

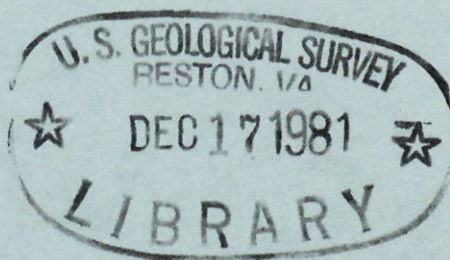
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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Hydrologic Data for Urban Studies in the San Antonio, Texas Metropolitan Area, 1978

Open-File Report 81-922



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Prepared in cooperation with the
Texas Department of Water Resources



UNITED STATES
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GEOLOGICAL SURVEY

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By Roberto Perez

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United States
Geological Survey

*Prepared in cooperation with the
Texas Department of Water Resources*

AUSTIN, TEXAS

AUGUST 1981

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UNITED STATES DEPARTMENT OF THE INTERIOR

JAMES G. WATT, Secretary

GEOLOGICAL SURVEY

Doyle G. Frederick, Director

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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	
Unit	Abbrevia- tion		Unit	Abbrevia- tion
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

1978

by
Roberto Perez
U. S. Geological Survey

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, Houston, and San Antonio. 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 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 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 San Antonio River Authority in conjunction with the Texas Department of Water Resources and the U.S. Geological Survey.

The operation and maintenance and collection of water-quality data at 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. These stations will provide hydrologic data on similar and adjacent watersheds. One watershed is undergoing extensive urbanization and the other is relatively 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.

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 1978 water year.

To facilitate the publication and distribution 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 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, Environmental 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).

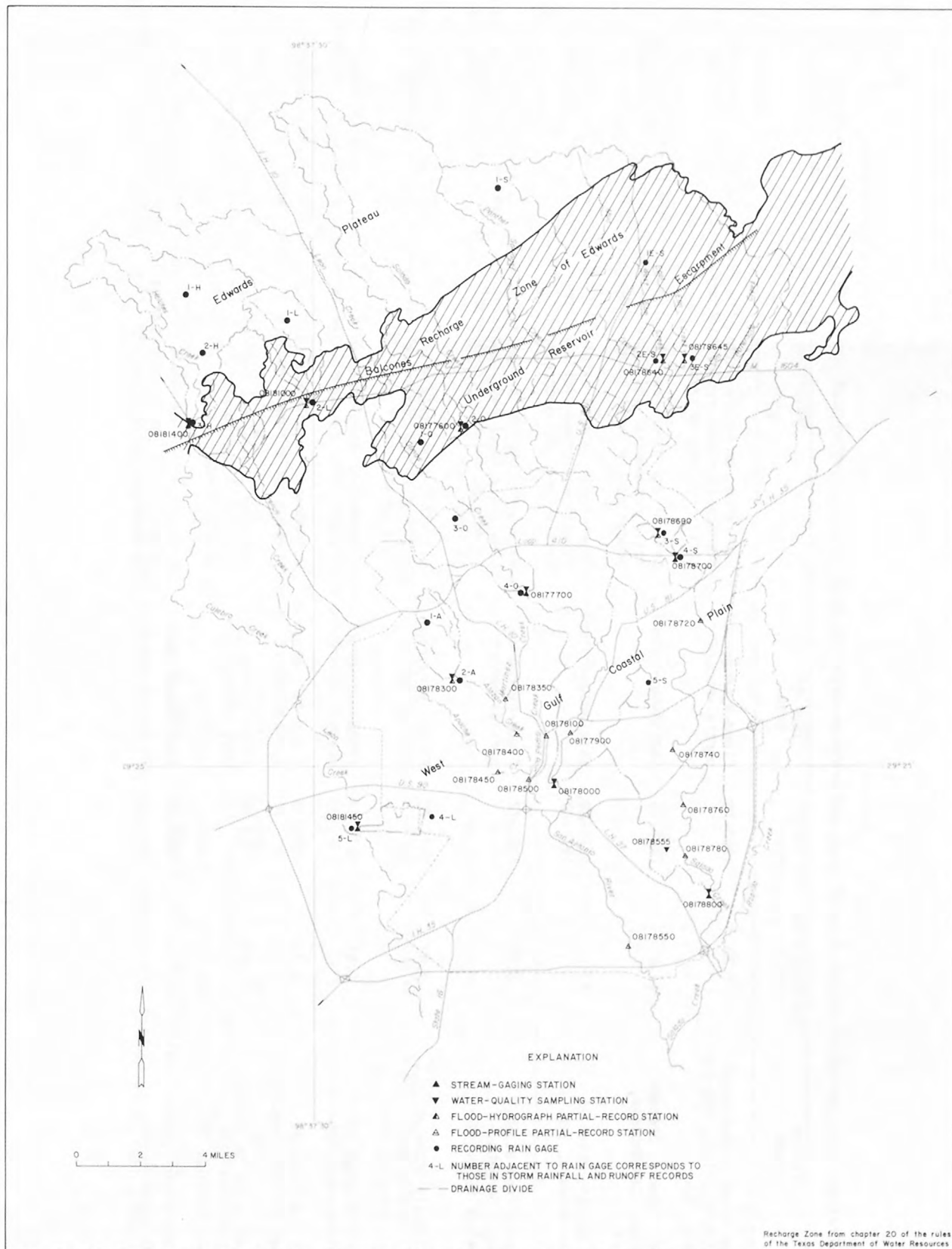


FIGURE 1.- Physiography, drainage basins, and hydrologic-instrument installations in the San Antonio urban area

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	1968-78	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	1968-78	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, 1939-78	Continuous-record	Upper reach located within the Edwards recharge zone; residential and commercial development in lower reach, predominantly rural in upper reach; rolling terrain.
08178300	Alazan Creek at St. Cloud Street, San Antonio, Tex.	3.26	1968-78	Flood-hydrograph partial-record	Watershed completely within the West Gulf Coastal Plain; completely developed, residential and commercial; gentle to rolling terrain; considerable storm sewer development in lower reach.
08178555	Harlandale Creek at W. Harding St., San Antonio, Tex.	2.43	1977-78	Flood-hydrograph partial record	Watershed completely within the West Gulf Coastal Plain; residential and commercial development; gentle terrain; considerable storm sewer development.
08178640	West Elm Creek at San Antonio, Tex.	2.45	1976-78	Flood-hydrograph partial-record	Watershed is completely within the Edwards recharge zone; predominantly rural; rolling to rugged terrain.
08178645	East Elm Creek at San Antonio, Tex.	2.33	1975-78	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	1968-78	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	1960-78	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	1960-78	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.
08181000	Leon Creek tributary at Farm Road 1604, San Antonio, Tex.	5.57	1968-78	Flood-hydrograph partial-record	Lower reach of watershed is within the Edwards recharge zone; predominantly rural; rolling to rugged terrain.
08181400	Helotes Creek at Helotes, Tex.	15.0	1968-78	Continuous-record	Extreme lower reach is within the Edwards recharge zone; predominantly rural; rugged terrain.
08181450	Leon Creek tributary at Kelly Air Force Base, Tex.	1.19	1969-78	Continuous-record	Watershed is completely within the West Gulf Coastal Plain; lower reach of watershed is developed by military for runways, offices, and warehouses; gentle terrain.

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 21 recording rain gages distributed throughout the study area of which three are in the Elm Creek basin (fig. 1). 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 Olmos Creek at Dresden Drive station could be computed as follows: Multiply the recorded precipitation at rain-gage 1-Ø by 0.34; to that value, add the recorded precipitation at rain-gage 2-Ø, multiplied by 0.18; to that value, add the recorded precipitation at rain-gage 3-Ø, multiplied by 0.40; and to that value, add the recorded precipitation at rain-gage 4-Ø, multiplied by 0.08.

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

Station	Station number	Rain gage <u>1/</u>	Weighted-mean Precipitation factor <u>2/</u>
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	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
Leon Creek tributary at Kelly Air Force Base	08181450	4-L	.63
		5-L	.37
Flood-hydrograph partial-record stations			
Olmos Creek tributary at FM 1535, Shavano Park	08177600	2-Ø	1.00
Alazan Creek at St. Cloud Street, San Antonio	08278300	1-A	.73
		2-A	.27
Harlandale Creek at West Harding St., San Antonio	08178555	1-WH	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 <u>1/</u>	Weighted-mean Precipitation factor <u>2/</u>
Flood-hydrograph partial-record stations--Continued			
West Elm Creek at San Antonio	08178640	1E-S	0.58
		2E-S	.41
		3E-S	.01
East Elm Creek at San Antonio	08178645	1E-S	.55
		2E-S	.07
		3E-S	.38
Salado Creek tributary at Bitters Road, San Antonio	08178690	3-S	1.00
Leon Creek tributary at FM 1604, San Antonio	08181000	1-L	.77
		2-L	.23

1/ Rain gage designations are: Ø, Olmos Creek; S, Salado Creek; H, Helotes Creek; L, Leon Creek; A, Alazan Creek; E-S, East Elm Creek; and WH, Harlandale Creek.

2/ See section on "Precipitation" for explanation of use of weighted-mean precipitation factors.

Runoff

Runoff data from the San Antonio urban study area are based on discharge measurements and stage records at six 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 six continuous-record stations and annual maximum discharge at the seven flood-hydrograph partial-record stations for the 1978 water year are given in the section "Compilation of data." Elevations for selected floods at four flood-profile partial-record stations and two 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 1978 WATER YEAR

Annual

During the 1978 water year, the average rainfall at 21 rain gages in the San Antonio urban study area was 33.91 inches. Rainfall at the National Weather Service station located at the San Antonio International Airport was 32.83 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 during the 1978 water year was compared with the long-term average at two selected stations. Runoff for the current year at San Antonio River at San Antonio (08178000) was 77.1 ft³/s or 140 percent of the 53-year average of 55.1 ft³/s. Runoff for the current year for Salado Creek (lower station, 08178800) at San Antonio was 66.3 ft³/s or 157 percent of the 18-year average of 42.2 ft³/s. Additional runoff data for these stations is given in the section "Compilation of data."

Weighted-mean rainfall totals, total runoff, and rainfall-runoff ratio for five continuous recording streamflow stations representing basins in the San Antonio metropolitan area for the 1978 water year are as follows:

Station	Weighted-mean rainfall (inches)	Total runoff (inches)	Ratio of runoff to rainfall
Helotes Creek at Helotes (08181400)	33.15	1.37	0.04
Leon Creek tributary at Kelly Air Air Force Base (08181450)	30.44	5.95	.20
Olmos Creek at Dresden Drive, San Antonio (08177700)	35.96	4.27	.12
Salado Creek (upper station) at San Antonio (08178700)	34.00	2.32	.07
Salado Creek (lower station) at San Antonio (08178800)	35.77	4.77	.13

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)	1978 Flood elevations										
				Oct. 22	Nov. 1	Nov. 8	Feb. 7	Apr. 10	Apr. 22	June 6	Aug. 1	Sept. 7	Sept. 8	Sept. 13
08178700 a/	Salado Creek (upper station) at San Antonio, Tex.	137	20.7	687.75	693.94	687.70	687.69	687.96	691.25	692.91	689.26	690.66	--	698.56
08178720	Salado Creek at Rittiman Road at San Antonio, Tex.	--	17.8	655.24	662.18	654.56	654.56	656.16	658.68	662.88	656.85	657.46	--	668.69
08178740	Salado Creek at East Houston Street, San Antonio, Tex.	--	11.2	597.64	608.67	--	--	598.45	600.69	607.57	602.01	600.43	--	621.18
08178760	Salado Creek at U.S. Highway 87, San Antonio, Tex.	--	7.7	577.90	584.73	--	--	578.58	580.00	584.02	584.09	--	580.10	589.53
08278780	Salado Creek at Southcross Boulevard, San Antonio, Tex.	--	5.4	--	559.72	552.68	--	--	--	557.66	557.75	--	522.98	565.95
08178800 a/	Salado Creek (lower station) at San Antonio, Tex.	189	3.7	537.10	548.95	536.17	535.45	538.66	540.22	546.45	541.28	--	540.52	555.16

a/ Stream-gaging station.

Table 4.--Peak elevations 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	1978 Flood elevations									
				Oct. 21	Nov. 1	Apr. 10	Apr. 22	May 2	June 6	Aug. 2	Aug. 16	Sept. 7	Sept. 13
08177900	San Antonio River at Navarro Street, San Antonio, Tex.	--	<u>b/</u> 14.5	639.72	643.46	641.72	641.50	639.63	639.36	--	640.84	641.14	644.64
08178000 <u>a/</u>	San Antonio River at San Antonio, Tex.	1.8	<u>b/</u> 12.7	614.32	617.46	614.86	615.64	615.25	613.91	--	614.75	615.03	617.82
08178100	San Pedro Creek at Santa Rosa Street, San Antonio, Tex.	--	3.7	642.13	643.23	644.80	643.76	642.44	640.01	--	641.23	643.24	644.90
08178350	Martinez Creek at Fredericksburg Road, San Antonio, Tex.	--	2.0	679.99	681.76	680.21	681.50	679.08	680.60	--	680.43	680.49	682.55
08178400	Alazan Creek at West Martin Street, San Antonio, Tex.	--	1.6	635.65	639.60	636.28	638.67	634.06	637.29	--	637.01	636.97	640.79
08178450	Apache Creek at South Zarzamora Street, San Antonio, Tex.	--	1.3	627.09	628.68	629.53	628.73	--	627.73	--	626.95	632.05	632.02
08178500	San Pedro Creek at Furnish Street, San Antonio, Tex.	--	1.7	601.84	606.92	605.56	606.68	602.25	605.08	--	604.76	607.68	608.86
08178550	San Antonio River at Ashley Street (Berg's Mill), San Antonio, Tex.	--	<u>b/</u> 5.5	512.54	522.16	514.47	514.50	512.04	513.20	514.16	--	515.46	515.92

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 1978 water year occurred on the following days: November 1, September 7-8, and September 13. These storms produced a variety of rainfall amounts, intensities, durations, and distributions in the drainage basins. Weighted-storm rainfall for these storm periods at areas upstream from continuous-record streamflow stations and from selected flood-hydrograph partial-record stations are given in table 5. Storm rainfall and runoff records are given in the section "Compilation of data."

Individual storms are not given for three stations during the 1978 water year. Storm rainfall data for station 08178645, East Elm Creek at San Antonio, 08178800, Salado Creek (lower station) at San Antonio, and 08181400, Helotes Creek at Helotes were not analyzed because of either insufficient data (missing record during storm periods) or the unit runoff factor for the period of streamflow was low and not representative of basin conditions during flood runoff.

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 1978 water year, water-quality data were collected at 13 locations in the San Antonio urban area (figure 1). At each site up to five sets of water-quality samples were collected during storms 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, one to four sets of samples from each site were selected and analyzed for pesticides and trace metals concentrations. Eight samples from four stations were also analyzed for oil and grease 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

Rainfall period	Weighted rainfall, in inches											
	Stream-gaging stations					Flood-hydrograph partial-record stations						
	Helotes Creek at Helotes (08181400)	Leon Creek tributary at Kelly Air Force Base (08181450)	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)	Alazan Creek at St. Cloud Street, San Antonio (08178300)	Salado Creek tributary at Bitters Road, San Antonio (08178690)	West Elm Creek at San Antonio (08178640)	East Elm Creek at San Antonio (08178645)	Leon Creek tributary at FM 1604, San Antonio (08181000)	Harlandale Creek at West Harding St., San Antonio (08178555)
Oct. 21-22												2.08
Nov. 1				4.84		5.77		5.69	4.56			2.62
April 10												1.36
April 22			2.16					2.16				
May 2-3												0.65
June 6								3.23				
Aug. 1							3.48					
Sept. 7-8		3.67						3.62				
Sept. 13				2.87		4.07		6.42	2.70			

Water-quality samples were collected during the storms of November 1, 1977, and May 2, April 10, June 6-7, August 1, September 7-8, and September 13, 1978. 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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COMPI LATION OF DATA

GUADALUPE RIVER BASIN

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 (water stage and rainfall). Datum of gage is 907.92 ft (276.734 m) National Geodetic Vertical Datum of 1929, San Antonio supplementary adjustments of 1951 and 1953.

REMARKS.--Additional storm rainfall-runoff data for this site can be obtained from the report "Hydrologic Data for Urban Studies in the San Antonio, Texas Metropolitan Area, 1978."

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 339 ft³/s (9.60 m³/s) Sept. 13, 1978, gage height, 6.71 ft (2.045 m).

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

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
aNov. 1	0825	106 3.00	3.76 1.146	aSept. 13	0805	*339 9.60	6.71 2.045

a Water-quality samples were obtained during this flood event.

WATER-QUALITY RECORDS

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)		
NOV 01...	0912	30	142	7.0	19.0	280	25	--	3.4		
SEP 13...	1100	23	156	6.7	22.5	20	25	7.2	2.6		
DATE	100 ML)	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)
NOV 01...	220000	48000	92000	55	2	20	1.2	3.3	.2	4.9	
SEP 13...	190000	20000	49000	74	5	27	1.6	2.4	.1	5.1	
DATE	HCO3)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	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- PENDE (MG/L)	SOLIDS, VOLA- TILE, SUS- PENDE (MG/L)	
NOV 01...	65	0	6.0	6.0	.1	12	86	42	3		
SEP 13...	84	0	6.8	2.9	.1	15	102	40	0		
DATE	AS N)	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)	METHY- LENE BLUE ACTIVE SUR- STANCE (MG/L)	
NOV 01...	1.8	.04	1.8	.07	1.1	1.2	.29	14	.10		
SEP 13...	.29	.01	.30	.05	1.1	1.1	.16	16	.10		

GUADALUPE RIVER BASIN

08177600 OLMOS CREEK TRIBUTARY AT FARM ROAD 1535, SHAVANO PARK, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

		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)			
NOV 01...	0912	2	0	0	5	1	60			
SFP 13...	1100	2	--	0	10	4	50			
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)			
NOV 01...		1	4	.0	0	0	10			
SEP 13...		0	0	.2	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)	
NOV 01...	0912	.0	.00	.00	.0	.00	.00	.00	.31	
SFP 13...	1100	.0	.00	.00	.0	.00	.00	.00	.00	
DATE	TIME	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)	METHYL PARA- THION, TOTAL (UG/L)
NOV 01...		.00	.00	.00	.00	.00	.00	.00	.00	.00
SFP 13...	.01	.00	.00	.00	.00	.00	.01	.00	.00	.00
DATE	TIME	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)	
NOV 01...		.00	--	.00	0	.00	.02	.06	.00	
SFP 13...		.00	.00	.00	0	.00	.00	.22	.00	

GUADALUPE RIVER BASIN

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 mi² (54.9 km²).

WATER-DISCHARGE RECORDS

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.--Water-discharge records good. Recording rain gage located at station, with three additional recording rain gages located in watershed. City of San Antonio rain gage and gage-height telemeters at station.

AVERAGE DISCHARGE.--10 years, 4.57 ft³/s (0.129 m³/s), 2.93 in/yr (74 mm/yr), 3,310 acre-ft/yr (4.08 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,450 ft³/s (211 m³/s) Sept. 13, 1978, gage height, 14.82 ft (4.517 m), from floodmark; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage since 1935, that of Sept. 13, 1978. 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 ft³/s (11.3 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
aNov. 1	0730	1,270 36.0	9.41 2.868	aAug. 1	2200	415 11.8	6.98 2.128
Apr. 22	1500	1,210 34.3	9.53 2.905	aSept. 7	2245	882 25.0	8.39 2.557
aJune 6	2230	941 26.6	8.58 2.615	Sept. 13	0900	*7,450 211	b14.82 4.517

a Water-quality samples were obtained during this flood event.
b From floodmark.

Minimum discharge, no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.10	583	.00	.12	.21	.18	.95	.84	5.5	.04	128	5.4
2	.10	12	.00	.11	.16	.14	.46	3.8	2.8	.04	34	5.3
3	.10	2.0	.01	.11	.17	.24	.84	6.4	14	.04	3.5	.85
4	.10	.93	.00	.14	.42	.24	.88	.73	3.1	.03	.91	3.4
5	.10	.68	.00	.14	.18	.10	.73	.44	.65	.02	.62	1.5
6	.10	.57	.00	.14	.19	7.7	.68	.33	69	.01	1.1	.91
7	.10	.38	.00	.14	11	.97	.77	.36	43	.01	1.0	.88
8	.06	14	.00	.14	.26	.38	.65	.31	3.0	.00	.51	124
9	.04	1.6	.00	.14	.08	.24	.78	.29	.34	.00	.46	3.7
10	.04	.57	.00	.14	.05	.24	34	.20	.27	.00	.36	1.7
11	.02	.31	.12	.50	.30	.24	1.7	.52	.23	.00	.36	1.6
12	.02	.31	.02	.44	16	.24	.84	.23	.17	.00	.36	.29
13	.04	.31	.01	.14	.14	.24	.93	.16	.17	.00	.32	791
14	.04	.24	.00	.08	.10	.24	1.1	.16	.14	.00	.37	24
15	.04	.24	.00	.06	.10	.24	1.2	.18	.13	.00	.31	11
16	.04	.24	.01	.59	.06	.24	1.2	.18	.13	.00	.29	10
17	.04	.24	.01	.14	.52	.24	1.6	.18	.13	.00	.27	6.3
18	.04	.18	.01	.22	.14	.24	1.6	.18	.10	.00	.25	4.2
19	.06	.18	.01	.23	.04	.24	1.5	.18	.10	.00	.21	3.7
20	.06	.14	.01	.10	.02	.24	1.6	2.8	.09	.00	.18	3.0
21	2.5	.14	.03	.10	.02	.24	1.6	5.8	.10	.00	.15	2.8
22	26	.18	.05	.10	.02	.22	122	2.1	.10	.01	.14	3.0
23	19	.18	.06	.10	.10	.48	10	.39	.07	.00	.12	3.9
24	7.1	.18	.06	.11	.14	4.4	2.7	.31	.06	.00	.12	3.4
25	3.6	.18	.09	.13	.10	.77	.81	.31	.04	.00	.10	2.7
26	3.4	.17	.08	.10	.14	.65	.86	.29	.05	.00	.10	1.8
27	3.4	.18	.08	.26	.18	.66	.64	.31	.04	.17	.09	3.4
28	3.1	.18	.08	.30	.18	.57	.61	.25	.04	3.3	.07	3.1
29	2.9	.62	.15	.14	---	.58	.45	3.6	.05	.38	.09	2.7
30	2.7	.01	.14	.17	---	.61	.46	6.7	.04	.10	.15	2.7
31	2.4	---	.14	.39	---	.81	---	.68	---	1.6	.17	---
TOTAL	77.34	620.14	1.17	5.72	31.02	22.82	194.14	39.21	143.64	5.75	174.68	1119.35
MEAN	2.49	20.7	.038	.18	1.11	.74	6.47	1.26	4.79	.19	5.63	37.3
MAX	26	583	.15	.59	16	7.7	122	6.7	69	3.3	128	791
MIN	.02	.01	.00	.06	.02	.10	.45	.16	.04	.00	.07	.29
CFSM	.12	.98	.002	.008	.05	.04	.31	.06	.23	.009	.27	1.76
IN.	.14	1.09	.00	.01	.05	.04	.34	.07	.25	.01	.31	1.96
AC-FT	153	1230	2.3	11	62	45	385	78	285	11	346	2220
(††)	2.07	6.70	.26	.74	2.01	.92	4.00	2.42	2.52	.66	4.64	9.02

CAL YR 1977 TOTAL 1553.66 MEAN 4.26 MAX 583 MIN .00 CFSM .20 IN 2.73 AC-FT 3080 †† 29.55
WTR YR 1978 TOTAL 2434.98 MEAN 6.67 MAX 791 MIN .00 CFSM .32 IN 4.27 AC-FT 4830 †† 35.96

†† Weighted-mean rainfall, in inches, based on four rain gages.

GUADALUPE RIVER BASIN

08177700 OLMOS CREEK AT DRESDEN DRIVE, SAN ANTONIO, TX--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Chemical, biochemical, and pesticide analyses: November 1968 to current year. Sediment analyses: October 1972 to September 1973. Water temperatures: November 1968 to current year. Bacteria analyses: April 1976 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

		STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPF- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)
DATE	TIME									
NOV										
01...	0920	1040	105	8.1	19.5	560	320	8.3	93	4.3
01...	1415	1590	100	8.4	19.0	520	310	8.4	93	3.9
JUN										
06...	2305	1260	87	8.2	17.5	520	1400	6.8	73	6.1
AUG										
01...	1446	139	124	7.5	23.5	100	170	7.1	86	4.8
SFP										
08...	0040	638	110	7.7	22.5	100	280	8.8	104	1.3
	COLI- FORM, TOTAL, YMED. (COLS. PER 100 ML)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCEI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	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)
DATE										
NOV										
01...	550000	66000	82000	44	0	16	.9	2.4	.2	4.0
01...	240000	72000	100000	43	0	16	.8	2.8	.2	3.4
JUN										
06...	>75000	>75000	96000	40	0	15	.6	3.2	.2	3.0
AUG										
01...	500000	250000	120000	49	0	18	.9	3.1	.2	3.2
SFP										
08...	110000	70000	110000	46	5	17	.9	2.1	.1	3.2
	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	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 CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDED (MG/L)	SOLIDS, VOLATILE, SUS- PENDED (MG/L)	
DATE										
NOV										
01...	57	0	3.7	2.3	.1	6.0	64	772	208	
01...	57	0	3.1	2.4	.1	6.0	63	704	196	
JUN										
06...	52	0	4.6	2.5	.1	4.2	59	3420	480	
AUG										
01...	60	0	5.6	2.6	.1	5.8	69	264	36	
SFP										
08...	50	0	7.2	2.8	.1	5.7	64	490	80	
	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)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)	
DATE										
NOV										
01...	.44	.02	.46	.10	1.8	1.9	.61	21	.00	
01...	.35	.01	.36	.04	1.3	1.3	.43	20	.00	
JUN										
06...	.76	.00	.76	.27	1.3	1.6	1.2	50	.00	
AUG										
01...	.35	.05	.40	.01	.65	.66	.38	9.7	.00	
SFP										
08...	.27	.01	.28	.02	1.7	1.7	.53	11	.00	

GUADALUPE RIVER BASIN

08177700 OLMOS CREEK AT DRESDEN DRIVE, SAN ANTONIO, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

		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)		
DATE	TIME								
NOV									
01...	0920		2	0	0	5	30		
01...	1415		2	200	0	10	90		
JUN									
06...	2305		3	200	0	0	130		
		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)		
DATE	TIME								
NOV									
01...		1	4	.0	0	0	10		
01...		5	4	.0	0	0	20		
JUN									
06...		9	5	.0	0	0	20		
		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)	
DATE	TIME								
NOV									
01...	0920	.0	.00	.00	.2	.00	.00	.00	
01...	1415	.0	.00	.00	.3	.00	.00	.01	
JUN									
06...	2305	.0	.00	.00	.4	.00	.02	.04	
DATE	DI- AZINON, TOTAL (UG/L)	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)
NOV									
01...	.22	.01	.00	.00	.00	.00	.02	.00	.00
01...	.00	.01	.00	.00	.00	.00	.02	.00	.00
JUN									
06...	.34	.06	.00	.00	.00	.01	.03	.01	.00
DATE	METHYL PARA- THION, TOTAL (UG/L)	METHYL TRI- THION, 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)	
NOV									
01...	.00	.00	.00	0	.00	.00	.01	.00	
01...	.00	.00	.00	0	.00	.00	.00	.00	
JUN									
06...	.00	.00	.00	0	.00	.00	.02	.00	

GUADALUPE RIVER BASIN

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 mi² (108.3 km²). Flow of river comes from intermittent spring flow and from artesian wells; drainage area of streams not applicable.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--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). December 1895 to June 1906, periodic discharge measurements only.

REVISED RECORDS.--WSP 1312: 1917. WSP 1923: Drainage area. WDR 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 ft (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 15,500 acre-ft (19.1 hm³) about 8.5 mi (13.7 km) upstream. Dam completed in 1926. Springs emerge intermittently from the Edwards and associated limestone along the Balcones Fault Zone. City of San Antonio rain gage and gage-height telemeters at station.

AVERAGE DISCHARGE.--53 years, 55.1 ft³/s (1.560 m³/s), 17.90 in/yr (455 mm/yr), 39,920 acre-ft/yr (49.2 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 15,300 ft³/s (433 m³/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 ft³/s (56.6 m³/s) on basis of slope-area measurement of peak flow; no flow at times due to regulation.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage since 1819, that of Sept. 10, 1921; flood of July 5, 1819, equaled or exceeded that of Sept. 10, 1921.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,470 ft³/s (98.3 m³/s) Sept. 13, gage height, 12.56 ft (3.828 m); no flow at times due to regulation.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	65	1330	122	100	81	70	57	53	37	21	634	48
2	100	539	120	103	79	72	41	124	12	17	310	7.5
3	90	94	107	99	77	70	31	36	82	19	20	8.1
4	77	91	120	99	75	70	32	25	10	16	13	52
5	60	93	119	101	75	74	34	24	8.7	19	6.1	28
6	72	103	116	98	73	234	34	24	78	21	13	13
7	68	123	112	99	199	126	32	25	285	12	18	310
8	75	178	112	95	59	79	33	23	14	13	15	360
9	70	113	110	94	75	77	35	21	21	12	15	33
10	78	116	108	94	74	52	313	17	22	13	17	44
11	73	113	124	102	80	74	54	34	23	13	17	38
12	64	112	120	100	157	74	51	5.6	25	13	15	33
13	68	117	118	94	79	77	52	14	15	15	12	1160
14	68	143	113	94	76	72	52	29	12	15	13	757
15	67	100	111	91	102	66	52	1.6	15	12	13	58
16	67	114	111	105	66	62	52	9.6	8.6	9.9	14	60
17	71	112	110	96	94	62	53	9.2	11	13	15	63
18	68	108	110	93	79	62	53	7.9	9.1	10	16	61
19	66	122	110	98	74	60	50	7.1	11	11	14	60
20	69	127	106	91	74	58	50	26	8.9	12	13	62
21	158	126	106	89	72	58	50	16	6.4	9.9	15	60
22	289	122	105	89	72	54	315	13	5.9	9.7	13	65
23	121	107	106	89	72	55	200	8.7	9.3	7.6	11	71
24	132	117	107	89	70	105	62	8.2	18	11	13	62
25	78	128	105	86	66	63	53	9.1	28	12	13	63
26	87	111	107	86	64	63	49	9.1	10	11	12	61
27	90	97	107	84	68	63	47	7.5	24	8.8	12	61
28	75	124	110	81	72	60	44	4.6	17	43	16	60
29	91	138	110	81	---	47	43	23	21	18	14	56
30	91	127	106	83	---	45	45	28	20	11	29	54
31	95	---	103	82	---	42	---	7.5	---	24	21	---
TOTAL	2743	5145	3451	2885	2304	2246	2069	650.7	867.9	452.9	1372.1	3868.6
MEAN	88.5	172	111	93.1	82.3	72.5	69.0	21.0	28.9	14.6	44.3	129
MAX	289	1330	124	105	199	234	315	124	285	43	634	1160
MIN	60	91	103	81	59	42	31	1.6	5.9	7.6	6.1	7.5
CFSM	2.12	4.12	2.66	2.23	1.97	1.73	1.65	.50	.69	.35	1.06	3.09
IN.	2.44	4.58	3.07	2.57	2.05	2.00	1.84	.58	.77	.40	1.22	3.44
AC-FT	5440	10210	6850	5720	4570	4450	4100	1290	1720	898	2720	7670
CAL YR 1977 TOTAL	53002.0			MEAN 145	MAX 1330	MIN 34	CFSM 3.47	IN 47.17	AC-FT 105100			
WTR YR 1978 TOTAL	28055.2			MEAN 76.9	MAX 1330	MIN 1.6	CFSM 1.84	IN 24.97	AC-FT 55650			

GUADALUPE RIVER BASIN
08178000 SAN ANTONIO RIVER AT SAN ANTONIO, TX--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Chemical, biochemical, and pesticide analyses: November 1968 to current year. Sediment analyses: May 1970 to September 1973. Water temperatures: November 1968 to current year. Bacteria analyses: May 1976 to current year.

REMARKS.--Peak discharges for storm events during which water-quality samples were obtained are given in the following table:

Date	Time	Discharge (ft ³ /s) (m ³ /s)		Gage height (ft) (m)		Date	Time	Discharge (ft ³ /s) (m ³ /s)		Gage height (ft) (m)	
Nov. 1	1315	3,170	89.8	22.2	3.72	Sept. 7	1945	1,500	42.5	9.77	2.978
May 2	2015	1,720	48.7	9.99	3.045	Aug. 1	1000	1,120	31.7	9.17	2.795
July 28	1745	483	13.7	7.73	2.356						

a From floodmark.

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

										OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)
DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPF- CIFIC CON- DUCT- ANCE (MICHO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	OXYGEN, DIS- SOLVED (MG/L)			
NOV 01...	1525	1870	128	8.2	19.0	440	310	7.3	81	4.6	
MAY 02...	2134	398	219	7.1	20.5	100	85	8.8	100	20	
JUL 28...	1710	129	443	8.1	27.5	30	40	6.8	87	7.6	
AUG 01...	1405	70	161	7.8	24.5	90	150	8.0	98	5.0	
SEP 08...	0115	817	150	7.9	23.5	80	200	7.4	89	3.5	
DATE	TIME	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)
NOV 01...	230000	68000	190000	47	1	16	1.7	3.4	.2	3.7	
MAY 02...	420000	90000	160000	84	20	26	4.6	7.1	.3	3.5	
JUL 28...	250000	94000	40000	200	25	56	14	11	.3	2.5	
AUG 01...	490000	310000	240000	59	10	20	2.2	4.2	.2	3.4	
SEP 08...	4180000	130000	94000	61	12	21	2.1	3.8	.2	3.1	
DATE	TIME	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	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 CONSTIT- UENTS, DIS- SOLVED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDE (MG/L)	SOLIDS, VOL- TILE, SUS- PENDE (MG/L)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)
NOV 01...	56	0	7.3	3.6	.1	4.8	68	840	188	.59	
MAY 02...	78	0	14	11	.1	4.5	109	538	140	.90	
JUL 28...	210	0	28	22	.2	9.8	247	99	12	1.2	
AUG 01...	60	0	13	5.0	.1	5.3	83	232	12	.55	
SEP 08...	60	0	14	5.0	.1	5.4	84	390	90	.46	
DATE	TIME	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)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)	OIL AND GREASE (MG/L)	
NOV 01...	.02	.61	.14	1.6	1.7	.40	23	.00	--		
MAY 02...	.04	.94	.34	2.2	2.5	.63	46	.30	--		
JUL 28...	.04	1.2	.04	.87	.91	.22	9.2	.30	--		
AUG 01...	.04	.59	.00	.87	.87	.38	14	.00	0		
SEP 08...	.02	.48	.07	.83	.90	.41	17	.10	--		

GUADALUPE RIVER BASIN

08178000 SAN ANTONIO RIVER AT SAN ANTONIO, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

		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)			
DATE	TIME									
NOV 01...	1525	4	0	0	5	1	50			
MAY 02...	2134	3	0	0	0	7	100			
JUL 28...	1710	5	--	<1	50	7	20			
		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)			
NOV 01...		2	0	.0	0	0	10			
MAY 02...		13	40	.0	0	0	40			
JUL 28...		25	20	.0	0	0	20			
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)	
NOV 01...	1525	.0	.00	.00	.4	.02	.00	.04	.07	
MAY 02...	2134	.5	.00	.00	1.3	.00	.00	.21	1.5	
JUL 28...	1710	.0	.00	.00	.1	.00	.01	.04	.16	
AUG 01...	1405	.0	.00	.00	.4	.00	.00	.09	.37	
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)
NOV 01...		.02	.00	.00	.00	.00	.02	.00	.00	--
MAY 02...		.00	.00	.00	.00	.02	.00	.02	.86	--
JUL 28...		.01	.00	.00	.00	.00	.00	.01	.00	.00
AUG 01...		.05	.00	.00	.00	.01	.00	.00	.03	--
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)
NOV 01...		.00	.00	--	.00	0	.00	.00	.02	.00
MAY 02...		.00	.00	--	.00	0	.00	.50	.14	.04
JUL 28...		.01	.00	.00	.01	0	.00	.00	.01	.00
AUG 01...		.00	.00	.00	.00	0	.00	.00	.02	.00

GUADALUPE RIVER BASIN
08178300 ALAZAN CREEK AT ST. CLOUD STREET, SAN ANTONIO, TX
(Flood-hydrograph partial-recrd station)

LOCATION.--Lat 29°27'29", long 98°32'59", Bexar County, Hydrologic Unit 12100301, at bridge on St. Cloud Street in San Antonio and 1.5 mi (2.4 km) upstream from Woodlawn Lake Dam.

DRAINAGE AREA.--3.26 mi² (8.44 km²).

WATER-DISCHARGE RECORDS

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

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

REMARKS.--Additional storm rainfall-runoff data for this site can be obtained from the report "Hydrologic Data for Urban Studies in the San Antonio, Texas Metropolitan Area, 1978."

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,380 ft³/s (124 m³/s) May 8, 1975, elevation, 16.08 ft (4.901 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft³/s (11.3 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s)	(m ³ /s)	Elevation (ft)	(m)	Date	Time	Discharge (ft ³ /s)	(m ³ /s)	Elevation (ft)	(m)
aOct. 22	0715	464	13.1	8.28	2.524	aJune 6	2120	608	17.2	8.91	2.716
aNov. 1	1325	1,800	51.0	12.07	3.679	aAug. 1	1215	304	8.61	7.48	2.280
Apr. 10	0225	554	15.7	8.68	2.646	Aug. 1	2100	803	22.7	9.66	2.944
Apr. 22	1355	1,740	49.3	11.94	3.639	Sept. 13	--	*3,200	90.6	b14.44	4.401
aMay 2	1915	201	5.69	6.87	2.094						

a Water-quality samples were obtained during this flood event.
b From crest-stage gage mark.

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Chemical, biochemical, and pesticide analyses: November 1968 to current year. Sediment analyses: September 1970 to September 1973. Water temperatures: November 1968 to current year. Bacteria analyses: December 1975 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPF- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)
OCT 22...	1045	14	202	7.3	21.5	220	120	8.2	95	5.7
NOV 01...	1500	62	230	7.5	19.5	640	90	8.4	94	4.3
MAY 02...	2205	51	228	7.0	20.5	110	85	7.2	82	21
JUN 07...	0130	74	158	7.9	21.0	140	120	6.8	78	3.9
AUG 01...	1213	214	110	7.9	23.0	110	180	4.7	56	3.3
DATE	100 ML	100 ML	100 ML	AS	AS	AS	AS	AS	AS	AS
OCT 22...	420000	98000	130000	73	27	26	2.0	7.7	.4	3.3
NOV 01...	540000	130000	240000	93	16	33	2.6	8.8	.4	6.6
MAY 02...	390000	63000	150000	82	8	29	2.3	13	.6	4.1
JUN 07...	430000	1180000	51000	64	1	26	1.1	4.9	.3	2.6
AUG 01...	11200000	490000	390000	39	5	14	1.0	2.1	.1	2.3
DATE	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS
OCT 22...	56	0	24	12	.2	4.8	108	172	46	
NOV 01...	94	0	28	8.7	.1	10	144	132	29	
MAY 02...	90	0	21	14	.2	5.4	133	984	256	
JUN 07...	84	0	11	4.7	.1	5.4	97	180	21	
AUG 01...	42	0	8.7	2.2	.1	3.8	55	484	64	
DATE	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS
OCT 22...	.46	.02	.48	.00	.61	.61	.24	9.6	.10	
NOV 01...	2.0	.04	2.0	.04	1.4	1.4	.42	11	.10	
MAY 02...	.75	.05	.80	.16	--	--	.81	27	.30	
JUN 07...	.46	.04	.50	.09	.75	.84	.17	11	.00	
AUG 01...	.32	.03	.35	.01	1.1	1.1	.34	26	.00	

GUADALUPE RIVER BASIN

08178300 ALAZAN CREEK AT ST. CLOUD STREET, SAN ANTONIO, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

		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 CH)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, DIS- SOLVED (UG/L AS FE)			
DATE	TIME									
NOV 01...	1500		2	0	0	10	4	50		
MAY 02...	2205		2	0	0	0	4	60		
		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)			
DATE	TIME									
NOV 01...		10	8	.0	0	0	10			
MAY 02...		12	20	.1	0	0	20			
		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)		
DATE	TIME									
OCT 22...	1045	.0	.00	.00	.0	.00	.00	.00		
NOV 01...	1500	.0	.00	.00	.1	.00	.00	.01		
MAY 02...	2205	.0	.00	.00	.1	.00	.01	.02		
DATE	TIME	DI- AZINON, TOTAL (UG/L)	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)
OCT 22...	.20	.00	.00	.00	.00	.00	.00	.00	.00	.00
NOV 01...	.00	.00	.02	.00	.00	.00	.00	.02	.00	.00
MAY 02...	.22	.01	.00	.00	.00	.00	.02	.00	.00	.19
DATE	TIME	METHYL PARA- THION, TOTAL (UG/L)	METHYL TRI- THION, 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 22...	.00	.00	.00	.00	0	.00	.00	.02	.00	
NOV 01...	.00	.00	.00	.00	0	.00	.00	.02	.00	
MAY 02...	.00	.00	.00	.00	0	.00	.20	.17	.00	

GUADALUPE RIVER BASIN

08178555 HARLENDAL CREEK AT WEST HARDING STREET, SAN ANTONIO, TX

LOCATION.--29°21'05", long 98°29'32", Bexar County, Hydrologic Unit 12100301, at mid-channel, 71 ft (22 m) upstream from West Harding Street, and 1.3 mi (2.1 km) upstream from Six Mill Creek.

PERIOD OF RECORD.--Chemical, biochemical, and pesticide analyses: October 1977 to September 1978.

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

		STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)	
DATE	TIME			(UNITS)							
OCT 22...	1430	21	124	7.9	--	140	80	5.1	--	4.4	
NOV 01...	1330	340	201	7.5	13.0	80	250	7.5	81	5.7	
APR 10...	1110	3.0	150	6.8	22.0	130	35	3.0	35	6.2	
MAY 02...	2248	45	124	7.1	20.0	80	35	6.2	70	14	
JUN 07...	0040	3.3	89	7.8	24.0	80	50	--	--	3.3	
		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 CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	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)
DATE	100 ML)										
OCT 22...	1400000	240000	180000	44	3	16	.9	3.4	.2	2.8	
NOV 01...	470000	100000	160000	66	5	22	2.8	8.4	.4	7.2	
APR 10...	970000	170000	200000	62	0	23	1.0	3.4	.2	3.5	
MAY 02...	1900000	1000000	100000	43	5	16	.7	4.2	.3	3.1	
JUN 07...	270000	240000	80000	42	2	16	.5	1.5	.1	1.5	
		BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS CO3)	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- PENDE (MG/L)	SOLIDS, VOLATILE, SUS- PENDE (MG/L)	
DATE											
OCT 22...		50	0	5.6	3.8	.0	2.4	60	116	28	
NOV 01...		74	0	19	9.3	.1	6.1	111	568	40	
APR 10...		76	0	4.3	3.7	.1	3.6	80	42	16	
MAY 02...		46	0	6.0	5.0	.0	1.7	59	60	16	
JUN 07...		49	0	4.1	1.6	.0	2.2	52	66	20	
		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)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)	
DATE											
OCT 22...		.20	.01	.21	.00	.50	.50	.24	9.4	.10	
NOV 01...		.71	.03	.74	.26	2.5	2.8	.82	25	.00	
APR 10...		.25	.04	.29	.05	.70	.75	.27	11	.20	
MAY 02...		.31	.01	.32	.25	1.2	1.4	.05	22	.40	
JUN 07...		.19	.02	.21	.06	.49	.55	.12	9.6	.10	

GUADALUPE RIVER BASIN

08178555 HARLANDALE CREEK AT WEST HARDING BOULEVARD, SAN ANTONIO, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

		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)		
DATE	TIME								
OCT 22...	1430		2	0	0	2	30		
NOV 01...	1330		3	0	0	5	40		
APR 10...	1110		3	100	0	2	30		
		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)		
DATE	TIME								
OCT 22...		5	4	.0	0	0	4		
NOV 01...		2	4	.0	0	0	10		
APR 10...		6	0	.0	0	0	10		
		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)	
DATE	TIME								
OCT 22...	1430	.0	.00	.00	.4	.00	.00	.02	
NOV 01...	1330	.0	.00	.00	.1	.02	.03	.02	
APR 10...	1110	.0	.00	.00	.0	.01	.01	.02	
DATE	DI- AZINON, TOTAL (UG/L)	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)
OCT 22...	.09	.01	.00	.00	.00	.00	.00	.00	.00
NOV 01...	.10	.00	.00	.00	.00	.00	.00	.00	.00
APR 10...	.24	.01	.00	.00	.00	.00	.00	.00	.04
DATE	METHYL PARA- THION, TOTAL (UG/L)	METHYL TRI- THION, 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 22...	.00	.00	.00	0	.00	.00	.00	.00	
NOV 01...	.00	.00	.00	0	--	.00	.00	.00	
APR 10...	.00	.00	.00	0	.00	.08	.03	.00	

GUADALUPE RIVER BASIN

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 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 (water stage and rainfall). Gage not referenced to National Geodetic Vertical Datum of 1929.

REMARKS.--Additional storm rainfall-runoff data for this site can be obtained from the report "Hydrologic Data for Urban Studies in the San Antonio, Texas Metropolitan Area, 1978."

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,000 ft³/s (56.6 m³/s) Nov. 1, 1978, gage height, 5.82 ft (1.774 m).

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

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Elevation (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Elevation (ft) (m)
Nov. 1	0820	*2,000 56.6	5.82 1.774	Sept. 13	0825	335 9.49	4.30 1.311

a Water-quality samples were obtained during this flood event.

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 1977 TO SEPTEMBER 1978

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)	
NOV 01...	0950	28	121	7.4	17.5	160	25	8.7	94	2.5	
SEP 13...	1054	28	156	8.1	23.0	160	20	7.9	94	2.3	
13...	1355	.70	202	7.1	23.0	140	10	7.5	89	1.9	
DATE	TIME	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 CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	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)
NOV 01...	160000	42000	41000	59	5	22	.9	1.0	.1	2.7	
SEP 13...	51000	39000	46000	75	1	28	1.2	1.3	.1	3.4	
13...	190000	25000	34000	110	8	41	1.0	1.2	.1	3.2	
DATE	TIME	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	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 CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDE (MG/L)	SOLIDS, VOLATILE, SUS- PENDE (MG/L)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)
NOV 01...	66	0	4.4	2.3	.0	9.4	75	42	12	.34	
SEP 13...	90	0	5.6	1.6	.1	14	100	42	9	.02	
13...	120	0	6.6	2.0	.1	14	128	13	0	.01	
DATE	TIME	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)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)	OIL AND GREASE (MG/L)	
NOV 01...	.01	.35	.02	.72	.74	.09	10	.10	0		
SEP 13...	.01	.03	.04	.74	.78	.06	1.3	.10	0		
13...	.00	.01	.02	.59	.61	.02	17	.10	0		

GUADALUPE RIVER BASIN

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

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)
NOV 01...	0950	1	0	0	5	0	40
SEP 13...	1054	1	--	0	10	8	40
13...	1355	1	--	0	10	3	30

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)
NOV 01...	1	4	.0	0	0	8
SEP 13...	0	0	.0	0	0	10
13...	0	0	.2	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)
NOV 01...	0950	.0	.00	.00	.0	.00	.00	.00	.00
SEP 13...	1054	.0	.00	.00	.0	.00	.00	.00	.00
13...	1355	.0	.00	.00	.0	.00	.00	.00	.00

DATE	DI- ELORIN 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)	METHYL PARA- THION, TOTAL (UG/L)
NOV 01...	.00	.00	.00	.00	.00	.00	.00	.00	.00
SEP 13...	.00	.00	.00	.00	.00	.00	.00	.00	.00
13...	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	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)
NOV 01...	.00	--	.00	0	.00	.00	.00	.00
SEP 13...	.00	.00	.00	0	.00	.00	.00	.00
13...	.00	.00	.00	0	.00	.00	.00	.00

GUADALUPE RIVER BASIN

08178645 EAST ELM CREEK AT SAN ANTONIO, TX
(Flood-hydrograph partial-record station)

LOCATION.--Lat 29°37'04", long 98°25'41", Bexar County, Hydrologic Unit 12100301, at mid-channel, 2.1 mi (3.4 km) upstream from West Elm Creek, 2.4 mi (3.9 km) upstream from Farm Road 1604, and 6.9 mi (11.1 km) north of San Antonio International Airport.

DRAINAGE AREA.--2.33 mi² (6.03 km²).

WATER-DISCHARGE RECORDS

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

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

REMARKS.--Additional storm rainfall-runoff data for this site can be obtained from the report "Hydrologic Data for Urban Studies in the San Antonio, Texas Metropolitan Area, 1978."

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 310 ft³/s (8.78 m³/s) May 7, 1976, elevation, 6.78 ft (2.067 m).

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

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
aNov. 1	0940	*277 7.84	6.61 2.015	aSept. 13	0845	267 7.56	6.53 1.990
Sept. 4	2100	158 4.47	5.47 1.667				

a Water-quality samples were obtained during this flood event.

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 1977 TO SEPTEMBER 1978

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)	
NOV 01...	1109	6.8	100	7.3	18.0	180	15	8.5	920	2.3	
SEP 13...	0945	130	85	7.8	22.5	120	20	8.4	99	1.9	
13...	1515	2.0	144	7.2	24.5	140	7	7.7	94	1.7	
DATE	TIME	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 CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	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)
NOV 01...	330000	21000	17000	46	3	17	.9	.9	.1	3.3	
SEP 13...	60000	330000	31000	41	0	15	.9	.7	.0	3.0	
13...	86000	19000	14000	73	4	27	1.3	1.0	.1	3.6	
DATE	TIME	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	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 CONSTITU- ENTS, DIS- SOLVED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDE (MG/L)	SOLIDS, VOLATILE, SUS- PENDE (MG/L)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)
NOV 01...	53	0	2.9	2.2	.0	11	64	17	4	.34	
SEP 13...	50	0	4.0	.8	.0	13	62	51	13	.04	
13...	84	0	4.1	1.2	.1	18	98	8	0	.05	
DATE	TIME	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)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)	OIL AND GREASE (MG/L)	
NOV 01...		.01	.35	.01	.81	.82	.07	9.7	.10	0	
SEP 13...		.01	.05	.05	1.1	1.1	.04	6.9	.00	0	
13...		.01	.06	.03	.63	.66	.02	27	.10	1	

GUADALUPE RIVER BASIN

08178645 EAST ELM CREEK AT SAN ANTONIO, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

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)
NOV 01...	1109	0	0	0	0	0	40
SEP 13...	0945	1	--	0	0	5	30
13...	1515	1	--	0	0	3	30

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)
NOV 01...	1	0	.0	0	0	10
SEP 13...	0	0	.0	0	0	0
13...	0	0	.0	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)
NOV 01...	1109	.0	.00	.00	.0	.00	.00	.00	.00
SEP 13...	0945	.0	.00	.00	.0	.00	.00	.00	.00
13...	1515	.0	.00	.00	.0	.00	.00	.00	.00

DATE	DI- ELORIN 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)	METHYL PARA- THION, TOTAL (UG/L)
NOV 01...	.00	.00	.00	.00	.00	.00	.00	.00	.00
SEP 13...	.00	--	.00	.00	.00	.00	.00	.00	.00
13...	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	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)
NOV 01...	.00	--	.00	0	.00	.00	.00	.00
SEP 13...	.00	.00	.00	0	.00	--	--	--
13...	.00	.00	.00	0	.00	.00	.00	.00

GUADALUPE RIVER BASIN

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 current year.

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

REMARKS.--Additional storm rainfall-runoff data for this site can be obtained from the report "Hydrologic Data for Urban Studies in the San Antonio, Texas Metropolitan Area, 1978."

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 279 ft³/s (7.90 m³/s) Sept. 13, 1978, elevation, 8.34 ft (2.542 m).

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

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Elevation (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Elevation (ft) (m)
Oct. 22	0720	83 2.35	4.66 1.420	June 1	1105	57 1.61	4.13 1.259
Oct. 23	1820	94 2.66	4.88 1.487	June 6	2030	213 6.03	7.15 2.179
Nov. 1	0435	211 5.98	7.12 2.170	Aug. 1	0940	86 2.44	4.72 1.439
aNov. 1	0740	154 4.36	6.08 1.853	Sept. 4	2035	59 1.67	4.17 1.271
Apr. 10	0245	93 2.63	4.86 1.481	aSept. 7	2020	97 2.75	4.95 1.509
Apr. 22	1405	244 6.91	7.72 2.353	Sept. 13	0645	279 7.90	8.34 2.542
May 29	1845	132 3.74	5.64 1.719				

a Water-quality samples were obtained during this flood event.

WATER-QUALITY RECORDS

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPF- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)
NOV 01...	082H	22	122	7.2	19.0	200	25	8.0	4.7
SEP 07...	1055	16	69	7.2	24.5	55	20	8.5	1.4
DATE	TIME	COLI- FORM, TOTAL, IMMEN. (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS./ 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L AS CAC03)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)
NOV 01...	270000	32000	83000	45	1	15	1.4	3.2	5.4
SEP 07...	140000	92000	100000	31	4	11	.8	.9	2.2
DATE	TIME	BICAR- BONATE (MG/L AS HC03)	CAR- BONATE (MG/L AS CC03)	SULFATE DIS- SOLVED (MG/L AS S04)	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 CONSTITUENTS, DIS- SOLVED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDE (MG/L)
NOV 01...	54	0	5.9	4.6	.1	4.6	67	41	10
SEP 07...	33	0	4.0	1.3	.0	2.6	39	29	5
DATE	TIME	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)
NOV 01...	.85	.02	.87	.08	.72	.80	.66	8.2	.00
SEP 07...	.26	.01	.27	.03	.47	.50	.20	12	.10

GUADALUPE RIVER BASIN

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

		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)			
DATE	TIME									
NOV 01...	0828	2	0	1	5	2	50			
SEP 07...	2250	2	--	0	0	2	20			
		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)			
DATE	TIME									
NOV 01...		9	4	.0	0	0	20			
SEP 07...		0	0	.2	0	0	0			
		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)	
DATE	TIME									
NOV 01...	0828	.0	.00	.00	.2	.00	.00	.01	.00	
SEP 07...	2250	.0	.00	.00	.1	.00	.01	.01	.15	
		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)	METHYL PARA- THION, TOTAL (UG/L)
DATE	TIME									
NOV 01...	.03	.00	.00	.00	.00	.00	.03	.00	.00	.00
SEP 07...	.02	.00	.00	.00	.00	.00	.02	.00	.00	.00
		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)	
DATE	TIME									
NOV 01...		.00	--	.00	0	.00	.00	.05	.00	
SEP 07...		.00	.00	.00	0	.00	.00	.00	.00	

GUADALUPE RIVER BASIN

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

LOCATION.--Lat 29°30'57", long 98°25'51", Bexar County, Hydrologic Unit 12100301, on upstream side of upstream bridge of two bridges 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 good. 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 seven floodwater-retarding structures with combined detention capacity of 17,390 acre-ft (21.4 hm³). These structures control runoff from 48.4 mi² (125.4 km²) above this station.

AVERAGE DISCHARGE.--18 years, 10.2 ft³/s (0.289 m³/s), 1.01 in/yr (26 mm/yr), 7,390 acre-ft/yr (9.11 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 150 ft³/s (4.25 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
aNov. 1	1045	5,070 144	b9.34 2.847	aJune 6	2315	2,900 82.1	8.31 2.533
aApr. 10	0530	70 1.98	3.36 1.024	Aug. 1	1145	285 8.07	4.66 1.420
Apr. 22	1545	772 219	6.65 2.027	aSept. 7	2200	543 15.4	6.06 1.847
May 29	2130	243 6.88	4.37 1.332	Sept. 13	1030	*19,800 561	b13.96 4.255

a Water-quality samples were obtained during this flood event.

b From floodmark.

Minimum discharge, no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.7	1890	.74	1.1	5.7	4.6	.42	2.3	21	.68	87	1.8
2	6.6	225	.60	1.2	5.4	4.8	.07	4.0	6.1	.66	42	2.2
3	4.4	19	.51	1.3	5.3	3.8	.67	4.8	11	.62	9.6	2.8
4	3.1	10	.51	1.3	4.0	3.8	2.3	5.0	4.4	.56	7.7	3.7
5	1.2	7.8	.47	4.4	1.1	3.1	2.2	4.9	2.9	.44	6.0	7.2
6	.98	6.8	.51	5.9	1.1	1.1	.38	3.5	216	.32	.44	3.1
7	.79	6.5	2.6	5.3	10	5.2	.06	4.9	516	.19	.23	76
8	4.5	12	5.2	3.5	4.8	1.0	.03	3.4	15	.08	2.5	65
9	6.8	6.6	.89	.75	3.9	.53	.02	.66	9.3	.04	2.9	8.0
10	5.9	5.6	.63	.75	3.8	.17	16	.51	7.6	.01	3.4	8.8
11	.96	4.9	.68	.88	3.8	.09	5.5	2.0	6.9	.00	2.0	12
12	2.3	4.6	.44	.90	12	.07	4.9	4.9	6.5	.33	1.7	10
13	4.6	4.6	.75	.84	4.0	1.8	4.0	2.4	6.0	.51	.19	4040
14	.67	4.6	.75	.90	1.3	5.7	3.3	.72	6.0	.51	.05	182
15	.51	4.4	.70	.90	2.0	6.0	2.0	.57	6.2	.47	.02	17
16	.51	3.6	.90	2.4	7.2	5.9	.98	.51	5.1	.31	.89	14
17	.42	.83	.90	5.0	6.0	3.5	2.1	.51	3.7	.13	1.8	12
18	5.8	.65	.90	5.1	2.8	1.1	5.7	.51	3.2	.05	2.0	10
19	5.7	.62	.90	4.2	2.5	.90	5.4	.51	2.6	.01	1.7	9.6
20	2.5	.60	1.9	.89	2.4	.90	1.6	.51	2.3	.00	.15	8.5
21	5.5	3.4	.97	.78	2.4	.90	.73	.51	1.9	.00	.02	10
22	7.4	4.9	.93	.90	1.9	.96	94	.51	1.8	.00	.00	10
23	14	.89	1.3	.90	1.1	.91	14	.51	1.2	.00	.00	7.4
24	9.4	.97	1.1	.99	1.0	2.3	8.5	.51	.85	.00	.04	7.0
25	6.1	.54	1.1	.61	.52	.75	8.0	.62	.87	.00	1.3	6.1
26	6.1	.62	1.3	.84	.53	.75	8.0	.62	.82	.00	1.6	4.9
27	6.1	.62	1.3	.53	.17	.99	3.2	2.3	.57	.00	1.6	4.9
28	5.7	.66	1.3	.29	4.1	3.5	.75	.99	.46	.18	1.6	4.9
29	1.3	5.4	3.5	3.3	---	3.4	.75	22	.37	.02	.12	4.9
30	.75	4.2	5.8	4.6	---	2.8	.75	7.3	.79	.00	.03	4.8
31	2.6	---	1.3	5.7	---	.92	---	6.3	---	.04	3.2	---
TOTAL	125.89	2240.90	41.38	66.95	100.82	72.24	196.31	89.28	867.43	6.16	181.78	4558.6
MEAN	4.06	74.7	1.33	2.16	3.60	2.33	6.54	2.88	28.9	.20	5.86	152
MAX	14	1890	5.8	5.9	12	6.0	94	22	516	.68	87	4040
MIN	.42	.54	.44	.29	.17	.07	.02	.51	.37	.00	.00	1.8
CFSM	.03	.55	.01	.02	.03	.02	.05	.02	.21	.001	.04	1.11
IN.	.03	.61	.01	.02	.03	.02	.05	.02	.24	.00	.05	1.24
AC-FT	250	4440	82	133	200	143	389	177	1720	12	361	9040
(††)	2.46	6.12	.26	.55	1.92	.82	2.88	1.96	2.61	.95	5.73	7.74
CAL YR 1977 TOTAL	5349.79											
WTR YR 1978 TOTAL	8547.74											
MEAN 14.7												
MAX 1890												
MIN .05												
CFSM .11												
IN 1.45												
AC-FT 10610												
†† 28.76												
IN 2.32												
AC-FT 16950												
†† 34.00												

†† Weighted-mean rainfall, in inches, based on five rain gages.

GUADALUPE RIVER BASIN

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 1977 TO SEPTEMBER 1978

		STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPF- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)
NOV 01...	1112	4550	118	7.3	19.5	720	380	8.2	92	5.2
APR 10...	0915	18	566	7.7	21.5	55	180	7.2	84	5.4
JUN 06...	2310	2620	167	8.6	22.0	280	3800	--	--	4.6
SEP 07...	2340	448	212	8.6	23.0	120	1500	4.8	57	2.1
	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)
NOV 01...	250000	34000	100000	54	0	20	.9	2.7	.2	5.0
APR 10...	89000	7600	430000	180	48	60	7.2	29	.9	33
JUN 06...	>50000	K50000	114000	45	0	17	.7	7.6	.5	6.8
SEP 07...	150000	94000	130000	46	0	17	.9	6.8	.4	18
	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	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)	
NOV 01...	120	0	4.7	3.4	.2	7.6	104	1100	272	
APR 10...	160	0	100	34	.6	7.9	351	210	56	
JUN 06...	65	3	5.2	2.1	.1	2.7	78	7750	690	
SEP 07...	64	3	28	6.5	.6	8.6	121	2320	360	
	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)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)	
NOV 01...	.79	.02	.81	.09	2.1	2.2	.77	22	.00	
APR 10...	.56	.03	.59	.13	.82	.95	.29	3.4	.10	
JUN 06...	.88	.00	.88	.37	3.1	3.5	1.2	65	.00	
SEP 07...	.44	.03	.47	.08	1.0	1.1	.67	19	.00	

GUADALUPE RIVER BASIN

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

		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)		
DATE	TIME								
NOV 01...	1112	3	100	1	5	2	80		
APR 10...	0915	2	100	0	0	1	20		
JUN 06...	2310	3	200	0	0	9	160		
		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)		
DATE	TIME								
NOV 01...		3	4	.0	0	0	20		
APR 10...		1	0	.0	0	0	0		
JUN 06...		4	5	.0	0	0	10		
		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)	
DATE	TIME								
NOV 01...	1112	.0	.00	.00	.1	.00	.00	.00	
APR 10...	0915	.0	.00	.00	.0	.00	.00	.00	
JUN 06...	2310	.0	.00	.00	.1	.00	.00	.01	
		DI- AZINON, TOTAL (UG/L)	DI- ELDRIN TOTAL (UG/L)	ENDO- SULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTA- CHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALA- THION, TOTAL (UG/L)
DATE	TIME								
NOV 01...		.00	.00	.00	.00	.00	.00	.00	.00
APR 10...	.21	.00	.00	.00	.00	.00	.00	.00	.04
JUN 06...	.23	.01	.00	.00	.00	.00	.01	.00	.00
		METHYL PARA- THION, TOTAL (UG/L)	METHYL TRI- THION, 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)
DATE	TIME								
NOV 01...		.00	.00	.00	0	.00	.00	.30	.00
APR 10...		.00	.00	.00	0	.00	.08	.17	.00
JUN 06...		.00	.00	.00	0	.00	1.1	1.7	.16

GUADALUPE RIVER BASIN

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 gage located at station with six additional 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.--18 years, 42.2 ft³/s (1.195 m³/s), 3.03 in/yr (77 mm/yr), 30,570 acre-ft/yr (37.7 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.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage since at least 1941, that of Sept. 27, 1973. 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.--Peak discharges above base of 600 ft³/s (17.0 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)				
aOct. 22	1500	402	11.4	10.15	3.094	aJune 7	1100	3,840	109	b19.50	5.944
aNov. 1	2100	5,470	155	b22.00	6.760	Aug. 1	2200	1,410	39.9	b14.33	4.368
aApr. 10	1400	678	19.2	11.71	3.569	Sept. 8	0900	1,160	32.9	13.57	4.136
Apr. 23	0300	1,080	30.6	13.27	4.045	Sept. 13	1900	*12,000	340	b28.21	8.598

a Water-quality samples were obtained during this flood event.

b From high-water mark.

Minimum discharge, 6.8 ft³/s (0.19 m³/s) July 22, 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	1960	35	28	28	31	29	33	135	13	607	38
2	81	1150	31	28	28	32	28	34	111	13	740	25
3	52	87	30	27	28	32	28	81	119	13	79	15
4	27	55	29	29	28	31	27	39	54	12	41	13
5	24	46	28	29	28	31	29	35	24	11	33	50
6	22	43	26	29	25	37	30	34	39	10	27	23
7	21	40	27	31	77	81	29	33	1670	10	22	99
8	22	157	28	29	70	39	26	33	122	10	21	716
9	25	80	31	28	26	31	33	30	52	10	18	82
10	24	44	28	26	23	29	375	24	43	11	17	57
11	23	40	30	27	22	29	81	34	37	10	15	66
12	22	38	38	29	58	28	41	28	35	13	15	54
13	21	37	30	27	70	28	37	27	33	15	14	3670
14	22	36	27	27	35	28	35	27	30	14	14	1200
15	23	35	27	27	37	31	33	27	29	15	12	117
16	21	35	27	30	34	31	34	25	27	17	12	63
17	20	35	27	30	47	31	31	23	26	20	13	53
18	20	33	27	30	39	30	30	24	24	17	13	48
19	21	33	26	32	29	28	31	25	23	16	13	44
20	23	33	26	32	27	27	31	42	21	16	13	42
21	26	35	26	27	26	27	30	60	19	16	13	38
22	214	41	26	27	26	27	139	38	18	13	13	36
23	68	36	27	26	33	28	414	28	17	9.6	12	45
24	67	33	26	26	32	84	55	25	15	12	13	38
25	34	32	26	26	31	41	43	23	15	14	13	34
26	26	31	25	25	29	30	41	23	15	13	13	32
27	25	31	25	25	29	29	41	21	14	14	14	31
28	25	31	27	23	29	28	38	21	14	30	18	33
29	25	45	29	23	---	31	35	22	14	82	19	30
30	23	55	29	23	---	31	34	89	14	30	23	29
31	22	---	31	26	---	31	---	30	---	22	16	---
TOTAL	1089	4387	875	852	994	1052	1888	1038	2809	521.6	1906	6821
MEAN	35.1	146	28.2	27.5	35.5	33.9	62.9	33.5	93.6	16.8	61.5	227
MAX	214	1960	38	32	77	84	414	89	1670	82	740	3670
MIN	20	31	25	23	22	27	26	21	14	9.6	12	13
CFSM	.19	.77	.15	.15	.19	.18	.33	.18	.50	.09	.33	1.20
IN.	.21	.86	.17	.17	.20	.21	.37	.20	.55	.10	.38	1.34
AC-FT	2160	8700	1740	1690	1970	2090	3740	2060	5570	1030	3780	13530
(ft)	2.75	6.07	.27	.52	1.86	.87	3.03	2.03	2.98	1.13	5.35	8.91

CAL YR 1977 TOTAL 22595.0 MEAN 61.9 MAX 2580 MIN 17 CFSM .33 IN 4.45 AC-FT 44820 ft 28.34
WTR YR 1978 TOTAL 24232.6 MEAN 66.4 MAX 3670 MIN 9.6 CFSM .35 IN 4.77 AC-FT 48070 ft 35.77

ft Weighted-mean rainfall, in inches, based on seven rain gages.

GUADALUPE RIVER BASIN

08178800 SALADO CREEK (LOWER 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: December 1975 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

		STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)
DATE	TIME			(UNITS)						
OCT 22...	1640	340	340	7.8	23.0	480	320	6.4	76	5.0
NOV 01...	1450	2390	58	7.4	18.0	180	80	6.9	75	4.7
APR 10...	1005	508	446	7.1	22.5	140	280	5.6	66	11
JUN 07...	0130	231	311	7.8	--	70	640	--	--	4.1
AUG 02...	1000	912	222	7.5	24.5	120	240	7.2	88	3.5
	COLI- FORM, TOTAL, IMMED. (COLS. PER 100 ML)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOC- CI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	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)
DATE	100 ML)	100 ML)	100 ML)							
OCT 22...	3000000	180000	120000	120	21	37	6.6	20	.8	5.1
NOV 01...	420000	160000	180000	25	0	9.2	.5	1.9	.2	2.0
APR 10...	1000000	170000	290	160	24	50	9.4	25	.9	6.0
JUN 07...	220000	160000	120000	110	16	35	5.1	17	.7	6.9
AUG 02...	550000	84000	88000	81	10	28	2.6	7.1	.3	6.8
	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	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- PENDE (MG/L)	SOLIDS, VOLA- TILE, SUS- PENDE (MG/L)	
DATE										
OCT 22...	120	0	28	26	.2	7.0	189	1320	264	
NOV 01...	34	0	1.7	1.7	.0	1.8	36	176	46	
APR 10...	170	0	38	39	.2	8.5	260	704	148	
JUN 07...	113	0	29	22	.2	9.2	180	1740	400	
AUG 02...	86	0	19	8.0	.2	9.4	124	392	52	
	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)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)	
DATE										
OCT 22...	.70	.01	.71	.05	1.2	1.2	.32	14	.10	
NOV 01...	.18	.01	.19	.06	.91	.97	.25	10	.10	
APR 10...	.72	.03	.75	.13	1.7	1.8	.51	18	--	
JUN 07...	.88	.00	.88	.26	1.8	2.1	.73	37	.00	
AUG 02...	.45	.05	.50	.00	1.0	1.0	.30	13	.00	

GUADALUPE RIVER BASIN

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

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 FF)
OCT 22...	1640	2	0	0	10	2	30
NOV 01...	1450	1	0	1	5	4	40
APR 10...	1005	2	100	0	0	1	20

DATE	TIME	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 22...		2	4	.0	0	0	10
NOV 01...		14	4	.0	0	0	10
APR 10...		2	60	.0	0	0	10

DATE	TIME	PCB, TOTAL (UG/L)	NAPH- THA- LFNES, POLY- CHLOR, TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	CHLOR- DANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	ODE, TOTAL (UG/L)	DDT, TOTAL (UG/L)
OCT 22...	1640	.0	.00	.00	.0	.00	.00	.02
NOV 01...	1450	--	--	--	--	--	--	--
APR 10...	1005	.0	.00	.00	.1	.00	.01	.03

DATE	DI- AZINON, TOTAL (UG/L)	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)
OCT 22...	.10	.00	.00	.00	.00	.00	.00	.00	.00
NOV 01...	--	--	--	--	--	--	--	--	--
APR 10...	.18	.01	.00	.00	.00	.00	.00	.00	.04

DATE	METHYL PARA- THION, TOTAL (UG/L)	METHYL TRI- THION, 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 22...	.00	.00	.00	0	.00	.00	.00	.00
NOV 01...	--	--	--	--	--	.00	.01	.00
APR 10...	.00	.00	.00	0	.00	.03	.12	.34

GUADALUPE RIVER BASIN

08181000 LEON CREEK TRIBUTARY AT FARM ROAD 1604, SAN ANTONIO, TX
(Flood-hydrograph partial-record station)

LOCATION.--Lat 29°35'14", long 98°37'40", Bexar County, Hydrologic Unit 12100301, 97 ft (30 m) upstream from culvert on Farm Road 1604 at San Antonio and 1.5 mi (2.4 km) west of bridge on Leon Creek.

DRAINAGE AREA.--5.57 mi² (14.43 km²).

WATER-DISCHARGE RECORDS

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

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

REMARKS.--Additional storm rainfall-runoff data for this site can be obtained from the report "Hydrologic Data for Urban Studies in the San Antonio, Texas Metropolitan Area, 1978."

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,790 ft³/s (50.7 m³/s) July 16, 1973, gage height, 10.91 ft (3.325 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 945 ft³/s (26.8 m³/s) Nov. 1, gage height, 7.00 ft (2.134 m), no peak above base of 200 ft³/s (5.66 m³/s); water-quality sample obtained during this flood event.

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Chemical, biochemical, and pesticide analyses: May 1970 to current year. Sediment analyses: May 1972 to June 1973. Water temperatures: May 1970 to current year. Bacteria analyses: April 1976 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)	
NOV 01...	0945	170	146	7.3	19.0	400	200	9.5	106	2.4	
		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 CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	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)
NOV 01...	78000	27000	44000	72	1	26	1.8	1.5	.1	3.1	
		BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	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- PENDE (MG/L)	SOLIDS, VOLATILE, SUS- PENDE (MG/L)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)
NOV 01...	86	0	5.1	2.7	.0	6.2	89	352	96	.41	
		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)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)	OIL AND GREASE (MG/L)	
NOV 01...		.01	.42	.13	1.2	1.3	.13	15	.20	0	

GUADALUPE RIVER BASIN

08181000 LEON CREEK TRIBUTARY AT FARM ROAD 1604, SAN ANTONIO, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

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)			
NOV 01...	0945	1	0	0	0	0	40			
DATE	TIME	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)			
NOV 01...		1	4	.0	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)		
NOV 01...	0945	.0	.00	.00	.0	.00	.00	.00		
DATE	TIME	DI- AZINON, TOTAL (UG/L)	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)
NOV 01...		.00	.00	.00	.00	.00	.00	.00	.00	.00
DATE	TIME	METHYL PARA- THION, TOTAL (UG/L)	METHYL TRI- THION, 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)	
NOV 01...		.00	.00	.00	0	.00	.00	.00	.00	

GUADALUPE RIVER BASIN

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.--WDR 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 good. 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.--10 years, 4.57 ft³/s (0.129 m³/s), 4.14 in/yr (105 mm/yr), 3,310 acre-ft/yr (4.08 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 discharges above base of 140 ft³/s (3.96 m³/s) and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
aNov. 1	0815	*1,970 55.8	5.37 1.637	aSept. 15	0845	132 3.74	2.42 0.738
aAug. 1	2245	16 .45	1.86 .567				

a Water-quality samples were obtained during this flood event.

Minimum discharge, no flow at times.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	346	.00	.00	.00	.00	.00	.00	.04	.00	2.1	.07
2	.00	42	.00	.00	.00	.00	.00	.03	.00	.00	3.2	.00
3	.00	16	.00	.00	.00	.00	.00	.00	.13	.00	.23	.00
4	.00	6.7	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5	.00	3.4	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
6	.00	1.8	.00	.00	.00	.01	.00	.00	.25	.00	.00	.00
7	.00	.54	.00	.00	.02	.00	.00	.00	.01	.00	.00	.69
8	.00	1.9	.00	.00	.00	.00	.00	.00	.00	.00	.00	.68
9	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
10	.00	.00	.00	.00	.00	.00	.22	.00	.00	.00	.00	.00
11	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
12	.00	.00	.00	.00	.14	.00	.00	.00	.00	.00	.00	.00
13	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	11
14	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	11
15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	49
16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	24
17	.00	.00	.00	.00	.05	.00	.00	.00	.00	.00	.00	13
18	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	7.3
19	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	5.0
20	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	2.6
21	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.57
22	.05	.00	.00	.00	.00	.00	4.1	.00	.00	.00	.00	.02
23	.07	.00	.00	.00	.00	.00	.25	.00	.00	.00	.00	.00
24	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
26	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
27	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
28	.00	.00	.00	.00	.00	.00	.00	.00	.00	.09	.00	.00
29	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
30	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
31	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	.12	418.35	.00	.00	.21	.01	4.57	.03	.43	.09	5.53	124.93
MEAN	.004	13.9	.000	.000	.008	.000	.15	.001	.014	.003	.18	4.16
MAX	.07	346	.00	.00	.14	.01	4.1	.03	.25	.09	3.2	49
MIN	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CFSM	.000	.93	.000	.000	.001	.000	.01	.000	.001	.000	.01	.28
IN.	.00	1.04	.00	.00	.00	.00	.01	.00	.00	.00	.01	.31
AC-FT	.2	830	.00	.00	.4	.02	9.1	.06	.9	.2	11	248
(††)	1.65	7.56	.18	.38	2.08	.69	3.05	1.32	1.79	.56	5.87	8.02
CAL YR 1977 TOTAL	1617.10											
WTR YR 1978 TOTAL	554.27											
MEAN 4.43												
MAX 346												
MIN .00												
CFSM .30												
IN 4.01												
AC-FT 3210												
†† 33.58												
MEAN 1.52												
MAX 346												
MIN .00												
CFSM .10												
IN 1.37												
AC-FT 1100												
†† 33.15												

†† Weighted-mean rainfall, in inches, based on three rain gages.

GUADALUPE RIVER BASIN

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 1977 TO SEPTEMBER 1978

		STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)	
DATE	TIME										
NOV 01...	1020	393	165	7.4	19.0	640	250	9.2	102	3.4	
AUG 01...	1250	3.2	126	7.8	23.0	70	20	8.0	95	2.8	
SEP 15...	1400	39	436	7.9	26.5	45	15	8.4	106	.6	
		COLI- FORM, TOTAL, IMMED. (COLS. PER 100 ML)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOC- CI 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)
DATE	TIME										
NOV 01...	79000	32000	47000	80	2	27	3.0	2.6	.1	2.5	
AUG 01...	K120000	K95000	73000	56	1	20	1.3	2.0	.1	3.3	
SEP 15...	19000	4600	4900	230	23	73	11	6.2	.2	1.5	
		BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	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- PENDE (MG/L)	SOLIDS, VOLA- TILE, SUS- PENDE (MG/L)	
DATE	TIME										
NOV 01...		95	0	6.3	3.9	.1	5.4	98	440	124	
AUG 01...		67	0	2.3	1.0	.0	6.9	70	25	0	
SEP 15...		250	0	17	12	.1	11	255	15	0	
		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)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)	
DATE	TIME										
NOV 01...		.55	.01	.56	.08	1.6	1.7	.12	17	.00	
AUG 01...		.21	.02	.23	.01	.57	.58	.14	6.3	.10	
SEP 15...		.62	.01	.63	.01	.49	.50	.00	5.4	.10	

GUADALUPE RIVER BASIN

08181400 HELOTES CREEK AT HELOTES, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

		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)			
DATE	TIME									
NOV 01...	1020		1	0	0	15	1	40		
AUG 01...	1250		1	300	0	0	2	20		
SEP 15...	1400		2	--	0	10	2	20		
		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)			
DATE										
NOV 01...		0	4	.0	0	0	4			
AUG 01...		4	0	.1	0	0	10			
SEP 15...		0	0	.2	0	0	0			
		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)	
DATE	TIME									
NOV 01...	1020	.0	.00	.00	.0	.00	.00	.00	.00	
AUG 01...	1250	.0	.00	.00	.0	.00	.00	.00	.00	
SEP 15...	1400	.0	.00	.00	.0	.00	.00	.00	.00	
		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)	METHYL PARA- THION, TOTAL (UG/L)
DATE										
NOV 01...		.00	.00	.00	.00	.00	.00	.00	.00	.00
AUG 01...		.00	.00	.00	.00	.00	.00	.00	.00	.00
SEP 15...		.00	.00	.00	.00	.00	.00	.00	.00	.00
		METHYL TRI- THION, TOTAL (UG/L)	MIREX, TOTAL (UG/L)	PARA- THION, TOTAL (UG/L)	TOX- APHENE, TOTAL (UG/L)	TOTAL TRI- THION TOTAL (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)	
DATE										
NOV 01...		.00	--	.00	0	.00	.00	.00	.00	
AUG 01...		.00	.00	.00	0	.00	.00	.00	.00	
SEP 15...		.00	.00	.00	0	.00	.00	.00	.00	

GUADALUPE RIVER BASIN

08181450 LEON CREEK TRIBUTARY AT KELLY AIR FORCE BASE, TX

LOCATION.--Lat 29°23'12", long 98°36'00", Bexar County, Hydrologic Unit 12100302, on left bank 128 ft (39 m) downstream from centerline of bridge on Billy Mitchell Road at Kelly Air Force Base, 0.15 mi (0.24 km) upstream from mouth, and 2.0 mi (3.2 km) southeast of intersection of U.S. Highway 90 West and Loop 13.

DRAINAGE AREA.--1.19 mi² (3.08 km²).

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder and sharp-crested weir. Datum of gage is 657.57 ft (220.427 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records fair. Recording rain gage located at station with an additional rain gage located in watershed.

AVERAGE DISCHARGE.--9 years, 0.54 ft³/s (0.0153 m³/s), 6.16 in/yr (156 mm/yr), 391 acre-ft/yr (482,100 m³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 555 ft³/s (15.7 m³/s) May 14, 1970, gage height, 4.44 ft (1.353 m), from rating curve extended above 300 ft³/s (8.50 m³/s) on basis of formula, $Q=CLH^{3/2}$; no flow at times each year.

EXTREMES OUTSIDE PERIOD OF RECORD.--No historical flood information is available.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 150 ft³/s (4.25 m³/s), revised, and maximum (*):

Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)	Date	Time	Discharge (ft ³ /s) (m ³ /s)	Gage height (ft) (m)
aOct. 22	0815	152 4.30	2.48 0.756	aJuly 28	1545	159 4.50	2.52 0.768
aNov. 1	1500	128 3.62	2.35 .716	aAug. 1	2130	119 3.37	2.30 .701
Apr. 10	0345	160 4.53	2.53 .771	Sept. 7	2045	*186 5.27	2.67 .814
aJune 6	2300	61 1.73	1.95 .594				

a Water-quality samples were obtained during this flood event.

Minimum discharge, no flow most of time.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	24	.00	.00	.00	.00	.00	.00	.00	.00	24	.79
2	.00	4.4	.00	.00	.00	.00	.00	2.3	.00	.00	6.6	.00
3	.00	2.1	.00	.00	.00	.00	.00	.39	3.8	.00	.08	.00
4	.00	1.1	.00	.00	.00	.00	.00	.00	.00	.00	.03	.00
5	.00	.12	.00	.00	.00	.00	.00	.00	.00	.00	.02	.00
6	.00	.00	.00	.00	.00	1.1	.00	.00	3.4	.00	.02	.00
7	.00	.00	.00	.00	3.9	1.3	.00	.00	4.7	.00	.02	.00
8	.00	4.5	.00	.00	.00	.00	.00	.00	.00	.00	.00	7.8
9	.00	.46	.00	.00	.00	.00	.00	.00	.00	.00	.00	.03
10	.00	.04	.00	.00	.00	.00	13	.00	.00	.00	.00	.02
11	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.13
12	.00	.00	.00	.00	1.3	.00	.00	.00	.00	.00	.00	.08
13	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	4.5
14	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.08
15	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.08
16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.08
17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01
18	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
19	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
20	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
21	.99	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
22	16	.00	.00	.00	.00	.00	7.8	.00	.00	.00	.00	.00
23	4.4	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
24	1.2	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	.04	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
26	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
27	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
28	.00	.00	.00	.00	.00	.00	.00	.00	.00	20	.00	.00
29	.00	.00	.00	.00	.00	.00	.00	.00	.00	.35	.00	.00
30	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.3	.18	.00
31	.00	.00	.00	.00	.00	.00	.00	.00	.00	.04	.00	.00
TOTAL	22.63	36.72	.00	.00	5.20	2.40	20.80	2.69	11.90	21.69	30.95	35.60
MEAN	.73	1.22	.000	.000	.19	.077	.69	.087	.40	.70	1.00	1.19
MAX	16	24	.00	.00	3.9	1.3	13	2.3	4.7	20	24	22
MIN	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CFSM	.61	1.03	.000	.000	.16	.07	.58	.07	.34	.59	.84	1.00
IN.	.71	1.15	.000	.000	.16	.07	.65	.08	.37	.68	.97	1.11
AC-FT	45	73	.00	.00	10	4.8	41	5.3	24	43	61	71
(ft)	4.13	2.81	.41	.45	1.72	1.06	2.90	1.73	2.84	2.64	4.01	5.74

CAL YR 1977 TOTAL 304.13 MEAN .83 MAX 63 MIN .00 CFSM .70 IN 9.50 AC-FT 603 ft 26.97
WTR YR 1978 TOTAL 190.58 MEAN .52 MAX 24 MIN .00 CFSM .44 IN 5.95 AC-FT 378 ft 30.44

ft Weighted-mean rainfall, in inches, based on two rain gages.

GUADALUPE RIVER BASIN

08181450 LEON CREEK TRIBUTARY AT KELLY AIR FORCE BASE, TX--Continued

WATER-QUALITY RECORDS

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

		STREAM- FLOW, INSTAN- TANEOUS (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L)
DATE	TIME			(UNITS)						
OCT 22...	1210	20	92	8.1	20.5	80	50	7.8	89	2.6
NOV 01...	1410	99	60	7.5	19.0	100	60	9.0	100	2.4
JUN 07...	0030	35	64	8.4	22.0	90	80	6.4	75	3.0
JUL 28...	1900	56	72	--	--	80	50	--	--	5.0
AUG 01...	1317	32	109	7.2	23.5	70	10	6.8	82	2.2
	COLI- FORM, TOTAL, IMMED. (COLS. PER 100 ML)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCHI KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CAC03)	HARD- NESS, NONCAR- BONATE (MG/L CAC03)	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)
DATE	100 ML)	100 ML)	100 ML)							
OCT 22...	170000	14000	17000	26	0	9.4	.5	.9	.1	1.8
NOV 01...	64000	21000	20000	35	3	13	.6	.9	.1	2.0
JUN 07...	48000	39000	25000	26	5	9.8	.4	.6	.1	1.5
JUL 28...	27000	8000	12000	27	0	10	.5	2.0	.2	2.7
AUG 01...	K160000	54000	48000	50	3	19	.7	1.2	.1	2.5
	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	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- PENDE (MG/L)	SOLIDS, VOLA- TILE, SUS- PENDE (MG/L)	
DATE										
OCT 22...	36	0	1.3	.8	.0	2.7	35	63	20	
NOV 01...	39	0	2.6	1.7	.0	2.4	42	103	3	
JUN 07...	24	1	3.2	1.0	.0	2.1	32	110	15	
JUL 28...	38	0	3.8	1.4	.0	2.4	42	81	5	
AUG 01...	58	0	2.3	1.2	.0	6.1	62	14	0	
	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)	METHY- LENE BLUF ACTIVE SUB- STANCE (MG/L)	
DATE										
OCT 22...	.27	.01	.28	.00	.36	.36	.16	7.0	.10	
NOV 01...	.18	.01	.19	.06	.29	.35	.13	5.7	.10	
JUN 07...	.42	.02	.44	.11	.33	.44	.08	4.5	.10	
JUL 28...	.24	.03	.27	.06	.74	.80	.25	8.6	.20	
AUG 01...	.13	.03	.16	.00	.39	.39	.07	6.2	.10	

GUADALUPE RIVER BASIN

08181450 LEON CREEK TRIBUTARY AT KELLY AIR FORCE BASE, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

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 07...	0030		5	100	0	0	3	10	
DATE	TIME	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 07...		3	0	.0	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)	
OCT 22...	1210	.0	.00	.00	.0	.00	.00	.84	
NOV 01...	1410	.0	.00	.00	.0	.07	.00	.20	
JUN 07...	0030	--	--	--	--	--	--	--	
DATE	DI- AZINON, TOTAL (UG/L)	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)
OCT 22...	.00	.04	.00	.00	.00	.00	.00	.00	.00
NOV 01...	.04	.00	.00	.01	.00	.00	.00	.00	.00
JUN 07...	--	--	--	--	--	--	--	--	--
DATE	METHYL PARA- THION, TOTAL (UG/L)	METHYL TRI- THION, 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 22...	.00	.00	.00	0	.00	.00	.00	.00	
NOV 01...	.00	.00	.00	0	.00	.00	.00	.00	
JUN 07...	--	--	--	--	--	.02	.01	.00	

S A N A N T O N I O U R B A N H Y D R O L O G Y S T U D Y											
D A I L Y A N D M O N T H L Y R A I N F A L L S U M M A R Y						P E R I O D : 1 9 7 8 W A T E R Y E A R					
G A G E N U M B E R											
D A T E	1-H	2-H	3-H	1-A	2-A	1-L	2-L	4-L	5-L	W H	
OCT											
2	0.13	0.00	0.00	0.82	0.38	0.00	0.04	0.47	1.16	0.67	
8	0.00	0.05	0.08	0.00	0.00	0.00	0.08	0.00	0.00	0.00	
10	0.00	0.00	0.00	0.05	0.00	0.13	0.05	0.00	0.00	0.00	
21	0.24	0.22	0.05	0.25	0.33	0.23	0.17	1.32	0.32	0.81	
22	1.06	1.03	0.75	1.06	1.21	0.81	1.34	1.67	1.30	1.27	
23	0.18	0.16	0.48	0.37	0.72	0.16	0.04	1.00	0.58	0.28	
24	0.10	0.08	0.02	0.00	0.08	0.04	0.09	0.07	0.10	0.11	
26	0.00	0.00	0.00	0.05	0.23	0.00	0.00	0.00	0.00	0.16	
27	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	
28	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	
31	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	
MTOT	1.71	1.54	1.38	2.60	2.96	1.37	1.93	4.53	3.46	3.30	
NOV											
1	6.80	6.62	6.35	5.50	4.17	7.02	7.17	2.11	1.46	2.62	
8	0.64	0.60	0.57	0.60	0.72	0.67	0.81	0.60	0.58	0.59	
18	0.00	0.00	0.00	0.03	0.52	0.00	0.04	0.00	0.00	0.00	
21	0.16	0.15	0.20	0.02	0.14	0.03	0.03	0.08	0.00	0.01	
24	0.05	0.03	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	
29	0.00	0.00	0.00	0.24	0.28	0.00	0.01	0.40	0.13	0.32	
30	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	
MTOT	7.65	7.40	7.12	6.39	5.83	7.72	8.10	3.19	2.17	3.54	
DEC											
11	0.00	0.00	0.00	0.25	0.27	0.00	0.09	0.38	0.15	0.27	
12	0.00	0.20	0.00	0.00	0.02	0.15	0.06	0.00	0.00	0.03	
13	0.00	0.00	0.00	0.15	0.02	0.00	0.00	0.00	0.00	0.01	
28	0.14	0.12	0.00	0.00	0.03	0.01	0.03	0.13	0.00	0.12	
29	0.00	0.00	0.08	0.18	0.08	0.00	0.11	0.06	0.00	0.03	
30	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	
MTOT	0.14	0.32	0.08	0.58	0.43	0.16	0.29	0.57	0.15	0.47	
CTOT	33.59	35.08	24.56	28.20	28.30	32.00	30.10	29.30	23.00	*****	
MTOT=MONTHLY TOTALS											
CTOT=CALENDAR YEAR TOTALS											

S A N A N T O N I O U R B A N H Y D R O L O G Y S T U D Y												
D A I L Y A N D M O N T H L Y R A I N F A L L S U M M A R Y						P E R I O D : 1 9 7 8 W A T E R Y E A R						
G A G E N U M B E R												
DATE	1-H	2-H	3-H	1-A	2-A	1-L	2-L	4-L	5-L	WH		
JAN												
1	0.02	0.00	0.00	0.21	0.01	0.04	0.01	0.05	0.00	0.05		
2	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.02	0.00	0.02		
3	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01		
11	0.10	0.12	0.00	0.02	0.26	0.11	0.09	0.02	0.08	0.12		
12	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.30	0.00	0.01		
13	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00		
15	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.02		
16	0.00	0.08	0.01	0.30	0.11	0.12	0.08	0.15	0.08	0.13		
18	0.10	0.13	0.00	0.11	0.06	0.19	0.16	0.03	0.00	0.03		
19	0.20	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.01		
22	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01		
24	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.00		
25	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00		
31	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.03	0.00	0.06		
MTOT	0.42	0.33	0.01	0.64	0.54	0.46	0.47	0.62	0.16	0.47		
FEB												
4	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00		
6	0.00	0.00	0.00	0.08	0.10	0.03	0.05	0.13	0.08	0.08		
7	0.50	0.55	0.60	0.78	0.86	0.60	0.77	0.87	0.77	0.88		
8	0.00	0.00	0.00	0.12	0.01	0.00	0.01	0.00	0.00	0.01		
9	0.00	0.03	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.02		
11	0.20	0.18	0.07	0.54	0.15	0.11	0.25	0.13	0.07	0.15		
12	0.88	0.66	0.41	0.00	0.29	0.78	0.52	0.35	0.30	0.34		
15	0.15	0.08	0.05	0.14	0.13	0.10	0.05	0.23	0.06	0.28		
16	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.01		
17	0.43	0.51	0.22	0.00	0.18	0.42	0.51	0.18	0.15	0.49		
MTOT	2.16	2.01	1.35	1.66	1.75	2.04	2.20	1.89	1.43	2.26		
MAR												
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01		
6	0.44	0.45	0.42	0.65	0.76	0.33	0.33	0.70	0.44	0.80		
7	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01		
13	0.00	0.03	0.03	0.00	0.03	0.00	0.02	0.02	0.00	0.01		
23	0.25	0.22	0.00	0.23	0.42	0.70	0.35	0.23	0.00	0.00		
24	0.00	0.00	0.20	0.11	0.08	0.00	0.00	0.22	0.40	0.49		
MTOT	0.69	0.70	0.65	0.99	1.30	1.03	0.70	1.19	0.84	1.32		
MTOT=MONTHLY TOTALS												

S A N A N T O N I O U R B A N H Y D R O L O G Y S T U D Y												
D A I L Y A N D M O N T H L Y R A I N F A L L S U M M A R Y							P E R I O D : 1 9 7 8 W A T E R Y E A R					
G A G E N U M B E R												
DATE	1-H	2-H	3-H	1-A	2-A	1-L	2-L	4-L	5-L	WH		
APR												
8	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00		0.00
9	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.05	0.00		0.13
10	1.20	1.40	1.68	1.20	1.65	1.78	1.38	1.72	1.60	1.36		
11	0.00	0.00	0.00	0.05	0.05	0.00	0.00	0.00	0.00	0.00		0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.04
17	0.00	0.07	0.00	0.00	0.00	0.08	0.04	0.00	0.00	0.00		0.01
20	0.00	0.04	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00		0.00
22	1.75	1.81	1.52	2.27	1.29	1.24	1.50	1.30	1.00	0.22		
23	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00		0.00
MTOT	2.95	3.32	3.20	3.52	3.03	3.10	2.94	3.07	2.60	1.76		
MAY												
2	0.57	0.45	0.35	0.42	0.55	0.33	0.52	0.64	0.94	0.59		
3	0.00	0.00	0.00	0.00	0.02	0.06	0.02	0.00	0.00	0.06		
6	0.05	0.10	0.01	0.06	0.05	0.15	0.03	0.06	0.00	0.11		
10	0.07	0.10	0.00	0.00	0.00	0.05	0.01	0.34	0.00	0.00		
11	0.00	0.00	0.06	0.07	0.09	0.00	0.07	0.00	0.28	0.63		
20	0.15	0.31	0.30	0.38	0.44	0.33	0.32	0.47	0.25	0.00		
21	0.23	0.00	0.15	0.10	0.13	0.00	0.06	0.14	0.00	0.51		
22	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.09		
26	0.00	0.00	0.00	0.02	0.03	0.00	0.02	0.00	0.00	0.00		
29	0.30	0.30	0.03	0.35	0.45	1.68	0.89	0.24	0.00	0.32		
30	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.01		
MTOT	1.37	1.26	0.90	1.41	1.77	2.60	1.96	1.89	1.47	2.32		
JUN												
1	0.14	0.00	0.54	0.15	0.19	0.13	0.19	0.29	0.00	0.33		
2	0.32	0.22	0.05	0.12	0.15	0.23	0.11	0.11	0.04	0.05		
3	0.47	0.52	0.59	0.63	0.82	0.57	0.67	1.04	1.10	1.06		
6	0.64	0.90	1.00	1.25	1.61	0.68	0.79	1.47	1.02	0.89		
7	0.12	0.12	0.12	0.10	0.16	0.15	0.18	0.22	0.18	0.25		
27	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00		
28	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08		
29	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00		
MTOT	1.77	1.76	2.30	2.31	2.95	1.76	1.94	3.13	2.34	2.66		

MTOT=MONTHLY TOTALS

S A N A N T O N I O U R B A N H Y D R O L O G Y S T U D Y											
D A I L Y A N D M O N T H L Y R A I N F A L L S U M M A R Y						P E R I O D : 1 9 7 8 W A T E R Y E A R					
G A G E N U M B E R											
DATE	1-H	2-H	3-H	1-A	2-A	1-L	*2-L	4-L	5-L	WH	
JUL											
28	0.25	0.76	0.48	0.99	2.17	0.20	0.16	2.28	1.58	0.00	
29	0.00	0.00	0.00	0.12	0.30	0.00	0.01	0.00	0.00	0.00	
30	0.00	0.00	0.00	0.16	0.36	0.00	0.00	0.59	0.00	0.00	
31	0.19	0.15	0.08	0.26	0.36	0.30	0.27	0.36	0.05	0.00	
MTOT	0.44	0.91	0.56	1.53	3.19	0.50	0.44	3.23	1.63	0.00	
AUG											
1	4.32	4.79	3.60	3.51	3.41	3.65	4.00	2.69	4.20	3.60	
2	0.15	0.26	1.00	0.18	0.01	0.65	0.45	0.14	0.15	0.10	
3	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	
5	0.07	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
6	1.00	0.45	0.00	0.00	0.00	0.05	0.03	0.05	0.00	0.01	
7	0.00	0.00	0.00	0.00	0.00	0.30	0.03	0.00	0.00	0.03	
20	0.00	0.00	0.00	0.00	0.00	0.62	0.01	0.00	0.00	0.00	
21	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	
29	0.00	0.00	0.00	0.00	0.00	0.15	0.03	0.15	0.05	0.02	
30	0.00	0.00	0.00	0.19	0.19	0.00	0.02	0.34	0.05	0.04	
31	0.50	0.00	0.25	0.04	0.04	0.67	0.49	0.37	0.20	0.92	
MTOT	6.04	5.55	4.85	3.92	3.65	6.09	5.09	3.74	4.65	4.75	
MTOT=MONTHLY TOTALS											

S A N A N T O N I O U R B A N H Y D R O L O G Y S T U D Y											
DAILY AND MONTHLY RAINFALL SUMMARY						PERIOD : 1978 WATER YEAR					
G A G E N U M B E R											
DATE	1-H	2-H	3-H	1-A	2-A	1-L	2-L	4-L	5-L	WH	
SFPT											
1	1.78	1.07	0.93	0.95	0.93	0.37	0.26	0.28	0.70	0.12	
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.42	
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	
7	1.58	1.15	0.80	3.87	3.72	1.75	1.75	3.77	3.28	2.75	
8	0.92	1.30	1.60	0.22	0.31	1.82	1.14	0.05	0.12	0.03	
9	0.04	0.28	0.00	0.00	0.01	0.09	0.01	0.05	0.10	0.02	
10	0.78	0.27	0.05	0.17	0.22	0.34	0.43	0.36	0.03	0.22	
11	0.33	0.00	0.25	0.31	0.23	0.36	0.31	0.22	0.10	0.20	
12	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	
13	1.44	1.75	0.40	2.62	2.04	1.15	1.68	0.83	0.67	0.84	
14	0.00	0.03	0.15	0.00	0.03	0.00	0.04	0.00	0.00	0.01	
15	1.32	1.31	0.15	0.00	0.00	0.45	0.16	0.00	0.00	0.00	
16	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
17	0.00	0.00	0.10	0.00	0.00	0.00	0.01	0.00	0.00	0.00	
18	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
19	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
20	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
21	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
22	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.14	0.00	0.00	
24	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	
27	0.17	0.13	0.08	0.18	0.20	0.15	0.11	0.19	0.00	0.06	
28	0.11	0.08	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.01	
29	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	
MTOT	8.47	7.37	4.97	8.32	7.71	6.48	5.93	6.17	5.00	4.69	
WTOT	33.81	32.47	27.37	33.87	35.11	33.31	31.99	33.22	25.90	27.54	

MTOT=MONTHLY TOTALS
WTOT=WATER YEAR TOTAL

S A N A N T O N I O U R B A N H Y D R O L O G Y S T U D Y													
D A I L Y A N D M O N T H L Y R A I N F A L L S U M M A R Y								P E R I O D : 1 9 7 8 W A T E R Y E A R					
G A G E N U M B E R													
DATE	1-S	3-S	4-S	5-S	1-ES	2-ES	3-ES	1-0	2-0	3-0	4-0	NOAA	
OCT													
2	0.04	1.90	1.84	0.86	0.83	1.38	1.34	0.12	0.31	0.15	0.26	0.32	
8	0.04	0.05	0.00	0.00	0.11	0.09	0.13	0.04	0.19	0.38	0.00	0.01	
10	0.00	0.00	0.00	0.07	0.00	0.06	0.06	0.18	0.04	0.00	0.00	0.00	
21	0.53	0.62	0.50	0.66	0.25	0.44	0.57	0.13	0.11	0.30	0.88	1.00	
22	1.07	1.06	0.95	1.00	0.88	1.04	0.95	1.17	1.11	0.85	0.82	1.10	
23	0.09	0.89	0.45	0.38	0.70	0.17	0.55	0.03	0.15	0.30	0.28	1.00	
24	0.06	0.07	0.05	0.04	0.00	0.07	0.07	0.22	0.09	0.10	0.08	0.04	
25	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	
26	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.00	0.03	0.00	0.00	0.00	
27	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.10	0.01	0.00	0.00	0.00	
28	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	
29	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MTOT	1.83	4.60	3.79	3.01	2.77	3.33	3.76	1.99	2.06	2.08	2.32	3.47	
NOV													
1	4.45	5.69	5.25	4.61	4.15	5.13	5.39	5.85	5.77	5.20	5.19	4.87	
8	1.16	0.30	0.40	0.51	0.65	0.58	0.60	1.36	1.00	0.81	0.52	0.49	
18	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.06	0.00	0.00	0.00	
21	0.07	0.16	0.05	0.00	0.05	0.00	0.17	0.00	0.02	0.00	0.00	0.18	
24	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.00	0.01	0.00	0.00	0.01	
28	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
29	0.20	0.37	0.40	0.43	0.29	0.30	0.48	0.15	0.23	0.10	0.34	0.46	
30	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	
MTOT	5.88	6.54	6.10	5.55	5.19	6.02	6.72	7.36	7.11	6.11	6.05	6.01	
DEC													
11	0.00	0.19	0.18	0.00	0.00	0.10	0.11	0.17	0.09	0.10	0.20	0.19	
12	0.07	0.04	0.00	0.25	0.10	0.05	0.06	0.00	0.03	0.00	0.00	0.04	
13	0.00	0.03	0.00	0.00	0.00	0.03	0.04	0.00	0.04	0.03	0.00	0.01	
28	0.06	0.00	0.00	0.04	0.05	0.02	0.03	0.00	0.05	0.00	0.07	0.01	
29	0.09	0.09	0.07	0.07	0.18	0.12	0.15	0.15	0.15	0.00	0.13	0.07	
30	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
31	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	
MTOT	0.22	0.35	0.25	0.36	0.33	0.33	0.40	0.32	0.37	0.13	0.40	0.32	
CTOT	28.65	30.57	28.71	25.51	29.91	34.60	34.70	29.64	28.72	30.41	26.49	29.74	
MTOT=MONTHLY TOTALS													
CTOT=CALENDAR YEAR TOTALS													

S A N A N T O N I O U R B A N H Y D R O L O G Y S T U D Y													
D A I L Y A N D M O N T H L Y R A I N F A L L S U M M A R Y										P E R I O D : 1 9 7 8 W A T E R Y E A R			
G A G E N U M B E R													
DATE	1-S	3-S	4-S	5-S	1-ES	2-FS	3-ES	1-0	2-0	3-0	4-0	NOAA	
JAN													
1	0.05	0.01	0.00	0.06	0.00	0.01	0.04	0.00	0.02	0.00	0.03	0.02	
2	0.00	0.01	0.00	0.00	0.00	0.01	0.02	0.00	0.01	0.00	0.00	0.00	
3	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	
11	0.16	0.29	0.18	0.10	0.57	0.35	0.43	0.36	0.28	0.07	0.20	0.28	
12	0.00	0.00	0.00	0.07	0.00	0.03	0.04	0.00	0.03	0.00	0.00	0.01	
13	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
16	0.07	0.24	0.12	0.04	0.00	0.13	0.13	0.15	0.14	0.57	0.05	0.17	
18	0.16	0.16	0.18	0.08	0.15	0.13	0.16	0.15	0.19	0.10	0.15	0.14	
19	0.00	0.01	0.02	0.00	0.07	0.01	0.01	0.00	0.01	0.00	0.00	0.00	
22	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	
24	0.00	0.01	0.00	0.00	0.00	0.02	0.02	0.07	0.02	0.05	0.00	0.01	
25	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
30	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.01	0.00	0.00	0.01	
31	0.00	0.04	0.00	0.00	0.09	0.03	0.05	0.00	0.02	0.00	0.00	0.03	
MTOT	0.44	0.78	0.50	0.35	0.88	0.73	0.96	0.73	0.75	0.79	0.43	0.68	
FEB													
1	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	
4	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	
6	0.00	0.06	0.05	0.00	0.00	0.02	0.05	0.05	0.03	0.07	0.05	0.08	
7	0.00	0.87	0.78	0.90	0.80	0.90	0.89	0.80	0.79	0.85	0.85	0.84	
8	0.53	0.02	0.00	0.00	0.00	0.01	0.04	0.00	0.01	0.00	0.00	0.01	
9	0.00	0.02	0.00	0.00	0.00	0.01	0.02	0.00	0.04	0.00	0.00	0.00	
11	0.18	0.15	0.10	0.00	0.22	0.16	0.18	0.17	0.15	0.18	0.28	0.20	
12	0.60	0.40	0.36	0.35	0.64	0.81	0.74	0.40	0.71	0.83	0.35	0.33	
15	0.08	0.14	0.10	0.20	0.08	0.06	0.05	0.09	0.06	0.06	0.00	0.13	
16	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	
17	0.53	0.14	0.18	0.25	0.45	0.31	0.29	0.29	0.30	0.22	0.20	0.17	
19	0.00	0.01	0.00	0.00	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	
MTOT	1.92	1.83	1.57	1.70	2.19	2.32	2.31	1.80	2.12	2.21	1.73	1.76	
MAR													
6	0.55	0.82	0.42	0.50	1.19	1.39	0.72	0.25	0.38	0.48	1.12	1.00	
7	0.00	0.01	0.00	0.00	0.00	0.02	0.03	0.00	0.02	0.00	0.04	0.00	
13	0.00	0.01	0.00	0.04	0.04	0.02	0.03	0.00	0.02	0.00	0.00	0.00	
23	0.00	0.43	0.30	0.63	0.33	0.26	0.35	0.54	0.46	0.45	0.30	0.65	
24	0.10	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.05	0.06	
MTOT	0.65	1.31	0.72	1.17	1.56	1.70	1.13	0.79	0.90	0.93	1.51	1.71	

MTOT=MONTHLY TOTALS

S A N A N T O N I O U R B A N H Y D R O L O G Y S T U D Y													
D A I L Y A N D M O N T H L Y R A I N F A L L S U M M A R Y										P E R I O D : 1 9 7 8 W A T E R Y E A R			
G A G E N U M B E R													
DATE	1-S	3-S	4-S	5-S	1-ES	2-ES	3-ES	1-0	2-0	3-0	4-0	NOAA	
APR													
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
9	0.00	0.00	0.00	0.00	0.00	0.04	0.02	0.03	0.00	0.00	0.09	0.00	0.00
10	2.00	1.48	1.42	1.88	2.25	1.87	1.65	2.11	2.11	1.37	1.35	1.44	
11	0.00	0.02	0.00	0.00	0.07	0.03	0.05	0.00	0.04	0.03	0.03	0.02	
12	0.00	0.01	0.00	0.00	0.00	0.03	0.02	0.00	0.02	0.00	0.00	0.01	
17	0.00	0.02	0.00	0.00	0.05	0.06	0.06	0.05	0.02	0.00	0.00	0.00	
20	0.04	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.06	
22	0.40	2.16	2.25	1.35	0.45	0.71	0.70	2.52	1.82	2.10	1.65	2.07	
23	0.00	0.02	0.00	0.00	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	
MTOT	2.44	3.73	3.69	3.23	2.86	2.73	2.52	4.68	4.06	3.59	3.03	3.62	
MAY													
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	
2	0.50	0.44	0.35	0.41	0.55	0.49	0.63	0.70	0.49	0.42	0.42	0.60	
3	0.00	0.03	0.00	0.00	0.05	0.06	0.07	0.00	0.07	0.00	0.00	0.00	
6	0.09	0.04	0.00	0.00	0.06	0.05	0.07	0.05	0.03	0.05	0.00	0.08	
10	0.10	0.00	0.00	0.20	0.06	0.00	0.00	0.08	0.01	0.00	0.00	0.02	
11	0.00	0.04	0.00	0.00	0.00	0.05	0.05	0.00	0.07	0.00	0.00	0.03	
20	0.39	0.59	0.62	0.80	0.65	0.70	0.52	0.38	0.39	0.44	0.38	0.62	
21	0.00	0.08	0.00	0.00	0.00	0.10	0.13	0.00	0.08	0.06	0.20	0.16	
22	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.05	0.00	0.00	0.00	
26	0.00	0.00	0.00	0.00	0.06	0.03	0.05	0.00	0.01	0.00	0.00	0.05	
29	0.44	1.64	1.42	0.46	1.07	0.49	0.85	2.08	2.02	0.54	0.44	0.89	
30	0.00	0.02	0.00	0.00	0.00	0.02	0.07	0.00	0.02	0.00	0.00	0.00	
MTOT	1.52	2.88	2.39	1.87	2.50	2.00	2.45	3.29	3.25	1.51	1.44	2.45	
JUN													
1	0.10	0.73	0.48	0.90	0.10	0.11	0.12	0.08	0.13	0.15	0.37	0.37	
2	0.12	0.10	0.00	0.05	0.10	0.16	0.32	0.10	0.13	0.11	0.11	0.19	
3	0.50	0.63	0.72	0.90	0.43	0.44	0.24	0.56	0.54	0.47	0.72	0.56	
6	0.56	2.95	2.40	1.78	1.72	2.39	2.25	1.70	1.53	1.38	2.10	2.68	
7	0.25	0.28	0.25	0.20	0.24	0.24	0.26	0.15	0.21	0.15	0.22	0.16	
8	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	
27	0.44	0.00	0.00	0.00	0.17	0.28	0.25	0.00	0.00	0.00	0.00	0.00	
28	0.00	0.00	0.00	0.00	0.00	0.02	0.22	0.00	0.00	0.00	0.00	0.00	
29	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	
MTOT	1.97	4.69	3.85	3.83	2.76	3.67	3.68	2.59	2.54	2.26	3.52	3.96	
MTOT=MONTHLY TOTALS													

MTOT=MONTHLY TOTALS

S A N A N T O N I O U R B A N H Y D R O L O G Y S T U D Y													
DAILY AND MONTHLY RAINFALL SUMMARY										PERIOD : 1978 WATER YEAR			
G A G E N U M B E R													
DATE	1-S	3-S	4-S	5-S	1-ES	2-ES	3-ES	1-0	2-0	3-0	4-0	NOAA	
JUL													
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00
28	0.17	1.13	1.40	0.82	0.18	0.18	0.28	0.15	0.21	0.40	0.15	0.58	
29	0.00	0.02	0.00	0.00	0.01	0.01	0.01	0.00	0.05	0.00	0.03	0.00	
30	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.01	0.05	0.00	0.00	
31	0.60	0.49	0.33	0.72	0.44	0.56	0.57	0.45	0.33	0.30	0.22	0.85	
MTOT	0.77	1.64	1.73	1.54	0.64	0.75	0.88	0.60	0.63	0.80	0.40	1.43	
AUG													
1	4.07	2.84	3.97	3.63	3.42	4.36	4.40	3.66	3.92	3.98	2.68	3.87	
2	0.22	0.44	0.10	0.08	0.13	0.29	0.29	0.24	0.19	0.19	0.10	0.13	
3	0.00	0.01	0.00	0.00	0.00	0.02	0.02	0.00	0.01	0.00	0.00	0.00	
5	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	
6	0.86	0.02	0.00	0.00	0.90	1.04	1.05	0.05	0.31	0.00	0.00	0.16	
7	0.00	0.03	0.00	0.00	0.00	0.04	0.04	0.00	0.02	0.00	0.00	0.00	
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	
20	0.00	0.00	0.00	0.00	0.00	0.22	0.82	0.00	0.09	0.00	0.00	0.00	
21	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.02	0.00	0.00	0.00	
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	
29	0.09	0.00	0.00	0.00	0.10	0.12	0.36	0.12	0.00	0.00	0.00	0.00	
30	0.04	0.09	0.12	0.19	0.10	0.07	0.14	0.09	0.15	0.15	0.05	0.13	
31	1.12	0.43	0.28	0.35	0.58	0.60	0.62	0.43	0.84	0.22	0.12	0.68	
MTOT	6.40	3.86	4.47	4.25	5.23	6.78	7.77	4.64	5.56	4.54	2.95	4.97	
MTOT=MONTHLY TOTALS													

S A N A N T O N I O U R B A N H Y D R O L O G Y S T U D Y													
D A I L Y A N D M O N T H L Y R A I N F A L L S U M M A R Y										P E R I O D : 1 9 7 8 W A T E R Y E A R			
G A G E N U M B E R													
D A T E	1-S	2-S	4-S	5-S	1-ES	2-ES	3-ES	1-0	2-0	3-0	4-0	N O A A	
SEPT													
1	0.27	0.06	0.30	0.43	0.91	0.82	0.74	0.77	0.58	0.75	0.17	0.04	
3	0.00	0.00	0.00	0.00	0.04	0.06	0.08	0.00	0.01	0.12	0.00	0.00	
4	0.00	0.69	0.35	0.35	2.05	0.95	1.84	0.00	0.00	0.00	0.62	0.43	
5	0.05	0.01	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	
6	0.05	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
7	1.73	3.46	3.08	3.08	1.80	1.92	2.04	2.50	2.33	3.56	3.18	2.51	
8	0.82	0.16	0.52	0.28	0.26	0.20	0.13	0.56	0.68	0.33	0.20	0.10	
9	0.14	0.16	0.02	0.06	0.00	0.00	0.30	0.07	0.13	0.05	0.00	0.08	
10	1.14	0.23	0.20	0.24	1.03	0.00	0.83	0.53	0.42	0.25	0.00	0.28	
11	0.21	0.11	0.06	0.06	0.23	0.02	0.30	0.17	0.23	0.15	0.08	0.10	
12	0.04	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.00	
13	1.53	6.42	6.88	4.53	1.32	4.62	4.18	3.68	4.07	4.56	2.78	5.13	
14	0.00	0.03	0.00	0.00	0.00	0.01	0.02	0.00	0.03	0.00	0.00	0.00	
15	0.18	0.01	0.00	3.23	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	
22	0.00	0.07	0.12	0.00	0.25	0.00	0.23	0.00	0.05	0.00	0.19	0.09	
23	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	
24	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
27	0.19	0.03	0.01	0.15	0.08	0.08	0.08	0.15	0.10	0.14	0.16	0.10	
28	0.00	0.04	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	
MTOT	6.35	11.50	11.54	12.76	7.97	8.69	10.84	8.54	8.69	9.91	7.38	8.86	
WTOT	30.39	43.71	40.60	39.62	34.88	39.05	43.42	37.33	38.04	34.86	31.16	39.24	
MTOT=MONTHLY TOTALS													
WTOT=WATER YEAR TOTAL													

STA. NO. 08177700						STORM RAINFALL AND RUNOFF RECORD				1978 WATER YEAR		
OLMOS CREEK AT DRESDEN DRIVE, SAN ANTONIO, TX.						STORM OF APRIL 22, 1978				ACCUM.	DISCHARGE	ACCUM.
DATE & TIME	G A G E					N U M B E R				WEIGHTED	IN	RUNOFF
	1-0	2-0	3-0	4-0						PRECIP.	FT ³ /S	IN.
										IN.		IN.
APR 22												
0000	0.0	0.0	0.0	0.0						0.0	1.4	0.0007
1300	0.0	0.0	0.0	0.0						0.0	1.4	0.0013
1310	0.0	0.0	0.0	0.0						0.0	1.4	0.0014
1315	0.08	0.0	0.0	0.0						0.03	1.4	0.0014
1320	0.47	0.0	0.0	0.0						0.16	1.4	0.0014
1325	1.13	0.02	0.0	0.20						0.40	1.4	0.0014
1330	2.02	0.17	0.0	0.40						0.75	1.4	0.0014
1335	2.22	0.66	0.0	0.70						0.93	29.0	0.0016
1340	2.45	1.39	0.0	1.00						1.16	56.0	0.0019
1345	2.49	1.55	0.70	1.60						1.53	83.0	0.0024
1350	2.52	1.72	1.20	1.62						1.78	111.0	0.0031
1355	2.52	1.77	1.80	1.63						2.03	139.0	0.0039
1400	2.52	1.79	1.99	1.65						2.11	167.0	0.0060
1415	2.52	1.79	2.10	1.65						2.15	476.0	0.0147
1430	2.52	1.79	2.10	1.65						2.15	786.0	0.0290
1445	2.52	1.79	2.10	1.65						2.15	1123.0	0.0495
1500	2.52	1.82	2.10	1.65						2.16	1210.0	0.0717
1515	2.52	1.82	2.10	1.65						2.16	1109.0	0.0919
1530	2.52	1.82	2.10	1.65						2.16	952.0	0.1093
1545	2.52	1.82	2.10	1.65						2.16	777.0	0.1235
1600	2.52	1.82	2.10	1.65						2.16	602.0	0.1510
1700	2.52	1.82	2.10	1.65						2.16	271.0	0.1807
1900	2.52	1.82	2.10	1.65						2.16	133.0	0.1953
2000	2.52	1.82	2.10	1.65						2.16	92.0	0.2054
2200	2.52	1.82	2.10	1.65						2.16	49.0	0.2126
2400	2.52	1.82	2.10	1.65						2.16	30.0	0.2148

SIA. NO. 0817770P					STORM RAINFALL AND RUNOFF RECORD				1978 WATER YEAR		
OLMOS CREEK AT DRESDEN DRIVE, SAN ANTONIO, TX					STORM OF SEPT 13, 1978				ACCUM.	DISCHARGE	ACCUM.
DATE & TIME					G A G E N U M B E R				WEIGHTED	IN	RUNOFF
					1-0	2-0	3-0	4-0	PRECIP.		
									IN.	FT ³ /S	IN.
SEPT 13											
0000	0.0	0.0	0.0	0.0					0.0	0.0	0.0
0325	0.0	0.0	0.0	0.0					0.0	0.0	0.0
0330	0.0	0.10	0.0	0.0					0.03	0.0	0.0
0345	0.10	0.21	0.0	0.0					0.07	0.0	0.0
0400	0.15	0.25	0.01	0.0					0.10	0.0	0.0
0430	0.19	0.32	0.03	0.04					0.14	0.0	0.0
0500	0.34	0.41	0.08	0.25					0.24	16.0	0.0004
0515	0.53	0.50	0.11	0.30					0.34	14.0	0.0007
0530	0.58	0.60	0.22	0.32					0.42	13.0	0.0009
0545	0.64	0.77	0.30	0.37					0.51	12.0	0.0012
0600	0.65	0.78	0.34	0.38					0.53	10.0	0.0015
0645	0.70	0.85	0.48	0.90					0.65	90.0	0.0048
0700	1.14	1.31	0.81	1.30					1.05	243.0	0.0078
0705	1.35	1.44	1.01	1.42					1.25	396.0	0.0102
0710	1.64	1.65	1.46	1.54					1.56	549.0	0.0135
0715	1.89	1.93	1.67	1.65					1.79	702.0	0.0178
0720	2.19	2.17	1.86	1.92					2.03	855.0	0.0230
0725	2.35	2.37	2.06	2.19					2.22	1010.0	0.0292
0730	2.59	2.44	2.27	2.45					2.42	1160.0	0.0362
0735	2.75	2.65	2.66	2.46					2.67	1310.0	0.0442
0740	2.92	3.01	3.05	2.47					2.95	1470.0	0.0532
0745	3.09	3.42	3.43	2.47					3.24	1620.0	0.0630
0750	3.23	3.82	3.73	2.50					3.48	1770.0	0.0738
0755	3.46	3.91	4.03	2.53					3.69	1930.0	0.0856
0800	3.50	3.93	4.32	2.55					3.83	2080.0	0.1679
0900	3.57	3.97	4.45	2.62					3.92	7450.0	0.7125
1000	3.61	4.02	4.52	2.70					3.97	4250.0	1.0231
1100	3.64	4.06	4.56	2.78					4.01	1780.0	1.1532
1200	3.64	4.06	4.56	2.78					4.01	1060.0	1.2307
1300	3.66	4.06	4.56	2.78					4.01	590.0	1.2738
1400	3.69	4.07	4.56	2.78					4.03	382.0	1.3157
1600	3.69	4.07	4.56	2.78					4.03	184.0	1.3426
1800	3.69	4.07	4.56	2.78					4.03	130.0	1.3616
2000	3.69	4.07	4.56	2.78					4.03	103.0	1.3767
2200	3.69	4.07	4.56	2.78					4.03	78.0	1.3881
2400	3.69	4.07	4.56	2.78					4.03	60.0	1.3924

STORM RAINFALL AND RUNOFF RECORD										1978 WATER YEAR		
STA. NO. 08178700												
SALADO CREEK UPPER STATION AT SAN ANTONIO, TX.										STORM OF NOVEMBER 1, 1977		
DATE & TIME	G A G E N U M B E R						ACCUM. WEIGHTED PRECIP.	DISCHARGE IN FT ³ /S	ACCUM. RUNOFF IN.			
	1-5	3-5	4-5	2-0	3-0							
NOV 1												
0000	0.0	0.0	0.0	0.0	0.0		0.0	6.1	0.0000			
0110	0.0	0.0	0.0	0.0	0.0		0.0	6.1	0.0001			
0130	0.04	0.0	0.0	0.0	0.0		0.06	6.1	0.0001			
0155	0.50	0.0	0.0	0.0	0.02		0.34	6.1	0.0001			
0215	1.52	0.0	0.20	0.0	0.63		1.05	6.1	0.0002			
0230	1.91	0.0	0.64	0.39	0.72		1.34	12.0	0.0002			
0245	2.01	0.19	0.68	1.03	0.77		1.51	12.0	0.0002			
0300	2.02	0.69	0.70	1.29	0.81		1.64	11.0	0.0003			
0330	2.10	0.79	0.80	1.34	1.77		1.74	9.7	0.0003			
0400	2.45	0.80	1.88	1.71	2.51		2.03	103.0	0.0007			
0405	2.48	0.81	1.96	1.98	2.62		2.08	87.0	0.0008			
0410	2.52	1.01	2.05	2.23	2.74		2.17	72.0	0.0008			
0415	2.52	1.53	2.16	2.29	2.74		2.29	56.0	0.0009			
0420	2.52	2.08	2.27	2.38	2.74		2.42	141.0	0.0011			
0430	2.55	2.21	2.38	2.66	2.78		2.49	310.0	0.0022			
0500	2.59	2.89	2.42	3.03	2.89		2.70	402.0	0.0045			
0530	2.62	2.90	2.42	3.43	2.96		2.75	584.0	0.0078			
0600	2.64	2.92	2.43	3.45	3.03		2.77	705.0	0.0108			
0615	2.78	2.95	2.50	3.48	3.13		2.88	709.0	0.0128			
0630	3.14	2.95	2.80	3.48	3.28		3.13	693.0	0.0158			
0700	3.75	3.36	3.71	4.06	3.71		3.69	791.0	0.0202			
0730	3.45	4.46	4.19	4.47	4.06		4.04	1160.0	0.0268			
0800	3.85	4.94	4.38	4.78	4.10		4.17	2470.0	0.0477			
0900	3.45	4.96	4.40	4.80	4.10		4.14	3290.0	0.0850			
1000	3.85	4.97	4.40	4.80	4.10		4.18	3810.0	0.1227			
1045	3.85	4.97	4.40	4.81	4.10		4.18	5070.0	0.1537			
1105	3.85	4.97	4.40	4.81	4.10		4.18	4860.0	0.1881			
1200	3.86	4.97	4.40	4.81	4.10		4.18	4220.0	0.2338			
1300	4.42	5.31	5.19	5.48	5.18		4.72	3900.0	0.2779			
1400	4.45	5.67	5.25	5.74	5.20		4.84	3630.0	0.3190			
1500	4.45	5.67	5.25	5.74	5.20		4.84	3160.0	0.3547			
1600	4.45	5.67	5.25	5.75	5.20		4.84	2740.0	0.3857			
1700	4.45	5.69	5.25	5.77	5.20		4.84	2660.0	0.4158			
1800	4.45	5.69	5.25	5.77	5.20		4.84	2220.0	0.4409			
1900	4.45	5.69	5.25	5.77	5.20		4.84	1670.0	0.4598			
2000	4.45	5.69	5.25	5.77	5.20		4.84	1270.0	0.4814			
2200	4.45	5.69	5.25	5.77	5.20		4.84	908.0	0.5019			
2400	4.45	5.69	5.25	5.77	5.20		4.84	736.0	0.5144			
NOV 2												
0000	4.45	5.69	5.25	5.77	5.20		4.84	736.0	0.5144			

STORM RAINFALL AND RUNOFF RECORD										1978 WATER YEAR		
STA. NO. 08178700												
SALADO CREEK UPPER STATION AT SAN ANTONIO, TX.										ACCUM.	DISCHARGE	ACCUM.
STORM OF NOVEMBER 1, 1977										WEIGHTED	IN	RUNOFF
DATE & TIME	G A G E				N U M B E R					PRECIP.		
	1-S	3-S	4-S		2-0	3-0				IN.	FT ³ /S	IN.
NOV 2												
0200	4.45	5.69	5.25		5.77	5.20				4.84	641.0	0.5331
0400	4.45	5.69	5.25		5.77	5.20				4.84	550.0	0.5455
0600	4.45	5.69	5.25		5.77	5.20				4.84	414.0	0.5572
0800	4.45	5.69	5.25		5.77	5.20				4.84	196.0	0.5639
1200	4.45	5.69	5.25		5.77	5.20				4.84	98.0	0.5672
1500	4.45	5.69	5.25		5.77	5.20				4.84	53.0	0.5690
1800	4.45	5.69	5.25		5.77	5.20				4.84	41.0	0.5704
2100	4.45	5.69	5.25		5.77	5.20				4.84	31.0	0.5714
2400	4.45	5.69	5.25		5.77	5.20				4.84	26.0	0.5719

STA. NO. 08178700							STORM RAINFALL AND RUNOFF RECORD			1978 WATER YEAR		
SALADO CREEK UPPER STATION AT SAN ANTONIO, TX.							STORM OF SEPT 13, 1978			ACCUM.	DISCHARGE	ACCUM.
DATE & TIME							G A G E N U M B E R			WEIGHTED PRECIP.	IN	RUNOFF
							1-S	3-S	4-S	2-0	3-0	
										IN.	FT ³ /S	IN.
SEPT 13												
0000	0.0	0.0	0.0	0.0	0.0	0.0				0.0	9.2	0.0002
0320	0.0	0.0	0.0	0.0	0.0	0.0				0.0	9.2	0.0004
0325	0.02	0.0	0.0	0.0	0.03	0.0				0.02	9.2	0.0004
0330	0.02	0.0	0.0	0.0	0.16	0.0				0.03	9.2	0.0004
0425	0.35	0.0	0.0	0.0	0.31	0.02				0.26	9.2	0.0005
0430	0.37	0.0	0.01	0.32	0.02	0.02				0.29	9.2	0.0005
0435	0.39	0.0	0.02	0.33	0.02	0.02				0.29	9.2	0.0005
0440	0.41	0.02	0.03	0.33	0.03	0.03				0.31	9.2	0.0005
0500	0.55	0.04	0.08	0.41	0.06	0.06				0.42	9.2	0.0006
0555	0.65	1.23	1.13	0.78	0.30	0.30				0.78	14.0	0.0006
0600	0.66	1.52	1.53	0.78	0.31	0.31				0.85	16.0	0.0007
0605	0.67	1.60	1.95	0.78	0.32	0.32				0.88	65.0	0.0007
0610	0.68	1.69	2.33	0.78	0.34	0.34				0.90	115.0	0.0008
0615	0.68	1.98	2.59	0.80	0.34	0.34				0.97	164.0	0.0010
0620	0.68	2.44	2.85	0.81	0.34	0.34				1.07	260.0	0.0014
0630	0.70	3.18	3.38	0.81	0.35	0.35				1.25	451.0	0.0031
0700	0.75	4.28	4.92	1.31	0.59	0.59				1.57	2120.0	0.0110
0710	0.76	4.71	5.43	1.65	0.81	0.81				1.70	2910.0	0.0193
0730	0.82	5.71	6.68	2.54	1.87	1.87				2.05	5250.0	0.0440
0800	0.89	6.23	6.71	3.93	3.72	3.72				2.36	10900.0	0.0851
0810	0.97	6.25	6.73	3.96	4.32	4.32				2.44	12000.0	0.1530
0900	1.30	6.30	6.79	3.97	4.44	4.44				2.68	12700.0	0.2847
1000	1.40	6.38	6.84	4.02	4.51	4.51				2.77	17700.0	0.4348
1030	1.49	6.38	6.86	4.05	4.54	4.54				2.83	19800.0	0.5468
1100	1.53	6.40	6.88	4.06	4.56	4.56				2.86	17800.0	0.6475
1130	1.53	6.41	6.88	4.06	4.56	4.56				2.87	15700.0	0.7362
1200	1.53	6.41	6.88	4.06	4.56	4.56				2.87	12700.0	0.8081
1230	1.53	6.42	6.88	4.07	4.56	4.56				2.87	9470.0	0.8616
1300	1.53	6.42	6.88	4.07	4.56	4.56				2.87	6730.0	0.9187
1400	1.53	6.42	6.88	4.07	4.56	4.56				2.87	4400.0	0.9685
1500	1.53	6.42	6.88	4.07	4.56	4.56				2.87	3180.0	1.0045
1600	1.53	6.42	6.88	4.07	4.56	4.56				2.87	2220.0	1.0296
1700	1.53	6.42	6.88	4.07	4.56	4.56				2.87	1530.0	1.0469
1800	1.53	6.42	6.88	4.07	4.56	4.56				2.87	1170.0	1.0601
1900	1.53	6.42	6.88	4.07	4.56	4.56				2.87	945.0	1.0708
2000	1.53	6.42	6.88	4.07	4.56	4.56				2.87	778.0	1.0840
2200	1.53	6.42	6.88	4.07	4.56	4.56				2.87	627.0	1.0982
2400	1.53	6.42	6.88	4.07	4.56	4.56				2.87	536.0	1.1088
SEPT 14												
0000	1.53	6.42	6.88	4.07	4.56	4.56				2.87	536.0	1.1088

STORM RAINFALL AND RUNOFF RECORD										1978 WATER YEAR			
SALADO CREEK UPPER STATION AT SAN ANTONIO, TX.										STORM OF SEPT 13, 1978			
DATE & TIME	G A G E					N U M B E R					ACCUM.	DISCHARGE	ACCUM.
	1-S	3-S	4-S	2-0	3-0	PRECIP.	IN.	FT ³ /S	IN.				
SEPT 14													
0300	1.53	6.42	6.88	4.07	4.56		2.87	400.0	1.1269				
0600	1.53	6.42	6.88	4.07	4.56		2.87	311.0	1.1374				
0900	1.53	6.42	6.88	4.07	4.56		2.87	226.0	1.1451				
1200	1.53	6.42	6.88	4.07	4.56		2.87	126.0	1.1494				
1500	1.53	6.42	6.88	4.07	4.56		2.87	60.0	1.1518				
1900	1.53	6.42	6.88	4.07	4.56		2.87	29.0	1.1532				
2400	1.53	6.42	6.88	4.07	4.56		2.87	24.0	1.1539				

STA. NO. 08181450		STORM RAINFALL AND RUNOFF RECORD						1978 WATER YEAR			
LEON CREEK TRIBUTARY AT KELLY AFB, TX						STORM OF SEPT 7-8, 1978			ACCUM.	DISCHARGE	ACCUM.
DATE & TIME		G A G E N U M B E R						WEIGHTED PRECIP.	IN	RUNOFF	
		4-L	5-L					IN.	FT ³ /S	IN.	
=====											
SEPT 7											
0000		0.0	0.0					0.0	0.0	0.0	
1300		0.0	0.0					0.0	0.0	0.0	
1345		0.03	0.02					0.03	0.0	0.0	
1400		0.03	0.04					0.03	0.0	0.0	
1500		0.12	0.12					0.12	0.0	0.0	
1730		0.12	0.12					0.12	0.0	0.0	
1745		0.12	0.40					0.22	0.0	0.0	
1800		0.47	0.60					0.52	0.0	0.0	
1830		0.87	0.70					0.81	0.0	0.0	
1845		1.02	0.95					0.99	0.0	0.0	
1900		1.29	1.00					1.18	0.0	0.0	
1915		1.37	1.10					1.27	0.0	0.0	
1930		1.46	1.20					1.36	5.0	0.0016	
1945		1.92	1.60					1.80	75.0	0.0260	
2000		2.34	1.68					2.10	90.0	0.0553	
2015		2.77	1.90					2.45	128.0	0.0970	
2030		2.82	2.32					2.63	148.0	0.1452	
2045		2.87	2.45					2.71	167.0	0.1996	
2100		2.93	2.50					2.77	186.0	0.2904	
2130		3.16	2.90					3.06	155.0	0.3913	
2200		3.29	3.05					3.20	123.0	0.4714	
2230		3.35	3.20					3.29	109.0	0.5246	
2245		3.65	3.25					3.50	102.0	0.5578	
2300		3.73	3.28					3.56	97.0	0.6368	
2400		3.77	3.28					3.59	83.0	0.7448	
SEPT 8											
0000		3.77	3.28					3.59	83.0	0.7448	
0200		3.82	3.40					3.66	32.0	0.8822	
0400		3.82	3.40					3.66	16.0	0.9239	
0600		3.82	3.40					3.66	6.9	0.9419	
0800		3.82	3.40					3.66	2.8	0.9528	
1200		3.82	3.40					3.66	0.1	0.9536	
2400		3.82	3.40					3.66	0.0	0.9538	
=====											

STA. NO. 08177609		STORM RAINFALL AND RUNOFF RECORD					1978 WATER YEAR		
OLMOS CREEK TRIBUTARY AT FARM ROAD 1535, SHAVANO PARK, TEX.					STORM OF NOVEMBER 1, 1977		ACCUM. WEIGHTED PRECIP. IN.	DISCHARGE IN FT ³ /S	ACCUM. RUNOFF IN.
DATE & TIME	G A G E N U M B E R								
NOV. 1									
0000	0.0						0.0	0.0	0.0
0115	0.0						0.0	0.0	0.0
0120	0.03						0.03	0.0	0.0
0125	0.17						0.17	0.0	0.0
0130	0.39						0.39	7.0	0.0041
0140	0.82						0.82	15.0	0.0158
0150	1.20						1.20	16.0	0.0284
0200	1.29						1.29	12.0	0.0472
0230	1.34						1.34	5.5	0.0568
0245	1.37						1.37	5.0	0.0617
0255	1.50						1.50	4.7	0.0645
0300	1.71						1.71	4.5	0.0671
0310	2.23						2.23	20.0	0.0828
0320	2.36						2.36	14.0	0.0910
0325	2.49						2.49	13.0	0.0961
0330	2.66						2.66	13.0	0.1063
0345	2.88						2.88	13.0	0.1215
0400	3.03						3.03	17.0	0.1415
0415	3.36						3.36	40.0	0.1884
0430	3.43						3.43	43.0	0.2305
0440	3.43						3.43	45.0	0.2833
0500	3.45						3.45	42.0	0.3655
0530	3.48						3.48	35.0	0.4271
0545	3.70						3.70	31.0	0.4635
0600	4.06						4.06	37.0	0.5070
0615	4.29						4.29	41.0	0.5551
0630	4.47						4.47	56.0	0.6208
0645	4.76						4.76	80.0	0.7147
0700	4.78						4.78	95.0	0.8263
0715	4.78						4.78	106.0	0.9507
0730	4.78						4.78	97.0	1.1215
0800	4.80						4.80	67.0	1.2788
0830	4.80						4.80	46.0	1.3868
0900	4.80						4.80	33.0	1.4643
0930	4.81						4.81	21.0	1.5136
1000	4.81						4.81	14.0	1.5465
1030	4.81						4.81	6.0	1.5559
1040	4.81						4.81	4.0	1.5606
1100	4.81						4.81	0.0	1.5606

SIA. NO. 08177600		STORM RAINFALL AND RUNOFF RECORD					1978 WATER YEAR		
OLMOS CREEK TRIBUTARY AT FARM ROAD 1535, SHAVANO PARK, TEX.					STORM OF NOVEMBER 1, 1977		ACCUM.	DISCHARGE	ACCUM.
DATE & TIME					WEIGHTED PRECIP.		IN.	IN	RUNOFF
G A G E N U M B E R								FT ³ /S	IN.
NOV. 1									
1145	4.90						4.90	0.0	1.5606
1150	5.14						5.14	0.0	1.5606
1200	5.48						5.48	0.0	1.5606
1220	5.71						5.71	0.0	1.5606
1300	5.74						5.74	0.0	1.5606
1330	5.74						5.74	48.0	1.6733
1400	5.74						5.74	40.0	1.8141
1500	5.75						5.75	20.0	1.8924
1540	5.77						5.77	10.0	1.9159
1600	5.77						5.77	5.5	1.9266
1630	5.77						5.77	0.0	1.9266
2400	5.77						5.77	0.0	1.9266

SIA. NO. 08177600							STORM RAINFALL AND RUNOFF RECORD			1978 WATER YEAR		
OLMOS CREEK TRIBUTARY AT FARM ROAD 1535, SHAVANO PARK, TEX.							STORM OF SEPT 13, 1978			ACCUM.	DISCHARGE	ACCUM.
DATE & TIME							G A G E N U M B E R			WEIGHTED PRECIP.	IN	RUNOFF
										IN.	FT ³ /S	IN.
SEPT 13												
0000	0.0									0.0	0.0	0.0
0120	0.0									0.0	0.0	0.0
0330	0.10									0.16	0.0	0.0
0400	0.25									0.25	0.0	0.0
0500	0.41									0.41	0.0	0.0
0530	0.60									0.60	0.0	0.0
0545	0.77									0.77	0.0	0.0
0600	0.78									0.78	0.0	0.0
0650	0.88									0.88	0.0	0.0
0700	1.31									1.31	16.0	0.0125
0710	1.65									1.65	20.0	0.0243
0715	1.93									1.93	22.0	0.0372
0725	2.37									2.37	54.0	0.0689
0730	2.44									2.44	69.0	0.0959
0735	2.65									2.65	101.0	0.1354
0740	3.01									3.01	125.0	0.1843
0745	3.42									3.42	147.0	0.2418
0750	3.82									3.82	202.0	0.3209
0755	3.91									3.91	274.0	0.4281
0800	3.93									3.93	317.0	0.5521
0805	3.94									3.94	340.0	0.9513
0830	3.97									3.97	216.0	1.2894
0845	3.97									3.97	141.0	1.4549
0900	3.97									3.97	101.0	1.6327
0930	4.00									4.00	72.0	1.8018
1000	4.02									4.02	47.0	1.9673
1100	4.06									4.06	20.0	2.0612
1200	4.06									4.06	14.0	2.1598
1400	4.07									4.07	13.0	2.2514
1500	4.07									4.07	2.0	2.2608
1600	4.07									4.07	0.0	2.2608
2400	4.07									4.07	0.0	2.2608

STA. NO. 08178300		STORM RAINFALL AND RUNOFF RECORD						1978 WATER YEAR		
ALAZAN CREEK AT ST. CLOUD STREET, SAN ANTONIO, TX						STORM OF AUG 1-2, 1978		ACCUM. WEIGHTED PRECIP.	DISCHARGE IN FT ³ /S	ACCUM. RUNOFF IN.
DATE & TIME	1-A	2-A	G A G E			N U M B E R		IN.	FT ³ /S	IN.
AUG 1										
0000	0.0	0.0						0.0	0.0	0.0
0100	0.0	0.04						0.01	0.0	0.0
0200	0.0	0.10						0.03	0.0	0.0
0300	0.18	0.26						0.20	57.0	0.0203
0330	0.33	0.33						0.33	64.0	0.0355
0400	0.47	0.40						0.45	126.0	0.0805
0500	0.64	0.46						0.59	84.0	0.1204
0600	0.66	0.47						0.61	66.0	0.1439
0630	0.75	0.70						0.74	104.0	0.1624
0645	0.75	0.73						0.74	84.0	0.1724
0700	0.79	0.80						0.79	96.0	0.2009
0800	0.91	0.95						0.92	88.0	0.2323
0830	0.98	1.01						0.99	93.0	0.2544
0900	1.17	1.33						1.21	186.0	0.2913
0920	1.27	1.46						1.32	340.0	0.3317
0930	1.30	1.47						1.35	255.0	0.3721
1000	1.36	1.52						1.40	124.0	0.4015
1030	1.39	1.55						1.43	93.0	0.4236
1100	1.42	1.66						1.48	80.0	0.4379
1115	1.45	1.67						1.51	99.0	0.4497
1130	1.46	1.68						1.52	83.0	0.4645
1200	1.91	2.07						1.95	263.0	0.5061
1210	1.93	2.08						1.97	304.0	0.5423
1230	1.99	2.12						2.03	230.0	0.5878
1300	2.07	2.18						2.10	137.0	0.6366
1400	2.14	2.23						2.16	84.0	0.6766
1500	2.14	2.23						2.16	54.0	0.7022
1600	2.14	2.24						2.17	35.0	0.7355
1900	2.14	2.25						2.17	17.0	0.7517
2000	2.43	2.51						2.45	99.0	0.7870
2030	2.41	2.85						2.82	164.0	0.8260
2100	3.16	3.27						3.19	803.0	0.9691
2115	3.21	3.31						3.24	556.0	1.0352
2130	3.25	3.35						3.24	353.0	1.0981
2200	3.35	3.41						3.37	206.0	1.1715
2300	3.48	3.41						3.46	155.0	1.2452
2400	3.51	3.41						3.48	77.0	1.2726
AUG 2										
0000	3.51	3.41						3.48	77.0	1.2726
0100	3.62	3.41						3.56	98.0	1.3284

SIA. NO. 08178300				STORM RAINFALL AND RUNOFF RECORD				1978 WATER YEAR		
ALAZAN CREEK AT ST. CLOUD STREET, SAN ANTONIO, TX				STORM OF AUG 1-2, 1975				ACCUM.	DISCHARGE	ACCUM.
DATE & TIME				G A G E N U M B E R				WEIGHTED	IN	RUNOFF
								PRECIP.	FT ³ /S	IN.
				1-A	2-A			IN.		
AUG 2										
0200				3.65	3.42			3.59	69.0	1.3612
0300				3.65	3.42			3.59	47.0	1.4059
0600				3.65	3.42			3.59	28.0	1.4458
0900				3.69	3.42			3.62	16.0	1.4686
1200				3.69	3.42			3.62	7.0	1.4786
1500				3.69	3.42			3.62	0.0	1.4786
2400				3.69	3.42			3.62	0.0	1.4786

STA. NO. 08178555					STORM RAINFALL AND RUNOFF RECORD				1978 WATER YEAR		
HARLENDALE CREEK AT WEST HARDING STREET, SAN ANTONIO, TX					STORM OF OCT 21-22, 1977				ACCUM.	DISCHARGE	ACCUM.
DATE & TIME					G A G E N U M B E R				WEIGHTED PRECIP.	IN	RUNOFF
									IN.	FT ³ /S	IN.
OCT 21											
0000	0.0								0.0	0.0	0.0
1710	0.0								0.0	0.0	0.0
1730	0.03								0.03	0.0	0.0
1745	0.17								0.17	0.0	0.0
1800	0.20								0.20	0.0	0.0
1815	0.45								0.45	0.0	0.0
1830	0.71								0.71	0.0	0.0
1845	0.72								0.72	18.0	0.0029
1900	0.73								0.73	20.0	0.0077
1930	0.75								0.75	20.0	0.0172
2030	0.80								0.80	15.0	0.0244
2100	0.81								0.81	13.0	0.0285
2130	0.81								0.81	61.0	0.0480
2200	0.81								0.81	108.0	0.1341
2400	0.81								0.81	57.0	0.1886
OCT 22											
0000	0.81								0.81	57.0	0.1886
0200	0.81								0.81	26.0	0.2399
0400	0.81								0.81	12.0	0.2552
0600	0.81								0.81	5.3	0.2600
0650	0.81								0.81	4.0	0.2612
0655	0.91								0.91	4.0	0.2614
0700	1.21								1.21	3.7	0.2616
0705	1.50								1.50	3.7	0.2618
0710	1.76								1.76	3.7	0.2620
0715	1.84								1.84	8.4	0.2629
0730	1.93								1.93	52.0	0.2753
0800	1.99								1.99	90.0	0.2968
0815	2.00								2.00	105.0	0.3136
0830	2.01								2.01	260.0	0.3550
0845	2.03								2.03	318.0	0.4057
0900	2.05								2.05	302.0	0.5261
1000	2.05								2.05	163.0	0.6300
1100	2.07								2.07	90.0	0.6874
1200	2.07								2.07	56.0	0.7231
1300	2.07								2.07	41.0	0.7493
1400	2.08								2.08	28.0	0.7761
1600	2.08								2.08	13.0	0.7926
1800	2.08								2.08	7.1	0.8017
2000	2.08								2.08	3.9	0.8079

STA. NO. 08178555				STORM RAINFALL AND RUNOFF RECORD				1978 WATER YEAR		
HARLENDALE CREEK AT WEST HARDING STREET, SAN ANTONIO, TX				STORM OF OCT 21-22, 1977				ACCUM.	DISCHARGE	ACCUM.
DATE & TIME				G A G E N U M B E R				WEIGHTED	IN	RUNOFF
								PRECIP.		
								IN.	FT ³ /S	IN.
OCT 22										
2300	2.08							2.08	0.0	0.8079
2400	2.08							2.08	0.0	0.8079

STA. NO. 08178555		STORM RAINFALL AND RUNOFF RECORD					1978 WATER YEAR		
HARLENDALE CREEK AT WEST HARDING STREET, SAN ANTONIO, TX STORM OF NOV 1, 1977							ACCUM.	DISCHARGE	ACCUM.
DATE & TIME		G A G E N U M B E R					WEIGHTED PRECIP.	IN	RUNOFF
							IN.	FT ³ /S	IN.
=====									
NOV 1									
0000	0.0						0.0	0.0	0.0
0345	0.0						0.0	0.0	0.0
0400	0.33						0.33	0.0	0.0
0415	0.36						0.36	0.0	0.0
0430	0.37						0.37	8.8	0.0021
0500	0.39						0.39	12.0	0.0059
0530	0.41						0.41	13.0	0.0101
0600	0.41						0.41	12.0	0.0139
0630	0.42						0.42	8.4	0.0172
0715	0.68						0.68	6.2	0.0192
0730	0.72						0.72	17.0	0.0233
0800	0.76						0.76	40.0	0.0424
0900	0.76						0.76	49.0	0.0737
1000	0.76						0.76	90.0	0.1311
1100	0.76						0.76	67.0	0.1738
1200	0.76						0.76	43.0	0.1909
1215	1.02						1.02	41.0	0.1953
1220	1.19						1.19	38.0	0.1973
1225	1.56						1.56	38.0	0.1993
1230	1.89						1.89	47.0	0.2018
1235	2.25						2.25	70.0	0.2055
1240	2.33						2.33	110.0	0.2114
1245	2.48						2.48	162.0	0.2200
1250	2.55						2.55	213.0	0.2313
1255	2.59						2.59	265.0	0.2454
1300	2.60						2.60	308.0	0.2618
1305	2.60						2.60	332.0	0.2794
1310	2.61						2.61	352.0	0.2981
1315	2.61						2.61	360.0	0.3364
1330	2.61						2.61	350.0	0.3736
1335	2.61						2.61	335.0	0.4270
1400	2.61						2.61	280.0	0.5088
1430	2.61						2.61	220.0	0.5790
1500	2.61						2.61	182.0	0.6370
1530	2.61						2.61	130.0	0.6784
1600	2.62						2.62	96.0	0.7550
1800	2.62						2.62	44.0	0.8251
2100	2.62						2.62	12.0	0.8481
2400	2.62						2.62	4.5	0.8524
=====									

SIA. NO. 08178555

STORM RAINFALL AND RUNOFF RECORD

1978 WATER YEAR

HARLENDALE CREEK AT WEST HARDING STREET, SAN ANTONIO, TX

STORM OF APRIL 10, 1978

DATE & TIME

1-WH

G A G E

N U M B E R

ACCUM. WEIGHTED PRECIP. IN.

DISCHARGE IN FT³/S

ACCUM. RUNOFF IN.

APR 10

0000

0.0

0.0

0.0

0.0

0220

0.0

0.0

0.0

0.0

0230

0.37

0.37

0.0

0.0

0235

0.47

0.47

0.0

0.0

0240

0.65

0.65

1.8

0.0001

0245

0.80

0.80

22.0

0.0013

0250

0.89

0.89

42.0

0.0035

0255

0.96

0.96

50.0

0.0062

0300

0.96

0.98

57.0

0.0122

0315

0.99

0.99

124.0

0.0320

0330

1.03

1.03

154.0

0.0565

0345

1.11

1.11

164.0

0.0827

0400

1.20

1.26

174.0

0.1104

0415

1.29

1.29

205.0

0.1431

0430

1.34

1.34

198.0

0.1747

0445

1.34

1.34

174.0

0.2024

0500

1.35

1.35

153.0

0.2390

0530

1.35

1.35

118.0

0.2766

0600

1.35

1.35

88.0

0.3187

0700

1.35

1.35

54.0

0.3531

0800

1.35

1.35

30.0

0.3818

1000

1.35

1.35

12.0

0.3933

1100

1.35

1.35

7.1

0.3960

1110

1.35

1.35

6.6

0.3981

1200

1.35

1.35

5.1

0.4037

1440

1.36

1.36

2.8

0.4073

1600

1.36

1.36

1.8

0.4098

1900

1.36

1.36

0.0

0.4098

2400

1.36

1.36

0.0

0.4098

-08-

SIA. NO. 08178555		STORM RAINFALL AND RUNOFF RECORD					1978 WATER YEAR		
HARLENDALE CREEK AT WEST HARDING STREET, SAN ANTONIO, TX					STORM OF MAY 2-3, 1978		ACCUM.	DISCHARGE	ACCUM.
DATE & TIME		G A G E N U M B E R					WEIGHTED PRECIP.	IN	RUNOFF
							IN.	FT ³ /S	IN.
MAY 2									
0000	0.0						0.0	0.0	0.0
1850	0.0						0.0	0.0	0.0
1855	0.05						0.05	0.0	0.0
1900	0.42						0.42	0.0	0.0
1905	0.55						0.55	0.0	0.0
1910	0.57						0.57	0.0	0.0
1915	0.58						0.58	0.0	0.0
2015	0.59						0.59	0.0	0.0
2030	0.59						0.59	20.0	0.0048
2100	0.59						0.59	29.0	0.0140
2130	0.59						0.59	29.0	0.0230
2200	0.59						0.59	18.0	0.0273
2215	0.59						0.59	16.0	0.0298
2230	0.59						0.59	20.0	0.0325
2240	0.59						0.59	45.0	0.0361
2245	0.59						0.59	57.0	0.0421
2300	0.59						0.59	66.0	0.0684
2400	0.59						0.59	46.0	0.0978
MAY 3									
0000	0.59						0.59	46.0	0.0978
0200	0.59						0.59	20.0	0.1379
0400	0.63						0.63	10.0	0.1507
0600	0.63						0.63	5.3	0.1574
0800	0.63						0.63	3.2	0.1615
1000	0.63						0.63	2.0	0.1647
1300	0.63						0.63	0.0	0.1647
2400	0.63						0.63	0.0	0.1647

SIA. NO. 08178690									
STORM RAINFALL AND RUNOFF RECORD									
1978 WATER YEAR									
SALADO CREEK TRIB. AT BITTERS RD. SAN ANTONIO, TEXAS									
STORM OF NOVEMBER 1, 1977									
DATE & TIME	G A G E N U M B E R						ACCUM. WEIGHED PRECIP.	DISCHARGE IN	ACCUM. RUNOFF IN.
							IN.	FT ³ /S	IN.
NOV. 1									
0000	0.0						0.0	0.0	0.0
0130	0.0						0.0	0.0	0.0
0135	0.01						0.01	0.0	0.0
0145	0.19						0.19	0.0	0.0
0150	0.39						0.39	0.0	0.0
0155	0.57						0.57	11.0	0.0055
0200	0.69						0.69	14.0	0.0298
0230	0.79						0.79	52.0	0.1848
0300	0.80						0.80	23.0	0.2305
0310	1.01						1.01	19.0	0.2446
0315	1.53						1.53	19.0	0.2535
0320	2.08						2.08	17.0	0.2620
0325	2.19						2.19	46.0	0.2848
0330	2.21						2.21	113.0	0.3410
0335	2.29						2.29	211.0	0.4982
0345	2.58						2.58	149.0	0.6092
0350	2.83						2.83	109.0	0.6633
0355	2.88						2.88	94.0	0.7100
0400	2.89						2.89	101.0	0.7601
0405	2.89						2.89	115.0	0.8458
0415	2.89						2.89	105.0	0.9762
0430	2.90						2.90	59.0	1.1081
0500	2.92						2.92	29.0	1.2377
0600	3.36						3.36	18.0	1.3047
0615	3.99						3.99	55.0	1.3867
0630	4.46						4.46	148.0	1.5704
0640	4.55						4.55	154.0	1.8381
0705	4.94						4.94	90.0	1.9946
0715	4.95						4.95	107.0	2.1274
0730	4.95						4.95	73.0	2.2906
0800	4.96						4.96	35.0	2.3979
0830	4.96						4.96	26.0	2.4754
0900	4.97						4.97	19.0	2.5603
1000	4.97						4.97	13.0	2.6378
1100	4.97						4.97	11.0	2.7033
1200	5.31						5.31	9.3	2.7357
1210	5.52						5.52	16.0	2.7595
1230	5.63						5.63	74.0	2.8881
1245	5.66						5.66	55.0	2.9701

STA. NO. 08178690				STORM RAINFALL AND RUNOFF RECORD				1978 WATER YEAR		
SALADO CREEK TRIB. AT BITTERS RD, SAN ANTONIO, TEXAS				STORM OF NOVEMBER 1, 1977				ACCUM.	DISCHARGE	ACCUM.
DATE & TIME				G A G E N U M B E R				WEIGHTED	IN	RUNOFF
								PRECIP.		
								IN.	FT ³ /S	IN.
NOV. 1										
1300	5.67							5.67	39.0	3.0572
1330	5.67							5.67	25.0	3.2062
1500	5.67							5.67	6.0	3.2450
1540	5.68							5.68	0.0	3.2450
2400	5.69							5.69	0.0	3.2450

STA. NO. 0P178690					STORM RAINFALL AND RUNOFF RECORD					1978 WATER YEAR		
SALADO CREEK TRIB. AT BITTERS RD, SAN ANTONIO, TEXAS					STORM OF APRIL 22, 1978					ACCUM. WEIGHTED PRECIP. IN.	DISCHARGE IN FT ³ /S	ACCUM. RUNOFF IN.
DATE & TIME	G A G E N U M B E R											
	2-5											
APR. 22												
0000	0.0									0.0	0.0	0.0
1330	0.0									0.0	0.0	0.0
1340	0.04									0.04	17.0	0.0127
1345	0.06									0.06	33.0	0.0291
1350	0.10									0.10	117.0	0.0872
1355	0.46									0.46	231.0	0.2019
1400	1.57									1.57	244.0	0.3231
1405	1.97									1.97	219.0	0.4318
1410	2.06									2.06	155.0	0.5088
1415	2.08									2.08	109.0	0.5630
1420	2.11									2.11	82.0	0.6241
1430	2.14									2.14	55.0	0.6923
1445	2.15									2.15	36.0	0.7460
1500	2.15									2.15	28.0	0.8086
1530	2.15									2.15	19.0	0.8652
1600	2.16									2.16	15.0	0.9099
1630	2.16									2.16	11.0	0.9427
1700	2.16									2.16	8.0	0.9665
1730	2.16									2.16	6.0	1.0023
1900	2.16									2.16	0.0	1.0023
2400	2.16									2.16	0.0	1.0023

STA. NO. 0817869		STORM RAINFALL AND RUNOFF RECORD					1978 WATER YEAR		
SALADO CREEK TRIB. AT BITTERS RD, SAN ANTONIO, TEXAS					STORM OF JUNE 6, 1978		ACCUM. WEIGHTED PRECIP.	DISCHARGE IN	ACCUM. RUNOFF
DATE & TIME	G A G E N U M B E R					IN.	FT ³ /S	IN.	
JUNE 6	3-5								
0000	0.0					0.0	0.0	0.0	
1955	0.0					0.0	0.0	0.0	
2000	0.10					0.10	13.0	0.0065	
2005	0.24					0.24	27.0	0.0199	
2010	0.63					0.63	22.0	0.0308	
2015	0.83					0.83	49.0	0.0551	
2020	1.07					1.07	126.0	0.1177	
2025	1.51					1.51	193.0	0.2136	
2030	1.81					1.81	213.0	0.3194	
2035	2.10					2.10	195.0	0.4162	
2040	2.16					2.16	157.0	0.4942	
2045	2.20					2.20	125.0	0.5563	
2050	2.38					2.38	109.0	0.6104	
2055	2.51					2.51	103.0	0.6616	
2100	2.62					2.62	98.0	0.8319	
2130	2.83					2.83	63.0	1.0196	
2200	2.88					2.88	40.0	1.2580	
2330	2.89					2.89	28.0	1.4249	
2400	2.95					2.95	16.0	1.4488	

STA. NO. 08178690					STORM RAINFALL AND RUNOFF RECORD			1978 WATER YEAR		
SALADO CREEK TRIB. AT BITTERS RD. SAN ANTONIO, TEXAS					STORM OF SEPTEMBER 7, 1978			ACCUM.	DISCHARGE	ACCUM.
DATE & TIME					G A G E N U M B E R			WEIGHTED PRECIP.	IN	RUNOFF
								IN.	FT ³ /S	IN.
=====										
SEPT. 7										
0000	0.0							0.0	0.0	0.0
1335	0.0							0.0	0.0	0.0
1340	0.06							0.06	0.0	0.0
1345	0.14							0.14	0.0	0.0
1400	0.20							0.20	0.0	0.0
1600	0.27							0.27	0.0	0.0
1755	0.27							0.27	0.0	0.0
1800	0.30							0.30	0.0	0.0
1805	0.49							0.49	9.0	0.0045
1810	0.60							0.60	12.0	0.0104
1815	0.84							0.84	21.0	0.0209
1820	0.95							0.95	32.0	0.0368
1825	0.97							0.97	53.0	0.0631
1830	0.98							0.98	60.0	0.1227
1845	1.03							1.03	42.0	0.1853
1900	1.07							1.07	29.0	0.2213
1910	1.16							1.16	26.0	0.2406
1915	1.34							1.34	28.0	0.2545
1920	1.55							1.55	39.0	0.2739
1925	1.77							1.77	60.0	0.3037
1930	1.80							1.80	85.0	0.3459
1935	1.83							1.83	97.0	0.4182
1945	1.93							1.93	73.0	0.5088
2000	2.10							2.10	51.0	0.5595
2005	2.29							2.29	51.0	0.5848
2010	2.49							2.49	65.0	0.6332
2020	2.65							2.65	97.0	0.7778
2040	2.85							2.85	71.0	0.9188
2100	2.94							2.94	45.0	1.0306
2130	3.03							3.03	31.0	1.1230
2200	3.08							3.08	24.0	1.1885
2225	3.30							3.30	20.0	1.2332
2245	3.38							3.38	32.0	1.3127
2315	3.41							3.41	22.0	1.3946
2400	3.46							3.46	16.0	1.4304
=====										

STA. NO. 08178690		STORM RAINFALL AND RUNOFF RECORD					1978 WATER YEAR		
SALADO CREEK TRIB. AT BITTERS RD, SAN ANTONIO, TEXAS					STORM OF SEPTEMBER 13, 1978		ACCUM.	DISCHARGE	ACCUM.
DATE & TIME					WEIGHTED		PRECIP.	IN	RUNOFF
G A G E N U M B E R					IN.		IN.	FT ³ /S	IN.
SEPT 13									
0000	0.0						0.0	0.0	0.0
0435	0.0						0.0	0.0	0.0
0440	0.02						0.02	0.0	0.0
0525	0.14						0.14	0.0	0.0
0535	0.29						0.29	0.0	0.0
0540	0.37						0.37	13.0	0.0097
0550	0.87						0.87	74.0	0.0832
0600	1.52						1.52	134.0	0.2203
0610	1.69						1.69	185.0	0.3581
0615	1.94						1.98	157.0	0.4361
0620	2.44						2.44	146.0	0.5086
0625	2.88						2.88	150.0	0.5831
0630	3.18						3.18	208.0	0.6864
0635	3.53						3.53	250.0	0.8106
0640	3.74						3.74	264.0	0.9417
0645	3.88						3.88	279.0	1.0802
0650	4.07						4.07	264.0	1.2114
0655	4.20						4.20	249.0	1.3350
0700	4.28						4.28	235.0	1.5685
0715	4.88						4.88	150.0	1.7175
0720	4.97						4.97	156.0	1.7949
0725	5.38						5.38	170.0	1.8794
0730	5.71						5.71	194.0	1.9757
0735	5.90						5.90	222.0	2.0860
0740	6.11						6.11	243.0	2.2067
0745	6.21						6.21	253.0	2.4580
0800	6.23						6.23	188.0	2.6914
0810	6.25						6.25	115.0	2.8056
0820	6.26						6.26	81.0	2.8861
0830	6.28						6.28	63.0	3.0113
0900	6.30						6.30	40.0	3.1305
0930	6.34						6.34	32.0	3.2258
1000	6.38						6.38	27.0	3.3465
1100	6.40						6.40	20.0	3.4657
1200	6.41						6.41	15.0	3.5551
1300	6.42						6.42	11.0	3.6207
1400	6.42						6.42	6.0	3.6609
1515	6.42						6.42	0.0	3.6609
2400	6.42						6.42	0.0	3.6609

STA. NO. 08178640				STORM RAINFALL AND RUNOFF RECORD				1978 WATER YEAR		
WEST ELM CREEK AT SAN ANTONIO, TEXAS				STORM OF NOVEMBER 1, 1977				ACCUM.	DISCHARGE	ACCUM.
DATE & TIME				G A G E N U M B E R				WEIGHTED	IN	RUNOFF
				1E-S	2E-S	3E-S		PRECIP.		
								IN.	FT ³ /S	IN.
NOV. 1										
0000	0.0	0.0	0.0					0.0	0.0	0.0
0140	0.0	0.0	0.0					0.0	0.0	0.0
0145	0.21	0.0	0.0					0.12	0.0	0.0
0150	0.42	0.0	0.0					0.24	0.0	0.0
0155	0.65	0.0	0.0					0.38	0.0	0.0
0200	0.71	0.07	0.0					0.44	0.0	0.0
0255	0.88	0.14	0.07					0.57	0.0	0.0
0300	0.88	0.44	0.07					0.69	0.0	0.0
0305	0.88	0.72	0.07					0.81	0.0	0.0
0310	0.90	0.94	0.07					0.91	0.0	0.0
0340	1.15	1.14	0.14					1.14	0.0	0.0
0345	1.18	1.14	0.35					1.18	0.0	0.0
0350	1.21	1.15	0.63					1.18	0.0	0.0
0355	1.25	1.15	0.80					1.20	0.0	0.0
0500	1.84	1.69	0.98					1.77	0.0	0.0
0515	1.84	1.93	1.05					1.87	0.0	0.0
0530	1.84	2.07	1.37					1.93	0.0	0.0
0545	1.84	2.12	1.62					1.95	0.0	0.0
0600	2.11	2.30	1.96					2.19	0.0	0.0
0605	2.37	2.30	2.06					2.34	0.0	0.0
0610	2.53	2.30	2.08					2.49	0.0	0.0
0710	3.60	2.41	2.45					3.10	0.0	0.0
0715	3.60	2.61	2.45					3.18	0.1	0.0000
0720	3.60	2.81	2.48					3.26	13.0	0.0007
0725	3.60	3.11	2.49					3.39	27.0	0.0021
0730	3.60	3.41	2.50					3.51	61.0	0.0053
0735	3.60	3.58	2.50					3.58	156.0	0.0136
0740	3.60	3.75	2.54					3.65	254.0	0.0269
0745	3.60	3.78	2.55					3.66	341.0	0.0539
0755	3.60	4.12	2.72					3.80	788.0	0.1162
0800	3.60	4.19	2.90					3.83	1190.0	0.1789
0805	3.60	4.23	3.21					3.85	1470.0	0.2564
0810	3.60	4.35	3.70					3.91	1800.0	0.3513
0815	3.60	4.51	3.86					3.98	1940.0	0.4535
0820	3.60	4.57	4.05					4.00	2000.0	0.5589
0825	3.60	4.58	4.16					4.01	1980.0	0.7155
0835	3.60	4.58	4.32					4.01	1910.0	0.9168
0845	3.60	4.54	4.45					4.01	1780.0	1.0575
0850	3.60	4.59	4.48					4.01	1570.0	1.1403

STA. NO. 08178640				STORM RAINFALL AND RUNOFF RECORD				1978 WATER YEAR		
WEST ELM CREEK AT SAN ANTONIO, TEXAS				STORM OF NOVEMBER 1, 1977				ACCUM.	DISCHARGE	ACCUM.
DATE & TIME				G A G E N U M B E R				WEIGHTED	IN	RUNOFF
								PRECIP.		
								IN.	FT ³ /S	IN.
NOV. 1										
0855	3.60	4.54	4.60					4.02	1480.0	1.2183
0900	3.60	4.54	4.72					4.02	1190.0	1.3437
0915	3.60	4.54	4.74					4.02	600.0	1.4386
0930	3.60	4.54	4.74					4.02	360.0	1.4955
0945	3.60	4.54	4.74					4.02	210.0	1.5287
1000	3.60	4.54	4.74					4.02	100.0	1.5525
1030	3.60	4.54	4.74					4.02	25.0	1.5604
1100	3.60	4.60	4.74					4.02	3.0	1.5629
1130	3.60	4.60	4.80					4.02	4.4	1.5643
1200	3.60	4.60	4.80					4.02	3.9	1.5674
1400	4.15	5.10	4.81					4.56	0.3	1.5676
1430	4.15	5.11	5.32					4.56	0.1	1.5676
1440	4.15	5.11	5.35					4.56	1.3	1.5678
1450	4.15	5.13	5.35					4.56	2.2	1.5680
1500	4.15	5.13	5.37					4.56	2.0	1.5683
1515	4.15	5.13	5.37					4.56	1.6	1.5686
1535	4.15	5.13	5.34					4.56	9.7	1.5709
1600	4.15	5.13	5.34					4.56	7.8	1.5725
1615	4.15	5.13	5.34					4.56	6.7	1.5736
1630	4.15	5.13	5.34					4.56	4.1	1.5745
1700	4.15	5.13	5.34					4.56	1.8	1.5754
1800	4.15	5.13	5.34					4.56	0.4	1.5756
1900	4.15	5.13	5.34					4.56	0.1	1.5757
2000	4.15	5.13	5.34					4.56	0.0	1.5757
2400	4.15	5.13	5.34					4.56	0.0	1.5757

STORM RAINFALL AND RUNOFF RECORD									
STA. NO. 08178640				1978 WATER YEAR					
WEST ELM CREEK AT SAN ANTONIO, TEXAS				STORM OF SEPTEMBER 13, 1978				ACCUM.	DISCHARGE
								WEIGHTED	IN
								PRECIP.	ACCUM.
								IN.	RUNOFF
DATE & TIME	1F-S	2E-S	3E-S	G A G E N U M B E R				IN.	FT ³ /S
									IN.
SEPT 13									
0000	0.0	0.0	0.0					0.0	0.0
0340	0.0	0.0	0.0					0.0	0.0
0400	0.06	0.01	0.0					0.04	0.0
0430	0.08	0.05	0.02					0.07	0.0
0500	0.15	0.11	0.11					0.13	0.0
0540	0.36	0.19	0.31					0.29	0.0
0545	0.38	0.32	0.34					0.35	0.0
0550	0.40	0.45	0.40					0.42	0.0
0555	0.44	0.47	0.48					0.45	0.0
0600	0.46	0.49	0.54					0.47	0.0
0605	0.48	1.59	0.60					0.94	0.0
0610	0.51	1.73	0.64					1.01	0.0
0615	0.52	2.09	0.94					1.17	0.0
0620	0.53	2.19	1.13					1.22	0.0
0625	0.54	2.34	1.30					1.31	0.0
0640	0.57	2.46	1.80					1.36	0.0
0715	0.65	3.05	2.21					1.65	0.5
0720	0.67	3.17	2.39					1.71	1.5
0725	0.70	3.38	2.50					1.82	11.0
0735	0.78	3.61	2.66					1.96	53.0
0740	0.83	3.73	2.81					2.04	75.0
0745	0.88	3.79	3.02					2.09	104.0
0750	0.93	3.83	3.18					2.14	141.0
0755	1.00	3.98	3.37					2.25	170.0
0800	1.04	4.18	3.64					2.35	199.0
0805	1.08	4.33	3.83					2.44	222.0
0815	1.13	4.42	3.95					2.51	289.0
0825	1.15	4.42	3.99					2.52	335.0
0835	1.15	4.43	4.00					2.52	310.0
0845	1.16	4.45	4.02					2.54	281.0
0900	1.18	4.46	4.02					2.55	250.0
0915	1.22	4.48	4.04					2.58	205.0
0930	1.27	4.52	4.07					2.63	156.0
0945	1.29	4.53	4.09					2.65	116.0
1000	1.30	4.54	4.11					2.66	85.0
1030	1.32	4.57	4.15					2.68	45.0
1100	1.32	4.60	4.17					2.69	25.0
1130	1.32	4.62	4.18					2.70	14.0
1200	1.32	4.64	4.19					2.71	7.8

STA. NO. 08178640				STORM RAINFALL AND RUNOFF RECORD				1978 WATER YEAR		
WEST ELM CREEK AT SAN ANTONIO, TEXAS				STORM OF SEPTEMBER 13, 1978				ACCUM.	DISCHARGE	ACCUM.
DATE & TIME				G A G E N U M B E R				WEIGHTED	IN	RUNOFF
								PRECIP.	FT ³ /S	IN.
								IN.		
SEPT 13										
1230	1.32	4.64	4.18					2.71	4.4	0.3604
1300	1.32	4.64	4.18					2.71	2.4	0.3612
1330	1.32	4.64	4.18					2.71	1.3	0.3616
1400	1.32	4.64	4.18					2.71	0.7	0.3618
1430	1.32	4.64	4.18					2.71	0.3	0.3619
1500	1.32	4.64	4.18					2.71	0.2	0.3620
1615	1.32	4.64	4.18					2.71	0.0	0.3620
2400	1.32	4.64	4.18					2.71	0.0	0.3620

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