HYDROLOGIC DATA FOR URBAN STUDIES IN THE SAN ANTONIO, TEXAS, METROPOLITAN AREA, 1981

By Roberto Perez

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METRIC CONVERSIONS

The inch-pound units of measurement used in this report may be converted to metric units by using the following conversion factors:

From		Multiply by	To obtain	
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

To convert degrees Celsius (°C) to degrees Fahrenheit (°F): °F=9/5 x °C+32.

HYDROLOGIC DATA FOR URBAN STUDIES IN THE SAN ANTONIO, TEXAS, METROPOLITAN AREA 1981

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INTRODUCTION

Hydrologic investigations of urban drainage basins in Texas were begun by the U.S. Geological Survey in 1954. These studies are now in progress in Austin and Houston. Studies were completed in the Fort Worth metropolitan area at the end of the 1977 water year, and in the Dallas metropolitan area at the end of the 1979 water year. The study in the San Antonio area was completed at the end of the 1981 water year.

The Geological Survey, in cooperation with the Texas Department of Water Resources, expanded the existing streamflow network in the San Antonio metropolitan area in May 1968 to begin urban hydrology studies in this area. In September 1968, the program was further expanded to include the collection of water-quality data. The Texas Department of Water Resources ended its participation in the project in 1979, and the city of San Antonio funded the program through the 1981 water year.

The operation and maintenance of stations 08178000, San Antonio River at San Antonio; 08178700, Salado Creek (upper station) at San Antonio; and 08178800, Salado Creek (lower station) at San Antonio are funded by the city of San Antonio and the U.S Geological Survey.

The operation and maintenance and collection of water-quality data at station 08178720, Lorence Creek at Thousand Oaks Blvd., San Antonio, station 08178640, West Elm Creek at San Antonio, and station 08178645, East Elm Creek at San Antonio, are funded by the Edwards Underground Water District in cooperation with the Texas Department of Water Resources and the U.S. Geological Survey. Station 08178640, West Elm Creek at San Antonio, and station 08178645, East Elm Creek at San Antonio will provide hydrologic data on similar and adjacent watersheds. The West Elm watershed is still predominately rural but is undergoing extensive urbanization in some areas. The East Elm watershed is relatively stable and undeveloped.

The objectives of the San Antonio urban hydrology study are:

1. To provide data showing the effects of various stages of urbanization on flood discharge and runoff.

2. To provide water-quality data on surface-water runoff from floods of various magnitudes, during all seasons of the year from areas with different types of urban development.

Annual publication of the San Antonio urban studies was initiated in 1969.

A definition of terms related to streamflow, water quality, and other hydrologic data, as used in this report, are defined in the U.S. Geological Survey's 1979 and 1980 "Water resources data for Texas" reports.

Purpose and Scope of this Hydrologic-Data Report

The purpose of this report is to present a compilation of hydrologic data collected by the U.S. Geological Survey in the San Antonio urban area for the 1981 water year.

To facilitate the publication and distributrion of this report certain material has been included that does not conform to the formal publication standards of the U.S. Geological Survey.

Watershed Features

The natural hydrologic features of watersheds in the San Antonio urban study are strongly affected by two physiographic regions, the Edwards Plateau and the West Gulf Coastal Plain, which are divided by the Balcones Escarpment (fig. 1).

The Edwards Plateau has been eroded by streams into relatively steep and rugged topography, while the West Gulf Coastal Plain, which is rolling or moderately hilly near the Balcones Escarpment, has a more gentle relief in the southern part of the study area.

The recharge zone of the Edwards underground reservoir, as presented in chapter 20 of the rules of the Texas Department of Water Resources, is that area where surface water has the potential of entering the Edwards aquifer.

A summary of flood-hydrograph partial-record stations and continuous recording gaging stations and their watershed characteristics is given in table 1.

Climate

The climate of the area is modified subtropical with a prevailing south wind. Thunderstorms occur frequently in the spring and summer. Long-duration

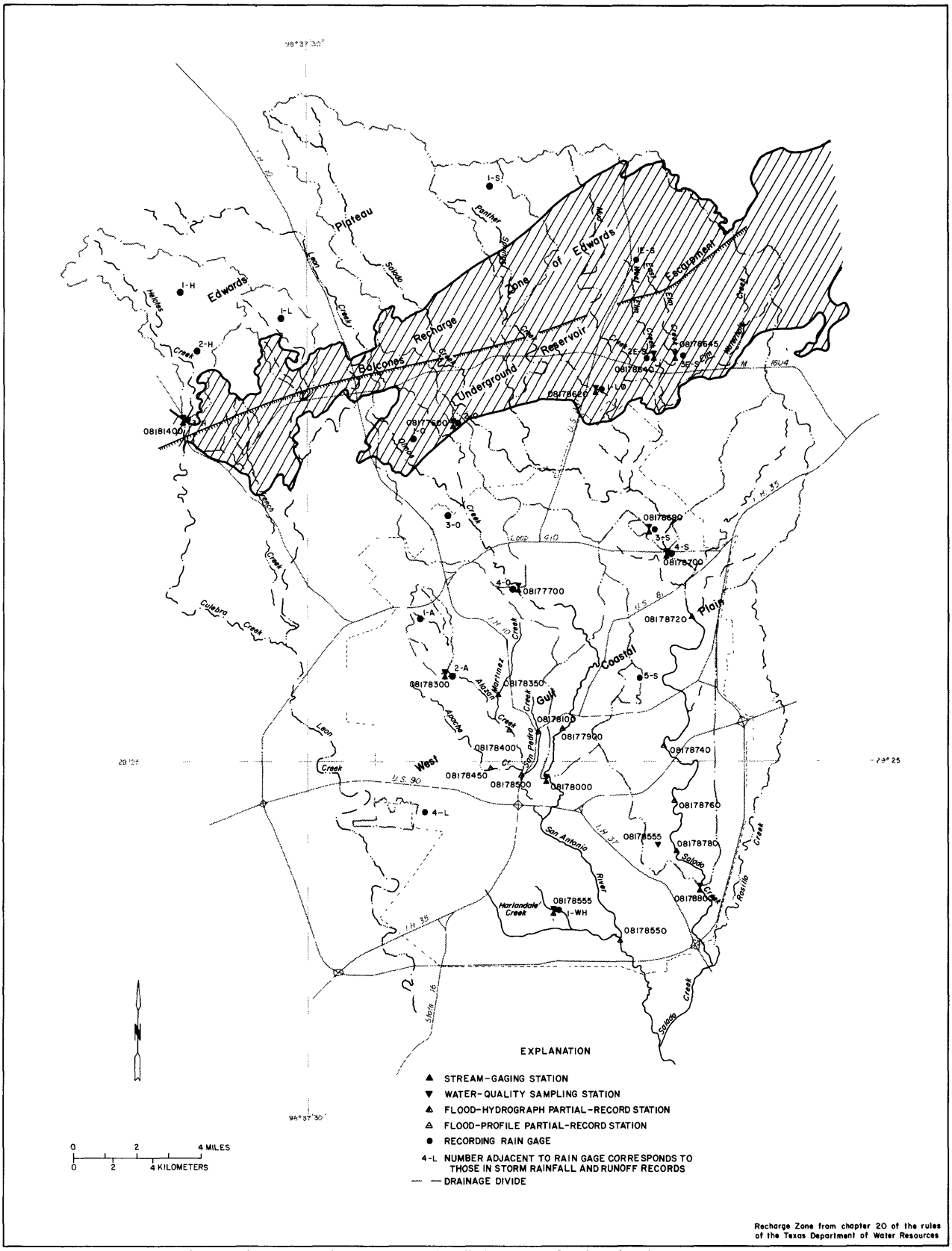

FIGURE 1.- Physiography, drainage basins, and hydrologic-instrument installations in the San Antonio urban area

low-intensity storms triggered by southward-moving cold fronts occur 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 may cause serious flooding during any season but are most frequent in the spring. The normal rainfall for San Antonio, based on records of the National Oceanic and Atmospheric Administration, Enviromental Data Service for the period 1941-70, is 27.54 inches, with the largest average monthly rainfall occurring in May and September. The average annual temperature is 69°F (20.5°C).

HYDROLOGIC INSTRUMENTATION

A partial list of gaging stations used in this report and the watershed characteristics at each of these stations are given in table 1. The locations of all hydrologic instrument installations for the San Antonio metropolitan area are shown on figure 1.

In addition to the stations listed in table 1, four flood-profile partial-record stations are located between the upper and lower stream-gaging stations on Salado Creek. In December 1972 and January 1973, seven flood-profile partial-record stations were installed at the request of the Corps of Engineers at sites on rectified channels of the San Antonio River and selected tributaries above the mouth of Salado Creek. Flood elevations for the flood-profile partial-record stations on Salado Creek and the San Antonio River are listed in tables 3 and 4.

DATA COLLECTION

Precipitation

Total precipitation and rainfall intensities were determined from 18 recording rain gages distributed throughout the study area (fig. 1). Two of the gages (4-O and 2-L) were out of operation several months during the year. Daily and monthly precipitation is also shown for the rain gage at the San Antonio International Airport. Precipitation data for these rain gages are given in the section "Compilation of data."

Precipitation amounts in each drainage basin were compiled on a daily basis. A digital computer was used to process the large amounts of precipitation and runoff data. Precipitation at individual gages and weighted precipitation in each drainage basin for selected storms are given in the section "Compilation of data."

Rainfall for each basin was weighted by the Thiessen polygon method as described by Linsley, Kohler, and Paulhus (1949). The factors used to determine weighted-mean precipitation for each drainage basin are given in table 2. For example, the weighted-mean precipitation for the drainage basin upstream from the Salado Creek (upper station) site could be computed as follows: Multiply the recorded precipitation at rain-gage 1-S by 0.68; to that value, add the recorded precipitation at rain-gage 3-S, multiplied by 0.22; to that value, add

Table 1.--Drainage area, period of record, type of gage, and drainage-basin characteristics at gaging stations in the San Antonio urban area

Station number	Station name	Drainage area (mi^2)	Period of record	Type of gage	Watershed Characteristics
08177600	Olmos Creek tributary at Farm Road 1535, Shavano Park, Tex.	0.33	1968-81	Flood-hydrograph partial-record	Watershed completely within the Edwards recharge zone; completely developed residential area with 3- to 4-acre home sites; rolling terrain.
08177700	Olmos Creek at Dresden Drive, San Antonio, Tex.	21.2	1968-81	Continuous-record	Central and upper reach located within the Edwards recharge zone; residential and commercial development in lower reach, predominantly rural in upper reach; rolling terrain.
08178000	San Antonio River at San Antonio, Tex.	41.8	1915-29, 1939-81	Continuous-record	Upper reach located within the Edwards recharge zone; residential and commerical development in lower reach, predominantly rural in upper reach; rolling terrain.
08178555	Harlandale Creek at W. Harding St., San Antonio, Tex.	2.43	1977-81	Flood-hydrograph partial record	Watershed completely within the West Gulf Coastal Plain; residential and commercial development; gentle terrain; considerable storm sewer development.
08178620	Lorence Creek at Thousand Oaks Blvd., San Antonio, Tex.	4.05	1980-81	Flood-hydrograph partial-record	Watershed completely within the Edwards recharge zone; residential and light commercial development; rolling terrain.
08178640	West Elm Creek at San Antonio, Tex.	2.45	1976-81	Flood-hydrograph partial-record	Watershed is completely with in the Edwards recharge zone; predominantly rural; rolling rugged terrain.
08178645	East Elm Creek at San Antonio, Tex.	2.33	1975-81	Flood-hydrograph partial-record	Watershed is completely within the Edwards recharge zone; predominantly rural; rolling to rugged terrain.
08178690	Salado Creek tributary at Bitters Road, San Antonio, Tex.	0.26	1968-81	Flood-hydrograph partial-record	Drainage area almost completely within the West Gulf Coastal Plain; completely developed residential area; gentle terrain; storm sewers in lower reach.
08178700	Salado Creek (upper station) at San Antonio, Tex.	137	1960-81	Continuous record	Central section of reach is within the Edwards recharge zone; limited amount of urban development in lower reach; predominantly rural in upper reach; rolling terrain.

Table 1.--Drainage area, period of record, type of gage, and drainage-basin characteristics at gaging stations in the San Antonio urban area--Continued

Station number	Station name	Drainage area (mi^2)	Period of record	Type of gage	Watershed characteristics
08178800	Salado Creek (lower station) at San Antonio Tex.	189	1960-81	Continuous-record	Upper section of watershed within the Edwards recharge zone; residential and commercial development in lower reach; predominantly rural in upper reach; rolling terrain.
08181400	Helotes Creek at Helotes, Tex.	15.0	1968-81	Continuous-record	Extreme lower reach is within the Edwards recharge zone; predominantly rural; rugged terrain.

Table 2.--Weighted-mean precipitation factors for drainage basins above stations in the San Antonio metropolitan area

Station	Station number	Rain gage 1/	Weighted-mean precipitation factor 2/
Continuous-record streamflow stations			
Olmos Creek at Dresden Drive, San Antonio	08177700	1-Ø	0.34
		2-Ø	.18
		3-Ø	.40
		4-Ø	.08
Salado Creek (upper station) at San Antonio	08178700	1-S	.68
		3-S	.22
		2-Ø	.08
		3-Ø	.02
Salado Creek (lower station) at San Antonio 3/	08178800	1-S	.50
		3-S	.20
		4-S	.10
		5-S	.13
		2-Ø	.06
		3-Ø	.01
Helotes Creek at Helotes	08181400	1-H	.70
		2-H	.25
		3-H	.05
Flood-hydrograph partial-record stations			
Olmos Creek tributary at FM 1535, Shavano Park	08177600	2-Ø	1.00

See footnotes at end of table.

Table 2.--Weighted-mean precipitation factors for drainage basins above stations in the San Antonio metropolitan area--Continued

Station	Station number	Rain gage 1/	Weighted-mean precipitation factor 2/
Flood-hydrograph partial-record stations--Continued			
Harlandale Creek at W. Harding St., San Antonio	08178555	1-WH	1.00
Lorence Creek at Thousand Oaks Blvd., San Antonio	08178620	1-LØ	1.00
West Elm Creek at San Antonio	08178640	1E-S 2E-S 3E-S	.58 .41 .01
East Elm Creek at San Antonio	08178645	1E-S 2E-S 3E-S	.55 .07 .38
Salado Creek tributary at Bitters Road, San Antonio	08178690	3-S	1.00

1/ Rain gage designations are: Ø, Olmos Creek; S, Salado Creek; H, Helotes Creek; A, Alazan Creek; E-S, East Elm Creek; WH, Harlandale Creek; and LØ, Lorence Creek.
2/ See section on "Precipitation" for explanation of use of weighted-mean precipitation factors.
3/ See table 1 for period of record.
Note: Where rain gage record was lost during a storm selected for analysis, that portion of the weighted-mean precipitation equation is prorated among the remaining rain gages in the equation.

the recorded precipitation at rain-gage 2-0, multiplied by 0.08; and to that value, add the recorded precipitation at rain-gage 3-0, multiplied by 0.02.

Runoff

For the 1981 water year, runoff data from the San Antonio urban study area are based on discharge measurements and stage records at five continuous-record stream-gaging stations, seven flood-hydrograph partial-record stations, and water-surface elevations at eleven flood-profile partial-record stations. Daily discharge records for the five continuous-record stations and annual maximum discharge at the flood-hydrograph partial-record stations are given in the section "Compilation of data." Elevations for selected floods at four flood-profile partial-record stations and one stream-gaging stations are given in table 3, and at seven flood-profile partial-record stations and one stream-gaging station in table 4.

SUMMARY OF DATA FOR THE 1981 WATER YEAR

Annual

The average rainfall for the 1981 water year was determined from 16 rain gages that were operated throughout the year. The average rainfall in the San Antonio urban study area for the 1981 water year was 35.30 inches. Rainfall at the National Weather Service station located at the San Antonio International Airport was 31.42 inches. Mean-annual precipitation at the National Weather Service station (at airport) for the 30-year period 1941-70 (calendar year) is 27.54 inches.

Runoff was compared with the long-term average at two selected stations. During the 1981 water year, runoff at station 08178000, San Antonio River at San Antonio, was 85 percent of the 54-year average of 55.8 ft^3/s. Runoff for station 08178800, Salado Creek (lower station) at San Antonio, was 92 percent of the 20-year average 42.7 ft^3/s.

Weighted-mean rainfall totals, total runoff, and rainfall-runoff ratio for three continuous recording streamflow stations representing basins in the San Antonio metropolitan area are as follows:

Station	Weighted-mean rainfall (inches)	Total runoff (inches)	Ratio of runoff to rainfall
	1981 water year		
Helotes Creek at Helotes (08181400)	37.04	6.32	0.17
Salado Creek (upper station) at San Antonio (08178700)	34.78	.51	.01
Salado Creek (lower station) at San Antonio (08178800)	34.04	2.81	.08

Table 3.--Peak elevations for selected floods at flood-profile partial-record stations (except as noted) in the Salado Creek watershed

Station no.	Station name	Drainage area (mi^2)	Distance above mouth of Rosillo Creek (miles)	1981 Flood elevations			
				Apr. 23	May 29-30	June 13-14	June 16
08178700 a/	Salado Creek (upper station) at San Antonio, Tex.	137	20.7	inoperative			
08178720	Salado Creek at Rittiman Road at San Antonio, Tex.	--	17.8	650.32	657.96	658.66	658.76
08178740	Salado Creek at East Houston Street, San Antonio, Tex.	--	11.2	591.29	600.33	602.15	603.03
08178760	Salado Creek at U.S. Highway 87, San Antonio, Tex.	--	7.7	570.06	577.62	581.20	581.72
08278780	Salado Creek at Southcross Boulevard, San Antonio, Tex.	--	5.4	--	552.83	554.23	554.94
08178800 a/	Salado Creek (lower station) at San Antonio, Tex.	189	3.7	536.99	539.93	541.93	542.87

a/ Stream-gaging station.

Table 4.--Peak elevations for selected floods at flood-profile partial-record stations (except as noted) on rectified channels of the San Antonio River and selected tributaries above the mouth of Salado Creek

Station no.	Station name	Drainage area (mi^2)	Distance above mouth of Posillo Creek (miles)	1981 Flood elevations					
				May 24	May 29	June 4	June 13-14	June 16	June 25
08177900	San Antonio River at Navarro Street, San Antonio, Tex.	--	b/ 14.5	639.19	638.59	--	642.92	--	--
08178000 a/	San Antonio River at San Antonio, Tex.	41.8	b/ 12.7	615.27	613.43	613.06	616.05	617.46	615.48
08178100	San Pedro Creek at Santa Rosa Street, San Antonio, Tex.	--	3.7	639.93	639.96	639.25	643.10	641.85	638.35
08178350	Martinez Creek at Fredericksburg Road, San Antonio, Tex.	--	2.0	681.71	--	680.11	682.38	679.92	679.98
08178400	Alazan Creek at West Martin Street, San Antonio, Tex.	--	1.6	--	634.30	634.29	638.98	--	--
08178450	Apache Creek at South Zarzamora Street, San Antonio, Tex.	--	1.3	627.42	627.58	--	633.24	628.77	628.36
08178500	San Pedro Creek at Furnish Street, San Antonio, Tex.	--	1.7	603.59	605.06	--	612.66	--	--
08178550	San Antonio River at Ashley Street (Berg's Mill), San Antonio, Tex.	--	b/ 5.5	513.08	512.32	--	518.72	514.27	--

a/ Stream-gaging station.
b/ Distance above mouth of Salado Creek.

Individual Storms

Storms producing the highest peak discharge in the San Antonio metropolitan area during the 1981 water year occurred on April 23 and May 29 and during the period June 12-13. These storms produced rainfall in the drainage basins of varying amounts, intensities, durations, and distributions. Weighted-storm rainfall data for these storm periods, collected at areas upstream from continuous-record streamflow stations and at selected flood-hydrograph partial-record stations, are given in table 5. Storm rainfall and runoff records are listed in the section entitled "Compilation of Data."

In this report, data for individual storms occurring during the 1981 water year are not included for five stations. Because of construction work being carried out in the channels at station 08177700, Olmos Creek at Dresden Drive, San Antonio, no storm data were obtained for this site. Storm rainfall data for station 08178800, Salado Creek (lower station) at San Antonio, were not analyzed because the unit runoff of streamflow for the period of record was low and not representative of basin conditions during flood runoff. Due to missing record, storm data for 08178640, West Elm Creek at San Antonio, 08178645, East Elm Creek at San Antonio, and 08178555, Harlandale Creek at West Harding Street are not given.

WATER QUALITY

The purpose of the San Antonio urban area water-quality program is to determine the variations of water quality under various hydrologic conditions for a period of 10 years or more. At the end of the data-gathering period, the results will be summarized and the water-quality variations will be evaluated. Urban planners can then use the results to help predict and better manage the water quality of the streams, reservoirs, and Edwards aquifer in the San Antonio area.

During the 1981 water year, water-quality data were collected at six locations in the San Antonio urban area (figure 1). About five sets of water-quality samples were collected during storms at each site by Geological Survey personnel. When possible, sample bottles were filled by depth integration and insitu field readings were taken at points near the centroid of flow. When streams could not be waded safely, samples were collected at points near the bank in a few feet of water.

For each set of samples, dissolved oxygen, water temperature, and pH were determined at the time of collection. Specific conductance, carbonate, bicarbonate, and bacteria concentrations were determined within 6 hours of collection. Physical parameters, biochemical oxygen demand, total organic carbon, nutrients, MBAS (methylene blue active substances), and major ions were preserved and analyzed later.

In addition, sets of samples from each site were selected and analyzed for pesticides and trace metals concentrations. Analytical results are given in the section "Compilation of data" of this report.

Table 5.--Weighted-storm rainfall for selected storms for areas upstream from continuous-record stations and flood-hydrograph partial-record stations, 1981 water year

Rainfall period	Weighted rainfall, in inches									
	Stream-gaging stations				Flood-hydrograph partial-record stations					
	Helotes Creek at Helotes (08181400)	Olmos Creek at Dresden Drive, at San Antonio (08177700)	Salado Creek (upper station) at San Antonio (08178700)	Salado Creek (lower station) at San Antonio (08178800)	Olmos Creek tributary at FM 1535, Shavano Park (08177600)	Lorence Creek at Thousand Oak Blvd., San Antonio (08178620)	Harlandale Creek at West Harding Street, San Antonio (08178555)	Salado Creek tributary at Bitters Road, San Antonio (08178690)	West Elm Creek at San Antonio (08178640)	East Elm Creek at San Antonio (08178645)
April 23						1.77				
May 29						1.82		2.72		
June 12	3.86									
June 12-13					5.37	2.10				
June 13-14			3.54							

The number of bacteria present in a water sample are reported as colonies per 100 milliliters of sample. Each individual plate count must be within a specified range of colonies (20 to 60 colonies for fecal coliform and 20 to 80 colonies for fecal streptococci) to be statistically valid. Those plate counts which do not fall within the specified range are based on "nonideal colony counts" and reported. The colony counts per 100 milliliters are footnoted with a "k" in the tables.

During the 1981 water year, water-quality samples were collected on October 18, April 23, May 29, June 12-13, and August 18. The analytical results for each set of samples can be compared to the magnitude of the peak discharge and the time of occurrence of storms. Time and discharge data for the respective storm peaks are given in the water discharge records section of each station under "Extremes for current year."

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C O M P I L A T I O N O F D A T A

08177600 OLMOS CREEK TRIBUTARY AT FARM ROAD 1535, SHAVANO PARK, TX
(Flood-hydrograph partial-record station)

LOCATION.--Lat 29°34'35", long 98°32'45", Bexar County, Hydrologic Unit 12100301, at culvert on Farm Road 1535 at Shavano Park and 1.9 mi (3.1 km) southeast of intersection of Farm Roads 1535 and 1604.

DRAINAGE AREA.--0.33 mi² (0.85 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1968 to current year.

GAGE.--Digital recorders (stage and rainfall) and crest-stage gages. Datum of gage is 907.92 ft (276.734 m) National Geodetic Vertical Datum of 1929, San Antonio supplementary adjustments of 1951 and 1953.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 303 ft³/s (8.58 m³/s) Sept. 26, 1973, gage height, 6.26 ft (1.908 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 43 ft³/s (1.22 m³/s) Dec. 28 at 1630 hours, gage height, 3.09 ft (0.942 m), no peak above base of 50 ft³/s (1.42 m³/s); no flow most of time.

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Chemical, biochemical, and pesticide analyses: May 1970 to current year. Water temperature: May 1970 to current year. Bacteria analyses: April 1976 to current year.

REMARKS.--No water-quality samples were made during the current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)
JUN										
13...	1542	37	166	6.2	24.0	70	17	--	--	3.2
13...	1554	72	137	7.1	24.0	60	35	--	--	4.2
13...	1604	86	121	7.3	--	--	--	--	--	3.7
13...	1637	219	102	7.5	24.0	80	70	--	--	4.5
13...	1702	278	90	7.4	22.5	80	52	8.4	98	3.7
13...	1733	141	92	7.4	22.5	80	34	8.2	95	3.0
13...	1822	67	109	7.5	22.0	--	--	8.7	101	2.9

DATE	COLI-FORM, TOTAL, IMMED. (COLS. PER 100 ML)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO
JUN									
13...	46000	26000	130000	71	4	26	1.5	2.7	.1
13...	--	--	--	60	1	22	1.3	2.5	.1
13...	--	--	--	--	--	--	--	--	--
13...	--	--	--	47	3	17	1.1	1.9	.1
13...	--	--	--	42	1	15	1.0	1.5	.1
13...	--	--	--	42	1	15	1.0	1.6	.1
13...	--	--	--	--	--	--	--	--	--

DATE	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, SUS-PENDED (MG/L)	SOLIDS, VOLA-TILE, SUS-PENDED (MG/L)
JUN									
13...	5.8	67	11	3.8	.1	15	106	47	5
13...	5.1	59	6.0	3.3	.0	13	88	151	36
13...	--	57	--	--	--	--	--	--	--
13...	4.3	44	3.1	1.8	.0	9.8	65	227	38
13...	4.3	41	3.1	1.6	.1	9.9	61	153	22
13...	4.3	41	3.0	1.8	.0	9.7	61	65	5
13...	--	49	--	--	--	--	--	--	--

08177600 OLMOS CREEK TRIBUTARY AT FARM ROAD 1535, SHAVANO PARK TX--CONTINUED
(Flood-hydrograph partial-record station)

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	CARBON, ORGANIC DISSOLVED (MG/L AS C)
JUN									
13...	.28	.020	.30	.320	1.3	1.6	.290	17	14
13...	.26	.020	.28	.210	1.4	1.6	.200	20	--
13...	--	--	--	--	--	--	--	--	--
13...	.18	.020	.20	.220	1.7	1.9	.390	19	--
13...	.20	.020	.22	.140	1.4	1.5	.280	18	11
13...	.22	.020	.24	.120	1.5	1.6	.270	17	--
13...	--	--	--	--	--	--	--	--	--

DATE	TIME	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)
JUN							
13...	1554	1	100	<1	0	<10	70
13...	1637	1	200	<1	0	<10	30
13...	1733	1	100	<1	0	<10	80

DATE	LEAD, DISSOLVED (UG/L AS PB)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, DISSOLVED (UG/L AS ZN)
JUN						
13...	<10	2	.0	0	0	<3
13...	<10	2	.0	0	0	<3
13...	<10	3	.0	0	0	9

DATE	TIME	PCB, TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	CHLORDANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)	DIAZINON, TOTAL (UG/L)
JUN									
13...	1554	.00	.00	.00	.00	.00	.00	.00	.03
13...	1733	.00	.00	.00	.00	.00	.01	.00	.49

DATE	DIELDRIN TOTAL (UG/L)	ENDOSULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)
JUN									
13...	.00	.00	.00	.00	.00	.00	.00	.00	.00
13...	.00	.00	.00	.00	.00	.00	.00	.01	.00

DATE	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)	MIREX, TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
JUN									
13...	.00	.00	.00	.00	0	.00	.01	.01	.00
13...	.00	.00	.00	.00	0	.00	.02	.03	.00

08177700 OLMOS CREEK AT DRESDEN DRIVE, SAN ANTONIO, TX

LOCATION.--Lat 29°29'56", long 98°30'36", Bexar County, Hydrologic Unit 12100301, on right bank 30 ft (9 m) downstream from low-water bridge on Dresden Drive at San Antonio, 0.15 mi (0.24 km) west of intersection of Blanco Road and Dresden Drive, and 4.0 mi (6.4 km) upstream from Olmos Dam.

DRAINAGE AREA.--21.2 mi^2 (54.9 km^2).

PERIOD OF RECORD.--June 1968 to current year.

GAGE.--Water-stage recorder. Datum of gage is 726.10 ft (221.315 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good prior to April and poor thereafter. Recording rain gage located at station, with three additional recording rain gages located in watershed. Rain gage and gage-height telemeters at station.

AVERAGE DISCHARGE.--13 years, 4.34 ft^3/s (0.123 m^3/s), 2.78 in/yr (71 mm/yr), 3,140 acre-ft/yr (3.87 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,450 ft^3/s (211 m^3/s) Sept. 13, 1978, gage height, 14.82 ft (4.517 m), from floodmark; no flow at times.
Maximum stage since 1935, that of Sept. 13, 1978.

EXTREMES OUTSIDE PERIOD OF RECORD.--Floods in September and November 1947 reached a stage of 8.5 ft (2.59 m), from information by local resident.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft^3/s (11.3 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
June 13	unknown	*2,500	70.8	unknown	---
Sept. 8	unknown	1,800	51.0	unknown	---

Minimum daily discharge, 0.01 ft^3/s (0.0003 m^3/s) Feb. 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.56	.05	.25	.06	.19	16	.10	.40	3.0	.80	.25	1.2
2	.97	.05	.21	.05	.13	.60	.10	3.0	2.0	.40	.25	1.1
3	.26	.05	.22	.05	.01	6.0	.10	6.6	1.4	.30	.25	1.0
4	.25	.05	.15	.05	4.8	2.5	.12	1.0	4.0	.30	.25	.80
5	.18	.03	.49	.05	3.2	.40	.14	.60	5.0	2.5	.25	.70
6	.13	.03	.50	.10	.86	.30	.14	.55	2.5	.80	.25	.68
7	.14	.05	.30	.05	.28	.25	.14	.40	2.0	.50	2.0	.68
8	.11	.05	12	.60	.19	.22	.10	.40	1.8	.45	1.0	150
9	.10	.04	2.4	.26	.30	.20	.07	.40	1.4	.42	.40	20
10	.08	.05	.65	.14	.28	.15	.05	.40	1.0	.40	.40	2.4
11	.08	.05	3.3	.10	.15	7.0	.08	.35	.80	.35	.40	1.6
12	.06	.03	.33	.06	.15	7.4	.08	.32	10	.35	.40	1.4
13	.04	.05	.20	.06	.11	1.0	.08	.30	350	.35	.40	1.2
14	.04	.04	.23	.32	.07	.50	.10	.28	250	.35	.60	1.0
15	.03	1.1	.23	.10	.09	.35	.10	.25	25	.35	.45	.80
16	.18	31	.17	.06	.18	.22	.20	.22	35	.35	.43	.60
17	.10	3.9	.15	.05	.22	.20	.30	.20	2.0	.33	.40	.42
18	32	.42	.17	.06	.22	.15	.30	.18	1.0	.33	10	.40
19	4.7	.25	.20	42	.21	.12	.20	.18	.80	.33	2.0	.40
20	.23	.20	.06	3.2	.20	.10	.10	.18	.60	.33	1.3	.37
21	.14	.21	.03	.48	.20	.08	3.0	.18	.50	.30	1.0	.35
22	.10	.84	.05	.29	.13	.05	10	.18	.40	.30	.80	.35
23	.07	.58	.06	.39	.22	.05	35	.18	.35	.28	.65	.35
24	.04	.20	.06	.32	.30	.05	8.6	25	.30	.30	.58	.35
25	.02	25	.05	.27	.28	.05	11	6.0	.30	.40	.52	.35
26	.02	10	.03	.30	.21	.08	5.0	2.0	8.0	.38	.45	.35
27	.04	.62	.03	.28	.16	.10	3.0	.60	.40	.40	.40	.35
28	1.4	.63	.04	.22	.35	.15	2.0	.20	.20	.35	.40	.35
29	.07	.26	.06	.22	---	.15	1.0	80	5.0	.28	.40	.35
30	.05	.25	.06	.21	---	.12	.60	20	2.0	.28	2.5	.35
31	.05	---	.05	.17	---	.10	---	7.0	---	.25	1.2	---
TOTAL	42.24	76.08	22.73	50.57	13.69	44.64	81.80	157.55	716.75	13.81	30.58	190.25
MEAN	1.36	2.54	.73	1.63	.49	1.44	2.73	5.08	23.9	.45	.99	6.34
MAX	32	31	12	42	4.8	16	35	80	350	2.5	10	150
MIN	.02	.03	.03	.05	.01	.05	.05	.18	.20	.25	.25	.35
CFSM	.06	.12	.03	.08	.02	.07	.13	.24	1.13	.02	.05	.30
IN.	.07	.13	.04	.09	.02	.08	.14	.28	1.26	.02	.05	.33
AC-FT	84	151	45	100	27	89	162	313	1420	27	61	377

CAL YR 1980 TOTAL 730.34 MEAN 2.00 MAX 103 MIN .00 CFSM .09 IN 1.28 AC-FT 1450
WTR YR 1981 TOTAL 1440.69 MEAN 3.95 MAX 350 MIN .01 CFSM .19 IN 2.53 AC-FT 2860

08178000 SAN ANTONIO RIVER AT SAN ANTONIO, TX

LOCATION.--Lat 29°24'34", long 98°29'41", Bexar County, Hydrologic Unit 12100301, on left bank 193 ft (59 m) downstream from South Alamo Street Bridge in San Antonio, 2.1 mi (3.4 km) upstream from San Pedro Creek, and 230.6 mi (371.1 km) upstream from mouth.

DRAINAGE AREA.--41.8 mi^2 (108.3 km^2). Flow of river comes from intermittent spring flow and from artesian wells; drainage area of streams not applicable.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--December 1895 to June 1906 periodic discharge measurements only, January 1915 to November 1929, February 1939 to current year. Ground-water discharge into river is discussed by Petit and George, Texas Board of Water Engineers Bull. 5608, vol. 1 (1956, p. 45).
Water-quality records: Chemical, biochemical, and pesticide analyses: November 1968 to September 1979. Sediment analyses: May 1970 to September 1973. Water temperatures: November 1968 to September 1979. Bacteria analyses: May 1976 to September 1979.

REVISED RECORDS.--WSP 1312: 1917. WSP 1923: Drainage area. WRD TX-72-1: 1971(m).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 605.26 ft (184.483 m) National Geodetic Vertical Datum of 1929. Jan. 26, 1915, to Feb. 27, 1916, nonrecording gage at site 1.3 mi (2.1 km) upstream at different datum. Feb. 28, 1916, to Apr. 7, 1920, nonrecording gage at site 1.1 mi (1.8 km) upstream at different datum. Apr. 8, 1920, to Nov. 16, 1929, and Feb. 15, 1939, to Apr. 25, 1967, water-stage recorder in vicinity of South Alamo Street Bridge at 7.00-foot (2.134 m) higher datum. Apr. 25, 1967, to May 13, 1969, water-stage recorder at site 307 ft (94 m) downstream at same datum.

REMARKS.--Water-discharge records good. Floodflow is regulated by Olmos flood-control reservoir, capacity 14,240 acre-ft (17.6 hm^3), about 8.5 mi (13.7 km) upstream. Dam completed in 1926 and rebuilt in 1980. Springs emerge intermittently from the Edwards and associated limestones along the Balcones Fault Zone. Rain gage and gage-height telemeters at station.

AVERAGE DISCHARGE.--56 years, 55.7 ft^3/s (1.577 m^3/s), 18.10 in/yr (460 mm/yr), 40,350 acre-ft/yr (49.8 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 15,300 ft^3/s (433 m^3/s) Sept. 10, 1921, gage height, 20.14 ft (6.139 m), from floodmark, at former site and datum, from rating curve extended above 2,000 ft^3/s (56.6 m^3/s) on basis of slope-area measurement of peak flow; no flow at times due to regulation.
Maximum stage since 1819, that of Sept. 10, 1921.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of July 5, 1819, equaled or exceeded that of Sept. 10, 1921.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,080 ft^3/s (87.2 m^3/s) June 16 at 0800 hours, gage height, 12.20 ft (3.719 m); minimum daily, 3.6 ft^3/s (0.102 m^3/s) Feb. 13, due to regulation.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	16	16	14	17	93	13	44	32	72	55	46
2	13	15	14	15	16	18	13	48	34	72	50	73
3	12	14	13	15	16	22	13	79	22	71	49	74
4	12	5.2	14	17	39	34	13	22	64	70	44	44
5	11	15	16	16	41	19	12	26	42	131	41	38
6	12	16	15	18	20	19	12	27	31	112	38	63
7	12	16	14	17	18	19	13	27	31	111	35	73
8	12	16	23	18	17	18	13	28	33	108	35	291
9	12	16	20	17	47	18	12	40	31	105	34	69
10	13	16	14	17	13	11	13	31	32	102	35	68
11	11	16	14	16	19	21	12	26	213	102	32	50
12	10	26	14	17	5.6	45	12	26	146	102	30	47
13	12	17	14	16	3.6	43	12	23	609	100	44	52
14	12	8.6	14	17	16	22	12	22	875	95	55	61
15	12	18	18	17	17	21	12	20	74	93	37	62
16	13	165	15	17	25	21	12	21	1200	90	35	60
17	14	33	14	16	13	21	15	19	286	87	23	57
18	63	12	15	17	16	20	12	19	72	85	75	56
19	36	12	14	189	18	20	12	16	74	81	243	57
20	14	12	13	38	17	19	12	13	81	76	38	72
21	14	14	14	7.9	17	19	9.9	12	75	73	30	43
22	13	17	14	17	15	18	38	13	71	69	44	37
23	16	15	25	17	31	18	335	16	79	67	42	37
24	29	12	16	19	17	17	22	228	83	66	42	23
25	18	124	15	17	16	17	107	53	82	66	41	32
26	16	61	16	18	18	18	30	11	271	64	40	31
27	19	12	16	18	16	16	13	31	124	69	40	53
28	19	13	15	16	16	16	18	17	79	76	39	48
29	17	14	15	20	---	16	24	280	103	66	42	34
30	16	12	15	17	---	15	24	380	82	46	110	13
31	17	---	15	17	---	14	---	102	---	56	81	---
TOTAL	512	758.8	480	707.9	540.2	708	870.9	1720	5031	2583	1579	1764
MEAN	16.5	25.3	15.5	22.8	19.3	22.8	29.0	55.5	168	83.3	50.9	58.8
MAX	63	165	25	189	47	93	335	380	1200	131	243	291
MIN	10	5.2	13	7.9	3.6	11	9.9	11	22	46	23	13
AC-FT	1020	1510	952	1400	1070	1400	1730	3410	9980	5120	3130	3500

CAL YR 1980 TOTAL 10925.36 MEAN 29.9 MAX 416 MIN .86 AC-FT 21670
WTR YR 1981 TOTAL 17254.80 MEAN 47.3 MAX 1200 MIN 3.6 AC-FT 34220

08178555 HARLANDALE CREEK AT WEST HARDING BOULEVARD, SAN ANTONIO, TEX.
(Flood-hydrograph partial-record gage)

LOCATION.--Lat 29°21'05", long 98°29'32", Bexar County, at mid-channel, 71 ft upstream from West Harding Boulevard and 1.3 ft upstream from Sixmile Creek.

DRAINAGE AREA.--2.43 mi^2.

PERIOD OF RECORD.--September 1977 to current year.

GAGE.--Digital recorders (stage and rainfall) and crest-stage gages. Gage is not referenced to National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair. No storms analyzed for 1981.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 365 ft^3/s June 1, 1979, elevation, 13.21 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 374 ft^3/s, June 13 (gage height, 13.26 ft).

08178620 LORENCE CREEK AT THOUSAND OAKS BOULEVARD, SAN ANTONIO, TX
(Flood-hydrograph partial-record station)

LOCATION.--Lat 29°35'24", long 98°27'47", Bexar County, Hydrologic Unit 123100301, on right bank 30 ft (9 m) upstream from Thousand Oaks Boulevard and 4.2 mi (6.8 km) upstream from mouth.

DRAINAGE AREA.--4.05 mi² (10.5 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--January 1980 to current year.

GAGE.--Digital recorders (stage and rainfall), concrete control, and crest-stage gages. Gage is not referenced to National Geodetic Vertical Datum of 1929.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 600 ft³/s (17.0 m³/s) Oct. 18, 1980, at 1335 hours, gage height, 2.59 ft (0.789 m); no flow most of time.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft³/s (2.83 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 18	1335	*600	17.0	2.59	0.789
June 13	1830	275	7.79	2.31	0.704
June 14	0740	121	3.43	2.05	0.625

Minimum discharge, no flow most of time.

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Chemical, biochemical, and pesticide analyses: January 1980 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)
OCT										
18...	1215	.80	112	7.9	--	80	31	--	--	--
18...	1232	6.0	96	7.4	21.0	100	71	8.3	95	6.3
APR										
23...	0910	3.5	147	--	20.5	--	--	9.2	102	--
23...	1030	26	151	--	20.5	--	--	--	--	--
23...	1045	28	153	--	--	--	--	--	--	--
23...	1100	25	150	--	--	--	--	--	--	--
23...	1112	19	126	--	20.5	--	--	9.2	102	--
23...	1115	19	154	--	--	--	--	--	--	--
23...	1130	16	150	--	--	--	--	--	--	--
MAY										
29...	1307	1.6	138	--	--	80	6.8	--	--	4.0
29...	1325	7.8	133	--	--	100	33	--	--	4.6
29...	1354	16	133	--	--	100	17	--	--	4.2
29...	1424	11	114	--	--	80	24	--	--	3.0
29...	1524	4.2	114	--	--	60	18	--	--	3.6

DATE	COLI-FORM, TOTAL, IMMED. (COLS. PER 100 ML)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)
OCT										
18...	180000	K73000	68000	--	--	--	--	--	--	--
18...	280000	130000	64000	34	2	12	.9	2.6	.2	5.0
APR										
23...	380000	88000	170000	--	--	--	--	--	--	--
23...	260000	44000	84000	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--
MAY										
29...	210000	16000	190000	61	0	22	1.5	1.5	.1	6.7
29...	K120000	K95000	310000	56	0	20	1.4	2.2	.1	8.1
29...	200000	K60000	390000	53	016	49	1.4	2.5	.1	7.8
29...	K160000	16000	140000	50	1	18	1.3	1.6	.1	5.5
29...	>31000	14000	130000	52	1	19	1.2	1.5	.1	4.7

08178620 LORENCE CREEK AT THOUSAND OAKS BLOULEVARD, SAN ANTONIO, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	ALKALINITY (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, SUSPENDED (MG/L)	SOLIDS, VOLATILE, SUSPENDED (MG/L)	NITROGEN, NITRATE TOTAL (MG/L AS N)
OCT									
18...	--	--	--	--	--	--	44	42	.63
18...	32	2.7	4.2	.1	8.4	55	139	28	.89
APR									
23...	--	--	--	--	--	--	--	--	3.5
23...	--	--	--	--	--	--	--	--	2.8
23...	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--
MAY									
29...	61	3.0	2.1	.1	14	88	67	18	.75
29...	56	3.8	2.6	.0	13	85	36	15	.46
29...	57	2.6	2.7	.0	14	84	49	14	.88
29...	49	2.2	1.6	.0	12	72	53	16	.63
29...	51	2.2	1.5	.0	11	72	19	15	.42

DATE	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	CARBON, ORGANIC DISSOLVED (MG/L AS C)
OCT									
18...	.030	.66	.170	1.2	1.4	.230	--	12	--
18...	.040	.93	.090	--	--	.410	--	16	--
APR									
23...	.050	3.5	.240	1.9	2.1	4.400	.460	--	--
23...	.030	2.8	.160	1.8	2.0	.430	.410	8.1	7.9
23...	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--
MAY									
29...	.020	.77	.140	1.3	1.4	.210	--	14	14
29...	.310	.77	.130	1.4	1.5	.310	--	19	--
29...	.030	.91	.120	1.5	1.6	.340	--	15	12
29...	.030	.66	.110	1.2	1.3	.240	--	12	--
29...	.030	.45	.110	1.1	1.2	.220	--	10	9.6

DATE	TIME	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)
OCT							
18...	1232	3	6	1	0	18	90
MAY							
29...	1307	2	100	<1	0	<10	210
29...	1325	2	200	<1	0	<10	110
29...	1354	2	200	<1	0	<10	40

DATE	LEAD, DISSOLVED (UG/L AS PB)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, DISSOLVED (UG/L AS ZN)
OCT						
18...	<10	4	.3	0	0	10
MAY						
29...	<10	7	.2	0	0	20
29...	<10	10	.3	0	0	10
29...	<10	4	.2	0	0	5

08178620 LORENCE CREEK AT THOUSAND OAKS BOULEVARD, SAN ANTONIO, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	PCB TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	CHLORDANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)	DIAZINON, TOTAL (UG/L)
OCT									
18...	1232	.00	.0	.00	.1	.00	.00	.00	.09
MAY									
29...	1307	.00	.0	.00	.0	.00	.00	.00	.01
29...	1325	.00	.0	.00	.0	.00	.00	.00	.03
29...	1354	.00	.0	.00	.0	.00	.00	.00	.08

DATE	DIELDRIN TOTAL (UG/L)	ENDOSULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)
OCT									
18...	.00	.00	.00	.00	.00	.01	.01	.00	.00
MAY									
29...	.00	.00	.00	.00	.00	.00	.00	.00	.00
29...	.00	.00	.00	.00	.00	.00	.00	.00	.00
29...	.00	.00	.00	.00	.00	.00	.00	.01	.00

DATE	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)	MIREX, TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
OCT									
18...	.00	.00	.00	.00	0	.00	.03	.02	.00
MAY									
29...	.00	.00	.00	.00	0	.00	.01	.02	.00
29...	.00	.00	.00	.00	0	.00	.01	.03	.00
29...	.00	.00	.00	.00	0	.00	.01	.02	.00

08178640 WEST ELM CREEK AT SAN ANTONIO, TX
(Flood-hydrograph partial-record station)

LOCATION.--Lat 29°37'23", long 98°26'29", Bexar County, Hydrologic Unit 12100301, at mid-channel, 1.8 mi (2.9 km) upstream from mouth of East Elm Creek, 2.1 mi (3.4 km) upstream from Farm Road 1604, and 7.0 mi (11.3 km) north of San Antonio International Airport.

DRAINAGE AREA.--2.45 mi² (6.35 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--February 1976 to current year.

GAGE.--Digital recorders (stage and rainfall) and crest-stage gages. Gage is not referenced to National Geodetic Vertical Datum 1929.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,000 ft³/s (56.6 m³/s) Nov. 1, 1977, gage height, 5.82 ft (1.774 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,300 ft³/s (36.8 m³/s) June 13 at 1655 hours, gage height, 5.43 ft (1.655 m); no flow most of time.

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Chemical, biochemical, pesticide, and bacteria analyses: May 1976 to current year. Water temperatures: May 1976 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)	COLI-FORM, TOTAL, IMMED. (COLS. PER 100 ML)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)
OCT 18...	1538	14	94	8.0	21.0	200	440	8.0	92	4.7	>68000	68000

DATE	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)
OCT 18...	22000	40	10	15	.5	1.3	.1	2.7	30	6.9	2.1	.1

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, SUS-PENDED (MG/L)	SOLIDS, VOLA-TILE, SUS-PENDED (MG/L)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)
OCT 18...	4.6	51	765	490	.47	.040	.51	.100	1.7	1.8	.150	33

DATE	TIME	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)
OCT 18...	1538	1	0	0	0	0	100

08178640 WEST ELM CREEK AT SAN ANTONIO, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, DIS-SOLVED (UG/L AS ZN)
OCT 18...	0	20	.3	0	0	10

DATE	TIME	PCB TOTAL (UG/L)	NAPH-THA-LENES, POLY-CHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	CHLOR-DANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)	DI-AZINON, TOTAL (UG/L)
OCT 18...	1538	.00	.0	.00	.1	.00	.00	.00	1.3

DATE	DI-ELDRIN TOTAL (UG/L)	ENDO-SULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTA-CHLOR, TOTAL (UG/L)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALA-THION, TOTAL (UG/L)	METH-OXY-CHLOR, TOTAL (UG/L)
OCT 18...	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	METHYL PARA-THION, TOTAL (UG/L)	METHYL TRI-THION, TOTAL (UG/L)	MIREX, TOTAL (UG/L)	PARA-THION, TOTAL (UG/L)	TOX-APHENE, TOTAL (UG/L)	TOTAL TRI-THION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
OCT 18...	.00	.00	.00	.00	0	.00	.11	.00	.00

08178645 EAST ELM CREEK AT SAN ANTONIO, TEX.
(Flood-hydrograph partial-record gage)

LOCATION.--Lat 29°37'04", long 98°25'41", Bexar County, at mid-channel, 2.1 mi upstream from West Elm Creek and 2.4 mi upstream from Farm Road 1604.

DRAINAGE AREA.--2.33 mi^2.

PERIOD OF RECORD.--November 1975 to current year.

GAGE.--Digital recorders (stage and rainfall) and crest-stage gages. Gage is not referenced to National Geodetic Vertical datum of 1929.

REMARKS.--Records fair. No storms analyzed for 1981.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 310 ft^3/s May 7, 1976, elevation 6.78 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge 267 ft^3/s June 13 (gage height 6.52 ft).

08178690 SALADO CREEK TRIBUTARY AT BITTERS ROAD, SAN ANTONIO, TX
(Flood-hydrograph partial-record station)

LOCATION.--Lat 29°31'36", long 98°26'25", Bexar County, Hydrologic Unit 12100301, at culvert on Bitters Road immediately east of MacArthur High School in San Antonio.

DRAINAGE AREA.--0.26 mi² (0.67 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1968 to September 1981 (discontinued).

GAGE.--Digital recorders (stage and rainfall) and crest-stage gage. Gage is not referenced to National Geodetic Vertical Datum of 1929.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 253 ft³/s (7.16 m³/s) May 7, 1972, gage height, 7.88 ft (2.402 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 50 ft³/s (1.42 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
aApr. 23	unknown	104	2.95	5.08	1.548	June 11	1030	53	1.50	4.05	1.234
aApr. 25	unknown	78	2.21	4.57	1.393	June 16	0650	97	2.75	4.94	1.506
May 24	2335	56	1.59	4.12	1.256	Sept. 8	0755	112	3.17	5.24	1.597
May 29	1225	*169	4.79	6.35	1.935	Sept. 14	1900	117	3.31	5.35	1.631

a From crest-stage gage.

Minimum discharge, no flow most of time.

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Chemical, biochemical, and pesticide analyses: November 1968 to September 1981 (discontinued). Sediment analyses: April to September 1973. Water temperatures: November 1968 to September 1981 (discontinued). Bacteria analyses: April 1976 to September 1981 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH FIELD (UNITS)	TEMPERATURE, WATER (DEG C)	COLOR (PLATINUM COBALT UNITS)	TURBIDITY (NTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)	COLIFORM, TOTAL, IMMED. (COLS. PER 100 ML)	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)
AUG												
18...	1444	17	77	8.1	27.5	60	57	6.8	87	18	350000	240000
18...	1449	39	89	8.2	28.0	55	37	6.3	82	>23	640000	380000
18...	1500	41	80	7.9	27.5	40	16	6.5	83	>23	>600000	600000
18...	1515	33	79	7.5	27.5	40	12	6.2	79	18	>820000	820000
18...	1543	22	89	--	28.0	45	8.0	5.2	67	15	>480000	480000

DATE	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)
AUG												
18...	860000	40	15	14	1.2	1.7	.1	3.0	25	8.0	4.3	.1
18...	1100000	26	3	9.2	.7	.8	.1	9.1	23	2.0	9.0	.0
18...	310000	30	5	10	1.1	1.2	.1	8.9	25	2.0	2.9	.0
18...	250000	29	4	10	.9	1.3	.1	7.6	25	5.0	3.3	.0
18...	420000	35	5	12	1.2	1.3	.1	3.6	30	5.0	2.9	.0

DATE	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, SUSPENDED (MG/L)	SOLIDS, VOLATILE, SUSPENDED (MG/L)	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)
AUG												
18...	2.4	50	0	0	.86	.050	.91	.360	2.1	2.5	.730	29
18...	1.7	46	231	58	.93	.070	1.0	.440	3.2	3.6	.860	38
18...	1.8	43	80	20	.80	.050	.85	.420	2.0	2.4	.560	20
18...	1.8	45	21	6	.80	.060	.86	.360	1.2	1.6	.400	18
18...	2.3	46	7	2	.73	.090	.82	.360	1.2	1.6	.410	17

08178690 SALADO CREEK TRIBUBARY AT BITTERS ROAD, SAN ANTONIO, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)
AUG							
18...	1444	1	10	<1	10	<10	54
18...	1449	1	7	<1	10	<10	44
18...	1515	1	7	<1	0	<10	44

DATE	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, DIS-SOLVED (UG/L AS ZN)
AUG						
18...	58	19	.1	0	0	19
18...	35	13	.0	0	0	12
18...	44	12	.0	0	0	17

DATE	TIME	PCB TOTAL (UG/L)	NAPH-THA-LENES, POLY-CHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	CHLOR-DANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)	DI-AZINON, TOTAL (UG/L)
AUG									
18...	1444	.00	.0	.00	.1	.00	.00	.00	.30
18...	1449	.00	.0	.00	.4	.00	.01	.00	1.0

DATE	DI-ELDRIN TOTAL (UG/L)	ENDO-SULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTA-CHLOR, TOTAL (UG/L)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALA-THION, TOTAL (UG/L)	METH-OXY-CHLOR, TOTAL (UG/L)
AUG									
18...	.01	.00	.00	.00	.00	.01	.00	.04	.00
18...	.02	.00	.00	.00	.00	.02	.01	.02	.68

DATE	METHYL PARA-THION, TOTAL (UG/L)	METHYL TRI-THION, TOTAL (UG/L)	MIREX, TOTAL (UG/L)	PARA-THION, TOTAL (UG/L)	TOX-APHENE, TOTAL (UG/L)	TOTAL TRI-THION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
AUG									
18...	.00	.00	.00	.00	0	.00	.03	.03	.00
18...	.00	.00	.00	.00	0	.00	.04	.05	.01

08178700 SALADO CREEK (UPPER STATION) AT SAN ANTONIO, TX

LOCATION (revised).-Lat 29°30'57", long 98°25'51", Bexar County, Hydrologic Unit 12100301, on right bant at downstream side of eastbound bridge on Interstate Highway 410 in San Antonio, 1.0 mi (1.6 km) west of Northeast School, 1.1 mi (1.8 km) upstream from Perrin-Beitel Creek, and 2.7 mi (4.3 km) east of San Antonio International Airport.

DRAINAGE AREA.--137 mi² (355 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1960 to current year.

GAGE.--Water-stage recorder with concrete control. Datum of gage is 684.60 ft (208.666 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records poor prior to June 12 and good there after. No known diversion above station. Recording rain gage located at station with four additional recording rain gages located in watershed. Flow is affected at times by discharge from flood-detention pools of nine floodwater-retarding structures with combined detention capacity of 24,460 acre-ft (30.2 hm³). These structures control runoff from 67.7 mi² (175.3 km²) above this station.

AVERAGE DISCHARGE.--21 years, 9.72 ft³/s (0.275 m³/s), 7,040 acre-ft/yr (8.68 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 24,900 ft³/s (705 m³/s) May 12, 1972, gage height, 15.22 ft (4.639 m), from rating curve extended above 8,000 ft³/s (227 m³/s) on basis of slope-area measurement of peak flow; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage since at least 1853, 23 to 24 ft (7.0 to 7.3 m) in October 1913. Flood in September 1921 reached a stage of 18 ft (5.5 m), and flood of Sept. 27, 1946, reached a stage of 18.2 ft (5.55 m), and are the highest since 1899.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 250 ft³/s (7.08 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 23	0900	332	9.40	a4.38	1.335
June 13	2400	*1,070	30.3	5.84	1.780
June 16	1230	930	26.3	5.60	1.707

a From floodmark.

Minimum discharge, no flow at times.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.9	.80	1.2	.38	.10	3.0	.00	2.3	3.7	7.2	.00	.80
2	1.4	.65	1.8	.38	.05	3.7	.00	5.0	2.6	6.9	.00	.81
3	.50	.52	2.0	.38	.04	2.0	.00	8.2	5.0	6.6	.00	.74
4	.18	.40	2.0	.38	2.5	3.0	.00	6.0	3.0	6.5	.00	1.3
5	.18	.25	1.7	.60	.70	1.6	.00	3.4	2.1	7.9	.00	.73
6	.18	.18	2.0	.40	.30	1.2	.00	2.5	2.0	7.4	.00	.67
7	.18	.12	2.5	.80	.20	1.1	.00	2.0	1.8	4.6	.00	.56
8	.18	.06	3.9	1.1	.15	1.0	.00	1.4	1.7	1.9	.00	12
9	.18	.00	2.0	.80	.13	2.0	.00	1.0	1.6	.99	.00	1.4
10	.18	.00	1.2	.60	.10	3.0	.00	.70	1.6	.60	.00	.99
11	.18	.00	.90	.60	.09	5.0	.00	.40	4.0	.50	.00	4.7
12	.18	.00	.60	.60	.08	2.5	.00	.20	40	.40	.00	5.3
13	.18	.00	.58	2.1	.07	1.6	.00	.04	267	.35	.00	5.3
14	.20	.00	.70	1.0	.06	1.0	.00	.15	384	.30	.01	5.7
15	.20	.00	1.1	.60	.05	.70	.00	.20	38	.25	.00	3.4
16	.20	.00	.90	.55	.07	.50	.20	.30	357	.20	.00	1.5
17	.20	.00	.65	.56	.08	.40	.20	.20	79	.18	.00	.72
18	5.4	.00	.58	.60	.08	.30	.20	.02	35	.15	1.4	.65
19	2.4	.00	.50	11	.08	.20	.20	.04	20	.12	7.4	.88
20	1.4	.00	.48	2.0	.08	.19	.20	.12	14	.10	4.5	1.0
21	1.7	.00	.46	.40	.08	.17	.20	1.6	13	.08	3.0	.86
22	1.3	.00	.44	.30	.08	.12	5.0	1.4	11	.08	.70	.13
23	.90	.00	.44	.20	.08	.10	25	1.4	12	.05	.33	.03
24	.50	.00	.44	.20	.08	.08	9.4	9.8	12	.05	.06	.00
25	.60	10	.44	.18	.08	.05	10	5.4	11	.05	.00	.00
26	.80	3.5	.42	.15	.20	.04	6.0	3.0	9.9	.05	.00	3.8
27	1.0	2.1	.40	.15	.45	.03	3.7	2.4	9.4	.03	.10	1.1
28	1.2	1.6	.40	.15	.80	.02	3.0	1.9	9.8	.00	.35	.90
29	1.2	1.2	.40	.15	---	.18	2.7	90	9.4	.00	.53	.85
30	1.1	1.0	.40	.15	---	.10	2.4	8.4	7.3	.00	2.0	.63
31	.95	---	.40	.10	---	.02	---	5.0	---	.00	2.2	---
TOTAL	27.85	22.38	31.93	27.56	6.86	34.90	68.40	164.47	1367.9	53.53	22.58	57.45
MEAN	.90	.75	1.03	.89	.25	1.13	2.28	5.31	45.6	1.73	.73	1.92
MAX	5.4	10	3.9	11	2.5	5.0	25	90	384	7.9	7.4	12
MIN	.18	.00	.40	.10	.04	.02	.00	.02	1.6	.00	.00	.00
AC-FT	55	44	63	55	14	69	136	326	2710	106	45	114

CAL YR 1980 TOTAL 1222.86 MEAN 3.34 MAX 140 MIN .00 AC-FT 2430
WTR YR 1981 TOTAL 1885.81 MEAN 5.17 MAX 384 MIN .00 AC-FT 3740

08178700 SALADO CREEK (UPPER STATION) AT SAN ANTONIO, TX--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Chemical, biochemical, and pesticide analyses: November 1968 to current year. Sediment analyses: November 1971 to September 1973. Water temperatures: November 1968 to current year. Bacteria analyses: May 1976 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)
JUN										
13...	1750	698	218	--	25.0	100	1800	7.0	85	5.8
13...	1852	738	203	--	25.0	100	3300	6.8	83	6.3
13...	2015	574	223	8.2	25.0	50	1200	7.6	93	4.9
14...	1306	312	214	--	25.0	60	120	6.4	78	3.1
15...	1109	29	364	7.2	25.0	35	32	5.6	68	2.8

DATE	COLI-FORM, TOTAL, IMMED. (COLS. PER 100 ML)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)
JUN										
13...	--	--	--	65	1	24	1.3	7.7	.4	11
13...	78000	62000	350000	78	9	29	1.4	7.3	.4	6.7
13...	540000	98000	300000	87	13	32	1.6	7.9	.4	6.8
14...	48000	10000	28000	92	7	34	1.6	4.5	.2	6.0
15...	K18000	K7000	K910	150	24	57	2.8	10	.4	10

DATE	ALKA-LINITY (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, SUS-PENDED (MG/L)	SOLIDS, VOLA-TILE, SUS-PENDED (MG/L)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)
JUN									
13...	64	26	6.6	.5	11	126	2440	370	.25
13...	69	24	7.8	.3	11	128	3720	420	.31
13...	74	24	8.8	.3	12	137	1690	340	.31
14...	85	8.9	5.6	.1	13	125	154	52	.11
15...	130	32	10	.2	17	217	48	106	.35

DATE	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
JUN									
13...	.070	.32	.180	1.2	1.4	.890	45	--	.10
13...	.030	.34	.110	2.1	2.2	2.200	43	4.0	.10
13...	.020	.33	.120	1.1	1.2	.960	25	--	--
14...	.020	.13	.010	2.3	2.3	.230	7.7	--	.00
15...	.040	.39	.210	4.1	4.3	.130	4.2	--	--

DATE	TIME	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)
JUN							
13...	1750	3	0	0	10	0	90
13...	1852	2	0	0	10	0	60
13...	2015	--	--	--	--	--	--
14...	1306	2	300	<1	0	<10	30

08178700 SALADO CREEK (UPPER STATION) AT SAN ANTONIO, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, DIS-SOLVED (UG/L AS ZN)
JUN						
13...	0	0	.1	0	0	0
13...	--	0	.1	0	0	0
13...	0	--	--	--	--	--
14...	<10	3	.1	0	0	4

DATE	TIME	PCB TOTAL (UG/L)	NAPH-THA-LENES, POLY-CHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	CHLOR-DANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)	DI-AZINON, TOTAL (UG/L)
JUN									
13...	1750	.00	.0	.00	.0	.00	.00	.00	.43
13...	1852	.00	.0	.00	.0	.00	.00	.00	.42

DATE	DI-ELDRIN TOTAL (UG/L)	ENDO-SULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTA-CHLOR, TOTAL (UG/L)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALA-THION, TOTAL (UG/L)	METH-OXY-CHLOR, TOTAL (UG/L)
JUN									
13...	.00	.00	.00	.00	.00	.00	.00	.00	.00
13...	.00	.00	.00	.00	.00	.00	.00	.01	.00

DATE	METHYL PARA-THION, TOTAL (UG/L)	METHYL TRI-THION, TOTAL (UG/L)	MIREX, TOTAL (UG/L)	PARA-THION, TOTAL (UG/L)	TOX-APHENE, TOTAL (UG/L)	TOTAL TRI-THION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
JUN									
13...	.00	.00	.00	.00	0	.00	.13	.04	.03
13...	.00	.00	.00	.00	0	.00	.07	.02	.01

08178800 SALADO CREEK (LOWER STATION) AT SAN ANTONIO, TX

LOCATION.--Lat 29°21'25", long 98°24'45", Bexar County, Hydrologic Unit 12100301, on right bank at upstream side of bridge on Loop 13 at San Antonio, 1.4 mi (2.3 km) east of Brooks Air Force Base, and 3.3 mi (5.3 km) upstream from Rosillo Creek.

DRAINAGE AREA.--189 mi² (490 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1960 to current year.

GAGE.--Water-stage recorder. Datum of gage is 526.95 ft (160.614 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good. Small diversions above station. Recording rain gages located in watershed. Most of low flow comes from artesian wells and springs in city of San Antonio. For statement regarding regulation by Soil Conservation Service floodwater-retarding structures, see station 08178700.

AVERAGE DISCHARGE.--21 years, 42.5 ft³/s (1.204 m³/s), 3.05 in/yr (77 mm/yr), 30,790 acre-ft/yr (38.0 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,100 ft³/s (371 m³/s) Sept. 27, 1973, gage height, 28.83 ft (8.787 m); no flow Aug. 13, 1967.
Maximum stage since at least 1941, that of Sept. 27, 1973.

EXTREMES OUTSIDE PERIOD OF RECORD.--Floods of Sept. 27, 1946, and Aug. 15, 1960, were about equal magnitude. Flood of Aug. 15, 1960, reached a stage of 26.8 ft (8.17 m), from floodmarks.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,020 ft³/s (57.2 m³/s) June 16, gage height, 15.92 ft (4.852 m); minimum, 8.2 ft³/s (0.23 m³/s) Feb. 2-4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	21	21	17	8.8	44	19	18	60	36	24	29
2	19	21	20	17	8.3	43	19	34	39	30	23	24
3	16	22	21	17	8.2	28	21	64	34	34	22	59
4	15	23	21	17	15	43	20	49	39	30	19	32
5	15	23	24	16	35	30	20	29	69	49	19	28
6	16	24	28	18	18	23	21	23	41	60	19	23
7	15	25	26	18	12	22	19	22	28	36	19	20
8	15	23	32	16	11	22	19	21	26	32	19	86
9	15	22	55	20	10	21	19	22	25	28	19	63
10	15	22	27	22	10	20	20	31	23	30	19	27
11	15	21	22	19	9.9	26	20	22	87	31	16	22
12	15	22	20	18	9.8	43	20	21	345	29	15	22
13	15	22	18	18	10	72	19	20	281	25	18	24
14	15	23	18	18	11	36	18	19	1090	25	51	23
15	15	25	21	19	11	26	19	19	201	25	68	55
16	16	134	20	19	9.9	24	20	20	898	25	11	29
17	17	118	18	18	9.9	23	21	22	580	25	9.6	24
18	23	37	18	18	10	22	21	21	91	24	29	22
19	73	24	18	128	11	20	22	19	59	24	303	20
20	33	20	17	158	11	21	20	19	47	24	69	21
21	23	19	17	29	11	21	19	18	43	24	32	21
22	21	22	17	16	12	21	19	19	40	23	27	20
23	21	25	18	13	12	23	182	19	38	23	25	21
24	24	22	17	12	12	21	74	144	37	23	24	19
25	19	61	17	12	13	21	76	149	39	23	24	18
26	17	155	17	12	16	22	82	62	40	22	22	17
27	18	50	18	11	17	22	29	34	56	22	22	18
28	19	28	19	11	19	23	23	29	41	22	20	19
29	20	24	19	11	---	23	23	74	47	22	21	19
30	22	22	17	9.5	---	20	20	433	46	21	52	19
31	22	---	17	8.9	---	19	---	153	---	22	82	---
TOTAL	636	1100	658	756.4	351.8	845	944	1649	4490	869	1142.6	844
MEAN	20.5	36.7	21.2	24.4	12.6	27.3	31.5	53.2	150	28.0	36.9	28.1
MAX	73	155	55	158	35	72	182	433	1090	60	303	86
MIN	15	19	17	8.9	8.2	19	18	18	23	21	9.6	17
CFSM	.11	.19	.11	.13	.07	.14	.17	.28	.79	.15	.20	.15
IN.	.13	.22	.13	.15	.07	.17	.19	.32	.88	.17	.22	.17
AC-FT	1260	2180	1310	1500	698	1680	1870	3270	8910	1720	2270	1670

CAL YR 1980 TOTAL 11589.6 MEAN 31.7 MAX 475 MIN 6.2 CFSM .17 IN 2.28 AC-FT 22990
WTR YR 1981 TOTAL 14285.8 MEAN 39.1 MAX 1090 MIN 8.2 CFSM .21 IN 2.81 AC-FT 28340

08181400 HELOTES CREEK AT HELOTES, TX

LOCATION.--Lat 29°34'42", long 98°41'29", Bexar County, Hydrologic Unit 12100302, 42 ft (13 m) left of and 44 ft (13 m) downstream from centerline of bridge on State Highway 16, 0.1 mi (0.2 km) northwest of Helotes, and 8.6 mi (13.8 km) upstream from mouth.

DRAINAGE AREA.--15.0 mi² (38.8 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1968 to current year.

REVISED RECORDS.--WRD TX-73-1: 1972(M).

GAGE.--Water-stage recorder. Datum of gage is 1,014.82 ft (309.317 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records fair. An undetermined amount of flow is diverted for domestic use above the station, and some flow enters the Edwards and associated limestones through the Balcones Fault Zone in the vicinity of the gage. Recording rain gage located at station, with two additional recording rain gages located in watershed.

AVERAGE DISCHARGE.--13 years, 4.63 ft³/s (0.131 m³/s), 4.19 in/yr (106 mm/yr), 3,350 acre-ft/yr (4.13 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,680 ft³/s (217 m³/s) July 16, 1973, gage height, 10.8 ft (3.29 m), from floodmarks, from rating curve extended above 5,000 ft³/s (142 m³/s); no flow most of time.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage since 1923, 13.7 ft (4.18 m) in 1927, from information by local resident.

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 140 ft³/s (3.96 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
June 12	1315	959	27.2	4.02	1.225
June 14	1200	*1,260	35.7	4.47	1.362

Minimum discharge, no flow most of time.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.03	.00	.00	4.1	7.4	.00	.00
2	.00	.00	.00	.00	.00	.00	.00	.03	3.1	6.1	.00	.00
3	.00	.00	.00	.00	.00	.00	.00	.16	1.9	5.2	.00	.00
4	.00	.00	.00	.00	.00	.00	.00	.00	2.4	4.4	.00	.00
5	.00	.00	.00	.00	.00	.00	.00	.00	8.0	6.8	.00	.00
6	.00	.00	.00	.00	.00	.00	.00	.00	7.7	5.8	.00	.00
7	.00	.00	.00	.00	.00	.00	.00	.00	6.7	3.9	.00	.00
8	.00	.00	.00	.00	.00	.00	.00	.00	5.3	3.1	.00	.00
9	.00	.00	.00	.00	.00	.00	.00	.00	4.0	2.4	.00	.00
10	.00	.00	.00	.00	.00	.00	.00	.00	2.6	2.1	.00	.00
11	.00	.00	.00	.00	.00	.00	.00	.00	1.5	1.3	.00	.00
12	.00	.00	.00	.00	.00	.32	.00	.00	166	1.0	.00	.00
13	.00	.00	.00	.00	.00	.00	.00	.00	280	.50	.00	.00
14	.00	.00	.00	.00	.00	.00	.00	.00	606	.24	.00	.00
15	.00	.03	.00	.00	.00	.00	.00	.00	385	.05	.00	.00
16	.00	.12	.00	.00	.00	.00	.00	.00	288	.00	.00	.00
17	.00	.00	.00	.00	.00	.00	.00	.00	198	.00	.00	.00
18	1.3	.00	.00	.00	.00	.00	.00	.00	134	.00	.11	.00
19	.00	.00	.00	.13	.00	.00	.00	.00	89	.00	.00	.00
20	.00	.00	.00	.00	.00	.00	.00	.00	63	.00	.00	.00
21	.00	.00	.00	.00	.00	.00	.00	.00	49	.00	.00	.00
22	.00	.00	.00	.00	.00	.00	.00	.00	38	.00	.00	.00
23	.00	.00	.00	.00	.00	.00	.17	.00	32	.00	.00	.00
24	.00	.00	.00	.00	.00	.00	.00	.30	27	.00	.00	.00
25	.00	.23	.00	.00	.00	.00	.03	.03	21	.00	.00	.00
26	.00	.00	.00	.00	.00	.00	.00	.00	18	.00	.00	.00
27	.00	.00	.00	.00	.00	.00	.00	.00	15	.00	.00	.00
28	.00	.00	.00	.00	.00	.00	.00	.00	13	.00	.00	.00
29	.00	.00	.00	.00	---	.00	.00	.09	11	.00	.00	.00
30	.00	.00	.00	.00	---	.00	.00	.48	8.5	.00	.00	.00
31	.00	---	.00	.00	---	.00	---	3.9	---	.00	.00	---
TOTAL	1.30	.38	.00	.13	.00	.35	.20	4.99	2488.8	50.29	.11	.00
MEAN	.042	.013	.000	.004	.000	.011	.007	.16	83.0	1.62	.004	.000
MAX	1.3	.23	.00	.13	.00	.32	.17	3.9	606	7.4	.11	.00
MIN	.00	.00	.00	.00	.00	.00	.00	.00	1.5	.00	.00	.00
CFSM	.003	.001	.000	.000	.000	.001	.000	.01	5.53	.11	.000	.000
IN.	.00	.00	.00	.00	.00	.00	.00	.01	6.17	.12	.00	.00
AC-FT	2.6	.8	.00	.3	.00	.7	.4	9.9	4940	100	.2	.00

CAL YR 1980 TOTAL 4.65 MEAN .013 MAX 1.3 MIN .00 CFSM .001 IN .01 AC-FT 9.2
WTR YR 1981 TOTAL 2546.55 MEAN 6.98 MAX 606 MIN .00 CFSM .47 IN 6.32 AC-FT 5050

08181400 HELOTES CREEK AT HELOTES, TX--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Chemical, biochemical, and pesticide analyses: May 1969 to current year. Sediment analyses: May 1972 to September 1973. Water temperatures: May 1969 to current year. Bacteria analyses: April 1976 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)
JUN										
12...	1145	247	384	7.9	24.5	5	33	7.4	89	2.3
12...	1204	882	304	7.5	24.0	30	290	7.4	88	3.4
12...	1240	754	255	7.8	24.0	35	140	7.6	90	4.1
12...	1406	662	283	7.8	24.0	50	150	--	--	4.2
12...	1454	429	--	--	--	--	--	7.7	92	3.8
12...	1546	295	309	7.8	24.5	30	150	7.7	93	3.1

DATE	COLI-FORM, TOTAL, IMMED. (COLS. PER 100 ML)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO
JUN									
12...	54000	--	89000	200	18	61	11	6.3	.2
12...	110000	K19000	K120000	160	9	49	8.9	4.4	.2
12...	>16000	K16000	K62000	130	7	40	6.6	3.6	.1
12...	21000	K13000	42000	150	19	48	7.0	3.2	.1
12...	--	--	--	--	--	--	--	--	--
12...	9800	7400	24000	160	10	52	7.3	4.3	.1

DATE	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, SUS-PENDED (MG/L)
JUN									
12...	1.4	180	14	13	.1	8.5	--	223	118
12...	2.1	150	10	7.1	.1	7.6	--	179	824
12...	2.5	120	13	5.3	.1	7.7	4140	151	462
12...	2.5	130	18	5.7	.1	7.9	--	170	472
12...	--	--	--	--	--	--	--	--	--
12...	2.4	150	13	7.1	.1	8.4	--	174	312

DATE	SOLIDS, VOLA-TILE, SUS-PENDED (MG/L)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)
JUN									
12...	38	.38	.010	.39	.060	.94	1.0	.080	7.5
12...	136	.36	.030	.39	.150	2.2	2.3	.330	48
12...	72	.44	.020	.46	.100	2.5	2.6	.190	23
12...	80	.54	.020	.56	.100	2.2	2.3	.220	32
12...	--	--	--	--	--	--	--	--	--
12...	64	.63	.020	.65	.100	1.9	2.0	.120	13

DATE	TIME	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)
JUN							
12...	1145	1	200	<1	10	<10	20
12...	1204	1	0	0	10	0	40
12...	1406	1	0	0	0	0	40

08181400 HELOTES CREEK AT HELOTES, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, DIS-SOLVED (UG/L AS ZN)
JUN						
12...	<10	3	.2	0	0	5
12...	0	0	.1	0	0	0
12...	0	0	.1	0	0	0

DATE	TIME	PCB TOTAL (UG/L)	NAPH-THA-LENES, POLY-CHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	CHLOR-DANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)	DI-AZINON, TOTAL (UG/L)
JUN									
12...	1145	.00	.0	.00	.0	.00	.00	.00	.00
12...	1204	.00	.0	.00	.1	.00	.00	.00	.01

DATE	DI-ELDRIN TOTAL (UG/L)	ENDO-SULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTA-CHLOR, TOTAL (UG/L)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALA-THION, TOTAL (UG/L)	METH-OXY-CHLOR, TOTAL (UG/L)
JUN									
12...	.00	.00	.00	.00	.00	.00	.01	.00	.00
12...	.00	.00	.00	.00	.00	.00	.01	.00	.00

DATE	METHYL PARA-THION, TOTAL (UG/L)	METHYL TRI-THION, TOTAL (UG/L)	MIREX, TOTAL (UG/L)	PARA-THION, TOTAL (UG/L)	TOX-APHENE, TOTAL (UG/L)	TOTAL TRI-THION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
JUN									
12...	.00	.00	.00	.00	0	.00	.00	.00	.00
12...	.00	.00	.00	.00	0	.00	.00	.00	.00

SAN ANTONIO URBAN HYDROLOGY STUDY

DAILY AND MONTHLY RAINFALL SUMMARY — PERIOD: 1981 WATER YEAR

DATE	GAGE NUMBER								
	1-S	3-S	4-S	5-S	1-ES	2-ES	3-ES	1-H	2-H	3-H
OCT										
1	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.03	0.07	0.03	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.02	0.05	0.02	0.00	0.00	0.00
18	2.37	0.84	1.25	0.54	1.85	2.89	3.36	2.31	2.21	2.26
19	0.01	0.01	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01
20	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
21	0.00	0.02	0.07	0.04	0.05	0.05	0.14	0.16	0.11	0.06
24	0.13	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.03	0.01	0.02
27	0.00	0.01	0.01	0.01	0.00	0.11	0.00	0.09	0.08	0.10
28	0.04	0.16	0.26	0.00	0.00	0.01	0.04	0.13	0.04	0.04
MTOT	2.55	1.06	1.59	0.73	1.97	3.21	3.63	2.73	2.46	2.50
NOV										
15	0.79	0.58	0.69	0.69	0.66	0.69	0.37	0.93	1.07	0.94
16	1.51	1.29	1.43	1.51	1.54	1.22	1.47	1.10	1.07	1.06
17	0.00	0.00	0.00	0.01	0.02	0.00	0.08	0.01	0.00	0.01
21	0.03	0.01	0.00	0.05	0.03	0.04	0.03	0.04	0.06	0.05
22	0.26	0.18	0.00	0.17	0.22	0.24	0.19	0.27	0.32	0.30
23	0.01	0.02	0.01	0.00	0.02	0.01	0.02	0.00	0.02	0.02
25	1.00	1.19	1.20	1.19	1.08	1.16	1.19	1.19	1.30	1.23
26	0.10	0.08	0.11	0.06	0.43	0.29	0.29	0.07	0.09	0.08
MTOT	3.70	3.35	3.44	3.68	4.00	3.65	3.64	3.61	3.93	3.69
DEC										
4	0.14	0.05	0.08	0.10	0.16	0.16	0.15	0.11	0.12	0.10
5	0.12	0.17	0.20	0.11	0.18	0.21	0.29	0.05	0.09	0.04
6	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01
7	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01
8	0.35	0.17	0.37	0.60	0.23	0.75	0.72	0.38	0.22	0.19
9	0.22	0.00	0.03	0.02	0.31	0.10	0.07	0.11	0.12	0.08
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03
14	0.10	0.01	0.06	0.02	0.10	0.14	0.05	0.09	0.12	0.09
15	0.07	0.02	0.06	0.10	0.09	0.04	0.14	0.05	0.02	0.07
MTOT	1.01	0.42	0.80	0.97	1.08	1.40	1.43	0.80	0.71	0.62
CTOT	28.97	23.77	28.75	26.82	33.64	33.84	34.66	29.79	30.52	27.92

MTOT=Monthly Totals
CTOT=Calendar Year Totals

SAN ANTONIO URBAN HYDROLOGY STUDY

DAILY AND MONTHLY RAINFALL SUMMARY — PERIOD: 1981 WATER YEAR

DATE	GAGE NUMBER								
	1-S	3-S	4-S	5-S	1-ES	2-ES	3-ES	1-H	2-H	3-H
JAN										
5	0.01	0.00	0.00	0.01	0.03	0.02	0.07	0.04	0.05	0.05
6	0.05	0.02	0.09	0.07	0.06	0.08	0.00	0.07	0.06	0.06
8	0.13	0.15	0.26	0.04	0.16	0.15	0.18	0.06	0.08	0.07
9	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01
13	0.14	0.00	0.07	0.00	0.16	0.18	0.17	0.06	0.06	0.08
14	0.09	0.00	0.06	0.04	0.10	0.05	0.06	0.08	0.08	0.06
18	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.01	0.03	0.01
19	1.59	1.58	1.59	1.56	1.58	1.59	1.62	1.61	1.73	1.60
20	0.01	0.00	0.01	0.00	0.01	0.01	0.02	0.01	0.01	0.01
MTOT	2.03	1.76	2.08	1.72	2.13	2.09	2.13	1.95	2.10	1.95
FEB										
1	0.02	0.02	0.00	0.00	0.08	0.00	0.09	0.02	0.01	0.01
4	0.80	0.65	0.53	0.55	0.69	0.56	0.68	0.67	0.79	0.72
5	0.14	0.07	0.11	0.02	0.08	0.14	0.12	0.13	0.13	0.09
7	0.00	0.00	0.00	0.09	0.00	0.00	0.01	0.01	0.01	0.00
8	0.00	0.00	0.01	0.09	0.02	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.01	0.16	0.00	0.01	0.00	0.01	0.00
10	0.07	0.00	0.01	0.08	0.00	0.00	0.05	0.07	0.05	0.08
13	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.04	0.07	0.04
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00
25	0.13	0.00	0.00	0.00	0.10	0.13	0.07	0.04	0.05	0.05
26	0.04	0.00	0.01	0.00	0.05	0.03	0.02	0.05	0.07	0.03
28	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.00
MTOT	1.24	0.74	0.67	0.85	1.22	0.86	1.06	1.05	1.23	1.02
MAR										
1	0.66	0.59	0.71	0.22	0.59	0.47	0.53	0.59	0.82	0.55
3	0.33	0.24	0.29	0.34	0.30	0.29	0.31	0.56	0.49	0.43
4	0.01	0.01	0.01	0.02	0.00	0.00	0.02	0.02	0.02	0.01
7	0.10	0.09	0.02	0.06	0.28	0.12	0.24	0.10	0.14	0.10
10	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.02
11	0.34	0.30	0.31	0.21	0.30	0.40	0.24	0.35	0.47	0.37
12	1.22	0.49	0.52	0.48	1.85	0.98	1.50	1.16	1.40	1.65
13	0.01	0.01	0.02	0.00	0.00	0.02	0.00	0.02	0.05	0.02
21	0.05	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.00	0.01
28	0.03	0.00	0.01	0.01	0.08	0.02	0.04	0.02	0.02	0.02
29	0.02	0.00	0.20	0.02	0.02	0.01	0.01	0.25	0.06	0.00
MTOT	2.79	1.74	2.10	1.37	3.43	2.32	2.91	3.08	3.48	3.18

MTOT=Monthly Totals

SAN ANTONIO URBAN HYDROLOGY STUDY

DAILY AND MONTHLY RAINFALL SUMMARY — PERIOD: 1981 WATER YEAR

DATE	GAGE NUMBER									
	1-S	3-S	4-S	5-S	1-ES	2-ES	3-ES	1-H	2-H	3-H
APR										
10	0.00	0.02	0.01	0.00	0.06	0.06	0.04	0.02	0.01	0.00
14	0.00	0.00	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.04
15	0.04	0.03	0.00	0.00	0.07	0.00	0.04	0.00	0.00	0.01
16	0.24	0.13	0.06	0.07	0.26	0.23	0.21	0.01	0.04	0.11
17	0.00	0.00	0.02	0.00	0.02	0.01	0.00	0.04	0.02	0.04
18	0.02	0.05	0.08	0.08	0.11	0.06	0.09	0.02	0.04	0.04
21	0.06	0.03	0.01	0.03	0.01	0.06	0.04	0.09	0.11	0.15
22	0.02	0.08	0.08	0.10	0.05	0.07	0.04	0.06	0.03	0.03
23	2.22	1.64	1.32	1.73	2.41	1.98	1.84	1.95	2.27	1.30
24	0.00	0.00	0.00	0.00	0.36	0.00	0.13	0.08	0.00	0.00
25	0.20	0.56	0.75	1.01	0.73	0.65	0.55	0.39	1.02	0.54
MTOT	2.80	2.54	2.34	3.02	4.12	3.12	2.98	2.66	3.54	2.26
MAY										
1	0.19	0.06	0.08	0.25	0.78	1.34	0.89	0.09	0.10	0.30
2	0.47	0.20	0.24	0.25	0.22	0.08	0.13	0.43	0.58	0.68
3	0.17	0.44	0.47	0.44	0.36	0.40	0.30	0.83	0.73	0.83
4	0.01	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02
9	0.00	0.04	0.08	0.38	0.00	0.00	0.00	0.00	0.00	0.09
15	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.05
16	0.03	0.03	0.04	0.00	0.00	0.00	0.00	0.04	0.03	0.04
23	0.01	0.00	0.00	0.00	0.46	0.22	0.00	0.10	0.00	0.00
24	2.05	1.76	2.13	1.73	1.84	2.91	2.56	2.59	3.16	2.20
25	0.07	0.08	0.08	0.06	0.05	0.15	0.18	0.03	0.04	0.03
29	0.66	2.72	2.80	1.07	0.93	1.34	1.39	1.59	0.94	0.94
30	0.38	0.41	0.38	0.76	0.59	0.89	0.77	0.75	1.01	1.17
31	0.02	0.05	0.04	0.00	0.00	0.00	0.03	0.00	0.02	0.03
MTOT	4.06	5.81	6.39	4.96	5.23	7.33	6.25	6.45	6.61	6.38

MTOT=Monthly Totals

SAN ANTONIO URBAN HYDROLOGY STUDY

DAILY AND MONTHLY RAINFALL SUMMARY — PERIOD: 1981 WATER YEAR

DATE	GAGE NUMBER									
	1-S	3-S	4-S	5-S	1-ES	2-ES	3-ES	1-H	2-H	3-H
JUNE										
1	0.15	0.00	0.00	0.00	0.00	0.15	0.10	0.00	0.00	0.00
2	0.04	0.00	0.01	0.00	0.15	0.07	0.21	0.02	0.06	0.10
3	0.67	0.07	0.16	0.05	1.34	0.89	0.00	0.14	0.14	0.55
4	0.49	0.06	0.10	0.27	1.22	0.82	0.00	0.00	0.00	0.51
5	0.00	0.04	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00
8	0.01	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.02
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.28	1.58	1.06	1.12	0.19	0.11	0.15	0.08	0.23	0.13
12	1.29	1.36	1.10	1.32	1.11	0.99	0.99	3.71	4.35	3.48
13	1.98	1.68	1.76	1.06	2.41	2.11	2.33	2.05	2.45	2.65
14	1.68	0.56	0.48	0.68	0.83	0.81	0.65	3.22	2.07	1.97
15	0.27	0.02	0.06	0.05	0.00	0.01	0.03	0.08	0.00	0.02
16	2.01	2.97	2.92	2.44	2.01	1.01	1.84	0.67	0.59	0.54
17	0.02	0.04	0.06	0.02	0.05	0.50	0.05	0.00	0.00	0.00
23	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.34	0.81	0.01
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.67
25	0.77	0.00	0.00	0.00	0.91	2.10	1.31	0.67	0.01	0.13
26	0.00	0.00	0.00	0.29	0.03	0.17	0.09	0.01	0.06	0.02
27	0.02	0.00	0.01	0.00	0.16	0.17	0.14	0.05	0.10	0.04
28	0.00	0.00	0.09	0.05	0.00	0.01	0.00	0.00	0.00	0.02
29	0.14	0.00	0.19	0.02	0.43	0.15	0.25	0.09	0.00	0.09
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MTOT	9.82	8.38	8.08	7.43	10.84	10.12	8.14	11.13	10.99	10.95
JULY										
5	0.62	0.14	0.20	0.56	0.30	0.29	0.46	1.39	0.54	0.69
7	0.02	0.00	0.00	0.00	0.06	0.05	0.14	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
25	0.01	0.00	0.00	0.00	0.00	0.18	0.08	0.00	0.00	0.00
26	0.01	0.00	0.00	0.00	0.18	0.04	0.04	0.23	0.03	0.08
27	0.12	0.00	0.03	0.00	0.01	0.09	0.08	0.01	0.02	0.10
28	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MTOT	0.78	0.14	0.24	0.56	0.55	0.65	0.80	1.64	0.59	0.87

MTOT=Montly Totals

SAN ANTONIO URBAN HYDROLOGY STUDY

DAILY AND MONTHLY RAINFALL SUMMARY — PERIOD: 1981 WATER YEAR

DATE	GAGE NUMBER								
	1-S	3-S	4-S	5-S	1-ES	2-ES	3-ES	1-H	2-H	3-H
AUG										
6	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
7	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.24	0.09	0.16	1.38	0.41	0.28	0.29	0.00	0.00	0.00
18	1.55	0.46	1.27	1.42	1.03	0.90	0.56	0.06	1.52	0.83
19	0.07	0.73	0.74	2.00	0.00	0.15	0.28	0.02	0.01	0.00
20	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.31	0.00	0.00
21	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.24	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.02	0.00	0.03	0.19	0.02	0.00	0.00	0.00	0.07
30	0.29	0.86	0.63	0.80	0.37	0.48	0.46	0.12	0.56	0.50
31	0.02	0.07	0.06	0.02	0.00	0.00	0.07	0.00	0.01	0.01
MTOT	2.48	2.23	2.86	5.67	2.03	1.83	1.67	0.75	2.10	1.41
SEPT										
1	0.00	0.00	0.02	0.07	0.06	0.00	0.09	0.00	0.00	0.00
2	0.23	0.00	0.00	0.23	0.00	0.18	0.16	0.00	0.00	0.06
3	0.01	0.06	0.08	0.15	0.97	0.97	0.82	0.22	0.22	0.14
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.08	1.76	1.28	0.71	0.37	0.73	0.23	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	1.44	0.48	0.79	0.06	1.29	0.34	0.74	0.38	0.79	0.47
15	1.07	0.00	0.03	0.00	0.00	0.78	0.03	0.02	0.04	0.00
23	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.05	0.00	0.11
MTOT	2.83	2.30	2.20	1.22	2.69	3.02	2.07	0.67	1.05	0.78
WTOT	36.09	30.47	32.79	32.18	39.29	39.60	36.71	36.52	38.79	35.61

MTOT=Monthly Totals
WTOT=Water Year Totals

SAN ANTONIO URBAN HYDROLOGY STUDY

DAILY AND MONTHLY RAINFALL SUMMARY — PERIOD: 1981 WATER YEAR

DATE	GAGE NUMBER							
	1-LO	1-L	2-L	1-WH	1-O	2-O	3-O	4-O	NOAA
OCT									
1	0.01	0.00	0.05	0.00	0.00	0.01	0.00	0.00	0.00
14	0.07	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	3.62	1.74	2.47	0.40	2.60	2.65	1.39	0.69	0.80
19	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.01
21	0.07	0.08	0.04	0.03	0.13	0.14	0.07	0.05	0.04
24	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00
26	0.00	0.02	0.01	0.00	0.00	0.02	0.01	0.04	0.02
27	0.13	0.09	0.04	0.00	0.07	0.06	0.09	0.34	0.02
28	0.03	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.20
MTOT	3.93	2.09	2.62	0.50	2.82	2.91	1.56	1.12	1.09
NOV									
15	0.48	1.02	0.93	0.58	0.66	0.63	0.74	0.69	0.67
16	1.35	1.18	1.09	1.55	1.20	1.29	1.37	1.32	1.34
17	0.00	0.00	0.00	0.01	0.00	0.02	0.01	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.03	0.02	0.03	0.11	0.03	0.04	0.05	0.04	0.05
22	0.20	0.27	0.28	0.16	0.25	0.20	0.22	0.15	0.18
23	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.02	0.00
25	1.24	1.32	1.20	1.09	1.19	1.17	1.28	1.23	1.18
26	0.12	0.10	0.09	0.05	0.11	0.11	0.10	0.07	0.11
MTOT	3.42	3.92	3.62	3.55	3.44	3.47	3.77	3.52	3.53
DEC									
4	0.05	0.14	0.15	0.10	0.12	0.11	0.12	0.09	0.07
5	0.15	0.13	0.13	0.10	0.14	0.12	0.16	0.14	0.11
6	0.08	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.11
7	0.01	0.02	0.09	0.01	0.08	0.02	0.09	0.01	0.00
8	0.59	0.28	0.23	0.10	0.32	0.45	0.29	0.20	0.19
9	0.06	0.07	0.00	0.02	0.14	0.08	0.07	0.00	0.02
13	0.02	0.01	0.00	0.02	0.03	0.02	0.01	0.01	0.04
14	0.08	0.10	0.00	0.04	0.17	0.10	0.08	0.05	0.04
15	0.06	0.05	0.00	0.24	0.06	0.04	0.03	0.02	0.03
MTOT	1.10	0.80	0.60	0.64	1.07	0.95	0.86	0.52	0.61
CTOT	9.99	27.80	23.58	23.70	29.88	27.77	28.00	26.17	24.23

MTOT=Monthly Totals
CTOT=Calendar Year Totals

SAN ANTONIO URBAN HYDROLOGY STUDY

DAILY AND MONTHLY RAINFALL SUMMARY — PERIOD: 1981 WATER YEAR

DATE	GAGE NUMBER							
	1-LO	1-L	2-L	1-WH	1-O	2-O	3-O	4-O	NOAA
JAN									
5	0.01	0.01	0.00	0.02	0.02	0.01	0.02	0.03	0.02
6	0.06	0.06	0.06	0.04	0.03	0.05	0.06	0.06	0.08
8	0.14	0.08	0.09	0.00	0.12	0.12	0.16	0.25	0.28
9	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
13	0.11	0.05	0.00	0.00	0.04	0.06	0.03	0.00	0.07
14	0.04	0.10	0.00	0.01	0.08	0.06	0.09	0.00	0.07
18	0.00	0.01	0.12	0.00	0.00	0.00	0.00	0.00	0.00
19	1.43	1.60	1.37	1.27	1.56	1.41	1.56	1.58	1.54
20	0.01	0.01	0.00	0.24	0.02	0.02	0.01	0.01	0.00
MTOT	1.82	1.93	1.64	1.58	1.87	1.73	1.94	1.93	2.06
FEB									
1	0.00	0.01	0.00	0.00	0.02	0.04	0.02	0.00	0.06
4	0.64	0.73	0.65	0.67	0.66	0.67	0.71	0.56	0.75
5	0.11	0.12	0.15	0.02	0.11	0.13	0.13	0.06	0.04
7	0.01	0.01	0.00	0.00	0.02	0.01	0.01	0.01	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.01	0.00	0.05	0.00	0.00	0.01	0.00	0.00	0.02
10	0.02	0.11	0.00	0.00	0.13	0.11	0.00	0.00	0.01
13	0.01	0.01	0.00	0.00	0.02	0.00	0.02	0.01	0.01
21	0.01	0.01	0.00	0.00	0.03	0.00	0.01	0.00	0.02
25	0.03	0.03	0.00	0.00	0.02	0.01	0.01	0.00	0.03
26	0.02	0.05	0.00	0.01	0.01	0.01	0.03	0.01	0.02
28	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MTOT	0.86	1.10	0.85	0.70	1.02	1.00	0.95	0.65	0.96
MAR									
1	0.54	0.78	0.35	0.20	0.42	0.31	0.59	0.96	0.80
3	0.30	0.45	0.30	0.40	0.38	0.33	0.38	0.28	0.29
4	0.01	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.00
7	0.09	0.13	0.00	0.01	0.09	0.12	0.11	0.06	0.08
10	0.00	0.01	0.30	0.08	0.00	0.00	0.00	0.00	0.01
11	0.38	0.39	1.65	0.21	0.31	0.31	0.42	0.23	0.28
12	0.72	1.37	0.00	0.37	0.85	0.77	0.68	0.34	0.46
13	0.01	0.02	0.00	0.01	0.02	0.02	0.00	0.00	0.00
21	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.01	0.00	0.00	0.01	0.01	0.02	0.01	0.01
29	0.02	0.01	0.00	0.00	0.01	0.01	0.01	0.02	0.03
MTOT	2.07	3.18	2.60	1.29	2.10	1.90	2.23	1.92	1.96

MTOT=Monthly Totals

SAN ANTONIO URBAN HYDROLOGY STUDY

DAILY AND MONTHLY RAINFALL SUMMARY — PERIOD: 1981 WATER YEAR

DATE	GAGE NUMBER								
	1-LO	1-L	2-L	1-WH	1-0	2-0	3-0	4-0	NOAA
APR									
10	0.02	0.01	0.00	0.00	0.01	0.00	0.02	0.00	0.04
14	0.01	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.01
15	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04	0.02
16	0.15	0.04	0.00	0.01	0.27	0.33	0.27	0.20	0.04
17	0.00	0.04	0.00	0.00	0.00	0.01	0.09	0.00	0.00
18	0.05	0.02	0.00	0.08	0.14	0.10	0.09	0.04	0.00
21	0.04	0.09	0.00	0.09	0.07	0.07	0.06	0.04	0.04
22	0.05	0.03	0.00	0.00	0.02	0.03	0.04	0.07	0.08
23	1.77	2.07	1.61	1.04	2.77	2.25	2.26	1.75	1.52
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.55	0.46	0.08	0.25	0.49	0.51	0.46	0.39	0.46
MTOT	2.64	2.76	1.69	1.60	3.78	3.31	3.31	2.53	2.21
MAY									
1	0.22	0.09	0.13	0.11	0.27	0.41	0.07	0.01	0.10
2	0.41	0.41	0.47	0.32	0.46	0.24	0.55	0.31	0.20
3	0.40	0.36	0.34	0.41	0.28	0.27	0.24	0.45	0.39
4	0.00	0.00	0.00	0.00	0.05	0.02	0.00	0.08	0.01
9	0.00	0.00	0.04	0.00	0.01	0.03	0.15	0.02	0.10
15	0.00	0.06	0.09	0.00	0.00	0.00	0.00	0.00	0.00
16	0.02	0.05	0.05	0.00	0.01	0.05	0.03	0.00	0.02
23	0.00	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.23
24	2.03	2.53	1.95	1.68	2.42	1.89	1.40	1.95	2.09
25	0.07	0.07	0.00	0.06	0.11	0.08	0.29	0.15	0.00
29	1.82	0.70	1.44	0.37	2.63	1.83	3.14	2.56	2.72
30	0.61	0.78	0.75	0.71	1.05	0.79	0.68	0.90	0.57
31	0.02	0.00	0.00	0.03	0.02	0.03	0.03	0.00	0.00
MTOT	5.60	5.08	5.37	3.69	7.31	5.64	6.58	6.43	6.43

MTOT=Monthly Totals

SAN ANTONIO URBAN HYDROLOGY STUDY

DAILY AND MONTHLY RAINFALL SUMMARY — PERIOD: 1981 WATER YEAR

DATE	GAGE NUMBER								
	1-LO	1-L	2-L	1-WH	1-C	2-O	3-O	4-O	NOAA
JUNE									
1	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00
2	0.07	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.10
3	0.64	0.04	0.00	0.00	0.15	0.31	0.51	0.30	0.02
4	0.97	0.63	0.65	0.37	0.67	0.36	0.61	0.60	0.52
5	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01
8	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00
11	0.34	0.00	0.15	0.32	0.06	0.04	0.43	0.15	2.13
12	0.77	2.35	2.25	0.46	0.92	0.86	1.51	1.05	0.99
13	1.33	2.70	2.79	2.93	4.31	4.51	5.25	4.67	1.22
14	0.70	1.93	1.04	0.40	1.40	1.07	0.17	0.90	0.69
15	0.20	0.11	0.10	0.09	0.36	0.11	1.27	0.60	0.18
16	0.84	0.84	1.25	1.30	1.26	1.55	0.86	1.20	2.32
17	0.00	0.00	0.00	0.01	0.04	0.04	0.00	0.00	0.02
23	0.02	0.81	0.21	0.02	0.03	0.04	0.05	0.00	0.00
24	0.00	0.00	0.00	0.00	0.01	0.04	0.00	0.00	0.01
25	0.70	0.00	0.00	0.20	0.00	0.26	0.05	0.00	0.00
26	0.62	0.00	0.40	0.09	0.39	0.26	1.72	0.78	0.04
27	0.08	0.00	0.00	0.03	0.04	0.00	0.01	0.02	0.13
28	0.02	0.00	0.04	0.20	0.03	0.00	0.03	0.00	0.00
29	0.18	0.00	0.00	0.18	0.01	0.00	0.05	0.44	0.29
30	0.00	0.00	0.00	0.02	0.01	0.19	0.01	0.02	0.04
MTOT	7.49	9.43	8.88	6.76	9.73	9.74	12.53	10.73	8.71
JULY									
5	0.43	0.48	0.41	0.73	0.74	0.66	0.83	--	0.21
7	0.00	0.00	0.00	0.00	0.02	0.02	0.00	--	0.00
12	0.38	0.00	0.00	0.00	0.00	0.01	0.03	--	0.00
25	0.00	0.00	0.00	0.00	0.00	0.01	0.02	--	0.00
26	0.00	0.17	0.48	0.13	0.01	0.29	0.02	--	0.00
27	0.14	0.14	0.11	0.13	0.14	0.25	0.04	--	0.01
28	0.00	0.38	0.26	0.13	0.01	0.00	0.01	--	0.03
MTOT	0.95	1.17	1.26	1.12	0.92	1.24	0.95	--	0.25

MTOT=Monthly Totals

SAN ANTONIO URBAN HYDROLOGY STUDY

DAILY AND MONTHLY RAINFALL SUMMARY — PERIOD: 1981 WATER YEAR

DATE	GAGE NUMBER							
	1-LO	1-L	2-L	1-WH	1-O	2-O	3-O	4-O	NOAA
AUG									
6	0.00	0.00	0.00	0.00	0.07	0.04	0.38	--	0.00
7	0.00	0.00	0.00	0.00	0.03	0.03	0.01	--	0.00
14	0.00	0.00	--	0.05	0.33	0.00	0.07	--	0.00
18	0.58	1.40	--	0.02	1.35	0.92	0.81	--	1.25
19	0.45	0.00	--	1.40	0.21	0.16	0.03	--	0.40
20	0.00	0.00	--	0.00	0.00	0.01	0.00	--	0.00
21	0.00	0.00	--	0.00	0.00	0.00	0.00	--	0.00
24	0.00	0.00	--	0.09	0.00	0.00	0.00	--	0.00
29	0.00	0.00	--	0.02	0.01	0.01	0.00	--	0.01
30	0.64	0.37	--	1.53	0.34	0.00	0.61	--	0.59
31	0.01	0.01	--	0.02	0.01	0.00	0.02	--	0.00
MTOT	1.68	1.78	--	3.13	2.35	1.17	1.93	--	2.25
SEPT									
1	0.07	0.05	--	0.00	0.04	0.00	0.09	--	0.03
2	0.00	0.00	--	0.19	0.00	0.00	0.01	--	0.02
3	0.41	0.14	--	0.25	0.01	0.02	0.04	--	0.08
5	0.00	0.00	--	0.21	0.00	0.00	0.00	--	0.01
8	0.00	0.00	--	0.56	1.54	0.62	3.95	--	0.85
13	0.00	0.00	--	0.00	0.00	0.00	0.00	--	0.01
14	0.35	0.97	--	0.35	0.34	0.23	0.09	--	0.36
15	0.25	0.06	--	0.34	0.05	0.05	0.00	--	0.00
23	0.00	0.00	--	0.00	0.00	0.00	0.00	--	0.00
MTOT	1.08	1.22	--	1.91	1.98	0.93	4.19	--	1.36
WTOT	32.64	34.46	--	26.47	38.39	33.99	40.80	--	31.42

MTOT=Monthly Totals
WTOT=Water Year Totals

STA. NO. 08178700 STORM RAINFALL AND RUNOFF RECORD 1981 WATER YEAR

SALADO CREEK UPPER STATION AT SAN ANTONIO, TX. STORM OF JUNE 13-14, 1981

DATE & TIME	GAGE NUMBER 1-S	3-S	2-O	3-O			ACCUM. WEIGHTED PRECIP. IN.	DISCHARGE IN CFS	ACCUM. RUNOFF IN
JUNE 13									
0000	0.0	0.0	0.0	0.0			0.0	19.0	0.0001
0100	0.01	0.0	0.0	0.01			0.01	19.0	0.0003
0200	0.04	0.0	0.0	0.01			0.03	19.0	0.0005
0300	0.08	0.04	0.09	0.01			0.07	21.0	0.0008
0400	0.11	0.08	0.41	0.22			0.13	19.0	0.0010
0500	0.22	0.08	0.68	0.54			0.23	18.0	0.0012
0600	0.23	0.12	0.72	0.64			0.25	18.0	0.0014
0700	0.27	0.15	0.73	0.65			0.29	17.0	0.0016
0800	0.27	0.15	0.73	0.65			0.29	16.0	0.0017
0830	0.27	0.17	0.73	0.66			0.29	16.0	0.0018
0845	0.27	0.18	0.73	0.83			0.30	16.0	0.0018
0900	0.27	0.19	0.73	1.12			0.31	17.0	0.0019
0915	0.27	0.25	0.73	1.12			0.32	21.0	0.0019
0930	0.27	0.34	0.76	1.43			0.35	24.0	0.0020
0940	0.27	0.39	0.77	1.96			0.37	24.0	0.0020
0945	0.29	0.42	0.77	2.19			0.39	23.0	0.0021
1000	0.30	0.51	0.93	2.55			0.44	23.0	0.0021
1010	0.34	0.57	1.00	2.80			0.49	23.0	0.0022
1015	0.34	0.59	1.01	3.36			0.51	22.0	0.0022
1030	0.34	0.65	1.10	3.98			0.54	21.0	0.0023
1045	0.47	0.65	1.21	4.25			0.64	22.0	0.0023
1100	0.76	0.65	1.22	4.29			0.84	23.0	0.0025
1200	0.89	0.66	1.32	4.31			0.94	56.0	0.0031
1300	0.90	0.67	1.32	4.31			0.95	83.0	0.0041
1400	0.90	0.67	1.33	4.31			0.95	68.0	0.0046
1430	0.90	0.72	1.33	4.31			0.96	60.0	0.0049
1445	0.90	0.74	1.71	4.31			1.00	59.0	0.0051

STA. NO. 08178700 STORM RAINFALL AND RUNOFF RECORD 1981 WATER YEAR

SALADO CREEK UPPER STATION AT SAN ANTONIO, TX. STORM OF JUNE 13-14, 1981

DATE & TIME	GAGE NUMBER 1-S	3-S	2-0	3-0			ACCUM. WEIGHTED PRECIP. IN.	DISCHARGE IN CFS	ACCUM. RUNOFF IN
JUNE 13									
1500	0.97	0.74	1.91	4.31			1.06	58.0	0.0053
1530	1.18	0.80	2.18	4.31			1.24	70.0	0.0056
1540	1.33	0.86	2.70	4.31			1.40	71.0	0.0057
1550	1.36	0.91	3.00	4.31			1.45	72.0	0.0058
1600	1.49	0.96	3.09	4.31			1.56	72.0	0.0060
1615	1.59	1.02	3.61	4.31			1.68	104.0	0.0063
1630	1.62	1.11	4.13	4.31			1.76	135.0	0.0069
1700	1.96	1.31	4.50	4.32			2.07	530.0	0.0114
1800	1.98	1.56	4.51	4.32			2.14	715.0	0.0174
1830	1.98	1.66	4.51	4.32			2.16	975.0	0.0230
1900	1.98	1.67	4.51	4.32			2.16	744.0	0.0314
2030	1.98	1.68	4.51	4.32			2.16	593.0	0.0381
2100	1.98	1.68	4.51	4.32			2.16	637.0	0.0435
2200	1.98	1.68	4.51	4.33			2.16	874.0	0.0509
2230	1.98	1.68	4.51	4.85			2.17	911.0	0.0560
2300	1.98	1.68	4.51	5.17			2.18	1000.0	0.0645
2400	1.98	1.68	4.51	5.25			2.18	1070.0	0.0766
JUNE 14									
0000	1.98	1.68	4.51	5.25			2.18	1070.0	0.0766
0200	1.98	1.68	4.51	5.28			2.18	920.0	0.1035
0400	2.01	1.68	4.51	5.31			2.20	637.0	0.1125
0430	2.57	1.68	5.03	5.32			2.63	593.0	0.1159
0500	2.79	1.71	5.36	5.33			2.81	541.0	0.1189
0530	3.10	1.85	5.39	5.33			3.05	527.0	0.1214
0550	3.37	1.94	5.41	5.34			3.26	508.0	0.1257
0700	3.52	2.08	5.43	5.34			3.39	424.0	0.1309
0800	3.55	2.11	5.46	5.34			3.42	459.0	0.1387
1000	3.62	2.13	5.51	5.34			3.48	473.0	0.1494
1200	3.66	2.16	5.53	5.41			3.51	473.0	0.1628
1500	3.66	2.17	5.54	5.41			3.52	253.0	0.1714
1800	3.66	2.24	5.58	5.41			3.54	172.0	0.1801
2400	3.66	2.24	5.58	5.42			3.54	100.0	0.1835

STA. NO. 08181400 STORM RAINFALL AND RUNOFF RECORD 1981 WATER YEAR

HELOTES CREEK AT HELOTES, TEXAS STORM OF JUNE 12, 1981

DATE & TIME	GAGE NUMBER 1-H	2-H	3-H				ACCUM. WEIGHTED PRECIP. IN.	DISCHARGE IN CFS	ACCUM. RUNOFF IN
JUNE 12									
0000	0.0	0.0	0.0				0.0	0.0	0.0
0430	0.0	0.0	0.0				0.0	3.5	0.0009
0500	0.0	0.01	0.0				0.00	3.5	0.0011
0530	0.0	0.01	0.0				0.00	3.5	0.0013
0600	0.02	0.01	0.0				0.02	3.5	0.0014
0630	0.02	0.01	0.02				0.02	3.5	0.0016
0645	0.04	0.09	0.15				0.06	3.5	0.0016
0650	0.06	0.34	0.19				0.14	3.5	0.0017
0700	0.22	0.50	0.20				0.29	4.2	0.0018
0730	0.25	0.51	0.20				0.31	4.2	0.0020
0800	0.26	0.62	0.41				0.36	5.8	0.0023
0815	0.35	0.64	0.42				0.43	5.8	0.0024
0830	0.57	0.72	0.44				0.60	5.8	0.0026
0900	0.59	0.74	0.45				0.62	5.8	0.0029
0930	0.60	0.75	0.49				0.63	5.8	0.0032
0945	0.68	0.82	0.68				0.71	6.6	0.0033
1000	1.00	1.27	0.74				1.05	9.1	0.0035
1005	1.01	1.28	0.94				1.07	15.0	0.0036
1010	1.03	1.29	1.49				1.12	22.0	0.0038
1015	1.11	1.76	1.76				1.30	28.0	0.0041
1020	1.37	2.08	1.99				1.58	35.0	0.0044
1025	1.58	2.22	2.12				1.77	43.0	0.0047
1030	1.79	2.51	2.20				1.99	50.0	0.0056
1045	2.27	2.76	2.77				2.42	64.0	0.0072
1100	2.84	3.30	3.05				2.97	78.0	0.0103
1130	3.11	3.69	3.13				3.26	106.0	0.0144
1145	3.11	3.69	3.13				3.26	190.0	0.0193
1200	3.11	3.69	3.13				3.26	857.0	0.0414
1215	3.11	3.69	3.13				3.26	900.0	0.0647
1230	3.12	3.70	3.14				3.27	808.0	0.0855
1245	3.13	3.70	3.14				3.27	730.0	0.1044
1300	3.14	3.70	3.14				3.28	814.0	0.1254

STA. NO. 08181400 STORM RAINFALL AND RUNOFF RECORD 1981 WATER YEAR

HELOTES CREEK AT HELOTES, TEXAS STORM OF JUNE 12, 1981

DATE & TIME	GAGE NUMBER 1-H	2-H	3-H				ACCUM. WEIGHTED PRECIP. IN.	DISCHARGE IN CFS	ACCUM. RUNOFF IN
JUNE 12									
1315	3.14	3.70	3.14				3.28	959.0	0.1502
1330	3.14	3.70	3.14				3.28	900.0	0.1850
1400	3.16	3.71	3.14				3.30	707.0	0.2398
1500	3.20	4.00	3.14				3.40	424.0	0.2836
1600	3.20	4.00	3.24				3.40	279.0	0.3124
1700	3.60	4.21	3.33				3.74	211.0	0.3342
1800	3.68	4.29	3.42				3.82	163.0	0.3511
1900	3.70	4.35	3.43				3.85	132.0	0.3647
2000	3.70	4.35	3.43				3.85	119.0	0.3954
2400	3.71	4.35	3.48				3.86	97.0	0.4155

STA. NO. 08177600 STORM RAINFALL AND RUNOFF RECORD 1981 WATER YEAR

OLMOS CREEK TRIBUTARY AT FM 1535, SHAVANO PARK, TX. STORM OF JUNE 12-13, 1981

DATE & TIME	GAGE NUMBER 2-0	ACCUM. WEIGHTED PRECIP. IN.	DISCHARGE IN CFS	ACCUM RUNOFF IN.
JUNE 12				
0000	0.00	0.0	0.0	0.0
0715	0.00	0.0	0.0	0.0
0730	0.01	0.01	0.0	0.0
0800	0.02	0.02	0.0	0.0
0900	0.12	0.12	0.0	0.0
0930	0.38	0.38	0.0	0.0
1000	0.39	0.39	0.0	0.0
1015	0.53	0.53	0.0	0.0
1100	0.69	0.69	0.0	0.0
1200	0.70	0.70	0.0	0.0
1600	0.70	0.70	0.0	0.0
1700	0.76	0.76	0.0	0.0
1800	0.84	0.84	0.0	0.0
2400	0.86	0.86	0.0	0.0
JUNE 13				
0000	0.86	0.86	0.0	0.0
0300	0.95	0.95	0.0	0.0
0330	0.95	0.95	0.0	0.0
0400	1.27	1.27	0.0	0.0
0430	1.53	1.53	0.0	0.0
0900	1.59	1.59	0.0	0.0
1000	1.79	1.79	0.0	0.0
1030	1.96	1.96	0.0	0.0
1100	2.08	2.08	0.0	0.0
1430	2.19	2.19	0.0	0.0
1440	2.49	2.49	0.0	0.0
1500	2.77	2.77	16.0	0.0250
1520	2.82	2.82	13.0	0.0403
1530	3.04	3.04	14.0	0.0405
1535	3.31	3.31	23.0	0.0575
1540	3.56	3.56	40.0	0.0732
1545	3.74	3.74	56.0	0.0951

STA. NO. 08177600 STORM RAINFALL AND RUNOFF RECORD 1981 WATER YEAR

OLMOS CREEK TRIBUTARY AT FM 1535, SHAVANO PARK, TX. STORM OF JUNE 12-13, 1981

DATE & TIME	GAGE NUMBER 2-0						ACCUM. WEIGHTED PRECIP. IN.	DISCHARGE IN CFS	ACCUM. RUNOFF IN.
JUNE 13									
1550	3.86						3.86	68.0	0.1350
1600	3.95						3.95	86.0	0.2023
1610	4.24						4.24	93.0	0.2569
1615	4.47						4.47	98.0	0.2952
1620	4.70						4.70	128.0	0.3704
1630	4.99						4.99	199.0	0.4872
1635	5.30						5.30	217.0	0.5721
1640	5.35						5.35	250.0	0.6699
1645	5.35						5.35	275.0	0.8313
1655	5.36						5.36	294.0	1.1765
1715	5.36						5.36	216.0	1.4723
1730	5.36						5.36	144.0	1.6413
1745	5.36						5.36	101.0	1.7599
1800	5.37						5.37	80.0	1.9947
1900	5.37						5.37	42.0	2.1919
2000	5.37						5.37	21.0	2.2905
2100	5.37						5.37	13.0	2.3516
2200	5.37						5.37	8.0	2.4079
2400	5.37						5.37	3.0	2.4220

STA. NO. 08178620 STORM RAINFALL AND RUNOFF RECORD 1981 WATER YEAR

LORENCE CREEK AT THOUSAND OAKS BLVD., SAN ANTONIO, TX STORM OF APRIL 23, 1981

DATE & TIME	GAGE NUMBER 1-LO	ACCUM. WEIGHTED PRECIP. IN.	DISCHARGE IN CFS	ACCUM. RUNOFF IN
APR 23				
0000	0.0	0.0	0.0	0.0
0100	0.04	0.04	0.0	0.0
0200	0.06	0.06	0.0	0.0
0400	0.06	0.06	0.0	0.0
0430	0.08	0.08	0.0	0.0
0445	0.11	0.11	0.0	0.0
0500	0.53	0.53	0.0	0.0
0530	0.57	0.57	0.0	0.0
0545	0.83	0.83	0.0	0.0
0600	0.88	0.88	0.0	0.0
0615	0.93	0.93	0.0	0.0
0630	1.44	1.44	0.0	0.0
0640	1.68	1.68	0.0	0.0
0650	1.72	1.72	0.7	0.0001
0735	1.75	1.75	0.0	0.0001
0900	1.76	1.76	0.0	0.0001
0910	1.76	1.76	3.6	0.0003
0915	1.76	1.76	11.0	0.0013
0940	1.76	1.76	42.0	0.0074
1000	1.76	1.76	36.0	0.0131
1030	1.77	1.77	28.0	0.0171
1045	1.77	1.77	27.0	0.0197
1100	1.77	1.77	25.0	0.0257
1200	1.77	1.77	13.0	0.0332
1400	1.77	1.77	3.2	0.0368
1800	1.77	1.77	1.9	0.0405
2400	1.77	1.77	0.7	0.0413

STA. NO. 08178620 STORM RAINFALL AND RUNOFF RECORD 1981 WATER YEAR

LORENCE CREEK AT THOUSAND OAKS BLVD., SAN ANTONIO, TX. STORM OF MAY 29, 1981

DATE & TIME	GAGE NUMBER 1-LO						ACCUM. WEIGHTED PRECIP. IN.	DISCHARGE IN CFS	ACCUM. RUNOFF IN
MAY 29									
0000	0.0						0.0	0.0	0.0
0625	0.0						0.0	0.0	0.0
0700	0.11						0.11	0.0	0.0
0800	0.12						0.12	0.0	0.0
0900	0.22						0.22	0.0	0.0
1100	0.24						0.24	0.0	0.0
1115	0.28						0.28	0.0	0.0
1130	0.45						0.45	0.0	0.0
1145	0.87						0.87	0.0	0.0
1200	1.16						1.16	0.5	0.0000
1210	1.48						1.48	0.7	0.0001
1230	1.72						1.72	0.8	0.0002
1245	1.80						1.80	0.7	0.0003
1300	1.81						1.81	0.7	0.0003
1315	1.81						1.81	6.7	0.0010
1330	1.81						1.81	9.5	0.0020
1350	1.81						1.81	16.0	0.0051
1430	1.81						1.81	10.0	0.0073
1500	1.81						1.81	7.0	0.0093
1600	1.82						1.82	3.9	0.0116
1800	1.82						1.82	2.9	0.0138
2000	1.82						1.82	1.2	0.0152
2400	1.82						1.82	0.7	0.0157

STA. NO. 08178620 STORM RAINFALL AND RUNOFF RECORD 1981 WATER YEAR

LORENCE CREEK AT THOUSAND OAKS BLVD., SAN ANTONIO, TX. STORM OF JUNE 12-13, 1981

DATE & TIME	GAGE NUMBER 1-LO						ACCUM. WEIGHTED PRECIP. IN.	DISCHARGE IN CFS	ACCUM. RUNOFF IN
JUNE 12									
0000	0.0						0.0	0.0	0.0
0700	0.0						0.0	0.0	0.0
0800	0.01						0.01	0.0	0.0
0900	0.12						0.12	0.0	0.0
0930	0.21						0.21	0.0	0.0
1000	0.48						0.48	0.0	0.0
1100	0.66						0.66	0.0	0.0
1700	0.68						0.68	0.0	0.0
2400	0.77						0.77	0.0	0.0
JUNE 13									
0000	0.77						0.77	0.0	0.0
0200	0.77						0.77	0.0	0.0
0500	0.83						0.83	0.0	0.0
0900	0.91						0.91	0.0	0.0
1000	1.10						1.10	0.0	0.0
1200	1.14						1.14	0.0	0.0
1500	1.15						1.15	0.0	0.0
1515	1.43						1.43	0.0	0.0
1545	1.53						1.53	0.0	0.0
1600	1.65						1.65	0.0	0.0
1615	1.85						1.85	0.0	0.0
1630	1.98						1.98	0.0	0.0
1700	2.09						2.09	0.6	0.0001
1730	2.10						2.10	10.0	0.0020
1800	2.10						2.10	20.0	0.0049
1815	2.10						2.10	148.0	0.0191
1830	2.10						2.10	275.0	0.0454
1845	2.10						2.10	223.0	0.0667
1900	2.10						2.10	143.0	0.0872
1930	2.10						2.10	64.0	0.0995

STA. NO. 08178620 STORM RAINFALL AND RUNOFF RECORD 1981 WATER YEAR

LORENCE CREEK AT THOUSAND OAKS BLVD., SAN ANTONIO, TX. STORM OF JUNE 12-13, 1981

DATE & TIME	GAGE NUMBER 1-LO						ACCUM. WEIGHTED PRECIP. IN.	DISCHARGE IN CFS	ACCUM. RUNOFF IN
JUNE 13									
2000	2.10						2.10	59.0	0.1164
2100	2.10						2.10	28.0	0.1271
2200	2.10						2.10	17.0	0.1336
2300	2.10						2.10	11.0	0.1378
2400	2.10						2.10	7.0	0.1391

STA. NO. 08178690 STORM RAINFALL AND RUNOFF RECORD 1981 WATER YEAR

SALADO CREEK TRIBUTARY AT BITTERS RD., SAN ANTONIO, TX. STORM OF MAY 29, 1981

DATE & TIME	GAGE NUMBER 3-S						ACCUM. WEIGHTED PRECIP. IN.	DISCHARGE IN CFS	ACCUM. RUNOFF IN
MAY 29									
0000	0.0						0.0	0.0	0.0
0630	0.0						0.0	0.0	0.0
0645	0.03						0.03	0.0	0.0
0900	0.06						0.06	0.0	0.0
1100	0.10						0.10	0.0	0.0
1135	0.27						0.27	0.0	0.0
1145	0.57						0.57	0.0	0.0
1200	1.00						1.00	85.0	0.1266
1215	1.61						1.61	116.0	0.2419
1220	1.87						1.87	152.0	0.3174
1225	2.01						2.01	169.0	0.4433
1235	2.21						2.21	146.0	0.5883
1245	2.46						2.46	111.0	0.6710
1250	2.55						2.55	99.0	0.7447
1300	2.70						2.70	91.0	0.9255
1330	2.71						2.71	50.0	1.0745
1400	2.72						2.72	26.0	1.1907
1500	2.72						2.72	13.0	1.3457
1800	2.72						2.72	11.0	1.6407
2400	2.72						2.72	9.9	1.8177