Outflow 844 + -59.6 ++ 25.92
WTR YR 1976: Inflow 458 Outflow 361 + +11.2 ++ 30.90

PEAK INFLOW (BASE, 100 FT^3/S)

DATE	TIME	DISCHARGE
4-19	1320	*106
4-19	1940	*1,020
5- 6	0450	*217

1/ Inflow adjusted for rainfall on pool and pool losses.
+ Change in contents, in acre-feet.
++ Rainfall, in inches.
* Average for 5-minute interval.

9-220 c
(Oct. 1951)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Sheet 1 of _____ Sheets

08052600

Monthly and ~~annual discharge~~ yearly weighted-mean rainfall, in inches, of Little Elm Creek Subwatershed No. 10 River at near Gunter, Tex.

[Drainage area, 2.10 square miles]

10—26489-5 U. S. GOVERNMENT PRINTING OFFICE

YEAR	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	ANNUAL
				Station established April 1, 1966									
1966	-	-	-	-	-	-	11.14	0.71	1.92	4.44	6.89	3.29	-
1967	0.35	0.82	1.13	0.03	0.84	2.97	4.86	7.46	.84	.99	.29	4.64	25.22
1968	2.15	.44	1.82	2.73	1.31	5.09	3.94	4.99	3.41	2.03	1.90	7.24	37.05
1969	1.41	4.24	1.95	1.67	2.57	2.99	2.35	8.32	3.35	0	2.10	1.00	31.95
1970	4.10	.29	3.83	.81	4.50	2.11	7.42	2.80	.36	.20	3.20	6.73	36.35
1971	1.44	.26	.45	.59	.98	.10	1.60	3.55	.43	3.60	4.87	3.15	21.02
1972	4.90	3.74	5.09	0	.24	1.44	2.89	1.92	1.41	.30	3.25	4.12	29.30
1973	5.60	2.64	.33	2.48	1.28	4.25	2.25	2.81	5.16	4.80	.58	4.33	36.51
1974	5.76	2.01	.53	.27	.60	.31	4.28	1.45	7.26	.45	4.88	3.89	31.69
1975	8.91	2.60	2.03	2.37	1.30	1.76	2.87	5.14	5.12	1.74	.40	2.63	36.87
1976	.04	1.33	1.22	.08	.55	1.84	8.01	7.23	2.05	3.92	2.36	2.27	30.90

9-220 c
(Oct. 1961)

UNITED STATES
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GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Sheet 1 of _____ Sheets

08052630

Monthly and ~~annual discharge~~ yearly net inflow, in acre-feet, of Little Elm Creek Subwatershed No. 10 River at near Gunter, Tex.
[Drainage area, 2.10 square miles] (revised)

16—26489-5 U. S. GOVERNMENT PRINTING OFFICE

YEAR	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	ANNUAL
			Station established April 1, 1966										
1966	-	-	-	-	-	-	741.6	74.9	4.2	4.4	45.9	149.7	-
1967	6.2	0.6	4.8	2.2	2.4	10.1	136.1	382.1	50.9	6.8	2.9	6.8	611.9
1968	5.0	2.8	8.1	45.0	8.6	418	148	246	14.6	4.0	3.6	19.0	923
1969	4.8	119	19.3	49.5	197	104	32.5	573	24.7	.7	1.2	4.9	1,130
1970	12.8	1.9	129	1.4	262	230	571	105	14.9	0	0	128	1,460
1971	7.9	4.6	2.1	3.8	2.5	4.3	1.6	39.8	3.4	8.8	42.2	37.3	158
1972	210	214	372	0	2.8	2.6	9.1	3.4	0	.1	1.7	33.4	849
1973	202	92.3	4.2	112	83.0	306	139	122	261	91.6	17.4	340	1,770
1974	525	161	3.6	6.8	14.0	2.2	50.3	101	515	4.7	30.3	121	1,530
1975	637	215	61.0	40.0	183	70.5	164	149	268	5.2	2.2	4.0	1,800
1976	0	2.6	1.6	0	.3	1.0	211	183	26.9	23.8	2.3	6.0	458

9-220 c
(Oct. 1961)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

08052630

Monthly and ~~annual discharge~~ yearly outflow, in acre-feet, of Subwatershed No. 10 Little Elm Creek River at near Gunter, Tex.

[Drainage area, 2.10 square miles]

16—26489-5 U. S. GOVERNMENT PRINTING OFFICE

YEAR	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	ANNUAL
			Station established April 1, 1966										
1966	-	-	-	-	-	-	188.8	508.2	0	0	3.0	125.8	-
1967	10.6	0	0	0	0	0	101.5	74.8	396.3	0	0	0	583.2
1968	0	0	0	4.0	3.4	404	148	239	0	0	0	0	798
1969	0	90.2	23.1	31.4	202	106	9.4	579	10.1	0	0	0	1,050
1970	0	0	73.4	18.6	224	264	361	277	22.8	0	15.9	52.5	1,310
1971	1.6	0	0	0	0	0	2.7	0	0	52.8	5.5	0	62.6
1972	187	212	383	1.0	0	0	23.7	15.9	50.4	6.2	0	0	879
1973	82.8	96.7	.2	98.2	87.3	298	127	112	253	46.4	34.2	266	1,500
1974	487	225	4.5	0	1.7	.1	13.1	138	488	0	26.7	80.3	1,460
1975	84.6	785	50.9	29.6	191	60.4	163	126	274	.1	0	0	1,760
1976	0	0	0	0	0	0	148	162	39.8	11.4	0	0	361

TX-74a
Rev. 2-74

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOL

ANNUAL SUMMARY

1976 WATER YEAR

08052630 Little Elm Creek subwatershed No. 10 near Gunter, Tex. Drainage Area 2.10 mi^2

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

Maxima: gage height, 22.48 ft; outflow, 23 ft^3/s; surface area, 54.8 acres; contents, 265 acre-feet; on Apr. 20, 1976.

Minima: gage height, 17.40 ft; surface area, 20.1 acres; contents, 92.8 acre-feet; on Apr. 15, 1976.

Maximum inflow, 1020 ft^3/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on Apr. 19, 1976.

Averages: 10 water years, (1967-76); inflow, 1070 acre-feet/year; outflow, 976 acre-feet/year; rainfall, 31.69 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	0	2.6	1.6	890	0	0.3	1.0	211	183	26.9	23.8	2.3	6.0	458
Total Outflow	0	0	0	844	0	0	0	148	162	39.8	11.4	0	0	361
Total Consumption	10.7	9.3	5.7	178	4.7	6.5	7.8	12.0	19.0	22.1	22.5	21.8	17.3	159
†	-10.6	-4.2	-1.8	-59.6	-4.5	-5.2	-3.5	+68.1	+22.0	-29.4	+.3	-14.0	-6.0	+11.2
‡	24.5	23.3	22.8	30.2	22.2	21.6	21.0	26.6	34.1	33.0	31.9	29.1	28.2	26.5
††	.04	1.33	1.22	25.92	.08	.55	1.84	8.01	7.23	2.05	3.92	2.36	2.27	30.90

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, at station.

* Peak inflow - (base, 100 ft^3/s)

Date	Time	Discharge	Date	Time	Discharge
Apr. 19	1320	106			
Apr. 19	1940	1020			
May 6	0450	217			

*Averaged for 5-minute interval.

08052650 Little Elm Creek near Celina, Tex.

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 (5.8 km) northwest of Celina, and 10 miles (16 km) upstream from Mustang Creek.

DRAINAGE AREA.--46.7 mi² (121.0 km²).

PERIOD OF RECORD.--Discharge: February 1966 to September 1976 (discontinued).
Water quality: Specific conductance: October 1966 to September 1975. Water temperatures: February 1966 to September 1975. Sediment records: February 1966 to September 1975.

GAGE.--Water-stage recorder. Datum of gage is 582.4 ft (177.5 m) above mean sea level (State Highway Department bench mark).

AVERAGE DISCHARGE.--10 years, 36.4 ft³/s (1.031 m³/s), 10.58 in/yr (269 mm/yr), 26,370 acre-ft/yr (32.5 hm³/yr).

EXTREMES.--Discharge: Current year: Maximum discharge, 1,140 ft³/s (32.3 m³/s) Apr. 20 (gage height, 10.81 ft or 3.295 m); no flow Oct. 1 to Apr. 17, July 1, July 29 to Sept. 30.
Period of record: Maximum discharge, 5,340 ft³/s (151 m³/s) May 31, 1967 (gage height, 13.32 ft or 4.060 m); no flow for many days each year.
Water quality: Period of record: Maximum water temperatures (1966-69), 31.0°C June 20, 1969; minimum, freezing point Jan. 1, 1969. Maximum daily sediment concentrations, 2,730 mg/l Apr. 8, 1975; no flow for many days. Maximum daily sediment loads, 15,200 tons Apr. 28, 1966; minimum daily, 0 tons on many days.

REMARKS.--Discharge records fair. 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 29.1 mi² (75.4 km²) above this station was affected at times by discharge from the flood-detention pools of 13 floodwater-retarding structures with combined detention capacity of 8,160 acre-ft (10.1 hm³). One structure was built during the current year and has a drainage area of 0.68 mi² (1.76 km²) and a detention capacity of 206 acre-ft (0.254 hm³).

REVISIONS.--WSP 2122: Drainage area.

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							0	2.5	293	0		
2							0	1.6	78	.98		
3							0	.96	44	11		
4							0	.50	25	13		
5							0	.28	16	10		
6							0	288	23	6.9		
7							0	161	15	4.5		
8							0	93	8.6	2.9		
9							0	51	5.4	2.3		
10							0	31	3.3	1.6		
11							0	18	2.2	3.4		
12							0	89	1.5	1.7		
13							0	192	.79	.68		
14							0	77	.24	.26		
15							0	50	.06	.05		
16							0	33	3.4	70		
17							0	20	2.5	72		
18							17	12	4.3	38		
19							249	7.6	79	21		
20							553	5.0	40	12		
21							265	3.1	19	7.7		
22							195	2.1	10	4.7		
23							119	109	6.5	2.8		
24							95	20	4.2	1.9		
25							59	20	2.9	1.3		
26							32	236	2.1	.71		
27							16	156	1.4	.15		
28							9.4	45	.82	.02		
29							7.0	24	.29	0		
30					---		4.3	47	.04	0		
31		---			---		---	269	---	0		---
TOTAL	0	0	0	0	0	0	1620.7	2064.64	692.54	291.55	0	0
MEAN	0	0	0	0	0	0	54.0	66.6	23.1	9.40	0	0
MAX	0	0	0	0	0	0	553	288	293	72	0	0
MIN	0	0	0	0	0	0	0	.28	.04	0	0	0
CFSM	0	0	0	0	0	0	1.16	1.43	.49	.20	0	0
IN.	0	0	0	0	0	0	1.29	1.64	.55	.23	0	0
AC-FT	0	0	0	0	0	0	3210	4100	1370	578	0	0

CAL YR 1975 TOTAL 12965.69 MEAN 35.5 MAX 1290 MIN 0 CFSM .76 IN 10.33 AC-FT 25720
WTR YR 1976 TOTAL 4669.43 MEAN 12.8 MAX 553 MIN 0 CFSM .27 IN 3.72 AC-FT 9260

9-220 c
(Oct. 1961)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Sheet 1 of _____ Sheets

08052650

Monthly and ~~annual discharge~~ yearly weighted-mean rainfall, in inches, of Little Elm Creek River at near Celina, Tex.
[Drainage area, 46.7 a/ square miles]

16—26489-5 U. S. GOVERNMENT PRINTING OFFICE

YEAR	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	ANNUAL
			Station established February 21, 1966										
1966	-	-	-	-	-	-	11.68	1.59	2.35	3.12	7.39	4.46	-
1967	0.50	0.80	1.44	0.09	1.26	3.44	5.15	8.81	1.05	1.91	1.00	4.63	30.08
1968	3.29	1.01	2.14	3.07	1.69	6.02	4.18	6.33	3.22	2.93	1.17	6.30	41.35
1969	1.68	4.25	1.84	1.90	3.07	2.67	2.85	8.52	4.46	.02	2.17	1.71	35.12
1970	5.91	.52	4.19	.60	5.54	3.24	8.53	3.01	.85	.49	3.84	7.51	44.23
1971	1.47	.47	.73	.82	1.45	.54	1.99	5.08	1.28	3.52	5.13	3.68	26.16
1972	6.23	3.83	6.90	.36	.29	1.49	2.86	2.01	1.19	1.41	3.61	4.28	34.46
1973	6.79	3.30	.60	3.30	1.64	5.09	3.78	3.89	6.84	5.04	1.05	8.77	50.09
1974	7.14	2.96	.80	1.09	1.32	.97	5.52	3.21	7.81	1.15	5.65	6.59	44.21
1975	9.07	2.99	2.52	2.18	2.20	2.68	3.18	6.22	6.36	1.94	.59	2.18	42.11
1976	.19	1.29	1.42	.11	.64	2.22	7.74	7.56	2.67	4.03	1.34	2.90	32.11

a/ Revised figure, prior to 1970 water year, 46.2 mi^2.

9-220 c
(Oct. 1951)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Sheet 1 of _____ Sheets

0805650

Monthly and ~~yearly~~ yearly mean discharge, in ft^3/s, of Little Elm Creek River at near Celina, Tex.
[Drainage area, 46.7 a/ square miles]

16—26489-6 U.S. GOVERNMENT PRINTING OFFICE

Water Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual	
			Station established February 21, 1966											
1966	-	-	-	-	-	2.55	250	71.8	0.50	0.30	28.2	21.8	--	
1967	2.19	0	0	0	0	2.53	43.1	97.6	89.3	0	0	0	19.6	
1968	0	0	1.50	18.2	7.76	140	75.0	136	2.94	2.15	0	7.70	33.0	
1969	2.18	32.0	13.8	14.5	82.2	54.0	34.1	228	19.6	.055	0	0	39.9	
1970	14.8	.041	52.6	13.9	103	89.6	161	52.1	3.65	0	.020	40.1	43.7	
1971	.88	.024	0	0	.071	.012	0	12.0	1.39	1.68	15.5	5.36	3.12	
1972	90.2	67.5	253	1.08	.060	.065	.77	4.03	0	0	0	4.18	35.5	
1973	69.5	50.1	1.20	37.6	36.0	128	67.2	49.4	128	7.21	3.02	111	57.1	
1974	186	85.5	4.72	2.52	11.7	1.15	44.4	41.9	176	0	5.16	71.6	52.5	
1975	111	245	26.2	18.6	97.8	27.6	66.5	52.9	171	.067	0	1.21	67.3	
1976	0	0	0	0	0	0	54.0	66.6	23.1	9.40	0	0	12.8	

a/ Revised figure, prior to 1970 water year, 46.2 mi^2.

GPO 849-229

TRINITY RIVER BASIN

08052700 Little Elm Creek near Aubrey, Tex.

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 (2.4 km) upstream from Mustang Creek, 5.5 miles (8.8 km) east of Aubrey, and 18 miles (29 km) upstream from Lewisville Dam.

DRAINAGE AREA.--75.5 mi² (195.5 km²).

PERIOD OF RECORD.--Discharge: June 1956 to September 1976 (discontinued).
Water quality: Chemical analyses: January 1968. Specific conductance: December 1966 to September 1975. Water temperatures: February 1966 to September 1975. Sediment records: February 1966 to September 1975.

GAGE.--Water-stage recorder. Datum of gage is 534.76 ft (162.995 m) above mean sea level (State Highway Department bench mark).

AVERAGE DISCHARGE.--20 years, 45.6 ft³/s (1.291 m³/s), 8.20 in/yr (208 mm/yr), 33,040 acre-ft/yr (40.7 hm³/yr).

EXTREMES.--Discharge: Current year: Maximum discharge, 1,720 ft³/s (48.7 m³/s) May 27 (gage height, 14.80 ft or 4.511 m); no flow for many days.
Period of record: Maximum discharge, 7,920 ft³/s (224 m³/s) Oct. 31, 1974 (gage height, 17.04 ft or 5.194 m); maximum gage height, 17.34 ft (5.285 m) Apr. 26, 1957; no flow at times each year.
Historic: Maximum stage since about 1900, 18.2 ft (5.55 m) in May 1941, from information by local residents.
Water quality: Period of record: Maximum specific conductance (1966-68, 1971-74), 1,380 micromhos Jan. 24, Feb. 25, 1967; minimum daily, 195 micromhos June 4, 1968. Maximum water temperatures (1966-68, 1971-74), 33.0°C June 16, 1968; minimum, freezing point Feb. 22, 1968. Maximum daily sediment concentrations, 4,750 mg/l Aug. 13, 1966; no flow for many days. Maximum daily sediment loads, 17,900 tons May 31, 1967; minimum daily, 0 tons on many days.

REMARKS.--Discharge records fair. 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 36.4 mi² (94.3 km²) above this station was affected at times by discharge from the flood-detention pools of 17 floodwater-retarding structures with combined detention capacity of 10,460 acre-ft (12.9 hm³). One structure was built during the current year and has a drainage area of 0.68 mi² (1.76 km²) and a detention capacity of 206 acre-ft (0.254 hm³).

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

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				0	.05	0	.01	3.8	571	0		24
2				0	.02	0	0	2.6	198	0		6.5
3				0	.01	0	0	1.7	92	.61		2.9
4				0	.01	0	.01	1.0	53	11		.93
5				0	.04	0	.01	1.0	24	11		.23
6				0	.06	0	.09	417	23	7.9		.02
7				0	.03	0	.12	272	18	5.1		0
8				0	.01	.06	.09	122	11	3.3		0
9				0	.02	.23	.06	61	6.9	2.0		0
10				0	.02	.39	.05	34	4.6	1.7		0
11				0	.05	.27	.06	16	2.7	27		0
12				0	.09	.21	.02	9.0	1.7	47		0
13				0	.08	.09	.01	333	.97	10		0
14				0	.09	.10	0	116	.50	4.4		0
15				0	.07	.16	0	61	.22	1.8		0
16				0	.08	.13	.02	37	.04	39		0
17				0	.13	.08	.17	19	.96	136		0
18				0	.11	.08	9.6	9.0	3.3	64		0
19				0	.13	.09	117	5.6	75	30		0
20				0	.12	.08	615	4.0	58	15		0
21				0	.18	.05	316	2.9	27	8.4		0
22				0	.13	.01	254	1.9	12	5.8		0
23				0	.12	.01	166	299	7.6	4.0		0
24				0	.10	.02	121	118	5.1	2.3		0
25				0	.05	.02	87	47	3.2	1.3		0
26				0	.07	.02	45	135	2.0	1.1		0
27				0	.04	.05	19	914	1.2	.34		0
28				.04	.01	.09	9.4	123	.66	.13		0
29				.09	0	.07	7.0	57	.26	.03		0
30				.08	---	.05	5.1	35	.08	0		0
31		---		.07	---	.01	---	759	---	0		---
TOTAL	0	0	0	.28	1.92	2.37	1771.82	4017.5	1203.99	440.21	0	34.58
MEAN	0	0	0	.009	.066	.077	59.1	130	40.1	14.2	0	1.15
MAX	0	0	0	.09	.18	.39	615	914	571	136	0	24
MIN	0	0	0	0	0	0	0	1.0	.04	0	0	0
CFSM	0	0	0	0	0	.001	.78	1.72	.53	.19	0	.02
IN.	0	0	0	.0001	.0009	.001	.87	1.98	.59	.22	0	.02
AC-FT	0	0	0	.6	3.8	4.7	3510	7970	2390	873	0	69

CAL YR 1975	TOTAL	16920.92	MEAN 46.4	MAX 1650	MIN 0	CFSM .61	IN 8.34	AC-FT	33560		
WTR YR 1976	TOTAL	7472.67	MEAN 20.4	MAX 914	MIN 0	CFSM .27	IN 3.68	AC-FT	14820		

9-220 c
(Oct. 1951)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Sheet 1 of _____ Sheets

08052700

yearly average rainfall
Monthly and ~~annual discharge~~, in inches, of Little Elm Creek ~~River~~ near Aubrey, Tex.
[Drainage area, 75.5 square miles]

16—26489-5 U. S. GOVERNMENT PRINTING OFFICE

YEAR	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	ANNUAL	
1957	2.16	2.78	2.87	2.47	2.34	5.96	13.16	16.28	0.68	1.86	0.20	5.99	56.75	
1958	2.55	7.83	1.60	2.06	.73	3.60	7.22	3.85	4.37	2.23	1.81	1.96	39.81	
1959	1.37	2.29	.69	.38	1.05	2.07	.55	2.16	6.76	4.71	2.10	1.34	25.47	
1960	6.84	1.88	4.00	2.18	2.03	1.21	2.22	3.21	3.40	6.55	2.32	2.40	38.24	
1961	1.70	.71	5.80	2.09	2.78	2.93	1.41	2.42	4.38	3.29	1.06	4.29	32.86	
1962	2.65	2.79	2.37	1.01	1.00	2.54	4.70	1.50	7.10	3.10	3.34	9.63	41.73	
1963	2.32	3.40	.75	.44	.44	.39	5.37	5.64	1.55	2.42	.32	.52	23.56	
1964	.20	.93	1.11	1.80	1.60	4.66	5.37	4.48	1.49	1.06	4.03	10.64	37.37	
1965	1.46	7.20	1.07	2.36	3.74	1.49	1.20	6.67	4.53	1.61	3.44	6.39	41.16	
1966	1.45	2.07	1.36	1.00	2.12	1.47	12.01	1.30	2.30	2.57	6.63	4.18	38.46	
1967	.56	.82	1.43	.17	1.14	3.19	4.82	8.12	1.14	1.42	.99	4.72	28.52	
1968	3.29	.97	2.16	3.13	1.64	5.89	4.48	5.71	3.39	2.91	.98	6.53	41.02	
1969	1.68	4.19	1.71	1.76	3.03	3.77	3.01	8.25	4.24	.03	2.07	1.89	35.57	
1970	5.65	.50	4.36	.64	5.47	3.11	8.20	2.67	1.13	.44	3.90	7.11	43.18	
1971	1.63	.47	.76	.75	1.47	.52	1.97	4.62	1.21	3.34	4.13	3.65	24.52	
1972	6.35	3.96	6.84	.36	.26	1.64	2.88	2.09	1.52	1.20	3.34	4.94	35.38	
1973	6.85	3.21	.68	3.24	1.68	4.96	3.96	4.33	6.70	5.15	.70	8.20	49.66	
1974	7.27	3.09	.84	1.12	1.23	.82	5.77	2.76	7.55	1.19	5.08	6.46	43.18	
1975	8.85	2.83	2.47	2.15	2.31	2.47	3.04	6.45	5.67	1.90	.69	2.27	41.10	
1976	.12	1.20	1.38	.08	.60	2.19	7.35	7.73	2.58	3.82	1.60	2.78	31.43	

YEAR	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	ANNUAL
			Station established June 8, 1956										
1956	-	-	-	-	-	-	-	-	-	0	0	0	-
1957	0	0.16	7.89	0.51	20.1	46.6	677	701	11.0	1.03	0	8.93	123
1958	3.06	193	7.99	21.5	1.41	41.5	113	278	25.1	.93	0	0	57.3
1959	0	0	0	0	0	.52	.10	0	12.2	13.9	.01	0	2.24
1960	52.3	46.7	41.7	54.1	24.4	2.14	.37	8.78	.04	28.8	.64	0	21.7
1961	0	0	31.9	60.2	54.6	18.8	1.54	9.27	4.40	3.92	0	6.45	15.7
1962	11.7	9.47	14.6	.80	.12	9.61	93.4	.88	78.7	15.4	.50	228	38.3
1963	4.31	50.6	5.47	.85	.07	.03	65.4	91.4	2.98	.07	0	0	18.5
1964	0	0	0	0	0	21.6	85.6	30.7	.74	0	.64	258	32.7
1965	3.01	29.1	7.16	31.0	97.8	3.61	.43	93.6	78.1	.25	0	78.4	56.1
1966	.24	7.41	.06	.34	44.3	2.18	281	94.2	1.04	0	28.5	22.0	39.7
1967	2.15	.001	.05	.028	.13	3.66	51.9	154	98.6	0	0	.57	26.0
1968	.58	.18	5.64	30.5	10.9	182	110	159	5.75	3.75	0	15.0	44.0
1969	5.15	48.3	19.1	17.7	107	75.5	49.5	294	24.9	.076	0	0	53.2
1970	20.6	.29	98.0	16.7	164	126	203	73.9	6.26	0	0	75.0	64.4
1971	2.19	.10	.094	.21	.31	.19	.12	13.8	2.62	1.75	18.8	5.91	3.89
1972	118	89.9	347	1.98	.23	.94	1.62	5.21	0	0	0	13.8	48.7
1973	127	82.6	1.98	55.1	51.2	160	95.2	70.9	167	13.6	6.24	148	81.4
1974	270	121	7.77	4.73	16.3	2.50	75.0	61.4	237	0	4.05	96.9	74.6
1975	172	332	36.8	27.2	143	36.7	81.5	77.3	203	.10	0	.26	91.4
1976	0	0	0	.009	.066	.077	59.1	130	40.1	14.2	0	1.15	20.4

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOL

ANNUAL SUMMARY

1976 WATER YEAR

____ Little Elm Creek subwatershed No. 1 near Gunter, Tex. Drainage Area 3.40 mi^2

~~Continuous water-stage recorder~~ staff gage ratio —. Date of last sediment survey —.

Maxima: gage height, 22.7 ft; outflow, 30. ft^3/s; surface area, 63.8 acres; contents, 365 acre-feet; on Apr. 20, 1976.

Minima: gage height, 16.4 ft; surface area, 24.0 acres; contents, 99.4 acre-feet; on Apr. 15, 1976.

Maximum inflow, — ft^3/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on —.

Averages: 10 water years, (1967-76); inflow, 2230 acre-feet/year; outflow, 2140 acre-feet/year; rainfall, 38.52 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct.	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	0.4	6.0	5.7	2080	6.6	7.8	6.1	321	400	65.0	133	2.1	8.0	962
Total Outflow	0	0	0	2060	0	0	0	248	374	87.5	124	0	0	834
Total Consumption	14.5	13.8	10.0	204	8.7	14.0	14.5	17.3	18.7	22.9	24.9	27.3	22.5	209
†	-13.7	-5.0	-.8	-73.2	-1.9	-4.4	-3.1	+75.4	+30.8	-36.1	-1.1	-21.9	-8.2	+ 10.0
‡	29.0	27.5	27.0	36.7	26.8	26.2	25.6	32.0	41.0	38.9	38.9	35.0	35.0	31.9
††	.15	1.21	1.58	31.13	.11	.82	2.47	8.04	7.16	2.89	4.67	1.18	2.29	32.57

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, — ft^3/s)

Date	Time	Discharge	Date	Time	Discharge

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOL

ANNUAL SUMMARY

1976 WATER YEAR

_____. Little Elm Creek subwatershed No. 2 near Gunter, Tex. Drainage Area 3.95 mi^2

~~Continuous~~ staff gage ~~water-stage recorder~~ ratio —. Date of last sediment survey —. Total Drainage Area 7.35 mi^2

Maxima: gage height, 19.7 ft; outflow, 94 ft^3/s; surface area, 108 acres; contents, 596 acre-feet; on Apr. 20, 1976.

Minima: gage height, 12.7 ft; surface area, 31.8 acres; contents, 131 acre-feet; on Apr. 15, 1976.

Maximum inflow, — ft^3/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on —.

Averages: 10 water years, (1967-76); inflow, 4320 acre-feet/year; outflow, 4180 acre-feet/year; rainfall, 39.04 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct.	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	0.6	3.8	1.9	3960	0.1	1.5	3.7	571	690	124	260	1.5	6.3	1660
Total Outflow	0	0	0	3900	0	0	0	463	601	195	233	0	0	1490
Total Consumption	15.9	15.1	9.2	344	7.2	10.4	13.4	20.4	42.2	45.0	48.2	48.2	32.2	307
†	-14.8	-7.6	-1.8	-123	-6.8	-6.9	-3.0	+131	+83.8	-102	+1.1	-41.9	-14.0	+17.1
‡	39.8	37.7	36.6	53.8	36.0	34.5	33.6	45.2	65.4	60.5	61.6	51.8	47.3	45.8
††	.15	1.21	1.58	31.13	.11	.82	2.47	8.04	7.16	2.89	4.67	1.18	2.29	32.57

1/ Inflow includes outflow from site no. 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, — ft^3/s)

Date	Time	Discharge	Date	Time	Discharge

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOL

ANNUAL SUMMARY

1976 WATER YEAR

_____. Little Elm Creek subwatershed No. 3 near Gunter, Tex. Drainage Area 7.27 mi^2

~~Continuous~~ staff gage ~~water-stage recorder~~: ratio —. Date of last sediment survey —. Total Drainage Area 14.6 mi^2

Maxima: gage height, 19.3 ft; outflow, 201 ft^3/s; surface area, 144 acres; contents, 703 acre-feet; on Apr. 20, 1976.

Minima: gage height, 10.2 ft; surface area, 20.5 acres; contents, 72.2 acre-feet; on Apr. 15, 1976.

Maximum inflow, — ft^3/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on —.

Averages: 10 water years, (1967-76); inflow, 8150 acre-feet/year; outflow, 8080 acre-feet/year; rainfall, 39.02 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	0.3	0.5	6.5	6400	1.2	2.0	5.2	1240	1280	461	334	1.8	5.4	3270
Total Outflow	0	0	0	6370	0	0	0	1200	1130	527	314	0	0	3170
Total Consumption	11.0	8.1	4.9	232	3.1	3.0	6.3	18.6	30.9	33.0	33.3	23.8	16.1	192
†	-9.9	-5.1	+3.8	-66.4	-1.6	0	+2.9	+53.5	+75.4	-86.4	-.9	-20.6	-3.1	+8.0
‡	21.9	20.2	19.6	32.4	20.4	20.2	21.0	33.4	41.0	37.0	35.5	28.0	26.0	27.0
††	.22	1.26	1.50	30.61	.10	.58	2.27	8.09	6.73	3.00	4.20	1.14	3.55	32.64

1/ Inflow includes outflow from site no. 2.
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, — ft^3/s)

Date	Time	Discharge	Date	Time	Discharge

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GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOL

ANNUAL SUMMARY

1976 WATER YEAR

_____. Little Elm Creek subwatershed No. 4 near Gunter, Tex. Drainage Area 3.33 mi^2

~~Continuous water-stage recorder~~ staff gage: ratio —. Date of last sediment survey —.

Maxima: gage height, 18.2 ft; outflow, 32 ft^3/s; surface area, 52.5 acres; contents, 324 acre-feet; on Apr. 20, 1976.

Minima: gage height, 13.2 ft; surface area, 27.0 acres; contents, 127 acre-feet; on Apr. 15, 1976.

Maximum inflow, — ft^3/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on —.

Averages: 10 water years, (1967-76); inflow, 2070 acre-feet/year; outflow, 1950 acre-feet/year; rainfall, 40.23 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct.	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	0.5	1.9	7.6	1490	0.9	1.8	1.9	242	209	100	91.0	11.2	8.0	676
Total Outflow	0	0	0	1450	0	0	0	142	178	127	77.8	0	0	525
Total Consumption	13.4	15.9	12.3	248	7.6	8.8	11.4	15.6	26.0	31.2	32.4	39.4	24.7	239
†	-11.7	-10.1	-1.3	-90.4	-6.3	-5.6	-4.0	+108	+31.9	-43.7	-5.4	-26.4	-5.6	+19.8
‡	33.4	31.8	30.7	39.6	30.2	29.2	28.6	34.0	44.0	43.5	42.5	39.4	37.5	35.4
††	.37	1.39	1.41	32.51	.13	.57	2.30	7.57	7.14	3.61	4.03	.75	3.61	32.88

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, — ft^3/s)

Date	Time	Discharge	Date	Time	Discharge

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GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOL

ANNUAL SUMMARY

1976 WATER YEAR

_____. Little Elm Creek subwatershed No. 5 near Gunter, Tex. Drainage Area 0.50 mi^2

~~Continuous water-stage recorder~~ staff gage ratio —. Date of last sediment survey —.

Maxima: gage height, 19.8 ft; outflow, 15. ft^3/s; surface area, 9.8 acres; contents, 70.5 acre-feet; on July 16, 1976.

Minima: gage height, 14.6 ft; surface area, 5.9 acres; contents, 29.9 acre-feet; on Apr. 15, 1976.

Maximum inflow, — ft^3/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on —.

Averages: 10 water years, (1967-76); inflow, 300 acre-feet/year; outflow, 280 acre-feet/year; rainfall, 40.84 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct.	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	0.3	0.8	0.3	212	0.3	0.1	0.4	30.4	35.8	21.3	34.9	0	1.7	126
Total Outflow	0	0	0	209	0	0	0	9.2	34.1	20.6	32.3	0	0	96.2
Total Consumption	4.1	3.2	1.6	46.1	1.3	1.9	2.1	3.1	5.1	6.3	6.7	8.5	5.0	48.9
†	-3.6	-1.6	-.6	-20.6	-.9	-1.5	-.5	+23.0	+1.8	-2.9	-1.3	-8.1	-.9	+2.9
‡	6.8	6.5	6.4	7.7	6.4	6.2	6.1	6.9	8.4	8.4	8.3	7.7	7.4	7.1
††	.45	1.47	1.35	33.50	.15	.58	2.32	8.01	7.41	3.94	3.94	.56	3.55	33.73

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, — ft^3/s)

Date	Time	Discharge	Date	Time	Discharge

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOL

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1976 WATER YEAR

_____. Little Elm Creek subwatershed No. 6 near Gunter, Tex. Drainage Area 1.99 mi^2

~~Continuous water stage recorder~~ staff gage: ratio —. Date of last sediment survey —.

Maxima: gage height, 21.1 ft; outflow, 17 ft^3/s; surface area, 30.8 acres; contents, 217 acre-feet; on Apr. 20, 1976.

Minima: gage height, about 7.5 ft; surface area, 0.1 acres; contents, 0.1 acre-feet; on Apr. 15, 1976.

Maximum inflow, — ft^3/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on —.

Averages: 10 water years, (1967-76); inflow, 1120 acre-feet/year; outflow, 1060 acre-feet/year; rainfall, 40.84 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct.	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	0.2	1.0	1.8	847	0.1	0.5	0.4	215	161	69.4	71.4	1.2	3.8	526
Total Outflow	4.9	4.4	4.6	952	1.9	1.9	.4	57.7	146	79.4	62.1	0	0	363
Total Consumption	2.3	1.5	.6	121	.2	.1	.1	6.3	15.4	18.7	19.8	21.2	14.7	101
†	-6.8	-4.5	-3.1	-160	-2.0	-1.5	-.1	+161	+15.6	-20.0	-1.8	-18.9	-3.7	+114
‡	5.0	3.7	2.2	19.3	1.0	.3	.1	8.9	26.6	26.4	26.2	25.2	24.5	12.5
††	.45	1.47	1.35	33.50	.15	.58	2.32	8.01	7.41	3.94	3.94	.56	3.55	33.73

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, — ft^3/s)

Date	Time	Discharge	Date	Time	Discharge

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOL

ANNUAL SUMMARY

1976 WATER YEAR

_____. Little Elm Creek subwatershed No. 7 near Gunter, Tex. Drainage Area 1.28 mi^2

~~Continuous water-stage recorder~~ staff gage ratio —. Date of last sediment survey —.

Maxima: gage height, 17.7 ft; outflow, 15 ft^3/s; surface area, 31.2 acres; contents, 202 acre-feet; on Apr. 20, 1976.

Minima: gage height, 11.4 ft; surface area, 14.1 acres; contents, 63.9 acre-feet; on Apr. 15, 1976.

Maximum inflow, — ft^3/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on —.

Averages: 10 water years, (1967-76); inflow, 658 acre-feet/year; outflow, 602 acre-feet/year; rainfall, 33.84 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct.	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	0.1	0.7	1.4	550	0.1	0.4	0.4	156	94.8	20.2	19.2	2.3	0.8	296
Total Outflow	0	0	0	529	0	0	0	116	78.9	32.1	15.3	0	0	242
Total Consumption	7.7	6.3	3.8	117	2.8	4.5	5.1	8.4	11.7	13.7	14.2	14.4	11.4	104
†	-7.5	-4.0	-.6	-38.5	-2.6	-3.1	-1.9	+45.5	+18.1	-22.8	-2.8	-8.6	-7.3	+ 2.4
‡	16.6	15.8	15.4	19.3	15.3	14.9	14.6	17.4	20.8	20.5	20.2	18.9	18.0	17.4
††	.08	1.23	1.40	31.59	.09	.77	2.25	8.53	8.08	1.73	4.41	2.31	2.30	33.18

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, — ft^3/s)

Date	Time	Discharge	Date	Time	Discharge

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WATER BUDGET OF POOL

ANNUAL SUMMARY

1976 WATER YEAR

_____. Little Elm Creek subwatershed No. 8-B near Gunter, Tex. Drainage Area 1.25 mi²

~~Continuous water-stage recorder~~ staff gage: ratio —. Date of last sediment survey —.

Maxima: gage height, 18.0 ft; outflow, 18 ft³/s; surface area, 18.6 acres; contents, 122 acre-feet; on May 31, 1976.

Minima: gage height, 11.4 ft; surface area, 8.3 acres; contents, 38.1 acre-feet; on Apr. 15, 1976.

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

Averages: 5 water years, (1972-76); inflow, 857 acre-feet/year; outflow, 821 acre-feet/year; rainfall, 40.10 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct.	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	0	0.5	0.4	652	0	0.2	0.4	17.4	65.0	42.3	47.4	0.9	2.3	177
Total Outflow	0	0	0	636	0	0	0	0	2.4	52.1	42.3	0	0	96.8
Total Consumption	4.0	3.6	1.7	71.3	1.7	2.5	3.7	4.2	8.7	9.8	10.3	11.8	9.1	71.1
†	-3.8	-2.1	-.2	-24.8	-1.6	-1.9	-1.7	+18.0	+63.2	-16.6	-.7	-10.0	-3.0	+39.6
‡	9.7	9.4	9.2	11.2	9.2	8.9	8.7	9.3	13.9	16.9	16.6	15.7	14.9	11.9
††	.21	1.30	1.45	29.41	.12	.60	2.14	6.27	8.18	2.10	3.25	.70	3.06	29.38

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)

Date	Time	Discharge	Date	Time	Discharge

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WATER BUDGET OF POOL

ANNUAL SUMMARY

1976 WATER YEAR

_____. Little Elm Creek subwatershed No. 9 near Celina, Tex. Drainage Area 0.58 mi^2

~~Continuous~~ ~~water-stage~~ ~~recorder~~ staff gage ratio —. Date of last sediment survey —.

Maxima: gage height, 15.4 ft; outflow, 8.8 ft^3/s; surface area, 12.0 acres; contents, 43.8 acre-feet; on May 31, 1976.

Minima: gage height, 9.4 ft; surface area, 2.4 acres; contents, 5.2 acre-feet; on Apr. 15, 1976.

Maximum inflow, — ft^3/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on —.

Averages: 5 water years, (1972-76); inflow, 412 acre-feet/year; outflow, 399 acre-feet/year; rainfall, 40.10 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct.	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	0	0.3	0.1	214	0	0.1	0.1	30.0	51.8	12.5	1.6	0.1	0.5	97.1
Total Outflow	0	0	0	204	2.8	0	0	14.0	37.4	29.8	0	0	0	84.0
Total Consumption	2.2	2.2	.8	40.9	.8	.8	1.1	1.7	4.6	5.0	4.4	4.2	3.0	30.8
†	-2.1	-1.3	-.2	-12.5	-3.6	-.5	-.5	+17.4	+15.8	-20.8	-1.0	-3.8	-1.2	-1.8
‡	4.9	4.4	4.2	6.6	4.0	3.0	2.8	4.6	7.9	7.3	6.4	5.6	4.3	5.0
††	.21	1.30	1.45	29.41	.12	.60	2.14	6.27	8.18	2.10	3.25	.70	3.06	29.38

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, — ft^3/s)

Date	Time	Discharge	Date	Time	Discharge

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1976 WATER YEAR

_____. Little Elm Creek subwatershed No. 11 near Gunter, Tex. Drainage Area 1.17 mi^2

~~Continuous water stage recorder~~ staff gage ratio —. Date of last sediment survey —. Total Drainage Area 3.27 mi^2

Maxima: gage height, 15.6 ft; outflow, 93 ft^3/s; surface area, 30.7 acres; contents, 142 acre-feet; on Apr. 20, 1976.

Minima: gage height, 8.3 ft; surface area, 5.9 acres; contents, 12.2 acre-feet; on Apr. 15, 1976.

Maximum inflow, — ft^3/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on —.

Averages: 5 water years, (1972-76); inflow, 1950 acre-feet/year; outflow, 1910 acre-feet/year; rainfall, 38.82 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct.	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	0	0.6	0.6	1400	0	0.3	0.4	309	273	61.8	32.0	0.9	0.6	679
Total Outflow	0	0	0	1380	0	0	0	283	239	91.6	25.0	0	0	639
Total Consumption	4.4	3.4	1.6	84.3	1.8	2.5	2.7	4.8	10.3	11.6	11.6	9.0	7.7	71.4
†	-4.3	-1.9	-.1	-23.4	-1.7	-1.7	-1.0	+28.2	+34.2	-39.4	+.7	-5.9	-4.9	+2.2
‡	9.6	8.4	8.0	13.0	7.8	7.2	6.7	10.6	15.9	14.9	14.3	12.8	11.6	10.6
††	.08	1.23	1.40	31.59	.09	.77	2.25	8.53	8.08	1.73	4.41	2.31	2.30	33.18

1/ Inflow includes outflow from site no. 10.

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, — ft^3/s)

Date	Time	Discharge	Date	Time	Discharge

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOL

ANNUAL SUMMARY

1976 WATER YEAR

_____. Little Elm Creek subwatershed No. 12 near Celina, Tex. Drainage Area 1.62 mi^2

~~Continuous water stage recorder~~ staff gage ratio —. Date of last sediment survey —.

Maxima: gage height, 17.3 ft; outflow, 13 ft^3/s; surface area, 34.6 acres; contents, 247 acre-feet; on Apr. 20, 1976.

Minima: gage height, 7.7 ft; surface area, 11.0 acres; contents, 42.8 acre-feet; on Apr. 15, 1976.

Maximum inflow, — ft^3/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on —.

Averages: 5 water years, (1972-76); inflow, 1010 acre-feet/year; outflow, 970 acre-feet/year; rainfall, 37.53 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct.	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	0.1	0.4	1.0	670	0.1	0.4	0.8	220	217	43.7	39.4	1.6	1.1	526
Total Outflow	0	0	0	652	0	0	0	179	171	107	0	0	0	457
Total Consumption	5.5	4.3	3.0	89.8	2.6	3.2	4.7	7.7	10.0	10.8	11.4	14.4	9.0	86.6
†	-5.3	-2.7	-.6	-29.4	-2.4	-2.1	-1.8	+43.8	+47.7	-71.7	+33.5	-9.5	-4.9	+24.0
‡	12.9	12.4	12.2	15.1	12.0	11.7	11.4	14.6	17.2	16.0	16.0	17.0	16.4	14.2
††	.08	1.23	1.40	30.93	.09	.77	2.25	8.53	8.08	1.73	4.41	2.31	2.30	33.18

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, — ft^3/s)

Date	Time	Discharge	Date	Time	Discharge

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOL

ANNUAL SUMMARY

1976 WATER YEAR

_____. Little Elm Creek subwatershed No. 17 near Celina, Tex. Drainage Area 2.17 mi^2

~~Continuous water-stage recorder~~ staff gage ratio —. Date of last sediment survey —.

Maxima: gage height, 20.7 ft; outflow, 20 ft^3/s; surface area, 56.8 acres; contents, 389 acre-feet; on Apr. 20, 1976.

Minima: gage height, 13.1 ft; surface area, 22.5 acres; contents, 80.5 acre-feet; on Apr. 15, 1976.

Maximum inflow, — ft^3/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on —.

Averages: 5 water years, (1972-76); inflow, 1370 acre-feet/year; outflow, 1270 acre-feet/year; rainfall, 37.62 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct.	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	1.1	2.2	5.4	834	0	0.5	2.1	280	397	50.3	114	20.2	24.5	897
Total Outflow	0	0	0	782	0	0	0	204	291	163	106	0	5.6	770
Total Consumption	13.3	11.1	8.7	198	4.8	7.0	9.6	14.5	21.5	15.5	24.3	23.3	25.9	180
†	-12.1	-6.9	-.5	-67.3	-4.6	-5.3	-3.5	+77.8	+113	-118	-2.2	+3.5	-.2	+41.0
‡	28.2	26.4	25.7	33.3	25.3	24.2	23.3	30.6	37.9	37.0	36.2	33.8	35.5	30.3
††	.06	.90	1.32	27.66	.09	.58	2.02	6.53	8.91	3.03	4.54	2.39	2.31	32.68

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, — ft^3/s)

Date	Time	Discharge	Date	Time	Discharge

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOL

ANNUAL SUMMARY

1976 WATER YEAR

Little Elm Creek subwatershed No. 18-A near Celina, Tex. Drainage Area 1.05 mi^2

~~Continuous water stage recorder~~ staff gage ratio —. Date of last sediment survey —.

Maxima: gage height, 16.3 ft; outflow, 15 ft^3/s; surface area, 13.9 acres; contents, 121 acre-feet; on May 31, 1976.

Minima: gage height, 13.2 ft; surface area, 10.7 acres; contents, 83.3 acre-feet; on Apr. 15, 1976.

Maximum inflow, — ft^3/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on —.

Averages: 6 water years, (1971-76); inflow, 611 acre-feet/year; outflow, 568 acre-feet/year; rainfall, 39.68 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct.	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	0.2	1.8	1.7	468	0.4	0.2	0.5	18.7	99.8	27.4	2.4	0.6	1.0	155
Total Outflow	0	0	0	444	0	0	0	0	88.8	33.3	0	0	0	122
Total Consumption	6.5	4.7	2.9	78.1	2.4	2.2	4.9	3.9	7.5	5.8	9.0	11.9	7.5	69.2
†	-6.3	-1.5	+.1	-22.2	-2.0	-1.4	-2.2	+21.0	+13.5	-8.9	-3.7	-9.3	-3.1	-3.8
‡	11.4	11.2	11.1	12.4	11.1	11.0	10.9	11.2	13.0	12.9	12.6	11.9	11.5	11.6
††	0	1.52	1.36	31.46	0	.67	2.40	6.68	9.36	2.64	2.73	2.04	3.51	32.91

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, — ft^3/s)

Date	Time	Discharge	Date	Time	Discharge

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOL

ANNUAL SUMMARY

1976 WATER YEAR

_____. Little Elm Creek subwatershed No. 19 near Celina, Tex. Drainage Area 2.01 mi^2

~~Continuous water-stage recorder~~ staff gage ratio —. Date of last sediment survey —.

Maxima: gage height, 12.4 ft; outflow, 17 ft^3/s; surface area, 48.8 acres; contents, 239 acre-feet; on May 31, 1976.

Minima: gage height, 7.9 ft; surface area, 19.9 acres; contents, 86.6 acre-feet; on Apr. 15, 1976.

Maximum inflow, — ft^3/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on —.

Averages: 6 water years, (1971-76); inflow, 994 acre-feet/year; outflow, 901 acre-feet/year; rainfall, 39.04 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct.	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	0.2	1.2	2.1	834	0.1	1.1	0.3	75.8	216	40.0	22.2	6.4	7.5	373
Total Outflow	0	0	0	793	0	0	0	1.6	166	84.8	10.8	0	0	263
Total Consumption	11.7	10.2	6.1	205	5.2	6.8	8.6	13.9	22.0	25.2	25.5	28.4	21.3	185
†	-11.5	-6.4	-1.2	-67.9	-5.0	-4.5	-4.1	+76.2	+58.6	-62.6	-2.1	-17.1	-5.8	+ 14.5
‡	27.3	25.4	24.4	33.9	23.8	22.6	21.5	26.8	38.3	38.0	36.7	33.4	32.8	29.2
††	.02	.92	1.38	29.97	.11	.57	2.27	6.71	8.14	1.63	4.84	1.55	2.29	30.43

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, — ft^3/s)

Date	Time	Discharge	Date	Time	Discharge

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

WATER BUDGET OF POOL

ANNUAL SUMMARY

1976 WATER YEAR

_____. Little Elm Creek subwatershed No. 20 near Celina, Tex. Drainage Area 2.06 mi^2

~~Continuous water-stage recorder~~ staff gage ratio —. Date of last sediment survey —.

Maxima: gage height, 20.0 ft; outflow, 21 ft^3/s; surface area, 50.2 acres; contents, 319 acre-feet; on Apr. 20, 1976.

Minima: gage height, 12.6 ft; surface area, 17.8 acres; contents, 82.0 acre-feet; on Apr. 15, 1976.

Maximum inflow, — ft^3/s (averaged for 5-min. interval and adjusted for rainfall on pool surface) on —.

Averages: 6 water years, (1971-76); inflow, 1270 acre-feet/year; outflow, 1190 acre-feet/year; rainfall, 39.03 inches/year.

Pool water budget, in acre-feet, water year October 1975 to September 1976.

	Oct.	Nov.	Dec.	Calendar year 1975	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Water year 1976
Total Inflow 1/	0.2	1.2	1.7	1000	0.2	0.4	0.1	268	413	90.0	35.9	2.6	25.0	838
Total Outflow	0	0	0	969	0	0	0	206	352	146	27.5	0	2.9	734
Total Consumption	10.0	8.3	5.0	168	4.6	5.3	6.5	12.9	18.7	21.4	21.5	20.6	16.6	151
†	-9.8	-5.0	-1.0	-57.7	-4.3	-3.9	-2.7	+65.8	+68.1	-71.2	-4.1	-14.2	+12.3	+30.0
‡	21.7	20.7	20.1	26.4	19.8	19.1	18.7	23.3	29.5	28.8	28.7	25.8	27.6	23.6
††	.02	.92	1.38	29.97	.11	.57	2.27	6.71	8.14	1.63	4.84	1.55	2.29	30.43

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, — ft^3/s)

Date	Time	Discharge	Date	Time	Discharge

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY-AUSTIN DISTRICT

RAINFALL DATA SUMMARY

STUDY AREA Little Elm Creek — 1976 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 V JMT CTS
October 7		.05																		
15	.04		.15		.13															
24	.11	.12	.30	.08	.08	.06		.02		.04										
October Total	.15	.17	.45	.08	.21	.06		.02		.04		.12								
November 2	.42	.47	.65	.19	.47	.14	.35	(.28)	.29	.16										
19	.25	.20	.42	.42	.27	.54	.55	(.20)	.20	.63										
28	.21	.52				.22				.54										
29	.33		.40	.62	.56		.62	(.44)	.45											
November Total	1.21	1.19	1.47	1.23	1.30	.90	1.52	(.92)	.94	1.33		1.20								
December 5	.14	.10	.10	.11	.02	.09	.16	.08	.05	.12										
24	1.09	1.06	1.00	1.17	1.12	.99	.94	1.01	1.04	.91										
25	.35	.39	.25	.12	.31	.24	.26	.29	.11	.19										
December Total	1.58	1.55	1.35	1.40	1.45	1.32	1.36	1.38	1.20	1.22		1.38								
1975 Calendar Year Total												29.65								
January 19	.07	.09	.12	.06	.09	.09		.06		.05										
24	.04		.03	.03	.03			.05		.03										
January Total	.11	.09	.15	.09	.12	.09		.11		.08		.08								
February 17	.58	.37	.25	.47	.29	.33	.35	.27	.15	.39										
20	.24	.19	.33	.30	.31	.25	.32	.30	.19	.16										
February Total	.82	.56	.58	.77	.60	.58	.67	.57	.34	.55		.60								
March 4	.06	.06	.03	.08		.07		.02	.05	.05										
7-8	1.41	1.25	1.34	1.23	1.21	1.14	1.16	.91	.76	1.11										
11	.21	.22	.18	.17	.21	.15	.56	.36	.32	.15										
13	.09	.16	.17	.16	.20	.18		.16	.09	.11										
15				.03				.02												
24	.36	.31	.37	.29	.30	.20	.45	.45	.41	.21										
28	.34	.26	.23	.29	.22	.28	.23	.35	.32	.21										
March Total	2.47	2.26	2.32	2.25	2.14	2.02	2.40	2.27	1.95	1.84		2.19								

( ) estimated

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY-AUSTIN DISTRICT

RAINFALL DATA SUMMARY

STUDY AREA Little Elm Creek — 1976 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 V JMT CTS
April 3	.22	.20	.33	.23		.15	.70	.26	.13	.15										
7	.16	.15	.20	.22	.51	.30	.20	.26	.28	.15										
15-16	.56	.61	.62	.60	.58	.50	.64	.52	.54	.55										
17-18	2.39	2.25	2.28	2.64	2.05	2.00	1.94	2.19	2.17	2.45										
18-20	3.56	3.88	3.31	3.73	(2.42)	2.95	2.60	2.89	2.64	3.65										
23	.46	.86	.64	.59	.34	.05				.42										
24	.08	.15	.13	.12		.16	.15	.17	.06	.10										
28	.61	.50	.50	.37	.37	.42	.45	.42	.38	.42										
29				.03						.05										
April Total	8.04	8.60	8.01	8.53	6.27	6.53	6.68	6.71	6.20	7.94		7.35								
May 5-6	2.26	1.98	2.20	1.93	2.67	1.86	1.85	2.52	2.01	1.90										
9	.04							.03												
12	1.24	1.24	1.42	1.41	1.43	1.04	1.60	.73	.77	1.46										
13	.18	.19	.12	.12	.14	.17				.19										
23	1.77	1.30	1.02	1.30	1.08	2.45	1.45	2.02	1.42	1.09										
25	.16	.24	.37	.33	.46	.36	.56	.52	.37	.36										
26	.62	.54	.93	.91	1.20	1.42	.96	.91	.62	.84										
30-31	.89	.95	1.35	2.08	1.20	1.61	2.94	1.41	1.23	1.39										
May Total	7.16	6.45	7.41	8.08	8.18	8.91	9.36	8.14	6.42	7.23		7.73								
June 1	.34	.40	.55		.90	.99	.43	.56	.33	.45										
5	.46	.35	.47	.02	.04															
7	.18	.03																		
18-19	1.81	2.00	2.85	1.69	1.16	1.85	2.13	.96	2.65	1.60										
22	.10		.07	.02		.19	.08	.11												
June Total	2.89	2.78	3.94	1.73	2.10	3.03	2.64	1.63	2.98	2.05		2.58								
July 1	2.13	1.04	.33	.23	.48	.21	.03	.04		.25										
3		.07	.10	.11		.25	.12	.05		.10										
5		.03	.27	.20	.15	.25		1.02		.20										
9	.24	.28	.15	.52	.24	.32	.55	.40		.77										
10	.13	.05	.12	.08	.07			.07		.03										
11		.25	.40	.91	.61	1.91	1.43	1.93	.97	.87										
13			.07		.05	.09			.04											
15	.10	.17						.09	.02	.05										
16	1.90	1.81	2.50	2.25	1.60	1.51	.60	.59	.56	1.55										
19								.02	.10	.10										
25	.17	.55		.11	.05			.63												

( ) estimated

Form A-88
Rev. 1-63

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY-AUSTIN DISTRICT

RAINFALL DATA SUMMARY

STUDY AREA Little Elm Creek — 1976 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 JMT CTS
July Total	4.67	4.25	3.94	4.41	3.25	4.54	2.73	4.84	1.69	3.92		3.82								
August 6		.20	.14	.13						.13										
23						.09														
24						.07	.53	.17	(.18)											
27	.55	.34		.42		(.42)	1.27	.63	(.66)	.30										
28			.25	.14		(.14)				.35										
29		.05	.07	.11	.30	(.11)				.10										
31	.63	.65	.10	1.51	.40	1.56	.24	.75	(.79)	1.48										
August Total	1.18	1.24	.56	2.31	.70	(2.34)	2.04	1.55	1.63	2.36		1.60								
September 1	.23	.40	.85	.08	1.03	(.08)	2.05	.62	(.66)	.36										
2	.04	.05	.15	.08	.07	(.08)		.16	(.17)	.10										
9	.18	.21	.28	.15	.13	(.15)	.02			.11										
16	.13	.99		.03	.20	(.03)														
17	.03	.20	.57	.08		(.08)		.46	(.48)											
19-20	1.44	1.50	1.15	1.12	1.05	(1.13)	1.05	.55	(.58)	1.00										
26			.02		.13			.04	(.04)											
28	.24	.40	.53	.76	.45	(.76)	.39	.46	(.49)	.70										
September Total	2.29	3.75	3.55	2.30	3.06	2.31	3.51	2.29	2.42	2.27		2.78								
1976 Water Year Total												31.43								

( ) estimated

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

Sheet 1 of 2

INFLOW AND OUTFLOW COMPUTATIONS

Storm period April 19-20, 1976

08052630 Little Elm Creek subwatershed No. 10 near Gunter, Tex. D.A. 2.10 sq mi

Date and time	Gage height ft	Storage ac-ft	Time int. hrs	Change in storage ac-ft	Change in storage cfs	Mean G. Ht. ft	Outflow cfs	Total inflow cfs	Rainfall on Pool in	Rainfall on Pool area ac	Rainfall on Pool Storage ac-ft	Rainfall on Pool Storage cfs	Net Inflow Rate cfs	Net Inflow Rate in/hr	Net Inflow in	Net Inflow Acc in
April 19																
1200	18.14	108.66														
30	18.21	110.26	.50	+ 1.60	38.7	18.18	0		.41	23.0	.79	19.1	19.6			
1300	18.35	113.54	.50	3.28	79.4	18.28			.08	23.4	.16	3.9	75.5			
15	.43	115.45	.25	1.91	92.4	18.39			.02	23.9	.04	1.9	90.5			
20	.46	116.18	.083	.73	106				0				106			
1400	.68	121.60	.667	5.42	98.3								98.3			
1500	.90	127.24	1.0	5.64	68.2								68.2			
1600	19.03	130.68	1.0	3.44	41.6								41.6			
1700	19.11	132.83	1.0	2.15	26.0				0				26.0			
1800	19.17	134.47	1.0	1.64	19.8	19.14			.06	27.2	.14	1.7	18.1			
45	.20	135.29	.75	.82	13.2			13.2	0				13.2	.0097		
1900	.36	139.76	.25	4.47	216	19.28		216	1.01	27.9	2.35	114	102	.0753	.0188	.0188
10	.49	143.48	.167	3.72	270	19.42		270	.25	28.6	.60	43.5	226	.1668	.0279	.0467
20	.65	148.20	.167	4.72	342	19.57		342	.23	29.4	.56	40.6	301	.2221	.0371	.0838
25	.77	151.82	.083	3.62	526	19.71		526	.05	30.3	.13	18.9	507	.3742	.0311	.1149
30	.91	156.17	.083	4.35	632	19.84		632	.01	31.0	.03	4.4	628	.4635	.0385	.1534
35	20.11	162.59	.083	6.42	932	20.01	0	932	.02	32.1	.05	7.3	925	.6826	.0567	.2101
40	.32	169.68	.083	7.09	1,030	20.22	.8	1,030	.03	33.8	.08	11.6	1,020	.7528	.0625	.2726
50	.70	183.38	.167	13.70	993	20.51	4.4	997	.02	36.1	.06	4.3	993	.7328	.1224	.3950
2000	21.05	197.04	.167	13.66	990	20.88	12.6	1,000	.16	37.0	.52	37.7	962	.7100	.1186	.5136
10	.33	208.78	.167	11.74	851	21.19	17.0	868	.06	41.9	.21	15.2	853	.6295	.1051	.6187
20	.55	218.54	.167	9.76	707	21.44	18.5	725	.05	44.4	.18	13.0	712	.5255	.0878	.7065
30	.71	225.94	.167	7.40	536	21.63	19.5	556	.02	46.3	.08	5.8	550	.4059	.0678	.7743
40	.83	231.68	.167	5.74	416	21.77	20.1	436					436	.3218	.0537	.8280
50	.94	237.05	.167	5.37	389	21.88	20.6	410					410	.3026	.0505	.8785
2100	22.02	241.03	.167	3.98	288	21.98	21.0	309					309	.2280	.0381	.9166
15	.13	246.62	.25	5.59	271	22.08	21.3	292					292	.2155	.0539	.9705
30	.19	249.70	.25	3.08	149	22.16	21.6	171					171	.1262	.0316	1.0021
45	.25	252.84	.25	3.14	152	22.22	21.8	174					174	.1284	.0321	1.0342
2215	.32	256.54	.50	3.70	89.5	22.28	22.0	112					112	.0827	.0414	1.0756
2300	.39	260.28	.75	3.74	60.3	22.36	22.3	82.6					82.6	.0610	.0458	1.1214
2400	.45	263.54	1.0	+ 3.26	39.4	22.42	22.5	61.9	.03	54.2	.14	1.7	60.2	.0444	.0444	1.1658

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

Sheet 2 of 2

INFLOW AND OUTFLOW COMPUTATIONS

Storm period April 19-20, 1976

08052630 Little Elm Creek subwatershed No. 10 near Gunter, Tex. D.A. 2.10 sq mi

Date and time	Gage height	Storage	Time int.	Change in storage		Mean G. Ht.	Outflow	Total inflow	Rainfall on Pool				Net Inflow			
										area	Storage		Rate			Acc
	ft	ac-ft	hrs	ac-ft	cfs	ft	cfs	cfs	in	ac	ac-ft	cfs	cfs	in/hr	in	in
April 20																
0200	22.48	265.18	2.0	+ 1.64	9.9	22.46	22.6	32.5	.13	54.6	.59	3.6	28.9	.0213	.0426	1.2084
0400	.46	264.09	2.0	- 1.09	- 6.6	22.47	22.6	16.0					16.0	.0118	.0236	1.2320
0800	.41	261.36	4.0	- 2.73	- 8.3	22.44	22.5	14.2					14.2	.0105	.0420	1.2740
1200	.33	257.08	4.0	- 4.28	- 12.9	22.37	22.3	9.4					9.4			
1600	.22	251.27	4.0	- 5.81	- 17.6	22.28	22.0	4.4					4.4			
2000	22.11	245.58	4.0	- 5.69	- 17.2	22.16	21.6	4.4					4.4			
2400	21.99	239.52	4.0	- 6.06	- 18.3	22.05	21.2	2.9					2.9			

comp RMS checked CTS

TX-78 (Revised July 1969)

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

WEIGHTED PRECIPITATION RECORD

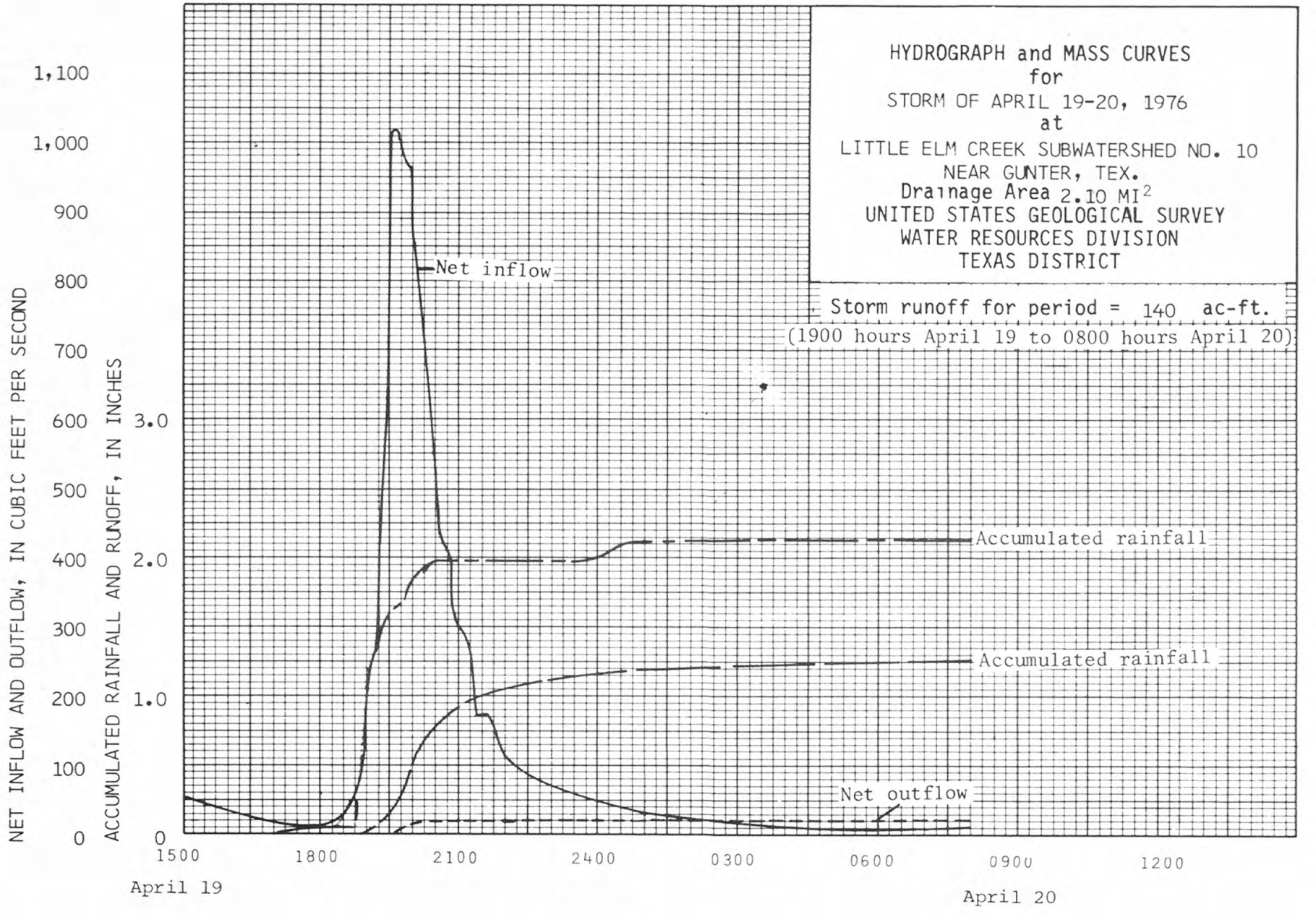
Sheet 1 of 1
Comp. by: RMS
Date Sept. 7, 1977
Check by CTS
Date Sept. 9, 1977

Study Area Little Elm Creek Subwatershed No. 10 near Gunter, Tex. Date of storm Apr. 19-20, 1976

	Accumulated Precipitation in Inches for Recording Rain Gages												Accumulated Weighted Precipitation	
Weight Factor	1.000													
	Gage 10-R		Gage		Gage		Gage		Gage		Gage			
Date & Time	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recording Gages All Gages	(Rec. Gages x K) All Gages
Apr. 19														
1700	0													0
1800	.06													.06
45	.06													.06
1900	1.07													1.07
15	1.42													1.42
30	1.61													1.61
45	1.66													1.66
2000	1.84													1.84
15	1.94													1.94
30	1.97													1.97
2345	1.97													1.97
2400	2.00													2.00
Apr. 20														
0030	2.09													2.09
0100	2.13													2.13
2400	2.13													2.13

Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor
										WMR	2.13

WMR = Sum of Precipitation x Weight Factor K = WMR / Total Recording Gages Weighted Precipitation =


HYDROGRAPH and MASS CURVES
for
STORM OF APRIL 19-20, 1976
at
LITTLE ELM CREEK SUBWATERSHED NO. 10
NEAR GUNTER, TEX.
Drainage Area 2.10 MI²
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT
Storm runoff for period = 140 ac-ft.
(1900 hours April 19 to 0800 hours April 20)
Net inflow
Accumulated rainfall
Accumulated rainfall
Net outflow
NET INFLOW AND OUTFLOW, IN CUBIC FEET PER SECOND
ACCUMULATED RAINFALL AND RUNOFF, IN INCHES
1,100
1,000
900
800
700
600
500
400
300
200
100
0
3.0
2.0
1.0
0
1500
1800
2100
2400
0300
0600
0900
1200
April 19
April 20

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UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

Sheet 1 of 1

INFLOW AND OUTFLOW COMPUTATIONS

Storm period May 6, 1976

08052630 Little Elm Creek subwatershed No. 10 near Gunter, Tex. D.A. 2.10 sq mi

Date and time	Gage height ft	Storage ac-ft	Time int. hrs	Change in storage ac-ft	Change in storage cfs	Mean G. Ht. ft	Outflow cfs	Total inflow cfs	Rainfall on Pool in	Rainfall on Pool area ac	Rainfall on Pool Storage ac-ft	Rainfall on Pool Storage cfs	Net Inflow Rate cfs	Net Inflow Rate in/hr	Net Inflow in	Acc in
May 6																
0000	20.10	162.26														
45	.13	163.26	0.75	+ 1.00	16.1	20.12	0.2	16.3	0.36	33.0	0.99	15.9	0.4	.0003	.0002	.0002
0130	.16	164.25	.75	.99	15.9	20.14	.3	16.2	.16	33.1	.44	7.1	9.1	.0067	.0050	.0052
0230	.17	164.58	1.0	.33	4.0	20.16	.4	4.4	0				4.4	.0032	.0032	.0084
0300	.18	164.92	.50	.34	8.2	20.18	.5	8.7	.04	33.4	.11	2.7	6.0	.0044	.0022	.0106
30	.24	166.94	.50	2.02	48.9	20.21	.7	49.6	.43	33.7	1.21	29.3	20.3	.0150	.0075	.0181
0400	.30	168.98	.50	2.04	49.4	20.27	1.2	50.6	.04	34.2	.11	2.7	47.9	.0354	.0177	.0358
15	.34	170.37	.25	1.39	67.3	20.32	1.6	68.9	.01	34.6	.03	1.5	67.4	.0497	.0124	.0482
30	.42	173.17	.25	2.80	136	20.38	2.4	138					138	.1018	.0254	.0736
45	.53	177.11	.25	3.94	191	20.48	3.9	195					195	.1439	.0360	.1096
50	.57	178.57	.083	1.46	212	20.55	5.1	217					217	.1601	.0133	.1229
0505	.68	182.64	.25	4.07	197	20.62	6.5	204					204	.1506	.0376	.1605
20	.77	186.04	.25	3.40	165	20.72	8.9	174					174	.1284	.0321	.1926
45	.90	191.06	.417	5.02	146	20.84	11.7	158					158	.1166	.0486	.2412
0600	.96	193.44	.25	2.38	115	20.93	13.6	129					129	.0952	.0238	.2650
30	21.06	197.45	.50	4.01	97.0	21.01	14.8	112					112	.0827	.0414	.3064
0700	.13	200.32	.50	2.87	69.5	21.10	16.1	85.6					85.6	.0632	.0316	.3380
30	.18	202.39	.50	2.07	50.1	21.16	16.7	66.8					66.8	.0493	.0246	.3626
0815	.23	204.50	.75	2.11	34.0	21.20	17.0	51.0					51.0	.0377	.0283	.3909
0930	.28	206.62	1.25	2.12	20.5	21.26	17.5	38.0					38.0	.0280	.0350	.4259
1200	.31	207.90	2.5	+ 1.28	6.2	21.30	17.8	24.0					24.0	.0177	.0442	.4701
1500	.29	207.04	3.0	- .86	- 3.5	21.30	17.8	14.3					14.3	.0106	.0318	.5019
1800	.23	204.50	3.0	- 2.54	- 10.2	21.26	17.5	7.3					7.3	.0054	.0162	.5181
2100	.16	201.56	3.0	- 2.94	- 11.9	21.20	17.0	5.1					5.1	.0038	.0114	.5295
2400	.09	198.66	3.0	- 2.90	- 11.7	21.12	16.3	4.6					4.6	.0034	.0102	.5397

comp RMS checked CTS

TX-78 (Revised July 1969)

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

WEIGHTED PRECIPITATION RECORD

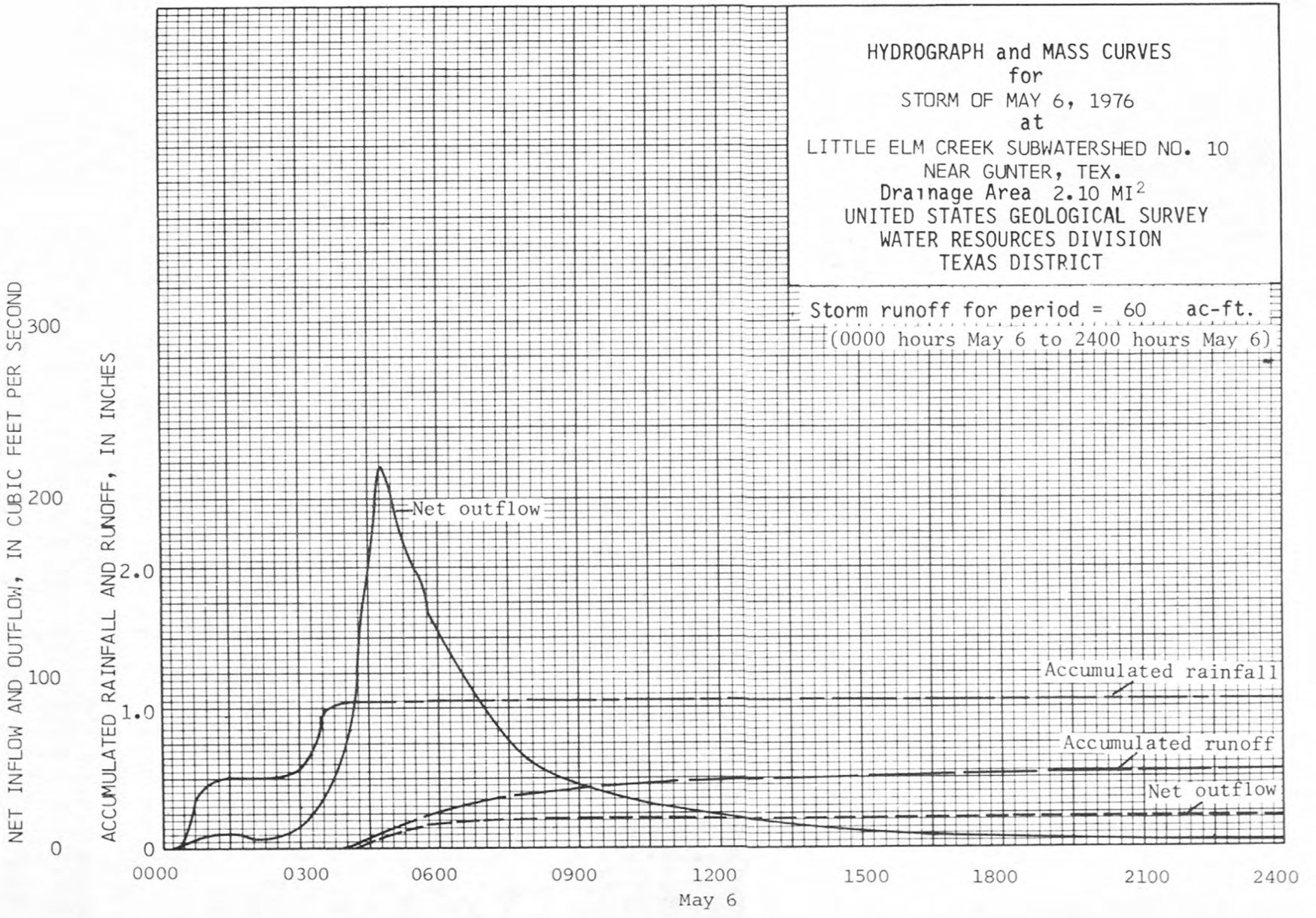
Sheet 1 of 1
Comp. by: RMS
Date Sept. 7, 1977
Check by CTS
Date Sept. 9, 1977

Study Area Little Elm Creek Subwatershed No. 10 near Gunter, Tex. Date of storm May 6, 1976

	Accumulated Precipitation in Inches for Recording Rain Gages												Accumulated Weighted Precipitation	
Weight Factor	1.000													
	Gage 10-R		Gage		Gage		Gage		Gage		Gage		Recording Gages All Gages	(Rec. Gages x K) All Gages
Date & Time	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor		
May 6														
0000	0													0
15	0													0
30	.07													.07
45	.36													.36
0100	.45													.45
15	.49													.49
30	.52													.52
0230	.52													.52
0300	.56													.56
15	.68													.68
30	.99													.99
0415	1.04													1.04
2400	1.04													1.04

Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor
										WMR	1.04

WMR = Sum of Precipitation x Weight Factor K = WMR / Total Recording Gages Weighted Precipitation =


HYDROGRAPH and MASS CURVES
for
STORM OF MAY 6, 1976
at
LITTLE ELM CREEK SUBWATERSHED NO. 10
NEAR GUNTER, TEX.
Drainage Area 2.10 MI2
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT
Storm runoff for period = 60 ac-ft.
(0000 hours May 6 to 2400 hours May 6)
NET INFLOW AND OUTFLOW, IN CUBIC FEET PER SECOND
ACCUMULATED RAINFALL AND RUNOFF, IN INCHES
300
200
100
0
2.0
1.0
0
Net outflow
Accumulated rainfall
Accumulated runoff
Net outflow
0000
0300
0600
0900
1200
1500
1800
2100
2400
May 6

TX.-65 (Rev. 2-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

RUNOFF COMPUTATIONS

Station Little Elm Creek near Celina, Tex.

Period of Record April 19-22, 1976 Drainage Area 46.7 mi.^{2}

Time	G. Ht. Feet	Sh. Adj.	Discharge Ft^3/s	Discharge Inc.	Discharge In/Hr	Runoff Inches	Runoff Acc. In.
	April	19,	1976				
0000	3.25	-.08	6.2	5	.0002	.0005	.0005
0500	3.20	-.07	5.5	11	.0002	.0011	.0016
1100	3.29	-.08	7.0	7	.0002	.0007	.0023
1200	3.48	-.08	11.0	1.5	.0004	.0003	.0026
30	4.45	-.12	48	1	.0016	.0008	.0034
1300	5.20	-.17	94	1	.0031	.0016	.0050
30	6.60	-.32	194	1	.0064	.0032	.0082
1400	7.75	-.41	288	1	.0096	.0048	.0130
30	8.42	-.46	352	1	.0117	.0058	.0188
1500	8.79	-.47	391	1.5	.0130	.0098	.0286
1600	9.02	-.45	427	2	.0142	.0142	.0428
1700	9.12	-.44	445	2	.0148	.0148	.0576
1800	9.12	-.44	445	2	.0148	.0148	.0724
1900	9.01	-.45	426	1.5	.0141	.0106	.0830
30	9.12	-.44	445	1	.0148	.0074	.0904
2000	9.43	-.42	502	1	.0167	.0084	.0988
30	9.81	-.38	602	1	.0200	.0100	.1088
2100	10.07	-.36	687	1	.0228	.0114	.1202
30	10.29	-.34	786	1	.0261	.0130	.1332
2200	10.39	-.33	835	1.5	.0277	.0208	.1540
2300	10.49	-.32	886	2	.0294	.0294	.1834
2400	10.56	-.32	926	1	.0307	.0154	.1988
	April	20,	1976				
0000	10.56	-.32	926	1	.0307	.0154	.2142
0100	10.66	-.31	999	2	.0332	.0332	.2474
0200	10.81	-.27	1,140	2	.0378	.0378	.2852
0300	10.77	-.30	1,080	2	.0359	.0359	.3211
0400	10.62	-.31	972	2	.0323	.0323	.3534
0500	10.39	-.33	835	2	.0277	.0277	.3811
0600	10.17	-.35	731	2	.0243	.0243	.4054
0700	9.94	-.37	637	2	.0211	.0211	.4265
0800	9.74	-.39	582	2	.0193	.0193	.4458
0900	9.57	-.40	539	3	.0179	.0268	.4726
1100	9.21	-.44	460	4	.0153	.0306	.5032
1300	8.83	-.47	396	4	.0131	.0262	.5294
1500	8.50	-.46	360	5	.0120	.0300	.5594
1800	8.11	-.43	322	6	.0107	.0321	.5915
2100	8.08	-.43	319	6	.0106	.0318	.6233
2400	8.08	-.43	319	3	.0106	.0159	.6392
	April	21,	1976				
0000	8.08	-.43	319	4	.0106	.0212	.6604
0400	7.80	-.41	293	8	.0097	.0388	.6992
0800	7.52	-.39	268	8	.0089	.0356	.7348
1200	7.39	-.38	257	8	.0085	.0340	.7688
1600	7.31	-.37	250	8	.0083	.0332	.8020
2000	7.22	-.36	243	8	.0081	.0324	.8344
2400	7.17	-.36	239	4	.0079	.0158	.8502
	April	22,	1976				
0000	7.17	-.36	239	6	.0079	.0237	.8739
0600	7.06	-.35	230	12	.0076	.0456	.9195
1200	6.63	-.32	196	12	.0065	.0390	.9585

Computed by RMS, JMT & CTS Date 11-30-76 Checked by THH & DLH Date 12-02-76

TX.-65 (Rev. 2-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

RUNOFF COMPUTATIONS

Station Little Elm Creek near Celina, Tex.

Period of Record April 19-22, 1976 Drainage Area 46.7 Mi.^{2}

Time	G. Ht. Feet	Sh. Adj.	Discharge Ft^3/s	Discharge Inc.	Discharge In/Hr	Runoff Inches	Runoff Acc. In.
1800	6.19	-.27	164	12	.0054	.0324	.9909
2400	5.90	-.24	143	6	.0047	.0141	1.0050

Time	G. Ht. Feet	Sh. Adj.	Discharge Ft^3/s	Discharge Inc.	Discharge In/Hr.	Runoff Inches	Runoff Acc. In

Computed by RMS, JMT & CTS Date 11-30-76 Checked by THH & DLH Date 12-02-76

TX-78 (Revised July 1969)

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

WEIGHTED PRECIPITATION RECORD

Sheet 1 of 2
Comp. by: RMS
Date 9-20-77
Check by THH
Date 9-20-77

Study Area Little Elm Creek near Celina, Tex. Date of storm April 18-20, 1976

	Accumulated Precipitation in Inches for Recording Rain Gages												Accumulated Weighted Precipitation	
Weight Factor	.45		.13		.42									
	Gage 2-R		Gage 6-R		Gage 10-R		Gage		Gage		Gage		Recording Gages	(Rec. Gages x K)
Date & Time	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	All Gages	All Gages
Apr. 18														
0500	0	0	0	0	0	0							0	0
2300	0		0		0								0	0
2400	.16	.07	.16	.02	.14	.06							.15	.14
Apr. 19														
0145	.17	.08	.20	.03	.16	.07							.18	.16
0300	.25	.11	.27	.04	.21	.09							.24	.22
0500	.31	.14	.30	.04	.31	.13							.31	.28
0830	.38	.17	.31	.04	.34	.14							.35	.32
0915	.53	.24	.32	.04	.46	.19							.47	.43
30	.66	.30	.43	.06	.55	.23							.59	.54
1030	.67	.30	.46	.06	.56	.24							.60	.54
1100	.95	.43	.50	.06	.94	.39							.88	.80
30	1.49	.67	.60	.08	.99	.42							1.17	1.06
1200	1.52	.68	.66	.09	1.00	.42							1.19	1.08
30	1.77	.80	1.12	.15	1.41	.59							1.54	1.40
1300	1.84	.83	1.22	.16	1.49	.63							1.62	1.47
1700	1.84	.83	1.24	.16	1.52	.64							1.63	1.48
15	1.87	.84	1.30	.17	1.56	.66							1.67	1.51
1845	1.90	.86	1.33	.17	1.58	.66							1.69	1.53
1900	2.40	1.08	1.80	.23	2.59	1.09							2.40	2.18
15	3.00	1.35	2.27	.30	2.94	1.23							2.88	2.61
30	3.23	1.45	2.45	.32	3.13	1.31							3.08	2.79
45	3.34	1.50	2.50	.32	3.18	1.34							3.16	2.87
2000	3.47	1.56	2.61	.34	3.36	1.41							3.31	3.00
30	3.67	1.65	2.74	.36	3.49	1.47							3.48	3.16
2400	3.69	1.66	2.75	.36	3.52	1.48							3.50	3.17

Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor
1-S	.16	3.56	.57	7-S	.02	2.60	.05				
2-R	.13	3.88	.50	10-R	.12	3.65	.44				
3-S	.20	3.31	.66								
4-S	.14	3.73	.52								
5-S	.19	(2.42)	.46								
6-R	.04	2.95	.12								
										WMR:	3.32

WMR = Sum of Precipitation x Weight Factor K = WMR / Total Recording Gages Weighted Precipitation = 3.32/3.66 = .907

( ) estimated

TX-78 (Revised July 1969)

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

WEIGHTED PRECIPITATION RECORD

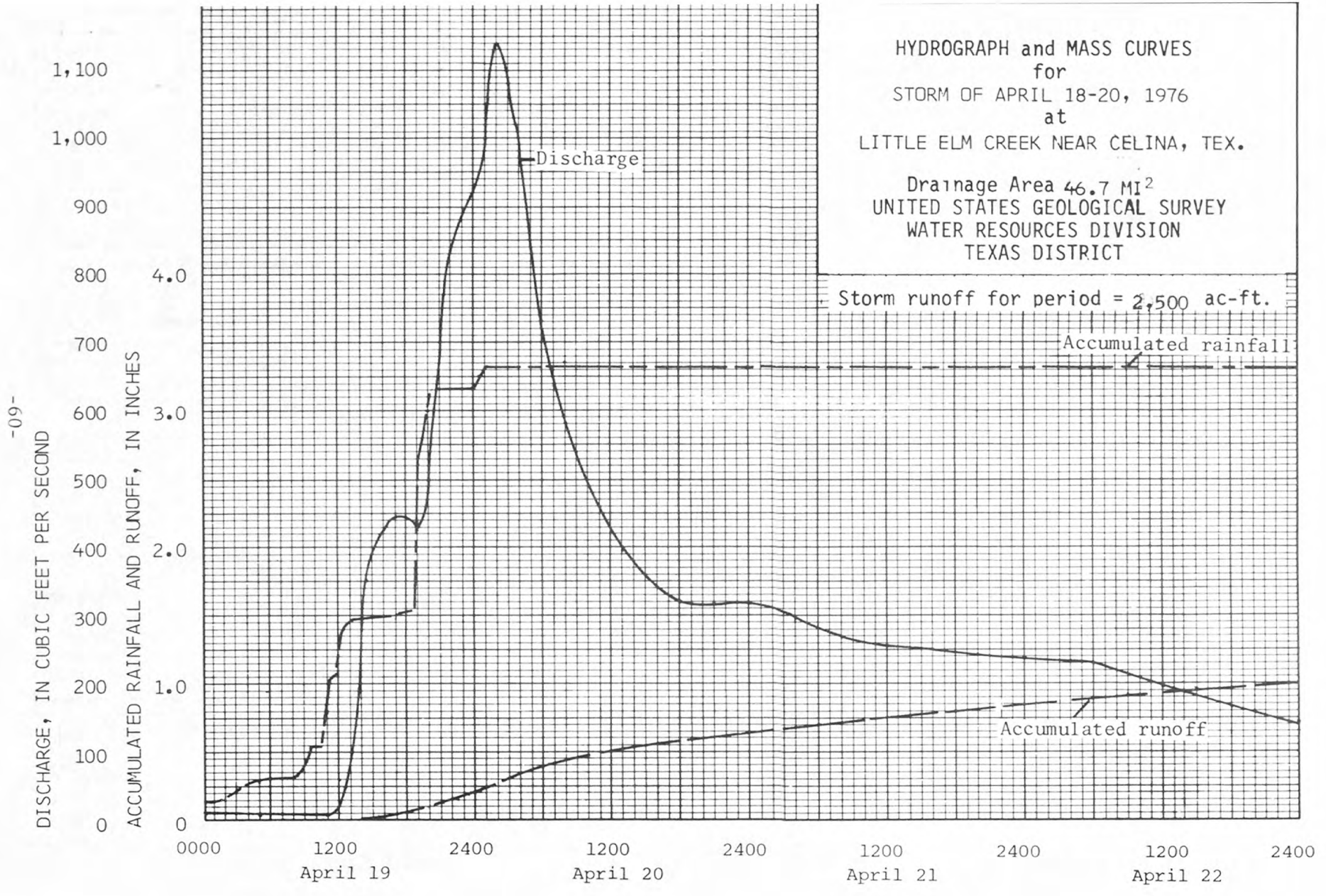
Sheet 2 of 2
Comp. by: RMS
Date 9-20-77
Check by TWH
Date 9-20-77

Study Area Little Elm Creek near Celina, Tex. Date of storm April 18-20, 1976

Accumulated Precipitation in Inches for Recording Rain Gages													Accumulated Weighted Precipitation	
Weight Factor	.45		.13		.42									
Date & Time	Gage 2-R Recorded	x Factor	Gage 6-R Recorded	x Factor	Gage 10-R Recorded	x Factor	Gage Recorded	x Factor	Gage Recorded	x Factor	Gage Recorded	x Factor	Recording Gages	(Rec. Gages x K) All Gages
Apr. 20														
0030	3.78	1.70	2.82	.37	3.61	1.52							3.59	3.26
0100	3.88	1.75	2.95	.38	3.65	1.53							3.66	3.32
2400	3.88	1.75	2.95	.38	3.65	1.53							3.66	3.32

Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor
										WMR:	

WMR = Sum of Precipitation x Weight Factor K = WMR / Total Recording Gages Weighted Precipitation =


HYDROGRAPH and MASS CURVES
for
STORM OF APRIL 18-20, 1976
at
LITTLE ELM CREEK NEAR CELINA, TEX.
Drainage Area 46.7 MI²
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT
Storm runoff for period = 2,500 ac-ft.
Discharge
Accumulated rainfall
Accumulated runoff
DISCHARGE, IN CUBIC FEET PER SECOND
ACCUMULATED RAINFALL AND RUNOFF, IN INCHES
1,100
1,000
900
800
700
600
500
400
300
200
100
0
4.0
3.0
2.0
1.0
0
0000
1200
2400
1200
2400
1200
2400
1200
2400
April 19
April 20
April 21
April 22

TX.-65 (Rev. 2-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

RUNOFF COMPUTATIONS

Station Little Elm Creek near Celina, Tex.

Period of Record May 26-28, 1976 Drainage Area 46.7 Mi.^{2}

Time	G. Ht. Feet	Sh. Adj.	Discharge Ft^3/s	Inc.	In/Hr	Runoff Inches	Acc. In.
	May 26, 1976						
0000	3.77	-.09	19	16.75	.0006	.0050	.0050
1645	3.63	-.09	15	17	.0005	.0042	.0092
1700	3.83	-.10	21	.75	.0007	.0003	.0095
30	6.62	-.31	196	1	.0065	.0032	.0127
1800	9.10	-.47	437	1	.0145	.0072	.0199
30	9.90	-.38	624	1	.0207	.0104	.0303
1900	10.37	-.32	830	1	.0276	.0138	.0441
30	10.60	-.29	972	1.25	.0323	.0202	.0643
2015	10.72	-.28	1,060	1.5	.0352	.0264	.0907
2100	10.68	-.28	1,030	1.75	.0342	.0299	.1206
2200	10.52	-.30	913	2	.0303	.0303	.1509
2300	10.30	-.33	795	2	.0264	.0264	.1773
2400	9.95	-.37	640	1	.0212	.0106	.1879
	May 27, 1976						
0000	9.95	-.37	640	1	.0212	.0106	.1985
0100	9.55	-.42	529	2	.0176	.0176	.2161
0200	9.01	-.46	424	2	.0141	.0141	.2302
0300	8.25	-.42	338	2	.0112	.0112	.2414
0400	7.31	-.36	251	2	.0083	.0083	.2497
0500	6.57	-.31	192	2	.0064	.0064	.2561
0600	6.12	-.26	159	3	.0053	.0080	.2641
0800	5.64	-.21	125	4	.0042	.0084	.2725
1000	5.39	-.19	106	4	.0035	.0070	.2795
1200	5.22	-.17	95	5	.0032	.0080	.2875
1500	5.03	-.15	83	6	.0028	.0084	.2959
1800	4.89	-.13	74	6	.0025	.0075	.3034

Time	G. Ht. Feet	Sh. Adj.	Discharge Ft^3/s	Inc.	In/Hr.	Runoff Inches	Acc. In
2100	4.77	-.13	66	6	.0022	.0066	.3100
2400	4.68	-.13	61	3	.0020	.0030	.3130
	May 28, 1976						
0000	4.68	-.13	61	6	.0020	.0060	.3190
0600	4.50	-.12	51	12	.0017	.0102	.3292
1200	4.37	-.11	44	12	.0015	.0090	.3382
1800	4.24	-.11	38	12	.0013	.0078	.3460
2400	4.12	-.11	32	6	.0011	.0033	.3493

Computed by RMS, JMT & CTS Date 12-01-76 Checked by THH & DLH Date 12-03-76

TX-78 (Revised July 1969)

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

WEIGHTED PRECIPITATION RECORD

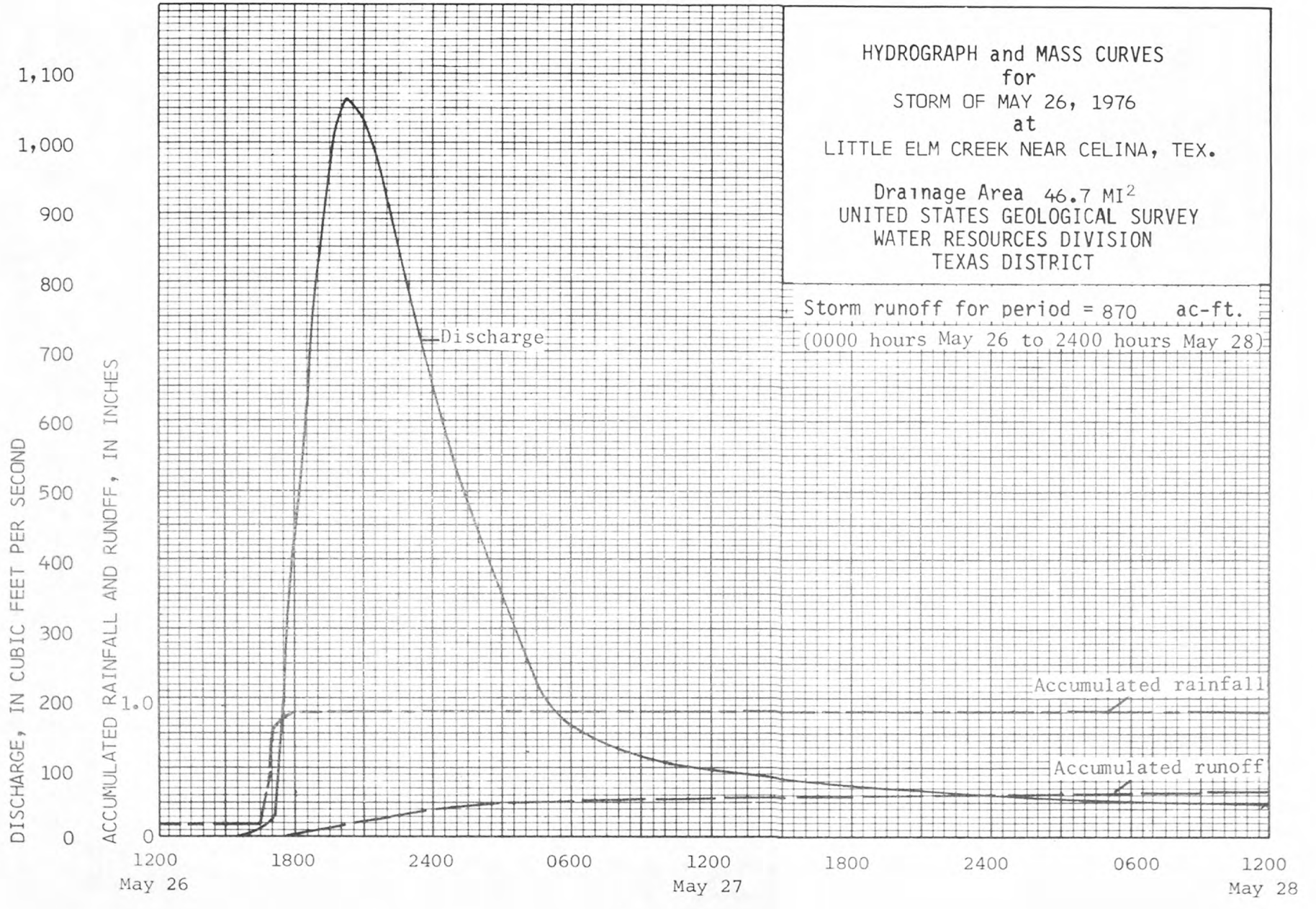
Sheet 1 of 1
Comp. by: RMS
Date 9-21-77
Check by THH
Date 9-21-77

Study Area Little Elm Creek near Celina, Tex. Date of storm May 26, 1976

	Accumulated Precipitation in Inches for Recording Rain Gages												Accumulated Weighted Precipitation	
Weight Factor	.45		.13		.42									
	Gage 2-R		Gage 6-R		Gage 10-R		Gage		Gage		Gage		Recording Gages	(Rec. Gages x K)
Date & Time	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	All Gages	All Gages
May 26														
0000	0	0	0	0	0	0							0	0
1545	0	0	0	0	0	0							0	0
1600	.01	0	0	0	.02	.01							.01	.01
15	.05	.02	0	0	.03	.01							.03	.04
30	.06	.03	.02	0	.04	.02							.05	.06
45	.20	.09	.34	.04	.32	.13							.26	.30
1700	.39	.18	.75	.10	.75	.32							.60	.70
15	.51	.23	1.02	.13	.81	.34							.70	.82
30	.53	.24	1.23	.16	.84	.35							.75	.88
45	.54	.24	1.36	.18	.84	.35							.77	.90
1830	.54	.24	1.42	.18	.84	.35							.77	.90
2400	.54	.24	1.42	.18	.84	.35							.77	.90

Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor
1-S	.16	.62	.10	7-S	.02	.96	.02				
2-R	.13	.54	.07	10-R	.12	.84	.10				
3-S	.20	.93	.19								
4-S	.14	.91	.13								
5-S	.19	1.20	.23								
6-R	.04	1.42	.06							WMR	0.90

WMR = Sum of Precipitation x Weight Factor K = WMR / Total Recording Gages Weighted Precipitation = 0.90/0.77 = 1.169


HYDROGRAPH and MASS CURVES
for
STORM OF MAY 26, 1976
at
LITTLE ELM CREEK NEAR CELINA, TEX.
Drainage Area 46.7 MI2
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT
Storm runoff for period = 870 ac-ft.
(0000 hours May 26 to 2400 hours May 28)
Discharge
Accumulated rainfall
Accumulated runoff
DISCHARGE, IN CUBIC FEET PER SECOND
ACCUMULATED RAINFALL AND RUNOFF, IN INCHES
1,100
1,000
900
800
700
600
500
400
300
200
100
0
1.0
0
1200
1800
2400
0600
1200
1800
2400
0600
1200
May 26
May 27
May 28

TX.-65 (Rev. 2-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

RUNOFF COMPUTATIONS

Station Little Elm Creek near Celina, Tex.

Period of Record May 30 – June 2, 1976 Drainage Area 46.7 mi.²

Time	G. Ht. Feet	Sh. Adj.	Discharge Ft³/s	Discharge Inc.	Discharge In/Hr	Runoff Inches	Runoff Acc. In.
	May 30, 1976						
0000	3.75	-.09	18	21	.0006	.0063	.0063
2100	3.58	-.09	13	21.5	.0004	.0043	.0106
30	3.82	-.10	20	1	.0007	.0004	.0110
2200	5.15	-.16	90	1	.0030	.0015	.0125
30	7.49	-.37	267	1	.0089	.0044	.0169
2300	8.80	-.45	394	1	.0131	.0066	.0235
30	9.52	-.43	520	1	.0173	.0086	.0321
2400	9.83	-.39	604	.5	.0201	.0050	.0371
	May 31, 1976						
0000	9.83	-.39	604	.5	.0201	.0050	.0421
30	9.98	-.37	649	1	.0215	.0108	.0529
0100	10.04	-.36	675	1	.0224	.0112	.0641
30	9.96	-.37	642	1	.0213	.0107	.0748
0200	9.85	-.39	609	1.5	.0202	.0152	.0900
0300	9.69	-.41	565	2	.0188	.0188	.1088
0400	9.45	-.44	502	2	.0167	.0167	.1255
0500	9.09	-.47	435	2	.0144	.0144	.1399
0600	8.69	-.44	383	2.5	.0127	.0159	.1559
0730	8.03	-.40	317	3	.0105	.0158	.1717
0900	7.45	-.37	263	3	.0087	.0130	.1847
1030	6.99	-.35	224	3	.0074	.0111	.1958
1200	6.59	-.31	194	4.5	.0064	.0144	.2102
1500	5.95	-.24	147	6	.0049	.0147	.2249
1800	5.55	-.20	119	6	.0040	.0120	.2369
2100	5.29	-.18	100	6	.0033	.0099	.2468
2400	5.13	-.16	89	3	.0030	.0045	.2513

Time	G. Ht. Feet	Sh. Adj.	Discharge Ft³/s	Discharge Inc.	Discharge In/Hr.	Runoff Inches	Runoff Acc. In
	June 1, 1976						
0000	5.13	-.16	89	.75	.0030	.0011	.2524
45	5.12	-.16	88	1	.0029	.0014	.2538
0100	5.26	-.17	98	.75	.0033	.0012	.2550
30	6.06	-.25	155	1	.0051	.0026	.2576
0200	7.30	-.36	250	1	.0083	.0042	.2618
30	8.47	-.43	360	1	.0120	.0060	.2678
0300	9.18	-.47	450	1	.0149	.0074	.2752
30	9.54	-.42	527	1	.0175	.0088	.2840
0400	9.72	-.40	574	1	.0191	.0096	.2936
30	9.83	-.39	604	1.25	.0201	.0126	.3062
0515	9.90	-.38	624	1.5	.0207	.0155	.3217
0600	9.87	-.38	617	1.75	.0205	.0179	.3396
0700	9.75	-.40	582	2	.0193	.0193	.3589
0800	9.52	-.43	520	2	.0173	.0173	.3762
0900	9.20	-.47	454	2	.0151	.0151	.3913
1000	8.80	-.45	394	2	.0131	.0131	.4044
1100	8.32	-.42	345	2.5	.0115	.0144	.4188
1230	7.50	-.37	268	3	.0089	.0134	.4322
1400	6.81	-.33	210	3	.0070	.0105	.4427
1530	6.38	-.29	178	3	.0059	.0088	.4515
1700	6.08	-.26	156	3.5	.0052	.0091	.4606
1900	5.80	-.23	136	4	.0045	.0090	.4696
2100	5.60	-.21	122	5	.0040	.0100	.4796
2400	5.39	-.19	106	3	.0035	.0052	.4848

Computed by RMS, JMT & CTS Date 12-01-76 Checked by CTS & DLH Date 12-03-76

TX.-65 (Rev. 2-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

RUNOFF COMPUTATIONS

Station Little Elm Creek near Celina, Tex.

Period of Record May 30 - June 2, 1976 Drainage Area 46.7 Mi.^{2}

Time	G. Ht. Feet	Sh. Adj.	Discharge Ft^3/s	Discharge Inc.	Discharge In/Hr	Runoff Inches	Runoff Acc. In.
	June 2, 1976						
0000	5.39	-.19	106	6	.0035	.0105	.4953
0600	5.14	-.16	90	12	.0030	.0180	.5133
1200	4.93	-.14	76	12	.0025	.0150	.5283
1800	4.76	-.13	66	12	.0022	.0132	.5415
2400	4.60	-.12	56	6	.0019	.0052	.5472

Time	G. Ht. Feet	Sh. Adj.	Discharge Ft^3/s	Discharge Inc.	Discharge In/Hr.	Runoff Inches	Runoff Acc. In

Computed by RMS, JMT & CTS Date 12-01-76 Checked by CTS & DLH Date 12-03-76

TX-78 (Revised July 1969)

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

WEIGHTED PRECIPITATION RECORD

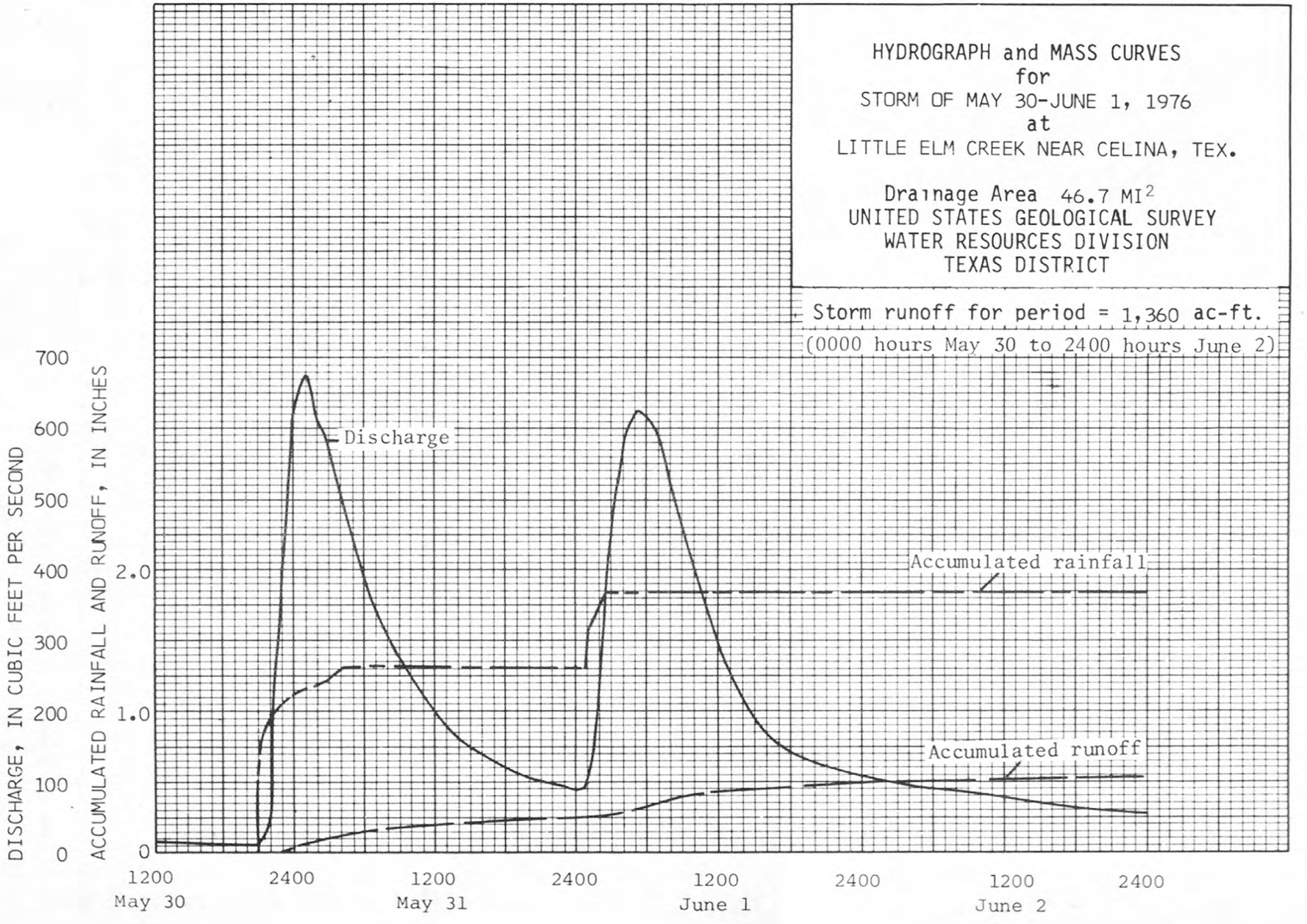
Sheet 1 of 1
Comp. by: RMS
Date 9-23-77
Check by JHH
Date 9-23-77

Study Area Little Elm Creek near Celina, Tex. Date of storm May 30 - June 1, 1976

	Accumulated Precipitation in Inches for Recording Rain Gages												Accumulated Weighted Precipitation	
Weight Factor	.45		.13		.42									
	Gage 2-R		Gage 6-R		Gage 10-R		Gage		Gage		Gage		Recording Gages	(Rec. Gages x K)
Date & Time	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	All Gages	All Gages
May 30														
0000	0		0		0	0							0	0
2045	0		0		0	0							0	0
2100	.20	.09	(.66)	.09	.57	.24							.42	.45
15	.40	.18	(1.01)	.13	.88	.37							.68	.73
30	.48	.22	(1.16)	.15	1.00	.42							.79	.85
45	.56	.25	(1.24)	.16	1.07	.45							.86	.92
2200	.62	.28	(1.30)	.17	1.12	.47							.92	.98
2300	.72	.32	(1.40)	.18	1.21	.51							1.01	1.08
2400	.77	.35	(1.45)	.19	1.25	.52							1.06	1.13
May 31														
0200	.81	.36	(1.50)	.20	1.29	.54							1.10	1.18
0300	.85	.38	(1.55)	.20	1.34	.56							1.14	1.22
0400	.94	.42	(1.61)	.21	1.39	.58							1.21	1.29
0500	.95	.43	(1.61)	.21	1.39	.58							1.22	1.31
2400	.95	.43	1.61	.21	1.39	.58							1.22	1.31
June 1														
0045	.95	.43	1.61	.21	1.39	.58							1.22	1.31
0100	1.02	.46	2.08	.27	1.67	.70							1.43	1.53
15	1.09	.49	2.38	.31	1.72	.72							1.52	1.63
30	1.12	.50	2.41	.31	1.74	.73							1.54	1.65
45	1.17	.53	2.45	.32	1.78	.75							1.60	1.71
0200	1.25	.56	2.48	.32	1.80	.76							1.64	1.75
15	1.31	.59	2.51	.33	1.82	.76							1.68	1.80
30	1.34	.60	2.54	.33	1.84	.77							1.70	1.82
45	1.35	.61	2.60	.34	1.84	.77							1.72	1.84
2400	1.35	.61	2.60	.34	1.84	.77							1.72	1.84

Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor
1-S	.16	1.23	.20	7-S	.02	3.37	.07				
2-R	.13	1.35	.18	10-R	.12	1.84	.22				
3-S	.20	1.90	.38								
4-S	.14	2.08	.29								
5-S	.19	2.10	.40								
6-R	.04	2.60	.10							WMR	1.84

WMR = Sum of Precipitation x Weight Factor K = WMR / Total Recording Gages Weighted Precipitation = 1.84 / 1.72 = 1.070


HYDROGRAPH and MASS CURVES
for
STORM OF MAY 30-JUNE 1, 1976
at
LITTLE ELM CREEK NEAR CELINA, TEX.
Drainage Area 46.7 MI2
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT
Storm runoff for period = 1,360 ac-ft.
(0000 hours May 30 to 2400 hours June 2)
DISCHARGE, IN CUBIC FEET PER SECOND
ACCUMULATED RAINFALL AND RUNOFF, IN INCHES
700
600
500
400
300
200
100
0
2.0
1.0
0
Discharge
Accumulated rainfall
Accumulated runoff
1200
May 30
2400
1200
May 31
2400
1200
June 1
2400
1200
June 2
2400

TX-65 (Rev. 2-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

RUNOFF COMPUTATIONS

Station Little Elm Creek near Aubrey, Tex.

Period of Record April 19-23, 1976 Drainage Area 75.5 mi.^{2}

Time	G. Ht. Feet	Sh. Adj.	Discharge Ft^3/s	Inc.	In/Hr	Runoff Inches	Acc. In.
	April	19,	1976				
0000	6.80	-.13	17	1	.0003	.0003	.0003
0200	6.72		14	2.5	.0003	.0008	.0011
0500	6.64		11	4.5	.0002	.0009	.0020
1100	6.54		8.2	4	.0002	.0008	.0028
1300	6.74		14	1.25	.0003	.0004	.0032
30	6.94		24	.5	.0005	.0002	.0034
1400	7.19		38	.75	.0008	.0006	.0040
1500	7.62		64	.75	.0013	.0010	.0050
30	8.19		97	.5	.0020	.0010	.0060
1600	8.77	-.13	129	.5	.0026	.0013	.0073
30	9.29	-.18	157	.5	.0032	.0016	.0089
1700	9.69	-.23	180	.5	.0037	.0018	.0107
30	10.05	-.28	205	.5	.0042	.0021	.0128
1800	10.36	-.32	229	.75	.0047	.0035	.0163
1900	10.83	-.39	266	1	.0054	.0054	.0217
2000	11.36	-.46	310	1	.0064	.0064	.0281
2100	11.86	-.47	358	1	.0073	.0073	.0354
2200	12.25		406	1	.0083	.0083	.0437
2300	12.47		438	1	.0090	.0090	.0527
2400	12.58	-.47	455	.5	.0093	.0046	.0573
	April	20,	1976				
0000	12.58	-.47	455	1	.0093	.0093	.0666
0200	12.80		490	2.5	.0100	.0250	.0916
0500	13.12		547	3	.0112	.0336	.1252
0800	13.50		647	3	.0133	.0399	.1651
1100	13.87	-.47	771	2.5	.0158	.0395	.2046
1300	13.96	-.47	807	2	.0165	.0330	.2376
1500	13.91		786	2	.0161	.0322	.2698
1700	13.68		699	2	.0143	.0286	.2984
1900	13.28		588	2	.0120	.0240	.3224
2100	12.81		492	2.5	.0100	.0250	.3474
2400	12.17	-.47	394	1.5	.0081	.0122	.3596
	April	21,	1976				
0000	12.17	-.47	394	1.5	.0081	.0122	.3718
0300	11.81	-.47	353	3	.0072	.0216	.3934
0600	11.60	-.47	332	4.5	.0068	.0306	.4240
1200	11.39	-.46	312	6	.0064	.0384	.4624
1800	11.13	-.43	290	6	.0059	.0354	.4978
2400	10.95	-.40	276	3	.0057	.0171	.5149
	April	22,	1976				
0000	10.95	-.40	276	3	.0057	.0171	.5320
0600	10.84	-.39	266	6	.0055	.0330	.5650
1200	10.76	-.38	260	6	.0053	.0318	.5968
1800	10.57	-.35	245	6	.0050	.0300	.6268
2400	10.14	-.29	212	3	.0043	.0129	.6397
	April	23,	1976				
0000	10.14	-.29	212	3	.0043	.0129	.6526
0600	9.73	-.24	182	6	.0037	.0222	.6748
1200	9.44	-.20	165	6	.0034	.0204	.6952
1800	9.13	-.15	149	6	.0030	.0180	.7132
2400	8.68	-.09	126	3	.0026	.0078	.7210

Computed by RMS & JMT & CTS Date 11/30/76 Checked by THH & DLH Date 12/02/76

TX-78 (Revised July 1969)

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

WEIGHTED PRECIPITATION RECORD

Sheet 1 of 2
Comp. by: RMS
Date 9-19-77
Check by THH
Date 9-20-77

Study Area Little Elm Creek near Aubrey, Tex. Date of storm April 18-20, 1976

Weight Factor	Accumulated Precipitation in Inches for Recording Rain Gages												Accumulated Weighted Precipitation	
	Gage 2-R		Gage 6-R		Gage 9-R		Gage 10-R		Gage		Gage		Recording Gages	(Rec. Gages x K)
	.294		.345		.088		.273							
Date & Time	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	All Gages	All Gages
Apr. 18														
0500	0	0	0	0	0	0	0	0					0	0
2300	0	0	0	0	0	0	0	0					0	0
2400	.16	.05	.16	.06	.15	.01	.14	.04					.16	.15
Apr. 19														
0145	.17	.05	.20	.07	.17	.01	.16	.04					.17	.16
0300	.25	.07	.27	.09	.26	.02	.21	.06					.24	.22
0500	.31	.09	.30	.10	.36	.03	.31	.08					.30	.28
0830	.38	.11	.31	.11	.36	.03	.34	.09					.34	.32
0915	.53	.16	.32	.11	.37	.03	.46	.13					.43	.40
30	.66	.19	.43	.15	.39	.03	.55	.15					.52	.48
1030	.67	.20	.46	.16	.81	.07	.56	.15					.58	.54
1100	.95	.28	.50	.17	.81	.07	.94	.26					.78	.72
30	1.49	.44	.60	.21	.97	.09	.99	.27					1.01	.94
1200	1.52	.45	.66	.23	1.03	.09	1.00	.27					1.04	.97
30	1.77	.52	1.12	.39	1.41	.12	1.41	.38					1.41	1.31
1300	1.84	.54	1.22	.42	1.63	.14	1.49	.41					1.51	1.40
1700	1.84	.54	1.24	.43	1.67	.15	1.52	.41					1.53	1.42
15	1.87	.55	1.30	.45	1.71	.15	1.56	.43					1.58	1.47
1845	1.90	.56	1.33	.46	1.73	.15	1.58	.43					1.60	1.49
1900	2.40	.71	1.80	.62	2.06	.18	2.59	.71					2.22	2.06
15	3.00	.88	2.27	.78	2.21	.19	2.94	.80					2.65	2.46
30	3.23	.95	2.45	.85	2.26	.20	3.13	.85					2.85	2.65
45	3.34	.98	2.50	.86	2.30	.20	3.18	.87					2.91	2.70
2000	3.47	1.02	2.61	.90	2.31	.20	3.36	.92					3.04	2.82
30	3.67	1.08	2.74	.95	2.37	.21	3.49	.95					3.19	2.96
2400	3.69	1.08	2.75	.95	2.38	.21	3.52	.96					3.20	2.97

Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor
1-S	.10	3.56	.36	7-S	.11	2.60	.29				
2-R	.09	3.88	.35	8-S	.12	2.89	.35				
3-S	.13	3.31	.43	9-R	.03	2.64	.08				
4-S	.09	3.73	.34	10-R	.08	3.65	.29				
5-S	.13	(2.42)	.31								
6-R	.12	2.95	.35							WMR:	3.15

WMR = Sum of Precipitation x Weight Factor K = WMR / Total Recording Gages Weighted Precipitation = 3.15/3.39 = 0.929

( ) estimated

TX-78 (Revised July 1969)

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

WEIGHTED PRECIPITATION RECORD

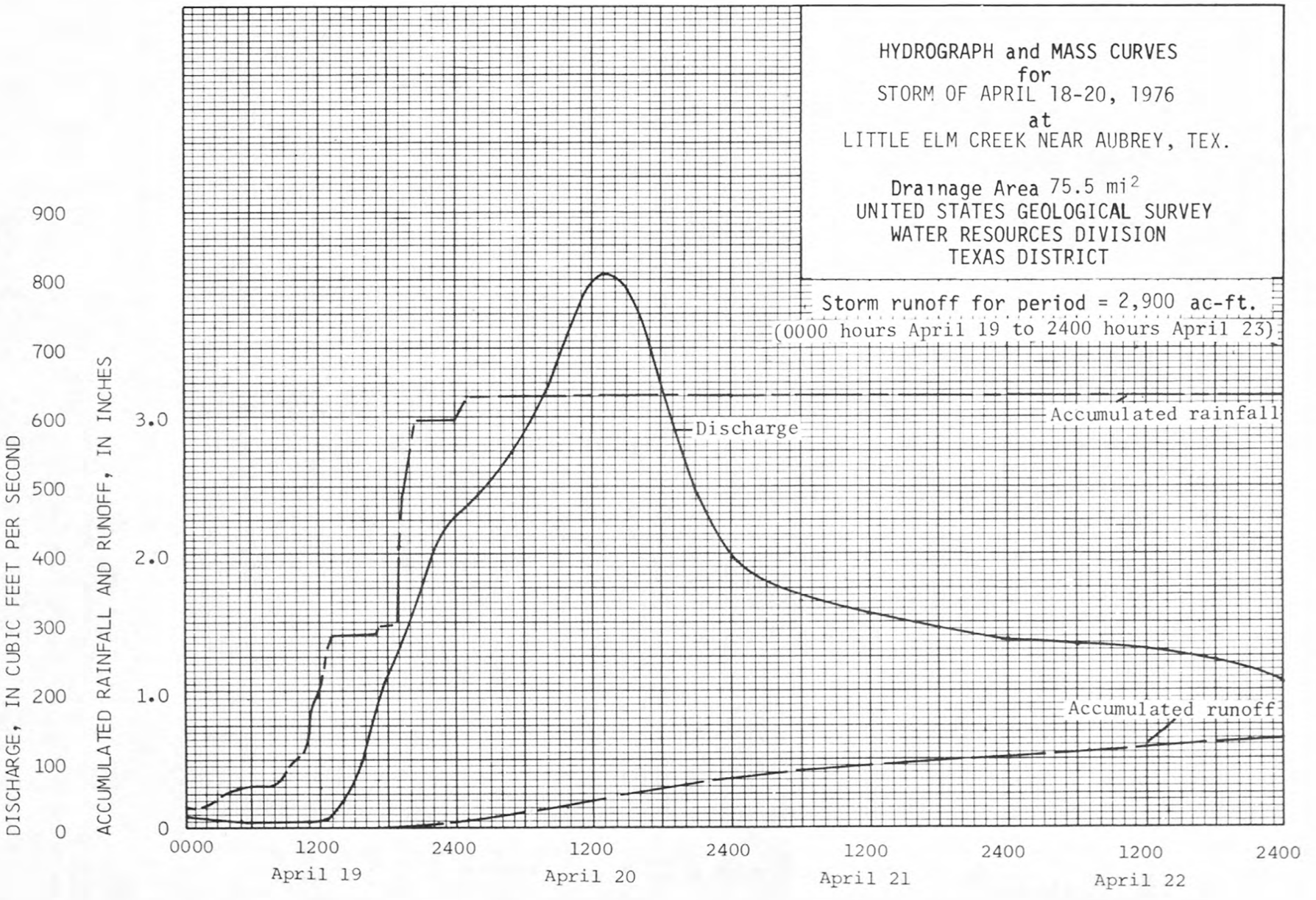
Sheet 2 of 2
Comp. by: RMS
Date 9-19-77
Check by THH
Date 9-20-77

Study Area Little Elm Creek near Aubrey, Tex. Date of storm Apr. 20, 1977

Date & Time	Accumulated Precipitation in Inches for Recording Rain Gages												Accumulated Weighted Precipitation	
Weight Factor	.294		.345		.088		.273						Recording Gages	(Rec. Gages x K)
	Gage 2-R		Gage 6-R		Gage 9-R		Gage 10-R		Gage		Gage		All Gages	All Gages
	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor		
Apr. 20														
0030	3.78	1.11	2.82	.97	2.46	.22	3.61	.99					3.29	3.06
0100	3.88	1.14	2.95	1.02	2.64	.23	3.65	1.00					3.39	3.15
2400	3.88	1.14	2.95	1.02	2.64	.23	3.65	1.00					3.39	3.15

Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor
										WMR:	

WMR = Sum of Precipitation x Weight Factor K = WMR / Total Recording Gages Weighted Precipitation =


HYDROGRAPH and MASS CURVES
for
STORM OF APRIL 18-20, 1976
at
LITTLE ELM CREEK NEAR AUBREY, TEX.
Drainage Area 75.5 mi²
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT
Storm runoff for period = 2,900 ac-ft.
(0000 hours April 19 to 2400 hours April 23)
Discharge
Accumulated rainfall
Accumulated runoff
DISCHARGE, IN CUBIC FEET PER SECOND
ACCUMULATED RAINFALL AND RUNOFF, IN INCHES
0
100
200
300
400
500
600
700
800
900
1.0
2.0
3.0
0000
1200
2400
1200
2400
1200
2400
1200
2400
April 19
April 20
April 21
April 22

TX.-65 (Rev. 2-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

RUNOFF COMPUTATIONS

Station Little Elm Creek near Aubrey, Tex.

Period of Record May 26-28, 1976 Drainage Area 75.5 mi.^{2}

Time	G. Ht. Feet	Sh. Adj.	Discharge Ft^3/s	Inc.	In/Hr	Runoff Inches	Acc. In.
	May	26,	1976				
0000	7.19	0	46	5	.0009	.0045	.0045
1000	7.00		35	8	.0007	.0056	.0101
1600	6.85		26	3.5	.0005	.0018	.0119
1700	6.93		31	1	.0006	.0006	.0125
1800	7.17		44	.625	.0009	.0006	.0131
15	7.32		54	.25	.0011	.0003	.0134
30	7.64		72		.0015	.0004	.0138
45	8.35		112		.0023	.0006	.0144
1900	9.04		153		.0031	.0008	.0152
15	9.72		201		.0041	.0010	.0162
30	10.30		252		.0052	.0013	.0175
45	10.75		295	.25	.0060	.0015	.0190
2000	11.10		329	.375	.0067	.0025	.0215
30	11.66		388	.5	.0080	.0040	.0255
2100	12.12		457		.0094	.0047	.0302
30	12.47		513		.0105	.0052	.0354
2200	12.75		572		.0117	.0058	.0412
30	12.95		625		.0128	.0064	.0476
2300	13.13		675		.0138	.0069	.0545
30	13.29		728	.5	.0149	.0074	.0619
2400	13.42	0	779	.25	.0160	.0040	.0659
	May	27,	1976				
0000	13.42	0	779	.5	.0160	.0080	.0739
0100	13.66		878	1.5	.0180	.0270	.1009
0300	14.03		1,060	2	.0217	.0434	.1443
0500	14.46	0	1,380	2	.0283	.0566	.2009
0700	14.73	0	1,640	1.875	.0336	.0630	.2639
0845	14.80		1,720	1.75	.0353	.0618	.3257
1030	14.67		1,580	1.625	.0324	.0526	.3783
1200	14.32		1,270	1.25	.0260	.0325	.4108
1300	13.96		1,020	1	.0209	.0209	.4317
1400	13.51		815	1.5	.0167	.0250	.4567
1600	12.48		515	2	.0106	.0212	.4779
1800	11.43		362	2	.0074	.0148	.4927
2000	10.44		266	2	.0054	.0108	.5035
2200	9.77		205	2	.0042	.0084	.5119
2400	9.35	0	172	1	.0035	.0035	.5154
	May	28,	1976				
0000	9.35	0	172	1.5	.0035	.0052	.5206
0300	9.01		151	3	.0031	.0093	.5299
0600	8.81		139	4.5	.0028	.0126	.5425
1200	8.52		122	6	.0025	.0150	.5575
1800	8.17		103	6	.0021	.0126	.5701
2400	7.91	0	88	3	.0018	.0054	.5755

Computed by RMS, JMT & CTS Date 12-01-76 Checked by CTS & DLH Date 12-03-76

TX-78 (Revised July 1969)

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

WEIGHTED PRECIPITATION RECORD

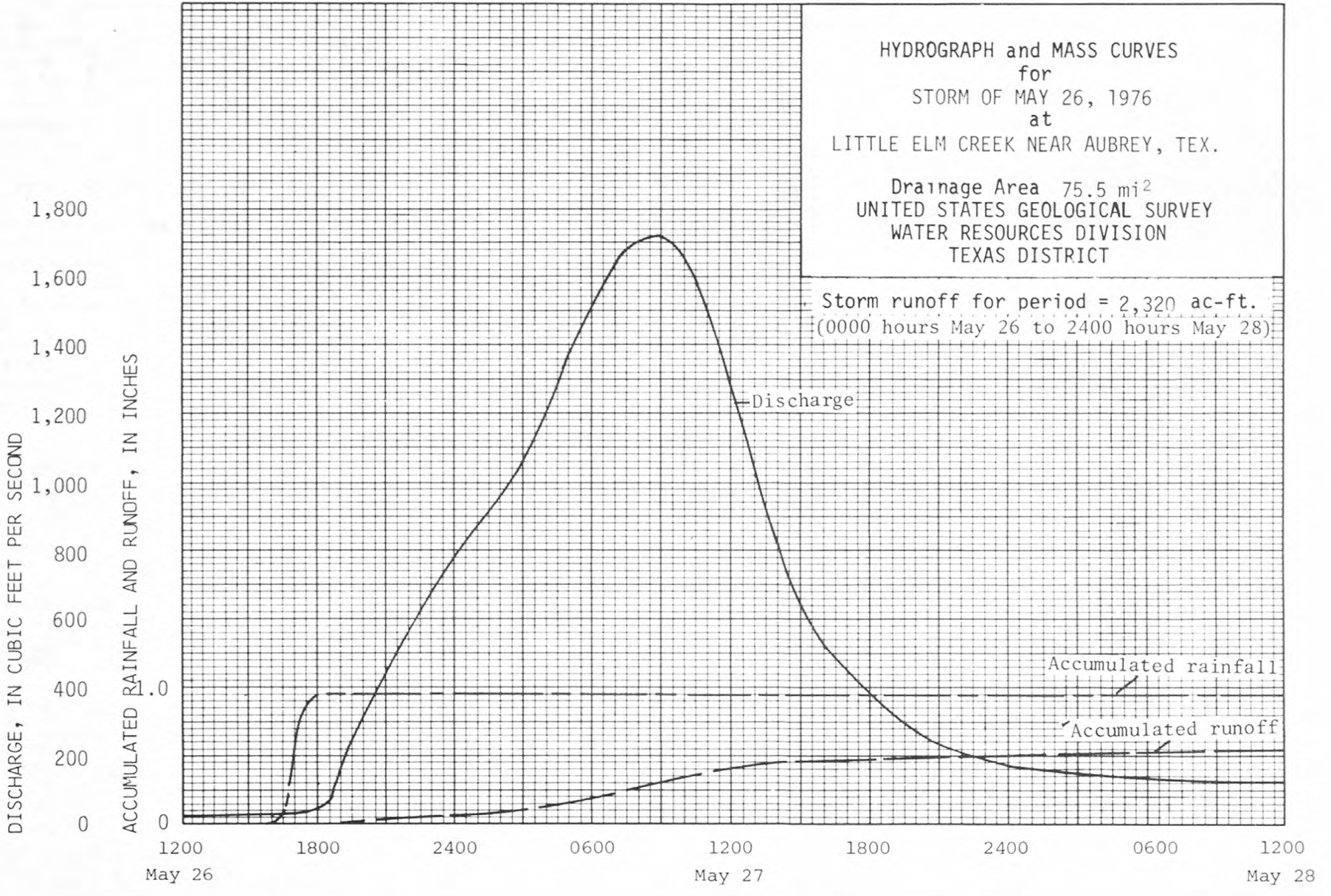
Sheet 1 of 1
Comp. by: RMS
Date 9/20/77
Check by THH
Date 9-20-77

Study Area Little Elm Creek near Aubrey, Tex. Date of storm May 26, 1976

Date & Time	Weight Factor .294 Gage 2-R Recorded	x Factor	Gage 6-R .345 Recorded	x Factor	Gage 9-R .088 Recorded	x Factor	Gage 10-R .273 Recorded	x Factor	Gage Recorded	x Factor	Gage Recorded	x Factor	Accumulated Weighted Precipitation Recording Gages	(Rec. Gages x K) All Gages
May 26														
0000	0	0	0	0	0	0	0	0					0	0
1545	0	0	0	0	0	0	0	0					0	0
1600	.01	0	0	0	0	0	.02	.01					.01	.01
15	.05	.01	0	0	0	0	.03	.01					.02	.02
30	.06	.02	.02	.01	0	0	.04	.01					.04	.04
45	.20	.06	.34	.12	.13	.01	.32	.09					.28	.29
1700	.39	.11	.75	.26	.47	.04	.75	.20					.61	.62
15	.51	.15	1.02	.35	.58	.05	.81	.22					.77	.79
30	.53	.16	1.23	.42	.58	.05	.84	.23					.86	.88
45	.54	.16	1.36	.47	.59	.05	.84	.23					.91	.93
1830	.54	.16	1.42	.49	.62	.05	.84	.23					.93	.95
2400	.54	.16	1.42	.49	.62	.05	.84	.23					.93	.95

Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor
1-S	.10	.62	.06	7-S	.11	.96	.11				
2-R	.09	.54	.05	8-S	.12	.91	.11				
3-S	.13	.93	.12	9-R	.03	.62	.02				
4-S	.09	.91	.08	10-R	.08	.84	.07				
5-S	.13	1.20	.16								
6-R	.12	1.42	.17							WMR	0.95

WMR = Sum of Precipitation x Weight Factor K = WMR / Total Recording Gages Weighted Precipitation = 0.95/0.93 = 1.022


HYDROGRAPH and MASS CURVES
for
STORM OF MAY 26, 1976
at
LITTLE ELM CREEK NEAR AUBREY, TEX.
Drainage Area 75.5 mi²
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT
Storm runoff for period = 2,320 ac-ft.
(0000 hours May 26 to 2400 hours May 28)
DISCHARGE, IN CUBIC FEET PER SECOND
ACCUMULATED RAINFALL AND RUNOFF, IN INCHES
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1.0
0
Discharge
Accumulated rainfall
Accumulated runoff
1200
1800
2400
0600
1200
1800
2400
0600
1200
May 26
May 27
May 28

TX.-65 (Rev. 2-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

RUNOFF COMPUTATIONS

Station Little Elm Creek near Aubrey, Tex.

Period of Record May 30 - June 3, 1976 Drainage Area 75.5 mi.^{2}

Time	G. Ht. Feet	Sh. Adj.	Discharge Ft^3/s	Discharge Inc.	Discharge In/Hr	Runoff Inches	Runoff Acc. In.
	May 30,		1976				
0000	6.92	0	30	6	.0006	.0036	.0036
1200	6.72		19	10	.0004	.0040	.0076
2000	6.61		14	4.5	.0003	.0014	.0090
2100	6.65		16	.75	.0003	.0002	.0092
30	6.89		28	.5	.0006	.0003	.0095
2200	7.26		50	.375	.0010	.0004	.0099
15	7.57		68	.25	.0014	.0004	.0103
30	8.09		99		.0020	.0005	.0108
45	8.61		127		.0026	.0006	.0114
2300	9.17		161		.0033	.0008	.0122
15	9.83		210		.0043	.0011	.0133
30	10.44		266		.0055	.0014	.0147
45	10.93		312	.25	.0064	.0016	.0163
2400	11.29	0	348	.125	.0071	.0009	.0172
	May 31,		1976				
0000	11.29	0	348	.25	.0071	.0018	.0190
30	11.86		418	.5	.0086	.0043	.0233
0100	12.30		486	.75	.0100	.0075	.0308
0200	12.83		593	1.5	.0122	.0183	.0491
0400	13.27		721	2	.0148	.0296	.0787
0600	13.56		836	2	.0171	.0342	.1129
0800	13.82		950	2	.0195	.0390	.1519
1000	14.03		1,060	1.875	.0217	.0407	.1926
1145	14.15		1,140	1.75	.0234	.0410	.2336
1330	14.05		1,070	1.625	.0219	.0356	.2692
1500	13.86	0	968	1.75	.0198	.0346	.3038

Time	G. Ht. Feet	Sh. Adj.	Discharge Ft^3/s	Discharge Inc.	Discharge In/Hr.	Runoff Inches	Runoff Acc. In
1700	13.38	0	763	2	.0156	.0312	.3350
1900	12.76		575	2	.0118	.0236	.3586
2100	12.02		442	2.5	.0091	.0228	.3814
2400	10.88	0	308	1.5	.0063	.0094	.3908
	June 1,		1976				
0000	10.88	0	308	1.5	.0063	.0094	.4002
0300	10.28		250	2	.0051	.0102	.4104
0400	10.52		273	1	.0056	.0056	.4160
0500	11.04		323	1	.0066	.0066	.4226
0600	11.57		377	1	.0077	.0077	.4303
0700	12.07		449	1	.0092	.0092	.4395
0800	12.46		512	1.5	.0105	.0158	.4553
1000	12.93		620	2	.0127	.0254	.4807
1200	13.25		713	2	.0146	.0292	.5099
1400	13.48		803	2	.0165	.0330	.5429
1600	13.59		848	2	.0174	.0348	.5777
1800	13.51		815	2	.0167	.0334	.6111
2000	13.22		702	2	.0144	.0288	.6399
2200	12.70		560	2	.0115	.0230	.6629
2400	11.96	0	432	1	.0089	.0089	.6718
	June 2,		1976				
0000	11.96	0	432	1	.0089	.0089	.6807
0200	11.18		337	2	.0069	.0138	.6945
0400	10.46		268	2	.0055	.0110	.7055
0600	9.97		222	2.5	.0046	.0115	.7170
0900	9.53	0	185	3	.0038	.0114	.7284

Computed by JMT, RMS & CTS Date 12-01-76 Checked by CTS & DLH Date 12-03-76

TX.-65 (Rev. 2-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY - TEXAS DISTRICT

RUNOFF COMPUTATIONS

Station Little Elm Creek near Aubrey, Tex.

Period of Record May 30 - June 3, 1976 Drainage Area 75.5 mi.^{2}

Time	G. Ht. Feet	Sh. Adj.	Discharge Ft^3/s	Discharge Inc.	Discharge In/Hr	Runoff Inches	Runoff Acc. In.
1200	9.30	0	169	45	.0035	.0158	.7442
1800	8.93	0	146	6	.0030	.0180	.7622
2400	8.50	0	121	3	.0025	.0075	.7697
	June	3,	1976				
0000	8.50	0	121	3	.0025	.0075	.7772
0600	8.18	|	103	6	.0021	.0126	.7898
1200	7.94	|	90	6	.0018	.0108	.8006
1800	7.73	|	78	6	.0016	.0096	.8102
2400	7.59	0	70	3	.0014	.0042	.8144

Time	G. Ht. Feet	Sh. Adj.	Discharge Ft^3/s	Discharge Inc.	Discharge In/Hr.	Runoff Inches	Runoff Acc. In

Computed by JMT, RMS & CTS Date 12-01-76 Checked by CTS & DLH Date 12-03-76

TX-78 (Revised July 1969)

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

WEIGHTED PRECIPITATION RECORD

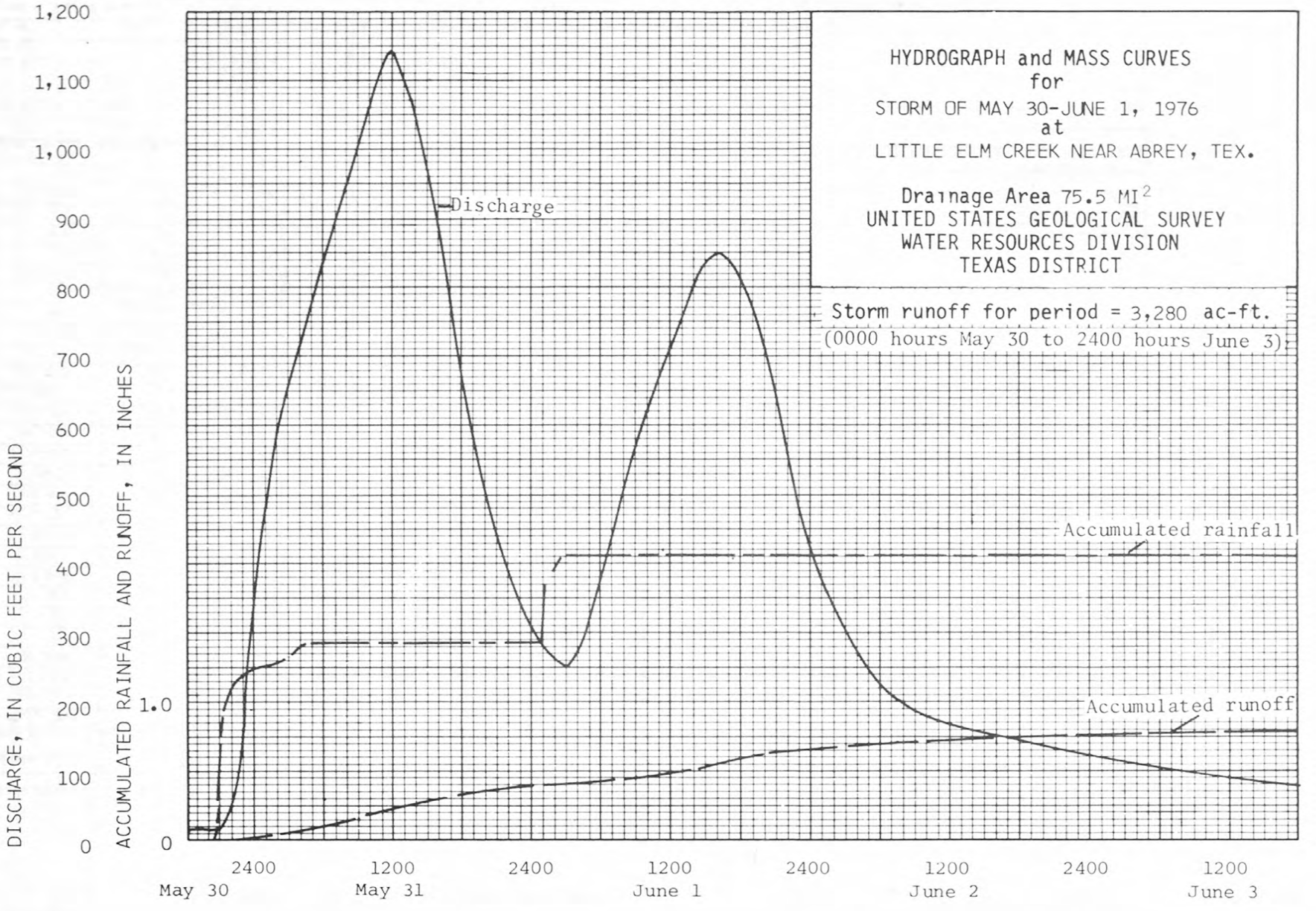
Sheet 1 of 1
Comp. by: RMS
Date 9-21-77
Check by TMH
Date 9-23-77

Study Area Little Elm Creek near Aubrey, Tex. Date of storm May 30-June 1, 1976

Date & Time	Accumulated Precipitation in Inches for Recording Rain Gages												Accumulated Weighted Precipitation	
Weight Factor	.294		.345		.088		.273							
	Gage 2-R		Gage 6-R		Gage 9-R		Gage 10-R		Gage		Gage		Recording Gages	(Rec. Gages x K)
	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	Recorded	x Factor	All Gages	All Gages
May 30														
0000	0	0	0	0	0	0	0	0					0	0
2045	0	0	0	0	0	0	0	0					0	0
2100	.20	.06	(66)	.23	.19	.02	.57	.16					.47	.50
15	.40	.12	(1.01)	.35	.56	.05	.88	.24					.76	.81
30	.48	.14	(1.16)	.40	.74	.07	1.00	.27					.88	.94
45	.56	.16	(1.24)	.43	.91	.08	1.07	.29					.96	1.02
2200	.62	.18	(1.30)	.45	1.04	.09	1.12	.31					1.03	1.10
2300	.72	.21	(1.40)	.48	1.07	.09	1.21	.33					1.11	1.18
2400	.77	.23	(1.45)	.50	1.10	.10	1.25	.34					1.17	1.25
May 31														
0200	.81	.24	(1.50)	.52	1.10	.10	1.29	.35					1.21	1.29
0300	.85	.25	(1.55)	.53	1.11	.10	1.34	.37					1.25	1.33
0400	.94	.28	(1.61)	.56	1.16	.10	1.39	.38					1.32	1.41
0500	.95	.28	(1.61)	.56	1.23	.11	1.39	.38					1.33	1.42
2400	.95	.28	1.61	.56	1.23	.11	1.39	.38					1.33	1.42
June 1														
0045	.95	.28	1.61	.56	1.23	.11	1.39	.38					1.33	1.42
0100	1.02	.30	2.08	.72	1.29	.11	1.67	.46					1.59	1.70
15	1.09	.32	2.38	.82	1.31	.12	1.72	.47					1.73	1.85
30	1.12	.33	2.41	.83	1.33	.12	1.74	.48					1.76	1.88
45	1.17	.34	2.45	.85	1.39	.12	1.78	.49					1.80	1.92
0200	1.25	.37	2.48	.86	1.42	.12	1.80	.49					1.84	1.96
15	1.31	.39	2.51	.87	1.47	.13	1.82	.50					1.89	2.02
30	1.34	.39	2.54	.88	1.51	.13	1.84	.50					1.90	2.03
45	1.35	.40	2.60	.90	1.56	.14	1.84	.50					1.94	2.07
2400	1.35	.40	2.60	.90	1.56	.14	1.84	.50					1.94	2.07

Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor	Rain Gage	Weight Factor	Precipitation	Precipitation x Weight Factor
1-S	.10	1.23	.12	7-S	.11	3.37	.37				
2-R	.09	1.35	.12	8-S	.12	1.97	.24				
3-S	.13	1.90	.25	9-R	.03	1.56	.05				
4-S	.09	2.08	.19	10-R	.08	1.84	.15				
5-S	.13	2.10	.27								
6-R	.12	2.60	.31							WMR	2.07

WMR = Sum of Precipitation x Weight Factor K = WMR / Total Recording Gages Weighted Precipitation = 2.07/1.94 = 1.067


HYDROGRAPH and MASS CURVES
for
STORM OF MAY 30-JUNE 1, 1976
at
LITTLE ELM CREEK NEAR ABREY, TEX.
Drainage Area 75.5 MI²
UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
TEXAS DISTRICT
Storm runoff for period = 3,280 ac-ft.
(0000 hours May 30 to 2400 hours June 3)
Discharge
Accumulated rainfall
Accumulated runoff
DISCHARGE, IN CUBIC FEET PER SECOND
ACCUMULATED RAINFALL AND RUNOFF, IN INCHES
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
1.0
0
2400
1200
May 30
May 31
June 1
June 2
June 3