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WATER BULLETIN NUMBER 60

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**Flow of the Rio Grande  
and  
Related Data**

*From Elephant Butte Dam, New Mexico  
to the Gulf of Mexico*

**1990**

STORAGE IN MAJOR RESERVOIRS  
SOURCES OF RIVER FLOW  
DIVERSIONS  
QUALITY OF WATER  
CLIMATOLOGICAL DATA  
DRAINAGE BASIN AND IRRIGATED AREAS

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## FOREWORD

This bulletin presents the sixtieth compilation of the stream discharges and related data concerning the international portion of the Rio Grande, prepared jointly by the United States and Mexican Sections of the International Boundary and Water Commission. The streamflow data and kindred subjects pertain to the Rio Grande and its important tributaries near their confluence with the main stream from Elephant Butte, New Mexico to the Gulf of Mexico. The first publication in the series was Water Bulletin No. 1 for the year 1931. The present volume contains information for the year 1990.

International stream gaging on the Rio Grande was initiated in 1889, when the station at El Paso, Texas was established. Several stations on the Rio Grande and its tributaries downstream from El Paso were established in 1900 and operated until 1914. Between 1914 and 1923, except for a few months in 1919 and 1920, all stream-gaging work on the international reach of the river was suspended. In 1923 the work was resumed and carried on independently by the two countries until 1931, when the present joint program of stream measurements was adopted.

During 1990 the United States Section of the Commission operated the stream-gaging stations on the Rio Grande at El Paso, Below American Dam, Fort Quitman, Candelaria, Above Rio Conchos, Below Rio Conchos, Johnson Ranch, Foster Ranch, Del Rio, El Indio, Laredo, Rio Grande City, San Benito, and Brownsville. The Mexican Section operated the stream-gaging stations on the Rio Grande at Below Amistad Dam, Jimenez, Piedras Negras, and Below Anzalduas Dam. The station at Below Falcon Dam was operated jointly by the two Sections. Each Section operated the gaging stations on tributary streams, floodways, and diversions within its own country.

In 1976 the names of several gaging stations were changed, pursuant to agreement between the two Sections of the Commission. Where it was decided that some confusion might result from this change, a note giving the former name was added to the descriptive heading of the gaging station.

The total drainage area within the outer rim of the Rio Grande Basin is 868,945 square kilometres. However, about half of this area yields no runoff to the river, the estimated productive area of the watershed being 456,701 square kilometres. Reservoirs in the basin have a total storage capacity of approximately 14,151,500 thousand cubic metres, in addition to the International Amistad and Falcon Reservoirs, which have a combined conservation capacity of 7,463,678 thousand cubic metres. In the Rio Grande basin, a total of 830,945 hectares is irrigated below Elephant Butte Dam on the Rio Grande and above Girvin on the Pecos River. The flow of the Rio Grande to the Gulf of Mexico below Brownsville prior to construction of Falcon Dam averaged 3,207,048 thousand cubic metres per year for the period 1934-1952. For the period 1954-1990, this flow has averaged 965,049 thousand cubic metres per year.

The mean sea level datum, referred to as the U. S. C. & G. S. in the description of the stream-gaging stations, is the North American Vertical Datum of 1927.

## ACKNOWLEDGMENTS

Other agencies which have contributed to some part of the data published herein include: The Agricultural Research Service and the Soil Conservation Service of the U. S. Department of Agriculture; the Bureau of Reclamation, the National Park Service, and the Geological Survey of the U. S. Department of the Interior; the National Weather Service of the U. S. Department of Commerce; the Texas Board of Health; the Texas Water Commission; the Middle Rio Grande Conservancy District; the Red Bluff Water Power Control District; State of Colorado, Division of Water Resources; the Rio Grande Compact Commission; the Delta Lake Irrigation District; the Del Rio City Water Department; the Eagle Pass City Water Department; the Laredo City Water Department; the Del Mar Conservation District; Central Power and Light Company; the El Paso Department of Water and Sewerage; the Maverick County Control and Improvement District No. 1; the Ministry of Agriculture and Hydraulic Resources of Mexico; the Meteorological Service of Mexico; Meteorological Service of the State of Chihuahua, Mexico; Federal Power Commission of Mexico; Potable Water Board of Piedras Negras, Coahuila; Federal Board of Public Improvement Works of Nuevo Laredo, Tamaulipas; and the Water and Drainage Board of Cd. Acuna, Coahuila.

Additional contributions have been made by individuals and corporations; and specific notation is made for such, as well as for those of the above-named agencies, where the data appear. The courtesy and cooperation of those who made these contributions are acknowledged with appreciation.

## PERIOD AVERAGES

In Water Bulletins Nos. 1 through 29, normal or average discharge volumes shown for the various gaging stations were based on a period beginning in 1924, or thereafter when records became available.

Beginning with Water Bulletin No. 30, the periods have been revised to include only the years following completion of major projects below which the flow of the Rio Grande or a major tributary was modified, or later when records became available. The revised periods are based on the completion of Caballo Dam in 1938, irrigation projects on the Rio Conchos and its tributaries in 1947, International Falcon Dam in 1953, and International Amistad Dam and Luis L. Leon Dam in 1968.

For purposes of comparison with the average flows in the Rio Grande below Caballo Dam, records of average discharge in the Rio Grande below Elephant Butte Dam have also been revised to include the same period.

The period of record used to determine the average diversions from the Rio Grande to the United States below Falcon Dam published herein was restricted to begin in 1957, the first complete year of record after United States' waters in Falcon Reservoir were placed under the jurisdiction of the 93rd District Court of Texas.

## FOREWORD

## UNITS OF MEASURE

This Bulletin is the first to be published in System International (SI) units which are based on the metric system. The following conversion constants may be used to convert to the English system of measurement. Data collected by the Mexican Section are computed and published in a Spanish version of the water bulletin in metric units.

## METRIC TO ENGLISH CONVERSION CONSTANTS

| <u>METRIC UNITS</u> |                  |   | <u>ENGLISH UNITS</u> |   |                   |
|---------------------|------------------|---|----------------------|---|-------------------|
| <u>LENGTH</u>       |                  |   |                      |   |                   |
| 1                   | Millimetre       | x | 0.03937              | = | Inch              |
| 1                   | Metre            | x | 3.28084              | = | Feet              |
| 1                   | Kilometre        | x | 0.62137              | = | Mile              |
| <u>AREA</u>         |                  |   |                      |   |                   |
| 1                   | Square Metre     | x | 10.76391             | = | Square Feet       |
| 1                   | Hectare          | x | 2.47105              | = | Acre              |
| 1                   | Square Kilometre | x | 0.38610              | = | Square Mile       |
| <u>VOLUME</u>       |                  |   |                      |   |                   |
| 1                   | Cubic Metre      | x | 35.31467             | = | Cubic Feet        |
| 1,000               | Cubic Metres     | x | 0.81071              | = | Acre-Feet         |
| <u>WEIGHT</u>       |                  |   |                      |   |                   |
| 1                   | Kilogram         | x | 2.20462              | = | Pounds            |
| 1                   | Megagram         | x | 1.10231              | = | Tons (2,000 lbs.) |
| <u>TEMPERATURE</u>  |                  |   |                      |   |                   |
| 1                   | Degree Celsius   | x | 1.8 + 32             | = | Degree Fahrenheit |

## GENERAL HYDROLOGIC CONDITIONS FOR 1990

## ALONG AND ADJACENT TO THE INTERNATIONAL PORTION OF THE RIO GRANDE

During the year 1990, temperatures were 1 degree Celsius above average on the watershed of the Rio Grande below El Paso, Texas. Evaporation was 88% of average. Precipitation was 130% of average from El Paso to Amistad Dam, 123% of average from Amistad Dam to Falcon Dam, 96% of average from Falcon Dam to Rio Grande City, and 60% of average in the lower Rio Grande Valley on the United States side.

The yearly volume of flow of the Rio Grande was above average from El Paso to the Confluence of the Rio Conchos with the Rio Grande and above average from the Rio Conchos Confluence to the Gulf of Mexico. In the reach between El Paso and the Confluence of the Rio Conchos, the flow was 132% of average, ranging from 100% of average at El Paso to 221% at Above Rio Conchos; in the reach between the Confluence of the Rio Conchos and Amistad Reservoir, where most of the flows originate from releases from Luis L. Leon Reservoir (El Granero) on the Rio Conchos, the flow was 220% of average; and in the reach between Amistad Dam and Falcon Reservoir, where flows mostly originate from releases from Amistad Reservoir, the flow was 161% of average. Most of the flows passing the Rio Grande Stations below Falcon Dam originated from releases from Falcon Reservoir, which in 1990 amounted to 3,223,619 thousand cubic metres, or 108% of the average for the thirty-seven years of operation, 1954-1990. The estimated volume of flow passing to the Gulf of Mexico was 155,301 thousand cubic metres, which is 16% of the average for this thirty-seven year period.

The total annual flow of all measured Tributaries below Fort Quitman was 128% of average. The total flow of these tributaries in the United States was 1,104,925 thousand cubic metres, or 146% of average. For Mexico, the measured tributary flow, excluding Rio Alamo and Rio San Juan, was 2,815,506 thousand cubic metres, or 162% of average. The flows of the Rio Alamo and Rio San Juan were 11% and 13% of their respective averages.

Return flow to the Rio Grande at Maverick Power Plant near Eagle Pass was 1,158,234 thousand cubic metres, or 137% of the twenty-three year average. Return flow to the Rio Grande through various drains in the Maverick County Irrigation District, excluding storm inflow, amounted to 61,464 thousand cubic metres, or 46% of the twenty-three year average.

There was minor flooding on the Rio Grande from Presidio to above Amistad Dam in 1990. The highest peak flows recorded on the Rio Grande were, above Falcon Dam, 1,720 cubic metres per second at Johnson Ranch; and, below Falcon Dam, 473 cubic metres per second at below Falcon Dam.

For all reservoirs in the Rio Grande basin having a capacity greater than 18,500 thousand cubic metres, excepting Amistad and Falcon International Reservoirs, the average amount of water in storage in 1990 was 6,074,300 thousand cubic metres, or 102% of the average 5,927,700 thousand cubic metres. In the United States, stored water in these reservoirs was 140% of average, while in Mexico it was 81% of average.

In International Amistad Reservoir there was an increase in storage during the year of 571,101 thousand cubic metres. Storage ranged from a high of 4,243,500 thousand cubic metres on October 11 and to a low of 2,389,500 thousand cubic metres on July 12 and averaged 3,297,700 thousand cubic metres during the year, or 90% of the average for the period 1969 through 1990. In International Falcon Reservoir, there was an increase in storage during the year of 918,777 thousand cubic metres. The storage ranged from a high of 2,612,300 thousand cubic metres on December 22 to a low of 1,125,300 thousand cubic metres on July 13 and averaged 1,693,500 thousand cubic metres during the year, or 71% of the average for the period 1954 through 1990.

Diversions from the Rio Grande in the United States were 123% of average. Diversions into the Maverick Canal were 117% of average and in the United States below Falcon Dam, 129% of the average for the thirty-four years, 1957-1990. In Mexico, diversions were 136% of average. Diversions into the Acequia Madre were 117% of average, while diversions through the Anzalduas Canal in Mexico were 137% of the thirty-seven year average.

In 1990, the total reported irrigated acreage from the Rio Grande and its tributaries below El Paso, Texas showed a very minor change from the previous year. On the United States side, there was a decrease of about 7% above Falcon Dam and no significant change below Falcon Dam, for an overall average decrease of 1%. On the Mexican side, there was no change above Falcon Dam and no change below Falcon Dam.

## 08-5610.00 RIO GRANDE BELOW ELEPHANT BUTTE DAM, NEW MEXICO

**DESCRIPTION:** Concrete wall control, bubbler gage, water-stage recorder, and data collection platform located on the left bank 30 metres upstream from the cableway at latitude 33°08'45", longitude 107°12'20", and river kilometre 2,236; 1.6 river kilometres downstream from Elephant Butte Dam, 2.4 river kilometres upstream from Cuchillo Negro River, and 217 river kilometres upstream from the American Dam at El Paso, Texas. The zero of the gage is 1,292.68 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 25 discharge measurements during the year and a continuous record of gage heights. Records were furnished by the United States Geological Survey. Records available: 1915 through 1990.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. Beginning December 1940, hydroelectric power generation facilities for 27,000 kva were placed in operation at Elephant Butte Dam. The data collection platform is operated by U. S. Geological Survey and relays gage height data by radio via satellite.

**EXTREME FLOWS FROM RECORDS:**

| Average Flow in Cubic Metres per Second |      |      |              | Min. 0<br>Occasionally<br>Nov. 1971 | Min. 0.03<br>Nov. 1971 | Min. 7.16<br>1964 |
|---|------|------|--------------|-------------------------------------|------------------------|-------------------|
| Daily                                   | Max. | 233  | May 22, 1942 |                                     |                        |                   |
| Monthly                                 | Max. | 215  | May 1942     |                                     |                        |                   |
| Yearly                                  | Max. | 71.1 | 1942         |                                     |                        |                   |

**Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary**

| Day | Jan.   | Feb.   | Mar.   | April  | May    | June   | July   | Aug.   | Sept.  | Oct.  | Nov.  | Dec.  |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|
| 1   | 0.40   | * 0.42 | 18.5   | 59.2   | 37.9   | 60.0   | 39.1   | * 39.4 | 53.8   | 0.48  | .0.27 | .0.28 |
| 2   | * 1.42 | .40    | 29.5   | 59.2   | 38.2   | 59.5   | 51.8   | 39.4   | 54.4   | * .45 | * .27 | .27   |
| 3   | .42    | .42    | 35.4   | 59.5   | * 39.6 | 58.9   | * 51.8 | 39.1   | 54.4   | .31   | .23   | .31   |
| 4   | .42    | .42    | 35.4   | 59.8   | 40.5   | * 58.6 | 40.5   | 39.4   | 54.4   | .31   | .21   | * .37 |
| 5   | .42    | .42    | * 35.7 | * 56.9 | 41.1   | 58.3   | 51.8   | 39.1   | 54.7   | .31   | .23   | .37   |
| 6   | * .40  | .42    | 47.6   | 43.9   | 41.3   | 58.3   | 58.1   | 39.1   | 48.7   | .28   | .22   | .37   |
| 7   | * .40  | .42    | 53.8   | 38.5   | 41.6   | 57.8   | 57.8   | 39.1   | 43.3   | .27   | .22   | .37   |
| 8   | .40    | .42    | 54.1   | 38.5   | 41.9   | 57.8   | * 57.8 | 25.9   | 43.6   | .26   | .20   | .34   |
| 9   | .40    | .42    | 54.1   | 38.8   | 41.9   | 58.1   | 57.5   | 19.3   | 43.9   | .24   | .21   | .34   |
| 10  | .40    | .42    | 54.1   | 38.8   | 42.8   | 57.8   | 57.5   | 19.3   | 43.9   | .25   | .19   | .34   |
| 11  | * .40  | .42    | 54.1   | 23.7   | 42.8   | 57.8   | 57.2   | 19.3   | * 44.2 | .26   | .20   | .37   |
| 12  | * .40  | .45    | * 54.4 | 16.5   | 43.0   | 58.1   | 57.5   | 19.3   | 44.5   | .26   | .20   | .37   |
| 13  | .37    | .40    | 54.4   | * 16.8 | 43.3   | 57.8   | 57.5   | * 44.7 | .24    | .20   | .37   |       |
| 14  | .37    | .42    | 54.4   | 16.9   | 43.6   | 57.8   | 57.2   | 19.1   | 40.8   | .24   | .20   | .34   |
| 15  | .37    | * .40  | 54.4   | 17.1   | 43.6   | 57.8   | 57.2   | 19.1   | * 40.8 | .24   | * .19 | .34   |
| 16  | .34    | .40    | 54.7   | 32.3   | 43.3   | 58.1   | 45.6   | 19.0   | 40.8   | * .23 | .20   | .34   |
| 17  | .34    | .40    | 54.7   | 41.6   | 43.0   | 58.1   | 39.9   | 19.0   | 40.8   | .22   | .20   | * .34 |
| 18  | .34    | .40    | 54.7   | 41.9   | * 43.0 | * 58.3 | 39.9   | 19.1   | 80.5   | .23   | .21   | .34   |
| 19  | .34    | .40    | 54.7   | 42.2   | 42.8   | 58.6   | 39.6   | 19.1   | 40.8   | .25   | .23   | .34   |
| 20  | .31    | .40    | 54.9   | 54.9   | 42.8   | 58.9   | 39.6   | * 19.5 | 29.5   | .25   | .24   | .34   |
| 21  | .31    | .40    | 54.9   | 61.5   | 57.8   | 59.2   | 39.6   | 19.7   | 19.9   | .25   | .25   | .34   |
| 22  | .31    | .40    | 54.9   | 61.2   | 67.1   | 59.2   | 39.4   | 19.1   | 19.9   | .25   | .25   | .34   |
| 23  | .37    | .45    | 55.2   | 62.0   | 66.0   | 59.8   | 39.1   | 19.7   | 19.9   | .26   | .27   | .34   |
| 24  | .40    | .42    | 54.9   | 46.2   | 65.4   | 60.0   | 38.8   | 19.7   | 19.8   | .26   | .24   | .34   |
| 25  | .40    | .42    | 51.0   | 36.0   | 64.9   | 60.0   | 38.8   | 19.6   | 19.7   | .27   | .24   | .34   |
| 26  | .40    | 12.1   | 56.9   | 35.7   | 64.0   | 60.3   | 38.8   | 19.7   | 5.47   | .26   | .25   | .34   |
| 27  | .40    | 18.4   | 58.9   | 36.0   | 63.2   | 60.3   | 38.8   | 32.3   | .45    | .25   | .25   | .34   |
| 28  | .40    | 18.4   | 58.9   | 36.5   | 62.6   | 60.3   | 39.1   | 38.8   | .45    | .25   | .27   | .34   |
| 29  | .40    |        | 58.9   | 37.1   | 61.7   | 53.2   | 39.1   | 41.1   | .48    | .27   | .28   | .34   |
| 30  | .40    |        | 59.2   | 37.7   | 61.2   | 38.5   | 39.1   | 41.9   | .48    | .27   | .28   | .34   |
| 31  | .42    |        | 59.2   |        | 60.6   |        | 39.1   | 45.9   | .26    |       |       | .34   |

|       |         |         |         |          |      |       |
|-------|---------|---------|---------|----------|------|-------|
| Sum   | 59.26   | 1,246.9 | 1,737.2 | 849.3    | 8.43 | 10.59 |
| 11.87 | 1,586.5 | 1,532.5 | 1,444.6 | 1,009.03 | 6.90 |       |

|                   |  |  |  |  |  |                  |
|-------------------|--|--|--|--|--|------------------|
| Current Year 1990 |  |  |  |  |  | Period 1938-1990 |
|-------------------|--|--|--|--|--|------------------|

| Month  | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |        |      | Average | Volume-Thousands of Cubic Metres |         |           |         |
|--------|---------------------|------|---------------------------------|--------|------|---------|----------------------------------|---------|-----------|---------|
|        | High                | Low  | Day                             | % High | Day  |         | Total                            | Average | Maximum   | Minimum |
| Jan.   | 1.2                 | 0.42 | 120                             | 0.31   | 0.38 | 1,026   | 31,800                           | 147,400 | 247       |         |
| Feb.   | 127                 | 18.4 | 12                              | .40    | 2.12 | 5,120   | 52,250                           | 207,297 | 232       |         |
| Mar.   | 130                 | 59.2 | 1                               | 18.5   | 51.2 | 137,074 | 87,130                           | 174,071 | 1,261     |         |
| Apr.   | 23                  | 62.0 | 12                              | 16.5   | 41.6 | 107,732 | 103,481                          | 199,454 | 13,824    |         |
| May    | 22                  | 67.1 | 1                               | 37.9   | 49.4 | 132,408 | 111,048                          | 576,485 | 632       |         |
| June   | 126                 | 60.3 | 30                              | 38.5   | 57.9 | 150,094 | 119,529                          | 447,576 | 20,862    |         |
| July   | 6                   | 58.1 | 124                             | 38.8   | 46.6 | 124,813 | 119,001                          | 261,049 | 51,006    |         |
| Aug.   | 31                  | 45.9 | 116                             | 19.0   | 27.4 | 73,380  | 93,530                           | 173,511 | 11,761    |         |
| Sept.  | 5                   | 54.7 | 127                             | .45    | 33.6 | 87,180  | 41,886                           | 159,174 | 201       |         |
| Oct.   | 1                   | .48  | 17                              | 21.8   | .27  | 728     | 19,266                           | 154,731 | 183       |         |
| Nov.   | 129                 | .28  | 110                             | .19    | .23  | 596     | 19,086                           | 195,408 | 91.5      |         |
| Dec.   | 14                  | .37  | 2                               | .27    | .34  | 915     | 25,728                           | 160,055 | 170       |         |
| Yearly |                     |      | 67.1                            |        | 0.19 | 26.0    | 821,066                          | 823,735 | 2,243,367 | 226,236 |

\* Discharge measurement made on this day

0 Mean daily

1 And other days

## 08-3625.00 RIO GRANDE BELOW CABALLO DAM, NEW MEXICO

**DESCRIPTION:** Cableway, gravity well, water-stage recorder, and data collection platform located on the left bank at Latitude 32°53'05", longitude 107°17'30", and river kilometre 2,190; 1.3 river kilometres downstream from Caballo Dam, about 5.0 kilometres northeast of Arrey, New Mexico, 8.0 kilometres south of Caballo, New Mexico, and 172 river kilometres upstream from the American Dam at El Paso, Texas. The zero of the gage is 1,262.15 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 47 discharge measurements during the year and a continuous record of gage heights. Records were furnished by the El Paso office of the United States Bureau of Reclamation. Records available: 1938 through 1990.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. In addition to the outflow from Caballo Dam listed below, 632,400 thousand cubic metres of water were diverted in 1990 into Bonita Lateral, a small irrigation canal just below Caballo Dam. Prior to 1938, discharge records were kept at Percha Dam, a low diversion dam about 2.4 kilometres downstream from this station. Small accretions to the river take place between the station and Percha Dam. The data collection platform is operated by U. S. Bureau of Reclamation and relays gage heights and flow data by radio via satellite.

**EXTREME FLOWS FROM RECORDS:**

| Average Flow in Cubic Metres per Second |              |  |  |  |  |  |            |                     |      |
|---|--------------|--|--|--|--|--|------------|---------------------|------|
| Daily: Max. 217                         | May 20, 1942 |  |  |  |  |  | Min. 0.003 | 1954, 1955 and 1972 |      |
| Monthly: Max. 190                       | May 1942     |  |  |  |  |  | Min. 0.003 | Nov. 1955           |      |
| Yearly: Max. 70.2                       | 1942         |  |  |  |  |  | Min. 8.04  |                     | 1964 |

**Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary**

| Day        | Jan.  | Feb.   | Mar.    | April  | May     | June   | July    | Aug.   | Sept.  | Oct.  | Nov.  | Dec. |
|------------|-------|--------|---------|--------|---------|--------|---------|--------|--------|-------|-------|------|
| 1          | .06   | .06    | 28.9    | 45.0   | 37.7    | 51.8   | 68.3    | 40.2   | 54.7   | 47.6  | .06   | .06  |
| 2          | * .06 | .08    | 31.2    | 39.1   | * 42.5  | 52.4   | 65.4    | 40.2   | 53.2   | .06   | .14   | .06  |
| 3          | .06   | .08    | 34.3    | 32.6   | 38.5    | 52.4   | 66.0    | 38.5   | 53.2   | .06   | .08   | .06  |
| 4          | .06   | .08    | 34.0    | * 29.2 | 35.4    | 52.4   | 54.7    | 39.4   | 51.3   | .06   | .08   | .06  |
| 5          | .06   | * .08  | 45.9    | 27.8   | 33.4    | 57.5   | 53.0    | * 42.5 | * 46.4 | .06   | .08   | .06  |
| 6          | .06   | .08    | * 48.4  | 28.0   | 33.4    | * 66.3 | * 50.1  | 42.5   | 43.9   | * .06 | * .08 | .06  |
| 7          | .06   | .06    | * 36.8  | 28.0   | 33.4    | 64.0   | 89.0    | 30.3   | 38.5   | .06   | .08   | .06  |
| 8          | .06   | .06    | 24.3    | 28.0   | 40.5    | 63.7   | 89.3    | * 22.2 | 34.0   | .06   | .08   | .06  |
| 9          | .06   | .06    | 22.8    | 28.6   | * 45.0  | 65.4   | 47.0    | 22.2   | 34.0   | .06   | .08   | .06  |
| 10         | .06   | .06    | 41.3    | 32.6   | 45.0    | 65.1   | 47.3    | 30.0   | 32.0   | .06   | .08   | *    |
| 11         | .06   | * .08  | 30.6    | * 36.8 | 43.0    | 64.6   | * 49.0  | 36.8   | 30.0   | .06   | .08   | .06  |
| 12         | .06   | * 5.21 | * 33.7  | 38.8   | 40.8    | 64.3   | 48.7    | 36.5   | * 30.9 | .06   | .08   | .06  |
| 13         | .06   | * 7.31 | 49.8    | 36.0   | 40.5    | * 63.7 | 47.9    | 31.4   | 31.2   | .06   | .08   | .06  |
| 14         | .06   | 4.96   | * 58.1  | 33.7   | 40.5    | 63.4   | 49.8    | 21.1   | 29.7   | .06   | * .06 | .06  |
| 15         | .06   | 4.96   | * 66.3  | 33.4   | 44.7    | 64.0   | 50.4    | * 21.7 | 28.3   | * .06 | * .06 | .06  |
| 16         | .06   | 5.72   | 69.4    | 34.6   | * 48.4  | 64.0   | 45.0    | 21.7   | 29.3   | .06   | .06   | .06  |
| 17         | .06   | 5.95   | 69.4    | 43.6   | 48.4    | 64.0   | 47.6    | 22.6   | 25.0   | .06   | .06   | .06  |
| 18         | .06   | 6.09   | 69.4    | * 50.1 | 44.7    | 64.0   | * 52.1  | 24.8   | 27.9   | * .06 | .06   | .06  |
| 19         | .06   | 6.32   | * 71.6  | 51.0   | 41.3    | 66.0   | 50.1    | 24.8   | * 29.5 | .06   | .06   | .06  |
| 20         | .06   | * 6.32 | 71.1    | 42.5   | 41.3    | * 71.1 | 49.8    | 27.7   | 28.5   | .06   | .06   | .06  |
| 21         | * .06 | 6.32   | * 70.5  | 34.8   | 41.1    | 71.1   | 52.4    | * 34.8 | 27.0   | .06   | .06   | .06  |
| 22         | * .06 | 6.32   | 69.7    | 34.8   | * 47.6  | 65.1   | 51.0    | * 43.0 | 24.3   | .06   | .06   | .06  |
| 23         | .06   | 19.9   | 68.3    | 34.8   | * 50.7  | 62.0   | 49.3    | 31.7   | 18.1   | .06   | .06   | .06  |
| 24         | .06   | 28.9   | 61.2    | 34.8   | 50.7    | 61.7   | 48.1    | 33.7   | 15.2   | .06   | .06   | .06  |
| 25         | .06   | 28.9   | 61.2    | * 33.7 | 47.9    | 61.7   | * 48.7  | 36.2   | 17.6   | .06   | .06   | .06  |
| 26         | .06   | * 28.9 | 62.0    | 32.6   | 44.7    | 65.4   | 48.7    | 36.0   | * 24.3 | .06   | .06   | .06  |
| 27         | .06   | 28.9   | 60.0    | 32.6   | 44.7    | * 69.1 | 48.7    | 35.7   | 22.7   | .06   | .06   | .06  |
| 28         | .06   | 28.9   | * 57.5  | 32.6   | 44.7    | 70.0   | 48.7    | 46.4   | 18.8   | .06   | .06   | .06  |
| 29         | .06   |        | 57.2    | 32.6   | 46.7    | 68.3   | 45.6    | * 54.9 | 17.0   | * .06 | .06   | .06  |
| 30         | .06   |        | 50.4    | 32.6   | * 49.3  | 67.4   | 41.6    | 56.4   | 12.9   | .06   | .06   | .06  |
| 31         | .06   |        | 44.7    |        | 51.0    |        | 41.1    | 57.5   |        | .06   |       | .06  |
| <b>Sum</b> |       | 230.66 | 1,055.3 |        | 1,901.9 |        | 1,083.4 |        | 6.56   |       | 1,86  |      |
|            |       | 1.86   | 1,600.0 |        | 1,337.5 |        | 1,564.4 |        | 928.5  |       | 2.08  |      |

**Current Year 1990****Period 1938-1990**

| Month         | Extreme Gage Metres |     | Extreme-Cubic Metres per Second |        |             | Average | Volume—Thousands of Cubic Metres |                |                |                  |                |
|---------------|---------------------|-----|---------------------------------|--------|-------------|---------|----------------------------------|----------------|----------------|------------------|----------------|
|               | High                | Low | Day                             | % High | Day         |         | Total                            | Average        | Maximum        | Minimum          |                |
| Jan.          |                     |     | 11                              | 0.06   | 11          | 0.06    | 161                              | 4,986          | 146,403        | 23.7             |                |
| Feb.          |                     |     | 124                             | 28.9   | 11          | .06     | 8,24                             | 19,929         | 15,148         | 14.4             |                |
| Mar.          |                     |     | 19                              | 71.6   | 9           | 22.8    | 51.6                             | 138,240        | 109,013        | 138,207          |                |
| Apr.          |                     |     | 19                              | 51.0   | 5           | 27.8    | 35.2                             | 91,178         | 100,460        | 30,675           |                |
| May           |                     |     | 31                              | 51.0   | 15          | 33.4    | 43.1                             | 115,560        | 99,151         | 31,417           |                |
| June          |                     |     | 120                             | 71.1   | 1           | 51.8    | 63.4                             | 164,324        | 131,972        | 508,691          |                |
| July          |                     |     | 1                               | 68.3   | 31          | 41.1    | 50.5                             | 135,164        | 140,906        | 34,748           |                |
| Aug.          |                     |     | 31                              | 57.5   | 14          | 21.1    | 34.9                             | 93,606         | 126,584        | 220,412          |                |
| Sept.         |                     |     | 1                               | 54.7   | 30          | 12.9    | 31.0                             | 80,222         | 62,633         | 223,812          |                |
| Oct.          |                     |     | 1                               | 47.6   | 12          | .06     | .21                              | 567            | 8,326          | 151,369          |                |
| Nov.          |                     |     | 2                               | .14    | 11          | .06     | .07                              | 180            | 4,176          | 101,642          |                |
| Dec.          |                     |     | 11                              | .06    | 11          | .06     | .06                              | 161            | 5,733          | 180,557          |                |
| <b>Yearly</b> |                     |     | <b>71.6</b>                     |        | <b>0.06</b> |         | <b>26.6</b>                      | <b>839,292</b> | <b>809,491</b> | <b>2,215,231</b> | <b>254,198</b> |

\* Discharge measurement made on this day

ø Mean daily

! And other days

## 08-3640.00 RIO GRANDE AT EL PASO, TEXAS

**DESCRIPTION:** Gravity well and water-stage recorder located on the downstream side of the first pier from the left abutment of the Courchesne Bridge at latitude  $31^{\circ}48'10''$ , longitude  $106^{\circ}32'25''$ , and river kilometre 2,021; 8.9 river kilometres upstream from the Paso del Norte Bridge between El Paso, Texas and Cd. Juarez, Chihuahua and 2.7 kilometres upstream from the American Dam at El Paso, Texas. The zero of the gage is 1,134.56 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Mean daily discharges in 1990 were computed by adding the flows in the American Canal and the flows at the river station below the American Dam. Because the mean daily discharges are rounded, the monthly sum for this station may not equal the sum of the monthly sums of the other two stations. Extreme discharges are those passing the El Paso station. In 1990, 17 discharge measurements were made at this station. Records available: 1889 through 1990.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 680 m<sup>3</sup>/sec on June 12, 1990. Min. occasionally no flow. Since Elephant Butte Dam was closed in 1915, the largest peak flow to pass this station was 382 m<sup>3</sup>/sec on September 3, 1925.

|          |           |               |  | Average Flow in Cubic Metres per Second |              |  |  |  |  |  |  |  |  |  |  |  |
|----------|-----------|---------------|--|---|--------------|--|--|--|--|--|--|--|--|--|--|--|
| Daily:   | Max. 671  | June 12, 1990 |  | Min. 0                                  | Occasionally |  |  |  |  |  |  |  |  |  |  |  |
| Monthly: | Max. 405  | June 1990     |  | Min. 0                                  | Occasionally |  |  |  |  |  |  |  |  |  |  |  |
| Yearly:  | Max. 78.7 | 1990          |  | Min. 1.99                               | 1902         |  |  |  |  |  |  |  |  |  |  |  |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day | Jan.   | Feb.   | Mar.   | April  | May    | June   | July   | Aug.   | Sept. | Oct.   | Nov. | Dec.   |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|-------|--------|------|--------|
| 1   | 2.97   | 2.13   | 19.9   | 22.9   | * 11.5 | 18.6   | 27.8   | 28.3   | 26.8  | 21.0   | 5.61 | 3.86   |
| 2   | 3.12   | 2.00   | 19.4   | 19.5   | 12.0   | 20.0   | 30.6   | 22.7   | 28.0  | 22.1   | 5.52 | 3.68   |
| 3   | 3.29   | 1.91   | 19.1   | 23.6   | 15.7   | 24.0   | 32.0   | 25.7   | 29.2  | 23.6   | 5.49 | 3.60   |
| 4   | 2.97   | 1.94   | 20.3   | 23.8   | 26.5   | 28.9   | 32.6   | 20.0   | 27.7  | 17.7   | 5.38 | 3.82   |
| 5   | 2.86   | 2.12   | 24.6   | * 19.5 | 21.1   | 29.7   | 30.6   | 18.9   | 28.1  | 14.3   | 10.2 | 3.99   |
| 6   | 2.83   | * 2.01 | 25.0   | 14.9   | 19.1   | 30.0   | 36.8   | 19.1   | 27.3  | 12.8   | 6.54 | 4.08   |
| 7   | 2.95   | 1.39   | 23.8   | 10.3   | 18.7   | 34.0   | 34.6   | 23.0   | 26.1  | 11.3   | 6.00 | 3.99   |
| 8   | 2.86   | 2.09   | 21.6   | 12.2   | 19.6   | 35.7   | 29.5   | 24.4   | 22.5  | 10.4   | 5.89 | 3.94   |
| 9   | 2.79   | 2.43   | 23.3   | 14.3   | 17.7   | 32.6   | 30.6   | 20.4   | 21.1  | 9.57   | 5.35 | 3.91   |
| 10  | * 2.74 | 2.37   | 18.5   | 14.0   | 17.2   | 36.0   | 32.6   | 11.4   | 20.2  | 9.18   | 5.30 | 3.82   |
| 11  | 2.53   | 2.20   | 14.0   | 13.2   | 16.9   | 36.0   | 29.2   | 8.33   | 19.3  | 8.92   | 5.18 | * 3.82 |
| 12  | 2.21   | 2.08   | 25.4   | 12.0   | 15.9   | 35.7   | 27.4   | 7.50   | 17.4  | 8.69   | 5.07 | 3.82   |
| 13  | 2.15   | 2.05   | 22.7   | 15.9   | 18.4   | 32.6   | 25.8   | 11.4   | 15.4  | 8.50   | 5.01 | 3.82   |
| 14  | 2.16   | 2.07   | 23.9   | 18.5   | 17.7   | 29.7   | 25.3   | 13.6   | 14.1  | 8.18   | 4.98 | 3.77   |
| 15  | 2.17   | 1.91   | 21.1   | 19.8   | * 15.7 | 26.6   | 28.0   | 23.1   | 14.7  | 7.90   | 4.87 | 3.68   |
| 16  | 2.16   | 1.82   | 21.3   | * 17.0 | 14.9   | 27.5   | 34.6   | 19.3   | 15.4  | * 7.73 | 4.76 | 3.71   |
| 17  | 2.13   | 3.09   | 22.5   | * 16.5 | 15.6   | 31.4   | 38.8   | 14.0   | 15.8  | 7.45   | 4.67 | 3.71   |
| 18  | 2.15   | 2.58   | 20.7   | 16.7   | 17.7   | 31.2   | 30.6   | 11.4   | 15.3  | 7.00   | 4.64 | 3.40   |
| 19  | 2.24   | 2.25   | 23.6   | 17.5   | 17.3   | 31.7   | 24.8   | 10.4   | 13.9  | 6.83   | 4.59 | 3.40   |
| 20  | 2.18   | * 2.33 | 24.6   | 20.1   | 18.6   | 32.6   | 26.2   | 13.2   | 11.4  | 6.74   | 4.67 | 3.31   |
| 21  | 2.10   | 2.21   | 27.1   | 26.5   | 16.4   | 28.0   | 36.0   | 17.4   | 14.3  | 6.37   | 4.59 | 3.23   |
| 22  | 2.18   | 2.19   | * 26.8 | 25.3   | 17.5   | 27.9   | 29.2   | 17.0   | 15.3  | 6.37   | 4.45 | 3.26   |
| 23  | 2.31   | 2.09   | 27.5   | 18.1   | 18.1   | 27.9   | 31.2   | 23.6   | 19.3  | 6.32   | 4.36 | 3.17   |
| 24  | 2.25   | 2.10   | 28.6   | 18.2   | 16.1   | 27.6   | * 44.5 | * 39.1 | 44.2  | 6.15   | 4.25 | 3.12   |
| 25  | * 2.03 | 1.82   | 25.2   | 17.4   | 15.6   | 27.4   | 31.4   | 24.3   | 29.5  | 6.12   | 4.16 | 3.03   |
| 26  | 2.06   | * 11.8 | 25.3   | 17.8   | 16.0   | 26.0   | 28.9   | 23.2   | 24.8  | 6.03   | 4.11 | 3.00   |
| 27  | 2.16   | 21.1   | 26.5   | 14.9   | 21.7   | * 24.9 | 25.9   | 24.3   | 16.4  | 5.86   | 3.99 | 3.20   |
| 28  | 2.11   | 19.8   | 28.6   | 12.6   | 19.9   | 26.0   | 25.5   | 23.1   | 16.6  | 5.52   | 3.96 | 3.51   |
| 29  | 2.05   |        | 25.6   | 10.9   | * 20.1 | 26.5   | 27.3   | 22.9   | 16.6  | 5.55   | 3.85 | 3.40   |
| 30  | 2.07   |        | 21.9   | 12.7   | 20.6   | 28.2   | 34.3   | 23.4   | 18.9  | * 5.75 | 3.82 | 3.26   |
| 31  | 2.04   |        | 24.1   | 18.0   |        | 36.2   | 36.2   | 26.4   |       | 5.55   |      | 3.11   |

|       |        |       |       |        |        |        |
|-------|--------|-------|-------|--------|--------|--------|
| Sum   | 105.88 | 516.6 | 874.9 | 610.83 | 295.48 | 110.47 |
| 74.82 | 722.5  | 547.8 | 958.8 | 625.6  | 151.26 |        |

## Current Year 1990

## Period 1938-1990

| Month  | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |      | Average | Total | Volume—Thousands of Cubic Metres |           |         |
|--------|---------------------|------|---------------------------------|------|---------|-------|----------------------------------|-----------|---------|
|        | High                | Low  | Day                             | Day  |         |       | Average                          | Total     | Maximum |
| Jan.   | .87                 | .82  | 3                               | 3.29 | 25      | 2.03  | 2.41                             | 6,464     | 10,745  |
| Feb.   | 1.34                | .79  | 27                              | 21.1 | 7       | 1.39  | 3.78                             | 9,148     | 12,297  |
| Mar.   | 1.66                | 1.20 | 124                             | 28.6 | 11      | 14.0  | 23.3                             | 62,424    | 140,433 |
| Apr.   |                     |      | 21                              | 26.5 | 7       | 10.3  | 17.2                             | 44,634    | 171,563 |
| May    | 1.43                | 1.14 | 4                               | 26.5 | 1       | 11.5  | 17.7                             | 47,330    | 56,799  |
| June   | 1.61                | 1.26 | 110                             | 36.0 | 1       | 18.6  | 29.2                             | 75,591    | 66,699  |
| July   | 1.80                | 1.32 | 24                              | 44.5 | 19      | 21.8  | 30.9                             | 82,840    | 75,781  |
| Aug.   | 1.69                | .98  | 24                              | 39.1 | 12      | 7.50  | 19.7                             | 52,776    | 70,651  |
| Sept.  | 1.58                | .98  | 24                              | 44.2 | 20      | 11.4  | 20.9                             | 54,052    | 47,841  |
| Oct.   | 1.35                | .83  | 3                               | 23.6 | 28      | 5.52  | 9.53                             | 25,529    | 20,867  |
| Nov.   | 1.02                | .77  | 5                               | 10.2 | 30      | 3.82  | 5.04                             | 13,069    | 12,506  |
| Dec.   | .78                 | .74  | 6                               | 4.08 | 26      | 3.00  | 3.56                             | 9,545     | 13,024  |
| Yearly |                     |      | ==                              | 44.5 | ==      | 1.39  | 15.3                             | 483,402   | 485,768 |
|        |                     |      |                                 |      |         |       |                                  | 1,923,317 | 70,867  |

\* Discharge measurement made on this day

ø Mean daily

! And other days

08-3645.00 DIVERSIONS FROM THE RIO GRANDE  
AMERICAN CANAL AT EL PASO, TEXAS

**DESCRIPTION:** Concrete control consisting of two triangular-shaped wingwalls extending toward the center of the canal about one-fourth of the canal width and downstream at a 30° angle with the canal side walls, bubbler gage, water-stage recorder, and binary decimal transmitter located on the right bank of the concrete-lined canal at El Paso, Texas, latitude 31° 46' 40", longitude 106° 31' 35", and about 0.7 kilometre downstream from the headgates of the American Dam which are located at river kilometre 2,018. The zero of the gage is 1,131.45 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 2 discharge measurements during the year, a stable rating curve at medium and high flows, and a continuous record of gage heights. Records available: June 2, 1938 through 1990.

**REMARKS:** This canal diverts water from the Rio Grande at the American Dam at El Paso, Texas, 3.4 river kilometres upstream from the International Dam at Cd. Juarez, Chihuahua. Water from this canal discharges into the Franklin Canal from which water is frequently returned to the Rio Grande at spillways 3.5, 4.3, and 5.8 river kilometres downstream from the American Dam. The transmitter relays gage height data upon interrogation by telephone via commercial circuits. There was no flow diverted to the American Canal from February 8, 1990 through December 1990 due to seepage of diesel fuel into the canal from the adjacent ASARCO property downstream from the gaging station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 52.1 m<sup>3</sup>/sec on March 27, 1944. Min. frequently no flow.

Average Flow in Cubic Metres per Second

|          |           |               |           |                       |
|----------|-----------|---------------|-----------|-----------------------|
| Daily:   | Max. 42.8 | Aug. 13, 1945 | Min. 0    | Frequently            |
| Monthly: | Max. 34.3 | Aug. 1943     | Min. 0    | Frequently since 1952 |
| Yearly:  | Max. 21.2 | 1943          | Min. 0.24 | 1990                  |

**Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary**

| Day        | Jan.   | Feb.   | Mar. | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|------------|--------|--------|------|-------|-----|------|------|------|-------|------|------|------|
| 1          | 2.97   | 2.13   | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 2          | * 3.12 | 2.00   | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 3          | 3.29   | 1.91   | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 4          | 2.97   | 1.94   | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 5          | 2.86   | * 2.12 | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 6          | 2.83   | 2.01   | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 7          | 2.95   | 1.07   | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 8          | 2.86   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 9          | 2.79   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 10         | 2.74   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 11         | 2.53   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 12         | 2.21   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 13         | 2.15   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 14         | 2.16   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 15         | 2.17   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 16         | 2.16   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 17         | 2.13   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 18         | 2.15   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 19         | 2.24   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 20         | 2.16   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 21         | 2.10   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 22         | 2.18   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 23         | 2.31   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 24         | 2.25   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 25         | 2.03   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 26         | 2.06   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 27         | 2.16   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 28         | 2.11   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 29         | 2.05   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 30         | 2.07   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| 31         | 2.04   | 0      | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| <b>Sum</b> |        | 13.18  | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
|            |        | 74.82  | 0    | 0     | 0   | 0    | 0    | 0    | 0     | 0    | 0    | 0    |

**Current Year 1990**

| Month         | Extreme Gage Metres |      |     | Extreme-Cubic Metres per Second |          |          | Average     | Volume - Thousands of Cubic Metres |                |               |              |  |
|---------------|---------------------|------|-----|---------------------------------|----------|----------|-------------|------------------------------------|----------------|---------------|--------------|--|
|               | High                | Low  | Day | High                            | Day      | Low      |             | Total                              | Average        | Maximum       | Minimum      |  |
|               |                     |      |     |                                 |          |          |             |                                    |                |               |              |  |
| Jan.          | 1.31                | 1.09 | 1 3 | 3.48                            | 25       | 1.73     | 2.41        | 6,464                              | 4,613          | 51,241        | 0            |  |
| Feb.          | 1.16                |      | 5   | 2.42                            | 1 7      | 0        | .47         | 1,139                              | 8,134          | 62,253        | 0            |  |
| Mar.          |                     |      | 1   | 0                               | 1        | 0        | 0           | 0                                  | 38,272         | 69,130        | 0            |  |
| Apr.          |                     |      | 1   | 0                               | 1        | 0        | 0           | 0                                  | 36,244         | 87,408        | 0            |  |
| May           |                     |      | 1   | 0                               | 1        | 0        | 0           | 0                                  | 34,029         | 85,163        | 0            |  |
| June          |                     |      | 1   | 0                               | 1        | 0        | 0           | 0                                  | 44,276         | 80,984        | 0            |  |
| July          |                     |      | 1   | 0                               | 1        | 0        | 0           | 0                                  | 52,187         | 87,171        | 0            |  |
| Aug.          |                     |      | 1   | 0                               | 1        | 0        | 0           | 0                                  | 50,912         | 92,064        | 0            |  |
| Sept.         |                     |      | 1   | 0                               | 1        | 0        | 0           | 0                                  | 34,607         | 77,877        | 0            |  |
| Oct.          |                     |      | 1   | 0                               | 1        | 0        | 0           | 0                                  | 15,891         | 59,131        | 0            |  |
| Nov.          |                     |      | 1   | 0                               | 1        | 0        | 0           | 0                                  | 8,407          | 37,208        | 0            |  |
| Dec.          |                     |      | 1   | 0                               | 1        | 0        | 0           | 0                                  | 8,441          | 55,112        | 0            |  |
| <b>Yearly</b> |                     |      |     | <b>3.48</b>                     | <b>—</b> | <b>0</b> | <b>0.24</b> | <b>7,603</b>                       | <b>336,013</b> | <b>66,068</b> | <b>7,603</b> |  |

C3-3000.00 RIO GRANDE BELOW AMERICAN DAM AT EL PASO, TEXAS  
AND Cd. JUAREZ, CHIHUAHUA

**DESCRIPTION:** Cableway, gravity well, and water-stage recorder located on the left bank of the river at latitude  $31^{\circ} 46' 35''$ , longitude  $106^{\circ} 31' 20''$ , and river kilometre 2,017; 2.4 river kilometres upstream from the International Dam, 5.0 river kilometres upstream from the Paso del Norte Bridge between El Paso, Texas and Cd. Juarez, Chihuahua, and 1.0 river kilometre downstream from the American Dam. The zero of the gage is 1,131.51 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 35 discharge measurements during the year, and a continuous record of gage heights. Computations by shifting control methods. Records available: June 1938 through 1990.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. The operation of the American Dam began June 2, 1938. Part of the flow above the dam is diverted into the American Canal, and the remainder, including excess flood flows, passes below the dam.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 320 m<sup>3</sup>/sec on September 14, 1958 with a gage height of 4.42 metres. Min. occasionally no flow.

## Average Flow in Cubic Metres per Second

|          |           |              |           |              |
|----------|-----------|--------------|-----------|--------------|
| Daily:   | Max. 171  | May 20, 1942 | Min. 0    | Occasionally |
| Monthly: | Max. 138  | May 1942     | Min. 0    | Occasionally |
| Yearly:  | Max. 42.8 | 1942         | Min. 0.39 | 1956         |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.         | Feb.   | Mar.         | April  | May          | June   | July          | Aug.   | Sept.         | Oct.   | Nov.          | Dec.   |
|------------|--------------|--------|--------------|--------|--------------|--------|---------------|--------|---------------|--------|---------------|--------|
| 1          | 0            | 0      | * 19.9       | 22.9   | 11.5         | 18.6   | 27.8          | 28.3   | 26.8          | 21.0   | * 5.61        | 3.85   |
| 2          | 0            | 0      | 19.4         | * 19.5 | 12.0         | 20.0   | 30.6          | 22.7   | 28.0          | 22.1   | 5.52          | 3.68   |
| 3          | 0            | 0      | 19.1         | 23.6   | * 15.7       | 24.0   | 32.0          | 25.7   | 29.2          | * 23.6 | 5.49          | * 3.60 |
| 4          | 0            | 0      | 20.3         | 23.8   | 26.5         | * 28.9 | 32.6          | 20.0   | 27.7          | 17.7   | 5.38          | * 3.82 |
| 5          | 0            | 0      | 24.6         | 19.5   | 21.1         | * 29.7 | 30.6          | * 18.9 | 28.1          | 14.3   | 10.2          | 3.99   |
| 6          | 0            | 0      | 25.0         | 14.9   | 19.1         | * 30.0 | 36.8          | 19.1   | 27.3          | 12.8   | 6.54          | 4.09   |
| 7          | 0            | .32    | 23.8         | 10.3   | 18.7         | * 34.0 | 34.6          | 23.0   | 26.1          | 11.3   | 6.00          | 3.99   |
| 8          | 0            | 2.09   | 21.6         | 12.2   | 19.6         | 35.7   | 29.5          | 24.4   | 22.5          | 10.4   | 5.89          | 3.94   |
| 9          | 0            | 2.43   | 23.3         | 14.3   | 17.7         | 32.6   | 30.6          | 20.4   | 21.1          | 9.57   | 5.35          | 3.91   |
| 10         | 0            | 2.37   | 18.5         | 14.0   | 17.2         | 36.0   | 32.6          | 11.4   | 20.2          | 9.18   | 5.30          | 3.82   |
| 11         | 0            | * 2.20 | 14.0         | * 13.2 | * 16.9       | 36.0   | 29.2          | 8.33   | 19.3          | 8.92   | 5.18          | 3.82   |
| 12         | 0            | * 2.08 | 25.4         | 12.0   | 15.9         | 35.7   | 27.4          | 7.50   | 17.4          | 9.69   | 5.07          | 3.82   |
| 13         | 0            | 2.05   | 22.7         | 15.9   | 18.4         | 32.6   | 25.8          | * 11.4 | * 15.4        | 8.50   | 5.01          | 3.82   |
| 14         | 0            | 2.07   | 23.9         | 18.5   | 17.7         | 29.7   | 25.3          | 13.6   | 14.1          | 8.18   | * 4.98        | 3.77   |
| 15         | 0            | 1.91   | 21.1         | * 19.8 | 15.7         | 26.6   | 28.0          | * 23.1 | 14.7          | 7.90   | 4.87          | 3.68   |
| 16         | 0            | 1.82   | 21.3         | 17.0   | * 14.9       | 27.5   | 34.6          | 19.3   | 15.4          | * 7.73 | 4.76          | 3.71   |
| 17         | 0            | 3.09   | 22.5         | 16.5   | 15.6         | 31.4   | 31.4          | 14.0   | 15.8          | * 7.45 | 4.67          | 3.71   |
| 18         | 0            | 2.58   | 20.7         | 16.7   | 17.7         | 31.2   | * 30.6        | 11.4   | 15.3          | 7.00   | 4.64          | 3.40   |
| 19         | 0            | 2.25   | 23.6         | 17.5   | 17.3         | 31.7   | 24.8          | 10.4   | 13.9          | 6.83   | 4.59          | 3.40   |
| 20         | 0            | 2.33   | 24.6         | 20.1   | 18.6         | 32.6   | 26.2          | * 13.2 | * 11.4        | 6.74   | 4.67          | 3.31   |
| 21         | 0            | 2.21   | * 27.1       | 26.5   | 16.4         | 28.0   | 36.0          | * 17.4 | 14.3          | 6.37   | 4.59          | 3.23   |
| 22         | 0            | 2.19   | 26.8         | 25.3   | * 17.5       | 27.9   | 29.2          | * 17.0 | 15.3          | 6.37   | 4.45          | 3.26   |
| 23         | 0            | 2.09   | 27.5         | 18.1   | * 18.1       | 27.9   | 31.2          | 23.6   | 19.3          | 6.32   | 4.36          | 3.17   |
| 24         | 0            | 2.10   | 28.6         | 18.2   | 16.1         | 27.6   | * 44.5        | 39.1   | * 44.2        | 6.15   | 4.25          | 3.12   |
| 25         | 0            | 1.82   | 25.2         | 17.4   | 15.6         | 27.4   | 31.4          | 24.3   | 29.5          | 6.12   | 4.16          | 3.03   |
| 26         | 0            | 11.8   | 25.3         | * 17.8 | 16.0         | 26.0   | 28.9          | 23.2   | 24.8          | 6.03   | 4.11          | 3.00   |
| 27         | 0            | 21.1   | 26.5         | 14.9   | 21.7         | 24.9   | 25.9          | 24.3   | 16.4          | 5.86   | 3.99          | 3.20   |
| 28         | 0            | * 19.8 | 28.6         | 12.6   | 19.9         | 26.0   | 25.5          | 23.1   | 16.6          | 5.52   | 3.96          | 3.51   |
| 29         | 0            | 25.6   | 10.9         | 20.1   | 26.5         | 27.3   | 22.9          | 16.6   | 16.6          | 5.55   | 3.85          | 3.40   |
| 30         | 0            | 21.9   | 12.7         | 20.6   | 28.2         | 34.3   | 23.4          | 18.9   | 5.75          | 3.82   | 3.26          | 3.17   |
| 31         | 0            | 24.1   | 18.0         |        |              | * 36.2 | 26.4          |        |               | 5.55   |               |        |
| <b>Sum</b> | <b>92.70</b> |        | <b>516.6</b> |        | <b>874.9</b> |        | <b>610.83</b> |        | <b>295.48</b> |        | <b>110.47</b> |        |
|            | 0            | 722.5  |              | 547.8  |              | 958.8  |               | 625.6  |               | 151.26 |               |        |

## Current Year 1990

## Period 1939-1990

| Month         | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |             |          | Average  | Volume - Thousands of Cubic Metres |                |                |                  |               |
|---------------|---------------------|------|---------------------------------|-------------|----------|----------|------------------------------------|----------------|----------------|------------------|---------------|
|               | High                | Low  | Day                             | High        | Low      |          | Total                              | Average        | Maximum        | Minimum          |               |
| Jan.          | !                   | 1    | 0                               | 1           | 0        | 0        | 0                                  | 6,080          | 98,781         | 0                |               |
| Feb.          | 2.17                | .91  | 27                              | 22.1        | ! 1      | 0        | 8,009                              | 3,992          | 60,041         | 0                |               |
| Mar.          | 2.45                | 2.02 | 12                              | 33.4        | 12       | 23.3     | 62,424                             | 7,920          | 79,572         | 99.8             |               |
| Apr.          | 2.47                | 1.93 | 22                              | 31.4        | ! 7      | 9.15     | 44,634                             | 15,405         | 91,915         | 2,752            |               |
| May           | 2.47                | 2.02 | 4                               | 28.3        | 1        | 11.0     | 47,330                             | 22,175         | 369,945        | 31.1             |               |
| June          | 2.68                | 2.24 | 10                              | 37.7        | 1        | 17.7     | 75,591                             | 21,835         | 308,855        | 0                |               |
| July          | 2.85                | 2.32 | 24                              | 55.8        | 19       | 23.7     | 30.9                               | 82,840         | 23,204         | 191,605          | 1,193         |
| Aug.          | 2.74                | 1.95 | 24                              | 43.9        | 12       | 6.74     | 19.7                               | 52,776         | 19,460         | 180,115          | 46.3          |
| Sept.         | 2.89                | 1.93 | 24                              | 70.5        | 20       | 10.5     | 20.9                               | 54,052         | 12,712         | 152,960          | 66.4          |
| Oct.          | 2.43                | 1.74 | 3                               | 26.8        | 30       | 4.81     | 9.53                               | 25,529         | 4,731          | 104,679          | 22.2          |
| Nov.          | 1.99                | 1.67 | 5                               | 12.9        | 30       | 3.74     | 5.04                               | 13,069         | 3,945          | 87,256           | 0             |
| Dec.          | 1.72                | 1.63 | ! 6                             | 4.19        | 25       | 2.83     | 3.56                               | 9,545          | 4,444          | 142,194          | 0             |
| <b>Yearly</b> |                     |      | <b>=</b>                        | <b>70.5</b> | <b>=</b> | <b>0</b> | <b>15.1</b>                        | <b>475,799</b> | <b>145,903</b> | <b>1,349,111</b> | <b>12,337</b> |

\* Discharge measurement made on this day

! And other days

## 08-3655.00 DIVERIONS FROM THE RIO GRANDE

## ACEQUIA MADRE AT CD. JUAREZ, CHIHUAHUA

**DESCRIPTION:** Bridge for making discharge measurements, gravity well, and water-stage recorder located on the right bank of the canal at Cd. Juarez, Chihuahua. Latitude  $31^{\circ}45'40''$ , longitude  $106^{\circ}30'30''$ , about 80 metres downstream from the canal intake at the International Dam at Cd. Juarez, Chihuahua, which is located at river kilometre 2,015 and 3.4 river kilometres downstream from the American Dam at El Paso, Texas.

**RECORDS:** Flow records provided by Mexican Section. Records available: 1938 through 1990. These records, showing the water diverted by Mexico, do not necessarily reflect the quantities of water made available to Mexico in the bed of the river by the United States under the terms of the Convention of 1906. Such quantities of water are included in the record of "Rio Grande below American Dam at El Paso, Texas" on the preceding page of this bulletin.

**REMARKS:** In 1990 all of the 71,977,000 mi<sup>3</sup> tabulated below were distributed to land irrigated in the first unit under the canal.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 13.6 m<sup>3</sup>/sec on July 21, 1944 with a gage height of 1.83 metres. Min. no flow during several months throughout the year.

## Average Flow in Cubic Metres per Second

|          |      |      |              |      |      |                          |
|----------|------|------|--------------|------|------|--------------------------|
| Daily:   | Max. | 9.61 | May 10, 1942 | Min. | 0    | Several months each year |
| Monthly: | Max. | 8.00 | May 1938     | Min. | 0    | Several months each year |
| Yearly:  | Max. | 3.28 | 1942         | Min. | 0.26 | 1964                     |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan. | Feb. | Mar.   | April  | May    | June  | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|------------|------|------|--------|--------|--------|-------|------|------|-------|------|------|------|
| 1          | 0    | 0    | 0      | 4.74   | 4.20   | 4.63  | 4.77 | 4.78 | 4.69  | 0    | 0    | 0    |
| 2          | 0    | 0    | 0      | 4.67   | 4.51   | 4.54  | 4.62 | 4.71 | 4.68  | 0    | 0    | 0    |
| 3          | 0    | 0    | 0      | 4.67   | 4.58   | 4.57  | 4.27 | 4.67 | 4.67  | 0    | 0    | 0    |
| 4          | 0    | 0    | 0      | 4.69   | 4.63   | 4.53  | 4.09 | 4.53 | 4.69  | 0    | 0    | 0    |
| 5          | 0    | 0    | 0      | 4.66   | 4.85   | 4.66  | 4.12 | 4.27 | 4.69  | 0    | 0    | 0    |
| 6          | 0    | 0    | 0      | 4.64   | 4.78   | 4.65  | 3.84 | 4.36 | 4.72  | 0    | 0    | 0    |
| 7          | 0    | 0    | 0      | 4.56   | 4.74   | 4.69  | 4.53 | 4.44 | 4.58  | 0    | 0    | 0    |
| 8          | 0    | 0    | 0      | 4.67   | 4.77   | 4.66  | 4.70 | 4.48 | 4.28  | 0    | 0    | 0    |
| 9          | 0    | 0    | 0      | 4.68   | 4.84   | 4.60  | 4.84 | 4.63 | 4.85  | 0    | 0    | 0    |
| 10         | 0    | 0    | 0      | 4.69   | 4.96   | 4.53  | 4.96 | 4.41 | 4.77  | 0    | 0    | 0    |
| 11         | 0    | 0    | 0      | 4.81   | 4.98   | 4.52  | 4.97 | 4.22 | 4.79  | 0    | 0    | 0    |
| 12         | 0    | 0    | 0      | 4.84   | 5.02   | 4.57  | 4.94 | 4.26 | 4.76  | 0    | 0    | 0    |
| 13         | 0    | 0    | 0      | 4.84   | 4.99   | 4.68  | 4.93 | 4.01 | 2.24  | 0    | 0    | 0    |
| 14         | 0    | 0    | 0      | 4.81   | 5.01   | 4.79  | 4.93 | 4.08 | .72   | 0    | 0    | 0    |
| 15         | 0    | 0    | 0      | 4.67   | 5.09   | 4.93  | 4.96 | 4.24 | .72   | 0    | 0    | 0    |
| 16         | 0    | 0    | 0      | 4.60   | 5.09   | 5.00  | 4.91 | 4.55 | .72   | 0    | 0    | 0    |
| 17         | 0    | 0    | 0      | 4.69   | 5.13   | 4.98  | 4.90 | 4.41 | .73   | 0    | 0    | 0    |
| 18         | 0    | 0    | 0      | 4.65   | 5.17   | 5.02  | 5.47 | 4.56 | .75   | 0    | 0    | 0    |
| 19         | 0    | 0    | 0      | 2.71   | 4.40   | 5.19  | 5.03 | 5.40 | 4.54  | .74  | 0    | 0    |
| 20         | 0    | 0    | 3.85   | 4.43   | 5.19   | 4.96  | 5.00 | 4.49 | .64   | 0    | 0    | 0    |
| 21         | 0    | 0    | 3.31   | 4.54   | 5.20   | 5.09  | 5.06 | 4.19 | .66   | 0    | 0    | 0    |
| 22         | 0    | 0    | 3.26   | 4.39   | 5.21   | 5.14  | 3.78 | 4.21 | .69   | 0    | 0    | 0    |
| 23         | 0    | 0    | 3.28   | 4.38   | 5.18   | 5.04  | 4.88 | 2.89 | .64   | 0    | 0    | 0    |
| 24         | 0    | 0    | 3.37   | 4.51   | 5.21   | 5.03  | 4.48 | 3.10 | .49   | 0    | 0    | 0    |
| 25         | 0    | 0    | 3.40   | 4.76   | 5.30   | 5.09  | 5.15 | 2.44 | .40   | 0    | 0    | 0    |
| 26         | 0    | 0    | 4.24   | 4.75   | 5.39   | 5.10  | 4.56 | 2.48 | .29   | 0    | 0    | 0    |
| 27         | 0    | 0    | 4.93   | 4.71   | 5.11   | 5.15  | 3.59 | 2.64 | .29   | 0    | 0    | 0    |
| 28         | 0    | 0    | 5.02   | 4.73   | 5.06   | 5.20  | 4.58 | 3.69 | .29   | 0    | 0    | 0    |
| 29         | 0    | 0    | 5.01   | 4.74   | 5.01   | 5.19  | 4.58 | 4.39 | .29   | 0    | 0    | 0    |
| 30         | 0    | 0    | 5.04   | 4.72   | 4.94   | 5.25  | 4.38 | 4.46 | .29   | 0    | 0    | 0    |
| 31         | 0    | 0    | 5.13   | 4.86   | 4.86   | 4.45  | 4.64 | 0    | 0     | 0    | 0    | 0    |
| <b>Sum</b> | 0    | 0    | 139.64 | 145.82 | 127.44 | 0     | 0    | 0    | 0     | 0    | 0    | 0    |
|            |      |      | 52.55  | 154.19 | 145.67 | 67.76 |      |      |       |      |      |      |

## Current Year 1990

## Period 1938-1990

| Month         | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |      |              | Average | Volume - Thousands of Cubic Metres |         |         |         |       |
|---------------|---------------------|------|---------------------------------|------|--------------|---------|------------------------------------|---------|---------|---------|-------|
|               | High                | Low  | Day                             | High | Day          |         | Total                              | Average | Maximum | Minimum |       |
| Jan.          | 0                   | 0    | ! 1                             | 0    | ! 1          | 0       | 0                                  | 47.3    | 2,504   | 0       |       |
| Feb.          | 0                   | 0    | ! 1                             | 0    | ! 1          | 0       | 0                                  | 175     | 9,263   | 0       |       |
| Mar.          | 1.74                | 1.24 | 31                              | 5.30 | ! 1          | 0       | 1.70                               | 4,540   | 2,086   | 0       |       |
| Apr.          | 1.74                | 1.51 | 1                               | 4.99 | 23           | 4.38    | 4.65                               | 12,065  | 10,323  | 15,274  |       |
| May           | 1.92                | 1.61 | 27                              | 5.58 | 4            | 4.00    | 4.97                               | 13,322  | 10,990  | 21,438  |       |
| June          | 2.00                | 1.45 | 22                              | 5.47 | 4            | 3.31    | 4.86                               | 12,599  | 10,685  | 19,366  |       |
| July          | 2.26                | 0    | 27                              | 7.65 | x            | 0       | 4.70                               | 12,586  | 10,940  | 18,712  |       |
| Aug.          | 2.00                | 1.30 | 12                              | 5.21 | 25           | 2.44    | 4.11                               | 11,011  | 10,639  | 15,567  |       |
| Sept.         | 2.01                | .73  | 8                               | 5.29 | 26           | .25     | 2.26                               | 5,854   | 5,600   | 15,270  |       |
| Oct.          | 0                   | 0    | ! 1                             | 0    | ! 1          | 0       | 0                                  | 0       | 1,743   | 0       |       |
| Nov.          | 0                   | 0    | ! 1                             | 0    | ! 1          | 0       | 0                                  | 0       | 0       | 0       |       |
| Dec.          | 0                   | 0    | ! 1                             | 0    | ! 1          | 0       | 0                                  | 0       | 0       | 0       |       |
| <b>Yearly</b> | 2.26                | 0    | <b>=====</b>                    | 7.65 | <b>=====</b> | 0       | 2.28                               | 71,977  | 61,554  | 103,526 | 8,206 |

\* Discharge measurement made on this day

0 Mean daily

! And other days

x Various days

08-3705.00 RIO GRANDE AT FORT QUITMAN, TEXAS  
NEAR COLONIA LUIS LEON, CHIHUAHUA

**DESCRIPTION:** Cableway, bubbler gage, and water-stage recorder located on the left bank of the rectified channel of the Rio Grande at latitude  $31^{\circ}05'10''$ , longitude  $105^{\circ}36'30''$ , and river kilometre 1,888; 2.4 river kilometres downstream from Old Fort Quitman, 14.5 kilometres southeast of Esperanza, Texas, and 28.2 kilometres southeast of McNary, Texas. The zero of the gage is 1,052.35 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 21 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: 1889 through 1990.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station.

**EXTREME FLOWS FROM RECORDS\*\*:** Momentary: Max. 300 m<sup>3</sup>/sec October 5, 1946 with a gage height of 3.05 metres. Min. frequently no flow.

## Average Flow in Cubic Metres per Second \*\*

|                   |              |           |                           |
|-------------------|--------------|-----------|---------------------------|
| Daily: Max. 167   | May 19, 1942 | Min. 0    | Frequently                |
| Monthly: Max. 142 | May 1942     | Min. 0    | Several months since 1951 |
| Yearly: Max. 49.6 | 1942         | Min. 0.07 | 1965                      |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan. | Feb.         | Mar.   | April         | May    | June         | July   | Aug.          | Sept.  | Oct.          | Nov.   | Dec.          |
|------------|------|--------------|--------|---------------|--------|--------------|--------|---------------|--------|---------------|--------|---------------|
| 1          | 4.28 | 2.86         | * 2.11 | 5.83          | 5.04   | 1.48         | 0.90   | 21.0          | 2.95   | 80.4          | 6.97   | 7.02          |
| 2          | 4.25 | 2.44         | 2.06   | 6.29          | * 4.50 | 1.09         | .95    | 22.9          | 2.74   | 79.3          | 8.58   | 7.59          |
| 3          | 4.25 | 2.40         | 1.96   | 8.01          | 5.32   | 1.06         | 1.00   | * 18.2        | 2.55   | 44.7          | 8.30   | 7.39          |
| 4          | 4.62 | 2.55         | 2.09   | * 7.08        | 4.28   | 1.25         | 1.05   | 19.5          | 2.57   | * 35.4        | 9.60   | 6.91          |
| 5          | 4.47 | 3.00         | 2.17   | 8.30          | 4.76   | 1.02         | * 1.26 | 27.6          | 2.57   | 25.9          | 10.2   | * 6.85        |
| 6          | 4.87 | 3.82         | 2.12   | 10.9          | 6.43   | .91          | .96    | 26.6          | * 7.39 | 19.5          | 10.6   | 7.28          |
| 7          | 4.59 | 3.68         | 2.10   | 8.78          | 6.20   | * .87        | 1.02   | 20.1          | 5.07   | 15.1          | 9.69   | 7.53          |
| 8          | 4.42 | * 3.00       | 2.19   | 7.16          | 4.90   | .86          | 1.27   | 24.7          | 4.13   | 12.9          | 9.09   | 7.53          |
| 9          | 4.02 | 2.79         | 2.01   | 6.40          | 3.79   | .84          | 3.09   | 24.4          | 4.84   | 9.97          | 8.44   | 7.56          |
| 10         | 5.10 | 2.29         | 2.16   | 4.36          | 3.48   | .89          | 1.56   | 23.3          | 5.72   | 10.9          | 8.98   | 7.42          |
| 11         | 4.67 | 2.08         | 2.60   | 4.19          | 4.45   | .96          | 1.46   | 18.7          | 6.00   | 10.3          | 15.1   | 7.25          |
| 12         | 4.28 | 2.20         | 2.44   | 4.39          | 3.37   | .80          | 1.44   | 23.9          | 5.49   | 10.3          | 14.0   | 7.19          |
| 13         | 3.74 | 2.10         | 2.41   | 4.56          | 3.51   | .85          | 1.50   | 21.6          | 6.00   | 10.5          | 12.7   | 7.05          |
| 14         | 3.74 | 2.02         | 2.30   | 4.33          | 3.79   | .94          | 1.54   | 20.9          | 6.77   | 12.0          | 9.49   | 7.22          |
| 15         | 3.99 | 2.06         | 2.25   | 5.21          | 3.12   | .91          | 1.63   | 24.9          | 7.48   | 10.3          | 8.38   | 6.85          |
| 16         | 3.88 | 2.04         | 2.33   | 6.66          | * 2.86 | 1.11         | 1.76   | * 38.5        | 8.55   | 8.84          | 8.55   | 7.31          |
| 17         | 2.72 | 2.12         | 2.08   | 5.15          | * 2.68 | .93          | 2.16   | 32.0          | 8.01   | 10.6          | 8.92   | 6.85          |
| 18         | 2.53 | 2.07         | 2.10   | 4.53          | 2.92   | * .87        | * 3.09 | 25.5          | 10.6   | * 10.1        | 8.16   | 7.65          |
| 19         | 2.78 | 1.97         | 2.17   | 4.19          | 3.14   | .86          | 2.92   | 21.7          | * 8.55 | 9.49          | * 8.24 | 6.77          |
| 20         | 2.66 | 2.06         | 2.05   | 3.85          | 3.62   | .86          | 2.26   | 20.8          | 12.4   | 12.0          | 7.84   | 6.74          |
| 21         | 2.71 | 1.85         | 2.07   | 4.36          | 3.34   | .84          | 2.75   | 23.3          | 9.43   | 16.3          | 8.10   | 6.74          |
| 22         | 2.95 | 1.78         | 2.02   | 5.41          | 2.71   | .85          | 5.81   | 25.8          | 7.79   | 13.1          | 9.91   | 6.85          |
| 23         | 3.09 | 1.67         | 2.16   | 7.11          | 2.60   | .92          | 6.66   | 15.5          | 8.81   | 8.44          | 8.84   | 6.43          |
| 24         | 2.56 | 1.50         | 2.31   | * 10.0        | 2.57   | 1.04         | 5.35   | 12.6          | 16.2   | 7.76          | 7.76   | 5.64          |
| 25         | 2.34 | 1.42         | 2.95   | 7.05          | 2.81   | 1.05         | 9.12   | 18.9          | 39.6   | 7.87          | 7.67   | 5.41          |
| 26         | 3.37 | 1.44         | 3.00   | 6.12          | 2.60   | 1.54         | * 16.6 | 23.9          | * 30.9 | 8.44          | 7.53   | 5.41          |
| 27         | 3.77 | 1.32         | 2.89   | 5.52          | 2.31   | 1.18         | 6.88   | 21.4          | 24.3   | 9.94          | 6.94   | 5.30          |
| 28         | 3.26 | 1.54         | 3.23   | 5.61          | 2.60   | .92          | 14.7   | 10.8          | 17.2   | 11.3          | 7.00   | 5.32          |
| 29         | 3.37 | 4.47         | 5.43   | 2.29          | .89    | 30.6         | 5.10   | 11.8          | 9.63   | 6.85          | 5.78   |               |
| 30         | 2.97 | 6.43         | 6.43   | 1.84          | .91    | 24.8         | 3.82   | 29.7          | 7.22   | 6.68          | 5.83   |               |
| 31         | 2.92 | 6.63         |        | 1.44          | 18.1   |              | 3.34   |               | 8.01   |               | 5.78   |               |
| <b>Sum</b> |      | <b>62.07</b> |        | <b>182.68</b> |        | <b>29.50</b> |        | <b>641.26</b> |        | <b>546.51</b> |        | <b>208.45</b> |
|            |      | 113.17       |        | 81.86         |        | 109.27       |        | 174.19        |        | 316.11        |        | 269.11        |

## Current Year 1990

## Period 1938-1990

| Month         | Extreme Gage Metres |             | Extreme-Cubic Metres per Second |            |              | Average     | Volume - Thousands of Cubic Metres |                |                |                  |              |
|---------------|---------------------|-------------|---------------------------------|------------|--------------|-------------|------------------------------------|----------------|----------------|------------------|--------------|
|               | High                | Low         | Day                             | High       | Day          |             | Total                              | Average        | Maximum        | Minimum          |              |
| Jan.          | 1.42                | 1.20        | 6                               | 5.72       | 17           | 2.21        | 3.65                               | 9,778          | 9,508          | 96,674           | 0            |
| Feb.          | 1.31                | 1.09        | ! 6                             | 3.99       | 27           | 1.22        | 2.22                               | 5,363          | 7,759          | 68,720           | 0            |
| Mar.          | 1.41                | 1.12        | 30                              | 7.33       | 1            | 1.50        | 2.64                               | 7,073          | 7,614          | 72,889           | 0            |
| Apr.          | 1.57                | 1.20        | 6                               | 13.8       | 11           | 3.37        | 6.09                               | 15,784         | 9,414          | 94,942           | 0            |
| May           | 1.44                | 1.12        | 6                               | 7.50       | 31           | 1.16        | 3.52                               | 9,441          | 15,682         | 381,665          | 0            |
| June          | 1.21                | 1.06        | 1                               | 1.97       | 114          | .76         | .98                                | 2,549          | 13,287         | 295,595          | 0            |
| July          | 2.15                | 1.05        | 30                              | 45.0       | 2            | .84         | 5.62                               | 15,050         | 17,713         | 173,266          | 4.7          |
| Aug.          | 2.21                | 1.12        | 16                              | 58.6       | 29           | 2.35        | 20.7                               | 55,405         | 17,932         | 158,563          | 20.6         |
| Sept.         | 3.04                | 1.11        | 30                              | 162        | 2            | 2.14        | 10.5                               | 27,312         | 20,324         | 181,266          | 0            |
| Oct.          | 3.05                | 1.34        | 1                               | 163        | 30           | 5.92        | 17.6                               | 47,218         | 18,052         | 114,377          | 0            |
| Nov.          | 1.70                | 1.35        | 11                              | 16.3       | 28           | 4.90        | 8.97                               | 23,251         | 12,248         | 106,523          | 0            |
| Dec.          | 1.59                | 1.29        | 3                               | 10.6       | 3            | 3.57        | 6.72                               | 18,010         | 12,799         | 152,593          | 0            |
| <b>Yearly</b> | <b>3.05</b>         | <b>1.05</b> | <b>=====</b>                    | <b>163</b> | <b>=====</b> | <b>0.76</b> | <b>7.49</b>                        | <b>236,234</b> | <b>162,332</b> | <b>1,569,390</b> | <b>2,050</b> |

\* Discharge measurement made on this day

! And other days

\*\* Period 1924-1990

08-3712.00 RIO GRANDE NEAR CANDELARIA, TEXAS  
AND SAN ANTONIO DEL BRAVO, CHIHUAHUA

**DESCRIPTION:** Cableway, gravity well, and digital recorder located on the left bank of the Rio Grande at San Antonio Diversion Dam, latitude  $30^{\circ}10'30''$ , longitude  $104^{\circ}41'10''$  and river kilometre 1,672, 0.5 river kilometre upstream from Capote Creek and about 4.0 kilometres north of Candelaria, Texas and San Antonio, Chihuahua. The zero of the gage is 871.11 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 26 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: November 19, 1975 through 1990.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the flow at this station. Prior to June 1979 the zero of the gage was 871.07 metres above mean sea level, U. S. C. & G. S. datum.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 561 m<sup>3</sup>/sec on September 30, 1978 with a gage height of 3.31 metres. Min. frequently no flow.

Average Flow in Cubic Metres per Second\*\*

|          |      |      |               |  |      |      |            |
|----------|------|------|---------------|--|------|------|------------|
| Daily:   | Max. | 222  | Dec. 23, 1986 |  | Min. | 0    | Frequently |
| Monthly: | Max. | 72.2 | Dec. 1986     |  | Min. | 0    | Frequently |
| Yearly:  | Max. | 37.8 | 1987          |  | Min. | 0.59 | 1977       |

**Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary**

| Day        | Jan.   | Feb.   | Mar.   | April  | May    | June  | July   | Aug.     | Sept.  | Oct.     | Nov.   | Dec.   |      |
|------------|--------|--------|--------|--------|--------|-------|--------|----------|--------|----------|--------|--------|------|
| 1          | 3.96   | * 3.14 | 2.10   | 2.27   | 3.37   | 0.88  | 0      | 32.0     | 12.3   | 32.0     | 9.54   | 6.88   |      |
| 2          | 3.96   | 2.97   | 2.00   | 2.44   | * 3.17 | .81   | 0      | 14.8     | 8.72   | 72.2     | 9.74   | 6.40   |      |
| 3          | * 3.99 | 2.89   | 1.95   | * 3.06 | 3.09   | * .76 | * 1.56 | 9.71     | 6.49   | 85.8     | 9.20   | 6.15   |      |
| 4          | 4.08   | 2.74   | 1.85   | 3.46   | 3.06   | * .61 | 2.55   | 24.0     | 5.75   | 87.5     | 8.84   | * 6.17 |      |
| 5          | 4.08   | 2.62   | 1.91   | 3.34   | 2.67   | .50   | 1.53   | 26.9     | 5.69   | 93.7     | 8.69   | 6.49   |      |
| 6          | 3.94   | 2.51   | 2.00   | 3.29   | 2.45   | .40   | .42    | * 32.6   | 5.47   | 96.6     | * 8.86 | 6.68   |      |
| 7          | 3.88   | 2.38   | 1.90   | 3.51   | 2.58   | .29   | .31    | 27.1     | 4.79   | 96.3     | 9.01   | 6.63   |      |
| 8          | 3.91   | 2.33   | 1.80   | 3.71   | 2.42   | .20   | .25    | 23.0     | 4.70   | 94.6     | 9.32   | 6.51   |      |
| 9          | 3.91   | 2.42   | 1.87   | 3.79   | 2.42   | .18   | .21    | 26.3     | 5.38   | 93.7     | 9.40   | 6.51   |      |
| 10         | 3.96   | 2.53   | 1.76   | 4.11   | 2.83   | .18   | .44    | 18.9     | 5.44   | 93.7     | 9.32   | 6.71   |      |
| 11         | 3.88   | 2.50   | 1.70   | 4.30   | 3.09   | .12   | .41    | 22.8     | * 5.04 | 93.5     | 9.63   | 6.80   |      |
| 12         | 3.77   | 2.47   | 1.68   | 4.30   | 2.76   | * .08 | .25    | 22.1     | 4.42   | 51.5     | 10.2   | 6.94   |      |
| 13         | 3.65   | 2.38   | 1.61   | 3.99   | 2.32   | .05   | .18    | 22.6     | 4.25   | 17.6     | 10.3   | 7.19   |      |
| 14         | 3.91   | 2.28   | 1.53   | 3.12   | 2.12   | .03   | .14    | * 32.6   | 4.39   | 15.0     | 10.2   | 7.33   |      |
| 15         | 4.02   | 2.07   | 1.50   | 2.69   | * 2.30 | .02   | .10    | 29.7     | 17.2   | 14.2     | 10.0   | 7.42   |      |
| 16         | 3.74   | 2.03   | 1.51   | 2.69   | 2.03   | .02   | .22    | 37.7     | 20.5   | 13.2     | 9.46   | 7.56   |      |
| 17         | 3.51   | 2.00   | 1.44   | 2.78   | 1.94   | .01   | * .23  | 58.1     | 10.1   | 12.9     | 8.92   | 7.67   |      |
| 18         | * 3.40 | 1.92   | 1.39   | * 2.77 | 2.62   | * .01 | .20    | 64.6     | 17.0   | 12.6     | 8.47   | * 7.65 |      |
| 19         | 3.48   | 1.85   | 1.35   | 3.23   | 2.01   | .01   | .15    | 78.2     | 23.7   | * 12.5   | 8.33   | 7.50   |      |
| 20         | 3.43   | 1.87   | * 1.29 | 5.07   | 1.60   | .01   | .15    | 82.1     | * 73.3 | 11.4     | 8.16   | 7.53   |      |
| 21         | 3.06   | * 1.80 | 1.37   | 4.28   | 1.52   | 0     | .16    | 71.6     | 222    | 10.8     | * 8.10 | 7.56   |      |
| 22         | 2.79   | 1.85   | 1.40   | 8.92   | 1.35   | .02   | .27    | 55.5     | 121    | 10.4     | 8.13   | 7.76   |      |
| 23         | 2.81   | 1.88   | 1.45   | 9.26   | 1.42   | .01   | 2.00   | * 47.3   | 70.5   | 9.77     | 8.16   | 7.59   |      |
| 24         | 2.83   | 1.95   | 1.73   | 5.72   | 1.53   | 0     | .32    | 33.1     | 52.1   | 9.74     | 7.96   | 7.50   |      |
| 25         | 2.92   | 1.94   | 1.50   | 3.23   | 1.48   | 0     | .15    | 7.56     | 26.4   | * 21.1   | 10.1   | 7.39   |      |
| 26         | 2.82   | 1.98   | 1.49   | 3.34   | 1.23   | 0     | 10.4   | 21.1     | 17.4   | 10.4     | 7.87   | 7.42   |      |
| 27         | 3.03   | 1.98   | 1.69   | 3.68   | 1.13   | 0     | 3.60   | 19.5     | 16.9   | 9.88     | 7.93   | 7.28   |      |
| 28         | 2.89   | 2.01   | 1.57   | 4.13   | 1.11   | 0     | 4.70   | 21.2     | 11.6   | 9.12     | 7.59   | 7.28   |      |
| 29         | 2.75   |        |        | 1.69   | 4.28   | 1.10  | 0      | 8.27     | 15.3   | 10.8     | 9.01   | 7.22   | 7.31 |
| 30         | 2.92   |        |        | 1.89   | 3.79   | 1.01  | 0      | 22.9     | 13.3   | 12.4     | 9.01   | 7.08   | 7.31 |
| 31         | 3.29   |        |        | 2.09   | .91    |       |        | 39.9     | 13.8   | 9.23     |        | 7.25   |      |
| <b>Sum</b> |        | 63.25  |        | 118.55 |        | 5.20  |        | 1,023.91 |        | 1,207.96 |        | 220.37 |      |
|            | 108.67 |        | 52.01  |        | 64.64  |       | 114.38 |          | 803.43 |          | 263.42 |        |      |

**Current Year 1990**

**Period 1975-1990**

| Month         | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |            |          | Average | Volume—Thousands of Cubic Metres |         |         |           |       |
|---------------|---------------------|------|---------------------------------|------------|----------|---------|----------------------------------|---------|---------|-----------|-------|
|               | High                | Low  | Day                             | High       | Day      |         | Total                            | Average | Maximum | Minimum   |       |
| Jan.          | 1.25                | 1.19 | 4                               | 4.13       | 1        | 2.9     | 2.69                             | 3.51    | 9,389   | 20,632    |       |
| Feb.          | 1.22                | 1.17 | 1                               | 3.26       | 21       | 1.80    | 2.26                             | 5,465   | 15,193  | 122,892   |       |
| Mar.          | 1.22                | 1.16 | 1                               | 2.27       | 1        | 1.19    | 1.68                             | 4,494   | 13,831  | 101,919   |       |
| Apr.          | 1.49                | 1.19 | 23                              | 16.2       | 1        | 2.21    | 3.95                             | 10,243  | 14,953  | 91,771    |       |
| May           | 1.27                | 1.16 | 18                              | 3.71       | 31       | .90     | 2.09                             | 5,585   | 19,591  | 159,009   |       |
| June          | 1.20                | .91  | 1                               | .91        | 25       | 0       | .17                              | 449     | 22,162  | 186,724   |       |
| July          | 2.28                | .91  | 25                              | 84.4       | 1        | 0       | 3.69                             | 9,882   | 25,799  | 118,433   |       |
| Aug.          | 2.62                | 1.41 | 13                              | 185        | 3        | 8.69    | 33.0                             | 88,466  | 28,991  | 88,466    |       |
| Sept.         | 4.07                | 1.30 | 21                              | 470        | 12       | 4.13    | 6.21                             | 69,416  | 34,711  | 166,806   |       |
| Oct.          | 2.65                | 1.57 | 5                               | 98.8       | 29       | 8.55    | 39.0                             | 104,368 | 34,189  | 125,576   |       |
| Nov.          | 1.72                | 1.56 | 13                              | 10.9       | 30       | 6.74    | 8.78                             | 22,759  | 21,272  | 132,602   |       |
| Dec.          | 1.60                | 1.51 | 22                              | 8.10       | 30       | 5.83    | 7.11                             | 19,040  | 21,922  | 187,408   |       |
| <b>Yearly</b> | 4.07                | 0.91 | <b>=</b>                        | <b>470</b> | <b>=</b> | 0       | 11.1                             | 349,556 | 273,246 | 1,191,590 | 6,889 |

\* Discharge measurement made on this day

! And other days

\*\* Period November 1975-1990

## WATER BULLETIN NUMBER 60 -- INTERNATIONAL BOUNDARY AND WATER COMMISSION

08-3/15.00 RIO GRANDE ABOVE RIO CONCHOS NEAR PRESIDIO, TEXAS  
AND OJINAGA, CHIHUAHUA

**DESCRIPTION:** Cableway, bubbler gage, and water-stage recorder (graphic and digital) located on the left bank at latitude 29°36'15", longitude 104°27'05", and river kilometre 1,551; 8.0 river kilometres upstream from the international highway bridge between Presidio, Texas and Ojinaga, Chihuahua and 3.8 river kilometres upstream from the confluence with the Rio Conchos. The zero of the gage is 784.29 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 28 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: 1884 through 1990.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. Prior to 1978 the zero of the gage was 785.37 metres above mean sea level, U. S. C. & G. S. datum.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 396 m<sup>3</sup>/sec on June 14, 1905. Highest flow recorded since 1924 was 146 m<sup>3</sup>/sec, with a gage height of 3.22 metres, on May 26, 1942. Min. frequently no flow.

## Average Flow in Cubic Metres per Second\*\*

|          |      |      |                    |      |      |            |
|----------|------|------|--------------------|------|------|------------|
| Daily:   | Max. | 388  | June 13 & 14, 1905 | Min. | 0    | Frequently |
| Monthly: | Max. | 287  | June 1905          | Min. | 0    | Frequently |
| Yearly:  | Max. | 55.8 | 1907               | Min. | 0.04 | 1964       |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.   | Feb.   | Mar.   | April        | May          | June  | July         | Aug.         | Sept.  | Oct.            | Nov.   | Dec.          |
|------------|--------|--------|--------|--------------|--------------|-------|--------------|--------------|--------|-----------------|--------|---------------|
| 1          | 4.22   | * 2.83 | * 2.28 | 1.78         | 4.30         | 0.63  | 0.43         | 13.1         | 14.3   | 41.3            | 9.15   | 9.01          |
| 2          | 3.91   | 3.14   | 2.18   | 1.83         | * 3.54       | .65   | .44          | 13.8         | 13.6   | 41.9            | 9.29   | 8.92          |
| 3          | * 4.05 | 3.03   | 2.46   | * 1.87       | 2.86         | .59   | * .36        | 16.0         | 11.9   | 51.3            | 9.43   | * 8.55        |
| 4          | 3.71   | 3.12   | 2.78   | 2.03         | 2.57         | .59   | 1.35         | 17.4         | 9.09   | * 66.0          | 9.18   | 7.90          |
| 5          | 3.82   | 2.89   | 2.55   | 2.56         | 2.39         | .60   | 4.62         | 15.1         | 7.56   | 94.3            | * 8.89 | 7.67          |
| 6          | 3.96   | 2.72   | 2.21   | 2.92         | 2.44         | * .48 | .51          | 31.7         | 6.54   | 117             | 8.81   | 7.67          |
| 7          | 4.19   | 2.60   | 2.29   | 2.92         | 2.05         | .38   | .35          | 54.7         | 5.89   | 113             | 8.55   | 7.82          |
| 8          | 4.16   | 2.68   | 2.42   | 3.20         | 1.73         | .37   | .31          | 68.3         | 5.38   | 113             | 8.67   | 7.99          |
| 9          | 3.85   | 2.51   | 2.44   | 3.57         | 1.79         | .40   | .32          | 29.2         | 4.93   | 92.0            | 10.2   | 7.93          |
| 10         | 3.91   | 2.23   | 2.42   | 3.82         | 1.61         | .18   | .37          | 20.4         | 4.70   | 78.2            | 9.94   | 7.73          |
| 11         | 3.94   | 2.29   | 2.36   | 3.65         | 1.58         | * .21 | .28          | 15.6         | 5.47   | 72.8            | 10.2   | 7.70          |
| 12         | 4.02   | 2.67   | 2.07   | 3.85         | 2.03         | * .17 | .11          | 13.4         | 5.75   | 70.5            | 10.3   | 8.04          |
| 13         | 3.85   | 2.65   | 1.88   | 3.74         | 2.24         | .23   | 1.26         | * 12.5       | 5.44   | 66.8            | 11.1   | 7.93          |
| 14         | 3.77   | 2.66   | 1.81   | 3.57         | 1.95         | * .21 | .45          | 29.2         | 5.13   | 57.2            | 12.0   | 7.56          |
| 15         | 3.77   | 2.69   | 1.61   | 3.17         | * 1.52       | .29   | .24          | 38.2         | 5.41   | 38.5            | 12.1   | 7.65          |
| 16         | 3.88   | 2.80   | 1.39   | 2.38         | 1.30         | .21   | * .53        | 51.0         | 6.77   | 23.8            | 11.5   | * 8.13        |
| 17         | 3.82   | 2.44   | 1.39   | 1.87         | 1.64         | .20   | * .73        | 43.3         | 12.9   | 21.2            | 11.1   | * 8.07        |
| 18         | *      | 2.35   | 1.54   | * 2.01       | 1.69         | * .20 | .28          | 34.8         | 17.5   | 19.3            | 11.1   | * 8.13        |
| 19         | 3.37   | 2.31   | 1.45   | 2.52         | 1.39         | .28   | .22          | 31.7         | * 11.2 | 18.1            | * 11.0 | 8.10          |
| 20         | 3.46   | 2.18   | * 1.59 | 2.34         | 1.69         | .17   | .16          | 33.1         | 22.5   | 16.5            | 10.2   | 8.13          |
| 21         | 3.62   | * 2.23 | 1.79   | 2.31         | 1.54         | .44   | .21          | 36.5         | 34.3   | 15.3            | 9.71   | 8.07          |
| 22         | 3.40   | 2.10   | 1.89   | 3.91         | 1.13         | .29   | .26          | 40.8         | 57.8   | 13.8            | 9.40   | 7.87          |
| 23         | 2.92   | 2.09   | 2.05   | 3.65         | 1.16         | 1.11  | .44          | 46.7         | 74.2   | 12.9            | 9.35   | 7.73          |
| 24         | 2.89   | 2.19   | 1.91   | 5.35         | .96          | 1.47  | .43          | 54.7         | 65.1   | 12.2            | 9.77   | 7.82          |
| 25         | 2.95   | 2.42   | 1.80   | 6.63         | .84          | .79   | 3.51         | 54.4         | 65.4   | 11.4            | 9.91   | 7.84          |
| 26         | 2.66   | 2.31   | 1.82   | 4.56         | 1.11         | .54   | 6.20         | 47.0         | 47.0   | 11.2            | 9.88   | 7.87          |
| 27         | 2.68   | 2.15   | 1.82   | 2.95         | 1.33         | .28   | 12.9         | 39.9         | 32.3   | 11.5            | 9.63   | 8.16          |
| 28         | 2.86   | 2.18   | 1.87   | 3.06         | 1.17         | .30   | 20.7         | 24.8         | 32.0   | 11.5            | 9.83   | 8.21          |
| 29         | 3.00   |        | 1.68   | 3.46         | 1.02         | .54   | 11.0         | 18.8         | 32.0   | 10.8            | 9.88   | 8.16          |
| 30         | 2.82   |        | 1.60   | 3.85         | .86          | .46   | 15.9         | 18.6         | 28.3   | 9.77            | 9.40   | 8.21          |
| 31         | 2.64   |        | 1.93   |              | .68          |       | 17.0         | 17.0         |        | 9.35            |        | 8.07          |
| <b>Sum</b> |        |        |        | <b>70.46</b> | <b>95.33</b> |       | <b>13.26</b> | <b>981.7</b> |        | <b>1,342.42</b> |        | <b>248.64</b> |
|            | 109.67 |        |        | 61.28        |              | 54.11 |              | 101.87       |        | 650.36          |        | 299.47        |

## Current Year 1990

## Period 1938-1990

| Month         | Extreme Gage Metres |             |           | Extreme-Cubic Metres per Second |           |             | Average     | Volume—Thousands of Cubic Metres |                |                  |              |
|---------------|---------------------|-------------|-----------|---------------------------------|-----------|-------------|-------------|----------------------------------|----------------|------------------|--------------|
|               | High                | Low         | Day       | High                            | Day       | Low         |             | Total                            | Average        | Maximum          | Minimum      |
| Jan.          | 0.06                | 0.44        | 1         | 4.53                            | 125       | 2.61        | 3.54        | 9,475                            | 10,689         | 183,346          | 0            |
| Feb.          | .49                 | .37         | 1         | 3.29                            | 26        | 1.96        | 2.52        | 6,088                            | 8,245          | 119,491          | 0            |
| Mar.          | .45                 | .31         | 3         | 2.92                            | 16        | 1.33        | 1.98        | 5,295                            | 6,530          | 91,778           | 0            |
| Apr.          | .73                 | .35         | 25        | 7.16                            | 18        | 1.65        | 3.18        | 8,237                            | 6,079          | 87,920           | 0            |
| May           | .57                 | .25         | 1         | 4.53                            | 31        | .65         | 1.75        | 4,675                            | 12,177         | 295,521          | 0            |
| June          | .47                 | .08         | 23        | 3.34                            | 11        | .11         | .44         | 1,146                            | 13,596         | 267,019          | 0            |
| July          | 1.44                | .09         | 31        | 26.6                            | 12        | .07         | 3.29        | 8,802                            | 16,949         | 191,983          | 0            |
| Aug.          | 2.66                | .89         | 8         | 88.9                            | 5         | 10.9        | 31.7        | 84,819                           | 18,191         | 164,116          | 0            |
| Sept.         | 2.52                | .53         | 23        | 81.8                            | 14        | 4.53        | 21.7        | 56,191                           | 21,690         | 185,694          | 0            |
| Oct.          | 3.10                | .83         | 6         | 125                             | 31        | 9.15        | 43.3        | 115,985                          | 21,651         | 129,311          | 0            |
| Nov.          | .97                 | .81         | 15        | 12.6                            | 5         | 8.38        | 9.98        | 25,874                           | 10,822         | 125,343          | 0            |
| Dec.          | .82                 | .74         | 1         | 9.06                            | 14        | 7.42        | 8.02        | 21,482                           | 11,183         | 167,944          | 0            |
| <b>Yearly</b> | <b>3.10</b>         | <b>0.08</b> | <b>==</b> | <b>125</b>                      | <b>==</b> | <b>0.07</b> | <b>11.0</b> | <b>348,069</b>                   | <b>157,802</b> | <b>1,450,617</b> | <b>1,174</b> |

\* Discharge measurement made on this day      ! And other days

\*\* Period June 1900-March 1914; September 1919-March 1920; and 1924-1990

08-3/30.00 RIO CONCHOS NEAR OJINAGA, CHIHUAHUA

**DESCRIPTION:** Cableway, gravity well, and water-stage recorder located on the right bank at latitude  $29^{\circ}34'55''$ , longitude  $104^{\circ}25'52''$ , 1.0 river kilometre from the confluence with the Rio Grande, 4.0 kilometres northwest of Ojinaga, Chihuahua, and 6.0 kilometres northwest of Presidio, Texas. This stream enters the Rio Grande at river kilometre 1,547, 18.7 river kilometres upstream from the "Rio Grande below Rio Conchos" Gaging Station. The zero of the gage is 780 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 155 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: 1896 through 1990. Prior to April 1, 1954, flow records were determined from records of the Rio Grande at stations located upstream and downstream from the Rio Conchos confluence.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. La Boquilla Reservoir, La Colina Reservoir, La Rosettilla Reservoir, and Luis L. Leon Reservoir are located 405, 393, 302, and 183 river Kilometres, respectively, upstream from this station. Francisco I. Madero Reservoir is located on the Rio San Pedro, a tributary which enters the Rio Conchos 283 river Kilometres upstream from this station. Power generation facilities: La Boquilla was 14,647 kw., La Colina 3,620 kw., La Rosettilla 5,150 kw., Francisco I. Madero and Luis L. Leon, none. The station was relocated on January 20, 1978 incident to the Rio Grande channel rectification in the Presidio-Ojinaga area.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. (period 1968-1990) 2,020 m<sup>3</sup>/sec, on September 30, 1978. The greatest recorded flow occurred September 11, 1904 with a peak flow estimated at 4,590 m<sup>3</sup>/sec.

## Average Flow in Cubic Metres per Second\*\*

| Daily:   | Max. | "1,490 | Oct. 1, 1978 | Min. | 0.65 | Dec. 19, 1973 |
|----------|------|--------|--------------|------|------|---------------|
| Monthly: | Max. | 302    | Oct. 1978    | Min. | 1.64 | Feb. 1968     |
| Yearly:  | Max. | 66.5   | 1990         | Min. | 13.9 | 1983          |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.   | Feb.   | Mar.   | April  | May    | June   | July   | Aug.     | Sept.  | Oct.    | Nov.   | Dec.    |
|------------|--------|--------|--------|--------|--------|--------|--------|----------|--------|---------|--------|---------|
| 1          | 7.20   | 5.52   | 20.8   | 20.3   | 7.38   | 9.25   | 2.61   | 122 *    | 90.3   | 567     | 103    | 6.96    |
| 2          | 7.67   | * 5.42 | * 20.9 | * 20.3 | 7.46   | 9.03   | 7.41   | * 77.7   | 69.3   | 615 *   | 102    | 6.52    |
| 3          | * 6.20 | 5.75   | 21.1   | 19.8   | 6.60   | 9.09   | * 10.5 | 60.5     | * 40.2 | 571 *   | 99.2   | * 6.06  |
| 4          | 5.01   | 16.1   | 21.2   | * 18.9 | 6.30   | * 9.81 | * 8.62 | 109      | 33.4   | 195     | 98.3   | 5.37    |
| 5          | * 5.23 | * 20.8 | * 21.1 | 15.0   | 6.85   | 9.67   | 23.3   | 142      | * 41.4 | 160 *   | 96.8   | * 4.58  |
| 6          | 5.56   | 20.8   | 20.6   | * 10.8 | 9.14   | * 9.18 | * 9.85 | 153 *    | 43.7   | 188     | * 94.4 | 4.27    |
| 7          | 6.26   | * 21.2 | * 19.7 | 9.71   | * 10.1 | 8.75   | 8.19   | 333 *    | * 39.5 | 226     | * 92.6 | * 4.02  |
| 8          | * 6.84 | 21.9   | 20.8   | 8.97   | 9.51   | * 8.53 | 7.60   | 251 *    | 40.4   | 186 *   | * 89.8 | 3.99    |
| 9          | 6.45   | * 23.1 | * 21.0 | * 8.82 | * 9.13 | 8.22   | * 7.39 | 135 *    | 39.3   | 227 *   | * 89.1 | 4.09    |
| 10         | * 6.33 | 23.0   | 20.8   | 7.96   | 9.00   | 8.08   | 7.03   | 112 *    | * 36.2 | 151 *   | 87.5   | * 4.27  |
| 11         | 6.03   | 22.4   | 20.4   | * 6.31 | * 8.83 | * 7.99 | * 6.73 | 106      | 39.3   | 144     | * 85.8 | 4.31    |
| 12         | * 5.96 | * 20.9 | * 20.3 | 6.76   | 9.11   | 7.98   | 5.48   | 131      | * 46.1 | 140     | * 68.2 | * 4.23  |
| 13         | 6.04   | 21.3   | 19.2   | 6.87   | 9.28   | * 7.65 | * 24.9 | 128 *    | 63.0   | 118     | 61.7   | 4.18    |
| 14         | 6.09   | * 20.6 | 17.6   | 7.59   | * 9.63 | 7.81   | 5.85   | 328 *    | * 47.1 | 130     | * 52.2 | * 4.20  |
| 15         | * 6.27 | 20.6   | 17.7   | 7.26   | 9.68   | * 7.26 | 7.55   | 471 *    | 50.7   | 122 *   | 42.6   | 4.68    |
| 16         | 5.77   | * 21.1 | * 18.1 | * 7.57 | 8.95   | 6.97   | * 18.9 | 502 *    | 69.0   | 117 *   | * 38.3 | 5.35    |
| 17         | * 5.66 | 20.9   | 18.1   | 7.04   | * 9.88 | 7.02   | 12.3   | 540 *    | * 48.4 | 114 *   | * 37.5 | * 4.85  |
| 18         | 5.45   | 21.2   | 18.0   | * 6.75 | 13.5   | * 7.69 | * 11.4 | 442      | * 54.2 | 113     | * 37.5 | * 4.49  |
| 19         | * 5.21 | * 21.8 | * 17.9 | 7.31   | * 11.5 | 7.68   | 9.23   | 404      | * 59.7 | 113 *   | * 37.5 | * 5.73  |
| 20         | 5.25   | 20.9   | 16.6   | * 7.30 | 11.0   | * 6.46 | * 9.73 | 402 *    | * 72.9 | 112     | * 37.5 | * 9.85  |
| 21         | 5.73   | * 20.2 | * 16.0 | 6.37   | * 10.2 | 6.29   | 12.5   | 411 *    | 228 *  | 110     | * 37.5 | * 10.4  |
| 22         | * 6.08 | 20.7   | 15.5   | 12.6   | 8.89   | * 5.82 | 20.0   | 412 *    | 187    | 109 *   | * 37.4 | 11.6    |
| 23         | 5.85   | * 20.3 | * 15.3 | 10.4   | * 8.98 | 4.58   | * 39.3 | 410      | 283    | 108 *   | * 37.0 | 12.0    |
| 24         | * 5.99 | 20.2   | 14.5   | 8.84   | * 9.01 | 4.45   | 14.0   | 474 *    | 254 *  | 108     | 36.6   | 12.5    |
| 25         | 6.07   | 20.2   | 15.4   | 8.40   | 9.22   | * 4.24 | 190 *  | 402      | 303 *  | 101     | 34.6   | 12.9    |
| 26         | * 6.30 | * 20.7 | * 16.6 | 7.22   | 9.15   | 3.89   | 112    | 298      | 381 *  | 105 *   | * 34.6 | * 13.2  |
| 27         | 6.34   | 20.7   | 17.1   | 6.98   | 9.97   | * 3.55 | * 64.2 | 245 *    | 531 *  | 96.5    | 34.6   | 13.0    |
| 28         | 6.13   | * 20.2 | * 16.2 | 6.95   | * 10.2 | 3.54   | 194    | 196 *    | 638 *  | 95.9    | * 34.5 | * 13.0  |
| 29         | * 6.60 | —      | 15.4   | 6.99   | 10.3   | * 2.96 | 274    | 158 *    | 627    | 94.3    | 34.5   | 13.0    |
| 30         | 6.32   | —      | * 16.0 | 7.00   | * 9.78 | 2.51   | 202 *  | 132 *    | 528    | 93.4    | * 34.5 | 13.0    |
| 31         | * 6.28 | —      | 20.3   | —      | 9.28   | —      | 132 *  | 113 *    | —      | 92.6    | —      | * 13.0  |
| <b>Sum</b> |        | 537.99 |        | 293.07 |        | 205.95 |        | 8,200.2  |        | 5,422.7 |        | 239.60  |
|            |        | 188.17 |        | 570.2  |        | 287.77 |        | 1,458.57 |        | 5,064.1 |        | 1,807.3 |

## Current Year 1990

## Period 1968-1990

| Month         | Extreme Gage Metres |      |     | Extreme-Cubic Metres per Second |      |      | Average | Volume - Thousands of Cubic Metres |         |           |         |        |
|---------------|---------------------|------|-----|---------------------------------|------|------|---------|------------------------------------|---------|-----------|---------|--------|
|               | High                | Low  | Day | High                            | Day  | Low  |         | Total                              | Average | Maximum   | Minimum |        |
| Jan.          | 0.88                | 0.80 | 2   | 0                               | 7.67 | 4    | 3.89    | 6.07                               | 16,258  | 39,534    | 161,947 | 14,030 |
| Feb.          | 1.20                | .85  | 12  | 23.6                            | 3    | 5.00 | 19.2    | 46,482                             | 39,011  | 153,428   | 41,115  |        |
| Mar.          | 1.16                | 1.03 | 8   | 21.4                            | 25   | 14.0 | 18.4    | 49,265                             | 57,474  | 248,200   | 51,145  |        |
| Apr.          | 1.18                | .83  | 22  | 22.7                            | 27   | 4.97 | 9.77    | 25,321                             | 50,723  | 110,859   | 6,864   |        |
| May           | 1.17                | .90  | 17  | 21.9                            | 4    | 6.30 | 9.28    | 24,863                             | 58,886  | 152,642   | 13,484  |        |
| June          | .97                 | .72  | 13  | 11.6                            | 30   | 2.29 | 6.87    | 17,194                             | 65,803  | 172,653   | 7,411   |        |
| July          | 3.88                | .72  | 29  | 323                             | 1    | 2.56 | 47.1    | 126,020                            | 79,281  | 190,649   | 20,542  |        |
| Aug.          | 5.54                | 1.64 | 17  | 580                             | 3    | 60.0 | 265     | 708,497                            | 150,066 | 708,497   | 39,136  |        |
| Sept.         | 5.68                | 1.39 | x   | 660                             | 4    | 32.6 | 169     | 437,538                            | 190,179 | 578,107   | 22,069  |        |
| Oct.          | 5.89                | 2.02 | 3   | 715                             | 25   | 87.9 | 175     | 468,521                            | 141,117 | 809,122   | 20,825  |        |
| Nov.          | 2.21                | 1.41 | 1   | 104                             | 126  | 34.5 | 60.2    | 156,151                            | 55,358  | 169,499   | 9,231   |        |
| Dec.          | .85                 | .60  | 26  | 13.4                            | 8    | 3.97 | 7.73    | 20,701                             | 34,094  | 81,371    | 9,107   |        |
| <b>Yearly</b> | 5.89                | 0.60 | =   | 715                             | =    | 2.29 | 66.5    | 2,097,411                          | 961,126 | 2,097,411 | 439,776 |        |

\* Discharge measurement made on this day      0 Mean daily      ! And other days      " Estimated

\*\* Period 1968-1990      x Various days

## 08-3740.00 ALAMITO CREEK NEAR PRESIDIO, TEXAS

**DESCRIPTION:** Gravity well and digital water-stage recorder located on the left bank 91 metres upstream from the highway bridge on Farm-to-Market Road 170 at latitude 29° 31' 25", longitude 101° 17' 15", about 610 metres from the confluence with the Rio Grande, and about 0.7 kilometres southeast of Presidio, Texas. This stream enters the Rio Grande near the lower end of the Presidio Valley at river kilometre 1,529, 13.8 river kilometres downstream from the international highway bridge between Presidio, Texas and Ojinaga, Chihuahua. Measurements of high flows are made from the highway bridge. The zero of the gage is 774.68 metres above mean sea level, U. S. G. & G. S. datum.

**RECORDS:** Based on 58 discharge measurements during the year at low and medium flows, a high flow rating curve determined by slope-area calculations, and a continuous record of gage heights. Computations by shifting control methods. Records available: 1932 through 1990.

**REMARKS:** A small irrigation reservoir (San Esteban) 16.9 kilometres south of Marfa, Texas and irrigation diversions below the reservoir modify the flow of this spring-fed creek. Backwater from the Rio Grande begins to affect the station record when the flow at the station on the Rio Grande below Rio Conchos reaches about 991 m<sup>3</sup>/sec.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 1,600 m<sup>3</sup>/sec, determined by slope-area calculations, on September 2, 1962, with a gage height of 4.13 metres. Min. no flow occasionally.

## Average Flow in Cubic Metres per Second

|          |      |      |                |      |      |              |
|----------|------|------|----------------|------|------|--------------|
| Daily:   | Max. | 351  | Sept. 21, 1974 | Min. | 0    | Occasionally |
| Monthly: | Max. | 28.3 | Sept. 1974     | Min. | 0.01 | July 1980    |
| Yearly:  | Max. | 2.75 | 1974           | Min. | 0.09 | 1982         |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day | Jan.  | Feb.  | Mar.  | April  | May   | June  | July   | Aug.   | Sept.  | Oct.   | Nov.  | Dec.  |
|-----|-------|-------|-------|--------|-------|-------|--------|--------|--------|--------|-------|-------|
| 1   | .05   | * .03 | * .04 | .03    | * .02 | .03   | .07    | 20.6   | .03    | * 53.2 | .04   | .05   |
| 2   | * .03 | .03   | .04   | * .03  | .02   | * .03 | * .04  | * 1.91 | .04    | 1.20   | .08   | * .06 |
| 3   | .03   | .03   | .04   | .03    | .02   | .02   | .02    | 2.21   | .04    | .34    | .03   | * .05 |
| 4   | .03   | .03   | .04   | .03    | .02   | * .02 | .02    | 11.7   | * .05  | .16    | .04   | .05   |
| 5   | .03   | * .03 | * .04 | .03    | .02   | .02   | .02    | 63.2   | .05    | .15    | * .04 | .05   |
| 6   | .03   | .03   | .04   | .03    | .02   | .02   | .02    | * 24.6 | .04    | .14    | .04   | .05   |
| 7   | .03   | .03   | .04   | .03    | * .02 | .02   | .03    | 17.8   | .05    | .14    | .04   | .04   |
| 8   | * .03 | .03   | .04   | .03    | .02   | .02   | .02    | 6.35   | .05    | .14    | .04   | .04   |
| 9   | .03   | .03   | .04   | * .03  | .02   | .02   | * .01  | 1.47   | .04    | .15    | .04   | .04   |
| 10  | .03   | .03   | .04   | .03    | .02   | .02   | .02    | * 2.22 | * .05  | .15    | .04   | * .04 |
| 11  | .03   | * .03 | .03   | .03    | .02   | * .02 | .03    | 1.40   | .09    | .16    | .06   | .04   |
| 12  | .03   | * .03 | * .03 | .04    | .02   | .01   | .04    | 1.06   | .16    | .16    | .04   | .04   |
| 13  | .03   | .03   | .03   | .04    | .03   | .01   | .06    | * 1.01 | .27    | .16    | * .06 | .04   |
| 14  | .03   | .03   | .04   | * .03  | .02   | * .02 | * .01  | 1.95   | .39    | .16    | .04   | .03   |
| 15  | .03   | .03   | .04   | .03    | .03   | .01   | .08    | 13.4   | .59    | * .16  | .05   | .03   |
| 16  | * .03 | .03   | .03   | * .03  | .03   | .04   | * .16  | 3.71   | 2.26   | .13    | .05   | * .03 |
| 17  | .03   | .03   | .03   | .03    | .03   | .03   | .07    | .99    | * 2.04 | .11    | .04   | * .03 |
| 18  | .03   | .03   | .03   | .03    | .03   | .09   | * .03  | .06    | .46    | .97    | .09   | .03   |
| 19  | .03   | * .03 | * .03 | .04    | .03   | .03   | .07    | .08    | .18    | 1.19   | .07   | * .06 |
| 20  | .03   | * .04 | .03   | .04    | .03   | .03   | .09    | * .61  | 1.09   | .06    | .06   | .03   |
| 21  | .03   | .04   | .03   | .04    | * .02 | .02   | .02    | .56    | .53    | * 4.87 | .04   | .03   |
| 22  | * .03 | .03   | .04   | 1.36   | .03   | .02   | .33    | .12    | 22.2   | * .04  | .06   | .03   |
| 23  | .03   | .03   | .03   | * 1.82 | .03   | .02   | * .03  | .08    | 1.50   | .04    | .05   | .03   |
| 24  | .03   | .04   | .03   | .06    | .03   | .02   | * .92  | .07    | .91    | .04    | .05   | * .04 |
| 25  | .03   | .04   | .03   | .03    | .02   | * .02 | * .08  | 17.4   | .06    | * 1.01 | .04   | .05   |
| 26  | .03   | * .04 | * .04 | .02    | .03   | .02   | * 1.31 | .05    | .05    | * .04  | * .05 | .05   |
| 27  | .03   | .04   | .04   | .02    | .02   | .02   | .71    | * .03  | 1.06   | .04    | .04   | .05   |
| 28  | .03   | .04   | .04   | .02    | .03   | .02   | .42    | .03    | 1.05   | .03    | .05   | .05   |
| 29  | * .03 | .03   | .02   | * .03  | .03   | .02   | 22.2   | .03    | 1.03   | * .03  | .05   | .05   |
| 30  | .03   | .03   | .02   | .03    | .03   | .03   | * 49.3 | .04    | 1.61   | .03    | .05   | .04   |
| 31  | .03   | .03   | .03   | .03    | .03   | .03   | .03    | 16.9   | .03    | .03    | .03   | .04   |

|     |      |      |      |        |       |      |
|-----|------|------|------|--------|-------|------|
| Sum | 0.91 | 4.06 | 1.93 | 169.90 | 57.43 | 1.26 |
|     | 0.93 | 1.08 | 0.93 | 111.09 | 45.85 | 1.39 |

## Current Year 1990

## Period 1932-1990

| Month  | Extreme Gage Metres |      |     | Extreme-Cubic Metres per Second |      |      | Volume-Thousands of Cubic Metres |        |         |         |         |
|--------|---------------------|------|-----|---------------------------------|------|------|----------------------------------|--------|---------|---------|---------|
|        | High                | Low  | Day | High                            | Day  | Low  | Average                          | Total  | Average | Maximum | Minimum |
| Jan.   | 1.41                | 1.40 | 3   | 0.04                            | 1.22 | 0.03 | 0.03                             | 80.4   | 161     | 370     | 57.2    |
| Feb.   | 1.40                | 1.39 | 15  | .04                             | 1    | .03  | .03                              | 78.6   | 214     | 3,953   | 51.2    |
| Mar.   | 1.39                | 1.38 | 8   | .04                             | 114  | .03  | .03                              | 93.3   | 180     | 1,256   | 57.2    |
| Apr.   | 1.37                | 1.37 | 22  | 9.58                            | 125  | .02  | .14                              | 351    | 314     | 4,550   | 49.7    |
| May    | 1.58                | 1.41 | 18  | .59                             | 1    | .02  | .02                              | 80.4   | 1,019   | 10,530  | 42.8    |
| June   | 1.90                | 1.40 | 17  | 6.43                            | 112  | .01  | .06                              | 167    | 2,198   | 16,607  | 29.9    |
| July   | 3.18                | 1.26 | 30  | 320                             | 21   | 0    | 3.58                             | 9,594  | 3,507   | 22,813  | 11.7    |
| Aug.   | 3.33                | 1.76 | 5   | 498                             | 29   | .02  | 5.48                             | 11,579 | 2,781   | 20,167  | 60.2    |
| Sept.  | 3.27                | 2.09 | 22  | 86.4                            | 1    | .03  | 1.53                             | 3,961  | 5,232   | 73,294  | 46.3    |
| Oct.   | 3.25                | 2.15 | 1   | 464                             | 127  | .03  | 1.85                             | 1,962  | 2,230   | 23,731  | 45.5    |
| Nov.   | 2.28                | 2.25 | 21  | .06                             | 3    | .03  | .05                              | 120    | .227    | 3,150   | 44.0    |
| Dec.   | 2.27                | 2.25 | 2   | .06                             | 117  | .03  | .04                              | 109    | 170     | 503     | 48.5    |
| Yearly | 3.33                | 1.26 | —   | 498                             | —    | 0    | 1.09                             | 34,280 | 19,233  | 86,682  | 2,804   |

\* Discharge measurement made on this day      ! And other days

05-5402.00 RIO GRANDE BELOW RIO CONCHOS NEAR PRESIDIO, TEXAS  
AND OJINAGA, CHIHUAHUA

**DESCRIPTION:** Cableway, bubbler gage, concrete control weir, water-stage recorders (graphic and digital), and data collection platform located on the left bank at latitude 29° 31' 10", longitude 104° 17' 10", and river kilometre 1,529; 0.6 river kilometre downstream from Alamito Creek and 14.4 river kilometres downstream from the International highway bridge between Presidio, Texas and Ojinaga, Chihuahua. The zero of the gage is 771.75 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 32 discharge measurements during the year and a continuous record of gage heights. Computations for high flows by shifting control methods. Low and medium flow computations based on a stable control weir rating curve defined by meter measurements. Records available: 1955 through 1990. Records are also available from 1896 through June 13, 1932 for a station located about 19.5 river kilometres downstream from the Rio Conchos and 2.1 kilometres upstream from Alamito Creek; and from June 14, 1932 through 1954 for a station about 3.2 river kilometres downstream from the Rio Conchos and 18.3 river kilometres upstream from Alamito Creek.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. The data collection platform, operated in cooperation with the National Weather Service, relays gage height data upon interrogation by telephone via commercial circuits. Prior to December 1, 1979, the zero of the gage was 772.97 metres above mean sea level, U. S. C. & G. S. datum.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 1,730 m<sup>3</sup>/sec on September 30, 1978 with a gage height of 4.70 metres. The greatest recorded flow occurred September 11, 1904, with a peak flow estimated at 4,390 m<sup>3</sup>/sec at a station 19.0 kilometres upstream. Min. 0.01 m<sup>3</sup>/sec several days in July 1955, and on June 30, 1958.

## Average Flow in Cubic Metres per Second\*\*

|          |            |              |           |                |
|----------|------------|--------------|-----------|----------------|
| Daily:   | Max. 1,510 | Oct. 1, 1978 | Min. 0.37 | March 27, 1968 |
| Monthly: | Max. 326   | Oct. 1978    | Min. 2.11 | March 1968     |
| Yearly:  | Max. 83.3  | 1990         | Min. 17.0 | 1983           |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day | Jan.   | Feb.   | Mar.   | April  | May    | June   | July     | Aug.     | Sept.   | Oct.  | Nov.    | Dec.   |
|-----|--------|--------|--------|--------|--------|--------|----------|----------|---------|-------|---------|--------|
| 1   | 10.9   | * 8.35 | * 23.9 | 21.4   | 10.1   | 9.83   | 4.79     | 197      | 63.2    | * 668 | 133     | 18.3   |
| 2   | 11.3   | 8.47   | 24.1   | 21.1   | 10.1   | 9.63   | 5.35     | * 113    | 49.6    | 733   | 132     | 17.7   |
| 3   | * 10.3 | 8.38   | 24.3   | * 20.3 | 8.61   | 9.32   | * 13.7   | 68.0     | 47.9    | 790   | 131     | 17.3   |
| 4   | 10.1   | 12.5   | 25.0   | 20.2   | 8.35   | 9.83   | 9.52     | 130      | * 50.4  | 312   | 129     | * 16.0 |
| 5   | 10.3   | 23.9   | 25.0   | 18.1   | 8.47   | * 9.91 | 26.5     | 246      | 52.4    | 237   | 127     | 15.6   |
| 6   | 10.6   | 23.8   | 24.2   | 13.1   | 10.0   | 9.94   | 13.0     | 242      | 54.9    | 274   | * 123   | 15.6   |
| 7   | 11.4   | 24.0   | 23.3   | 11.7   | 10.8   | 9.52   | 9.40     | 450      | 42.8    | 312   | 120     | 15.6   |
| 8   | 12.2   | 24.8   | 23.7   | 11.2   | 10.9   | 8.92   | 8.64     | * 362    | 29.7    | 295   | 117     | 15.6   |
| 9   | * 12.2 | 26.1   | 24.4   | 11.4   | 10.5   | 8.72   | 8.52     | 178      | 30.9    | 334   | 116     | 15.5   |
| 10  | 11.8   | 26.3   | 24.2   | 10.9   | 9.91   | 8.67   | 8.50     | 147      | 30.3    | 237   | 113     | 15.6   |
| 11  | 11.6   | 26.3   | 23.8   | 10.3   | 9.77   | 8.78   | 8.30     | 128      | 32.3    | 222   | 112     | 15.7   |
| 12  | 11.3   | 25.1   | 23.4   | 10.2   | 10.6   | 8.55   | 7.22     | 159      | 39.9    | 216   | 98.6    | 15.9   |
| 13  | 11.2   | * 25.3 | 21.7   | 10.3   | 10.9   | 8.50   | 8.13     | * 169    | 39.9    | 207   | 51.0    | 16.1   |
| 14  | 11.2   | 24.1   | 20.1   | 11.0   | 11.4   | 8.16   | 7.39     | 374      | 44.2    | 199   | 39.6    | 16.0   |
| 15  | 11.4   | 24.0   | 20.1   | 10.8   | * 11.2 | 7.96   | 8.35     | 612      | 51.5    | 180   | 35.4    | 16.1   |
| 16  | 11.3   | 25.0   | 20.3   | 10.6   | 10.1   | 7.39   | * 27.5   | * 513    | 93.5    | 164   | 31.4    | 16.3   |
| 17  | 11.2   | 24.2   | 20.2   | 9.29   | 10.0   | 8.35   | * 14.4   | * 702    | 93.2    | 162   | 29.5    | * 17.1 |
| 18  | * 11.0 | 24.3   | 20.6   | * 8.81 | 15.8   | 8.27   | 12.1     | 595      | 62.9    | * 165 | 28.0    | 16.5   |
| 19  | 10.5   | 25.4   | 20.6   | 9.43   | 13.6   | 8.01   | 11.6     | 501      | * 98.8  | 166   | * 27.1  | 16.6   |
| 20  | 10.3   | 24.2   | * 19.5 | 9.88   | 12.5   | 7.48   | 9.94     | 473      | 109     | 162   | 25.4    | 21.2   |
| 21  | 10.2   | * 23.6 | 19.0   | 8.78   | 12.2   | 6.97   | 14.8     | 487      | 306     | 152   | 23.7    | 21.7   |
| 22  | 10.3   | 23.2   | 18.2   | 15.6   | 10.1   | 7.25   | 17.3     | 484      | 425     | 152   | 22.3    | 22.6   |
| 23  | 9.57   | 23.2   | 17.8   | 17.5   | 9.91   | 6.20   | 49.3     | 481      | 521     | 152   | 21.6    | 22.4   |
| 24  | 9.35   | 23.1   | 16.9   | 13.4   | 9.91   | 6.97   | 17.6     | 569      | 428     | 149   | 21.6    | 22.3   |
| 25  | 9.43   | 23.2   | 17.2   | 14.1   | 10.3   | 6.77   | * 229    | 515      | 419     | 135   | 21.2    | 22.3   |
| 26  | 9.29   | 24.0   | 18.9   | 12.3   | 10.0   | 6.03   | 135      | 360      | 377     | 140   | 21.4    | 22.2   |
| 27  | 9.12   | 24.0   | 19.1   | 9.91   | 10.5   | 5.81   | * 82.7   | * 271    | 521     | 141   | 20.7    | 21.7   |
| 28  | 8.81   | 24.4   | 18.4   | 10.1   | 11.2   | 5.58   | * 220    | 185      | 626     | 140   | 20.0    | 21.0   |
| 29  | 9.03   |        | 16.8   | 9.91   | 11.2   | 5.47   | 357      | 132      | 632     | 139   | 19.7    | 20.6   |
| 30  | 8.81   |        | 16.8   | 10.0   | 10.6   | 4.90   | 269      | 101      | 549     | 138   | 19.1    | 20.3   |
| 31  | 8.52   |        | 20.6   |        | 9.71   | 202    |          | 80.7     |         | 136   |         | 20.1   |
| Sum |        | 623.40 |        | 381.61 |        | 237.69 |          | 10,024.7 |         | 7,609 |         | 567.5  |
|     | 324.56 |        | 652.1  |        | 329.24 |        | 1,816.15 |          | 5,921.3 |       | 1,930.3 |        |

## Current Year 1990

## Period 1968-1990

| Month  | Extreme Gage Metres |      |     | Extreme-Cubic Metres per Second |     |      | Average | Volume - Thousands of Cubic Metres |           |           |         |
|--------|---------------------|------|-----|---------------------------------|-----|------|---------|------------------------------------|-----------|-----------|---------|
|        | High                | Low  | Day | High                            | Day | Low  |         | Total                              | Average   | Maximum   |         |
| Jan.   | 0.95                | 0.84 | 1 8 | 12.5                            | 31  | 8.47 | 10.5    | 28,042                             | 54,005    | 225,647   | 19,820  |
| Feb.   | 1.22                | .87  | 9   | 27.7                            | 1 1 | 8.33 | 22.3    | 53,862                             | 48,909    | 159,491   | 5,853   |
| Mar.   | 1.16                | .98  | 5   | 25.5                            | 125 | 16.1 | 21.0    | 56,341                             | 66,255    | 275,997   | 5,653   |
| Apr.   | 1.35                | .76  | 22  | 34.6                            | 18  | 8.52 | 12.7    | 32,971                             | 60,690    | 199,909   | 8,014   |
| May    | 1.06                | .74  | 18  | 19.8                            | 4   | 8.24 | 10.6    | 28,446                             | 70,155    | 243,287   | 14,983  |
| June   | .95                 | .57  | 17  | 13.8                            | 30  | 4.56 | 7.92    | 20,536                             | 82,619    | 314,438   | 7,311   |
| July   | 3.04                | .57  | 29  | 481                             | 1   | 4.56 | 58.6    | 156,915                            | 100,534   | 276,193   | 23,118  |
| Aug.   | 3.93                | 1.69 | 15  | 810                             | 4   | 62.0 | 323     | 866,134                            | 181,945   | 866,134   | 37,455  |
| Sept.  | 3.87                | 1.45 | 22  | 844                             | 10  | 27.2 | 197     | 511,600                            | 224,755   | 579,520   | 27,740  |
| Oct.   | 4.23                | 1.94 | 3   | 937                             | 25  | 116  | 245     | 557,418                            | 179,687   | 871,689   | 20,688  |
| Nov.   | 2.04                | 1.04 | 4   | 138                             | 30  | 18.6 | 64.3    | 166,778                            | 70,407    | 197,536   | 10,782  |
| Dec.   | 1.15                | .95  | 22  | 23.0                            | 1 8 | 15.3 | 18.3    | 49,032                             | 50,702    | 229,318   | 13,618  |
| Yearly | 4.23                | 0.57 | ==  | 937                             | ==  | 4.56 | 83.3    | 2,628,075                          | 1,190,663 | 2,628,075 | 537,182 |

\* Discharge measurement made on this day

! And other days

\*\* Period 1968-1990

## 08-5715.00 TERLINGUA CREEK NEAR TERLINGUA, TEXAS

**DESCRIPTION:** Cableway, gravity well, and water-stage recorder (graphic and digital) located on the left bank at latitude 29° 11' 50", longitude 103° 36' 20", 4.2 creek kilometres from the confluence with the Rio Grande, and about 13.7 kilometres south of Terlingua, Brewster County, Texas. This creek enters the Rio Grande at river kilometre 1,425, the lower end of Santa Helena Canyon. The zero of the gage is 670.76 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 53 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: 1932 through 1990.

**REMARKS:** Irrigation diversions modify the flow of this spring-fed creek at this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 988 m³/sec on May 24, 1935 with a gage height of 5.36 metres on a gage 0.5 kilometre downstream. Min. no flow on several occasions in 1986.

## Average Flow in Cubic Metres per Second

|          |      |      |              |           |                        |
|----------|------|------|--------------|-----------|------------------------|
| Daily:   | Max. | 487  | June 1, 1937 | Min. 0    | August 14 and 15, 1986 |
| Monthly: | Max. | 32.6 | Sept. 1974   | Min. 0.02 | October 1934           |
| Yearly:  | Max. | 4.28 | 1990         | Min. 0.16 | 1943                   |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan. | Feb.  | Mar.  | April | May    | June   | July   | Aug.   | Sept.  | Oct.   | Nov.  | Dec.  |
|------------|------|-------|-------|-------|--------|--------|--------|--------|--------|--------|-------|-------|
| 1          | 0.04 | 0.04  | 0.03  | 0.04  | * 0.02 | 0.03   | 0.26   | 55.2   | 0.11   | 47.9   | 0.15  | 0.10  |
| 2          | *    | .04   | .04   | .04   | * 0.02 | .03    | * .07  | 6.88   | .10    | 114    | .16   | .10   |
| 3          | .04  | .04   | .03   | * .04 | .02    | .03    | .02    | 6.63   | .19    | 50.4   | .15   | .10   |
| 4          | .04  | .04   | .03   | .04   | .02    | * .03  | .02    | 58.6   | .16    | 5.24   | .14   | .09   |
| 5          | .04  | * .04 | * .03 | .03   | .02    | .03    | * .02  | 47.9   | .11    | 2.66   | .14   | * .09 |
| 6          | .04  | .04   | .03   | .03   | * .02  | .03    | .02    | 248    | .11    | 2.50   | * .14 | .09   |
| 7          | .04  | .04   | .03   | .03   | * .02  | * .03  | .01    | 229    | * .10  | 2.69   | * .14 | .10   |
| 8          | *    | .04   | .04   | .03   | .02    | .02    | .01    | 10.7   | .10    | 1.87   | .14   | * .10 |
| 9          | .04  | .03   | .03   | * .03 | .02    | .18    | * .01  | 12.1   | .09    | 9.03   | .14   | .10   |
| 10         | .04  | .04   | .03   | .03   | .02    | .04    | .01    | 8.16   | .09    | 2.05   | .14   | .10   |
| 11         | .04  | .03   | .03   | .03   | .02    | * .03  | .01    | 6.71   | .08    | * 1.51 | .14   | .11   |
| 12         | .04  | * .03 | * .07 | .04   | .02    | .03    | * .01  | 5.61   | * .42  | .80    | .13   | .11   |
| 13         | .04  | .03   | .03   | .04   | .02    | .03    | .02    | 18.6   | .23    | .52    | .13   | .12   |
| 14         | .04  | .04   | .03   | .05   | * .02  | * 19.7 | .02    | 51.8   | .34    | .35    | * .13 | .12   |
| 15         | .04  | .04   | .03   | .12   | .02    | 6.20   | .14    | 75.3   | 1.07   | .26    | .13   | .12   |
| 16         | .04  | .04   | .04   | .05   | .02    | 1.94   | * .03  | 19.1   | 6.09   | .49    | .13   | .12   |
| 17         | .04  | * .04 | * .05 | .05   | .02    | .40    | .03    | 8.95   | 6.23   | .97    | .12   | .12   |
| 18         | .04  | .04   | .05   | .06   | 13.5   | * .39  | .21    | 6.32   | * 3.29 | 1.25   | .12   | .12   |
| 19         | .03  | .04   | * .05 | .06   | 10.8   | * .07  | * 1.65 | 5.30   | 4.87   | .52    | .12   | * .12 |
| 20         | .03  | * .04 | .05   | .06   | 2.75   | * .03  | .39    | 6.20   | 7.93   | .31    | * .12 | .12   |
| 21         | .03  | .04   | .04   | .36   | * .03  | .02    | .04    | * 16.0 | 12.8   | .21    | .12   | .13   |
| 22         | *    | .03   | .04   | 8.18  | .03    | .03    | 10.0   | 5.44   | 15.0   | .19    | .12   | .12   |
| 23         | .04  | .04   | * .56 | .02   | .03    | * 3.17 | 3.29   | 51.8   | * .18  | .12    | .12   | .12   |
| 24         | .04  | .04   | .03   | .17   | .02    | .03    | 2.66   | 1.90   | 7.31   | .16    | .12   | .12   |
| 25         | .04  | .04   | .03   | .04   | .02    | * .03  | 30.6   | 1.20   | 2.70   | .16    | .12   | .12   |
| 26         | .04  | .03   | * .03 | .03   | .03    | * .03  | * 12.9 | .74    | * 1.53 | .16    | .12   | .12   |
| 27         | .04  | .03   | .03   | .02   | .03    | .02    | 2.34   | 3.33   | 1.10   | .15    | * .12 | .12   |
| 28         | .04  | .03   | .03   | .02   | .03    | * .02  | 4.64   | * .14  | .89    | .15    | .11   | .12   |
| 29         | *    | .04   | .04   | .02   | * .03  | .02    | 3.09   | .13    | 1.27   | .15    | .11   | .13   |
| 30         | .04  | .04   | .04   | .02   | * .03  | .02    | * 20.2 | .12    | 6.71   | .14    | .10   | .12   |
| 31         | .04  | .04   | .04   | .03   | .03    | .03    | 53.8   | .11    | .15    |        |       | .12   |
| <b>Sum</b> |      | 1.05  |       | 10.32 |        | 29.93  |        | 916.46 |        | 250.12 |       | 3.49  |
|            | 1.20 |       | 1.82  |       | 65.37  |        | 146.40 |        | 132.82 |        | 3.87  |       |

## Current Year 1990

## Period 1932-1990

| Month         | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |      |     | Average | Volume-Thousands of Cubic Metres |         |         |         |       |
|---------------|---------------------|------|---------------------------------|------|-----|---------|----------------------------------|---------|---------|---------|-------|
|               | High                | Low  | Day                             | High | Day |         | Total                            | Average | Maximum | Minimum |       |
| Jan.          | 0.51                | 0.50 | 3                               | 0.05 | 119 | 0.03    | 0.04                             | 104     | 233     | 1,079   |       |
| Feb.          | .52                 | .50  | 1                               | .05  | 127 | .03     | .04                              | 90.7    | 281     | 5,431   |       |
| Mar.          | .91                 | .50  | 11                              | 2.17 | 14  | .03     | .06                              | 157     | 301     | 2,978   |       |
| Apr.          | 2.10                | .47  | 22                              | 120  | 127 | .02     | .34                              | 892     | 1,740   | 23,016  |       |
| May           | 2.59                | .46  | 17                              | 244  | 112 | .02     | 2.11                             | 5,648   | 4,394   | 32,095  |       |
| June          | 1.93                | 1.01 | 14                              | 77.6 | 28  | .02     | 1.00                             | 2,586   | 8,454   | 67,640  |       |
| July          | 2.75                | .86  | 31                              | 227  | 17  | .01     | 4.72                             | 12,619  | 9,839   | 35,129  |       |
| Aug.          | 2.99                | .97  | 7                               | 555  | 130 | .11     | 29.6                             | 79,182  | 9,143   | 79,182  |       |
| Sept.         | 2.21                | .79  | 23                              | 103  | 111 | .08     | 4.43                             | 11,476  | 10,952  | 84,339  |       |
| Oct.          | 3.08                | .77  | 2                               | 515  | 129 | .14     | 8.07                             | 21,610  | 4,700   | 34,414  |       |
| Nov.          | .80                 | .77  | 2                               | .25  | 30  | .10     | .13                              | 334     | 593     | 7,015   |       |
| Dec.          | .78                 | .76  | 21                              | .18  | 5   | .09     | .11                              | 302     | 377     | 3,800   |       |
| <b>Yearly</b> | 3.08                | 0.46 | —                               | 555  | —   | 0.01    | 4.28                             | 135,031 | 51,007  | 135,031 | 4,885 |

## 08-0730.00 RIO GRANDE AT JOHNSON RANCH NEAR CASTOLON, TEXAS

## AÑO SANTA ELENA, CHIHUAHUA

**DESCRIPTION:** Cableway, gravity well, digital water-stage recorder, and G.O.E.S. Data Collection Platform located on the left bank at latitude  $29^{\circ}02'05''$ , longitude  $103^{\circ}23'25''$ , and river kilometre 1,388; 2.2 river kilometres upstream from the old Johnson Ranch headquarters, 9.7 river kilometres downstream from Smoky Creek, and 14.8 river kilometres upstream from Chizos Crossing and the Chihuahua-Coahuila state line. The zero of the gage is 623.41 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 73 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: April 1936 through 1990.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. The Data Collection Platform transmits gage heights by radio via NWS G.O.E.S. satellite to NWS computer bank.

**EXTREME FLOWS FROM RECORDS:** Momentary Max. 2,000 m<sup>3</sup>/sec., on September 30, 1978, with a gage height of 8.66 metres. A flow estimated at 2,750 m<sup>3</sup>/sec. with a stage of 7.50 metres occurred at this station site on October 3, 1932. Min. no flow several days in 1953, 1955, 1957, and 1958.

## Average Flow in Cubic Metres per Second\*\*

|          |      |       |              |      |      |               |
|----------|------|-------|--------------|------|------|---------------|
| Daily:   | Max. | 1,850 | Oct. 1, 1978 | Min. | 0.78 | Sept. 9, 1968 |
| Monthly: | Max. | 245   | Oct. 1978    | Min. | 2.74 | April 1976    |
| Yearly:  | Max. | 88.8  | 1990         | Min. | 15.9 | 1983          |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.   | Feb.   | Mar.   | April  | May    | June   | July   | Aug.     | Sept.  | Oct.    | Nov. | Dec.    |
|------------|--------|--------|--------|--------|--------|--------|--------|----------|--------|---------|------|---------|
| 1          | 13.8   | 8.86   | 23.0   | 17.0   | 8.86   | 9.90   | 2.63   | 293      | 119    | 755     | 122  | 19.8    |
| 2          | 13.2   | 9.89   | 22.3   | 20.5   | 8.69   | 8.81   | 3.68   | 210      | 64.9   | 1,020   | 120  | 20.3    |
| 3          | * 13.0 | 8.55   | 23.0   | 20.3   | 8.30   | 9.20   | 2.66   | 110      | 63.2   | 1,410   | 113  | 19.6    |
| 4          | 12.5   | 8.78   | 23.4   | 19.5   | 8.21   | 9.20   | 2.61   | 156      | 56.5   | 855     | 116  | 19.0    |
| 5          | 11.2   | * 9.49 | * 23.6 | 19.5   | 7.05   | 8.86   | 6.09   | 238      | 71.1   | 357     | 114  | * 18.5  |
| 6          | 10.3   | 21.7   | 23.7   | 18.3   | 6.68   | 9.83   | 14.5   | 566      | 49.0   | 304     | 112  | 17.9    |
| 7          | 10.3   | 23.8   | 22.3   | 16.4   | 7.22   | 9.43   | 16.8   | 300      | 50.7   | 388     | 108  | 17.6    |
| 8          | 10.7   | 23.5   | 21.7   | 13.3   | 9.01   | 8.61   | 9.21   | 334      | 50.7   | 318     | 105  | 17.5    |
| 9          | 11.5   | 23.6   | 21.4   | 12.1   | 9.29   | 13.9   | 6.43   | 289      | 48.1   | 379     | 103  | 17.3    |
| 10         | 11.8   | 24.6   | 22.3   | 12.0   | 9.37   | 7.19   | 5.64   | 167      | 47.9   | 306     | 101  | 17.1    |
| 11         | 11.2   | 25.9   | 22.7   | 11.5   | 9.03   | 6.74   | 5.24   | 131      | 46.4   | 218     | 98.6 | 17.0    |
| 12         | 11.1   | 25.4   | 22.1   | 10.8   | 8.72   | 4.79   | 4.98   | 119      | * 50.1 | 234     | 96.6 | 17.0    |
| 13         | 11.0   | 25.5   | 21.6   | 10.3   | 8.86   | 6.63   | 4.70   | 205      | 58.6   | 223     | 84.7 | 17.0    |
| 14         | 10.9   | 24.6   | 19.7   | 10.1   | * 10.1 | 20.2   | 3.88   | 236      | 59.2   | 214     | 52.2 | 17.0    |
| 15         | 11.0   | 24.3   | 19.3   | 10.8   | 10.6   | 9.83   | 5.10   | 484      | 64.6   | 200     | 41.6 | 16.8    |
| 16         | 11.0   | 23.4   | 17.5   | 11.8   | 10.3   | 5.72   | * 6.32 | 484      | 100    | 185     | 37.9 | 16.7    |
| 17         | 10.5   | 23.4   | 17.5   | 11.0   | 13.7   | 4.09   | 25.1   | 459      | 119    | 174     | 34.8 | 16.7    |
| 18         | 9.97   | 23.9   | 17.2   | 9.97   | 113    | 5.21   | 15.5   | 481      | * 98.6 | 167     | 32.6 | 16.8    |
| 19         | 9.95   | 23.2   | * 17.3 | 8.64   | 25.7   | * 5.83 | 11.4   | 442      | 138    | 163     | 30.6 | 16.7    |
| 20         | 8.89   | * 23.8 | 17.6   | 7.87   | 17.7   | 5.41   | 18.2   | 365      | 133    | * 59    | 29.5 | 16.9    |
| 21         | 8.84   | 23.7   | 17.4   | 8.01   | 14.0   | 4.38   | 10.1   | 382      | 314    | 154     | 28.3 | 18.5    |
| 22         | * 8.89 | 22.6   | 17.0   | 20.1   | 13.5   | 4.79   | 14.0   | 377      | 382    | 151     | 26.8 | 20.0    |
| 23         | 9.37   | 21.9   | 16.3   | 43.9   | 12.0   | 4.08   | 59.5   | 392      | 606    | 149 *   | 25.6 | 20.7    |
| 24         | 9.57   | 21.7   | 16.3   | 19.4   | 10.2   | 4.13   | 50.7   | 385      | 470    | 145     | 24.8 | 21.2    |
| 25         | 8.89   | 21.2   | 15.9   | 13.5   | 11.2   | 3.71   | 317    | 422      | 331    | 142     | 24.2 | 21.6    |
| 26         | 8.72   | 21.1   | 15.3   | 13.0   | 13.3   | 3.94   | 274 *  | 413      | 354    | 129     | 23.5 | 22.1    |
| 27         | 8.84   | 21.6   | 16.6   | 12.8   | 11.4   | 3.85   | 137    | 309      | 374    | 135     | 23.0 | 22.5    |
| 28         | 9.01   | 21.9   | 17.1   | 10.5   | 10.3   | 3.34   | 88.4   | 246      | 459    | 133     | 22.3 | 22.5    |
| 29         | 8.72   |        | 17.4   | 8.61   | 12.1   | 2.92   | 250    | 195      | 586    | 131     | 21.6 | 22.6    |
| 30         | 8.34   |        | 16.5   | 8.50   | 10.1   | 2.48   | 317    | 162      | 728    | 127     | 21.3 | 22.8    |
| 31         | 9.09   |        | 15.5   | 10.4   | 3.37   | 138    |        |          |        | 125     |      | 23.0    |
| <b>Sum</b> |        | 580.87 |        | 429.00 |        | 211.88 |        | 9,479    |        | 9,710   |      | 591.7   |
|            |        | 321.79 |        | 599.5  |        | 438.89 |        | 2,024.37 |        | 5,121.6 |      | 1,900.5 |

## Current Year 1990

## Period 1968-1990

| Month         | Extreme Gage Metres |             | Extreme-Cubic Metres per Second |              |          | Average     | Volume—Thousands of Cubic Metres |                  |                  |
|---------------|---------------------|-------------|---------------------------------|--------------|----------|-------------|----------------------------------|------------------|------------------|
|               | High                | Low         | Day                             | High         | Day      |             | Total                            | Average          | Maximum          |
| Jan.          | 0.64                | 0.51        | 2                               | 14.1         | 129      | 8.41        | 10.4                             | 27,803           | 54,155           |
| Feb.          | .86                 | .50         | 11                              | 26.5         | 3        | 8.33        | 20.7                             | 50,187           | 47,855           |
| Mar.          | .82                 | .57         | 6                               | 24.5         | 31       | 14.7        | 19.3                             | 51,797           | 63,362           |
| Apr.          | 1.58                | .46         | 22                              | 97.1         | 20       | 7.33        | 14.3                             | 37,066           | 57,769           |
| May           | 3.28                | .45         | 18                              | 292          | 6        | 6.54        | 14.2                             | 37,920           | 71,936           |
| June          | 1.25                | .27         | 14                              | 58.6         | 30       | 2.20        | 7.06                             | 18,306           | 87,524           |
| July          | 4.93                | .26         | 25                              | 552          | 4        | 2.09        | 65.3                             | 174,906          | 108,499          |
| Aug.          | 5.34                | 1.99        | 6                               | 671          | 3        | 90.6        | 306                              | 818,986          | 186,845          |
| Sept.         | 5.82                | 1.15        | 24                              | 833          | 1        | 45.6        | 204                              | 528,906          | 228,839          |
| Oct.          | 8.04                | 2.39        | 3                               | 1,720        | 26       | 118         | 313                              | 838,944          | 582,309          |
| Nov.          | 2.41                | 1.51        | 1                               | 124          | 30       | 21.0        | 63.4                             | 164,203          | 73,288           |
| Dec.          | 1.51                | 1.41        | 31                              | 23.1         | 18       | 16.4        | 19.1                             | 51,123           | 52,672           |
| <b>Yearly</b> | <b>8.04</b>         | <b>0.26</b> | <b>=</b>                        | <b>1,720</b> | <b>=</b> | <b>2.09</b> | <b>88.8</b>                      | <b>2,800,147</b> | <b>1,233,424</b> |
|               |                     |             |                                 |              |          |             |                                  | <b>2,800,147</b> | <b>499,282</b>   |

\* Discharge measurement made on this day

† And other days

\*\* Period 1968-1990

## 08-3772.00 RIO GRANDE AT FOSTER RANCH NEAR LANGTRY, TEXAS

AND RANCHO SANTA ROSA, COAHUILA

**DESCRIPTION:** Cableway, bubbler gage, concrete control weir, and water-stage recorder (graphic and digital) located on the left bank at latitude  $29^{\circ}46'50''$ , longitude  $101^{\circ}45'30''$ , and river kilometre 1,058; 152 metres downstream from the Terrell-Val Verde County Line, 8.8 kilometres downstream from Lozier Canyon, and about 19.8 kilometres west of Langtry, Texas. The zero of the gage is 352.71 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 34 discharge measurements during the year, 12 by the United States Section and 22 by the Mexican Section of the Commission, and a continuous record of gage heights. Computations for high flows by shifting control methods. Low and medium flow computations based on a stable control weir rating curve defined by meter measurements. Records available: September 1961 through 1990.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. The concrete control weir was placed in operation on February 21, 1967. A computerized radio telemetry system relays gage height data to the Amistad Dam office.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 4,190 m<sup>3</sup>/sec on November 5, 1978 with a gage height of 11.63 metres. Min. 5.32 m<sup>3</sup>/sec on August 19, 1965.

## Average Flow in Cubic Metres per Second\*\*

|          |            |                |           |              |
|----------|------------|----------------|-----------|--------------|
| Daily:   | Max. 2,310 | Sept. 20, 1978 | Min. 6.15 | July 1, 1968 |
| Monthly: | Max. 416   | Oct. 1978      | Min. 9.12 | March 1968   |
| Yearly:  | Max. 105   | 1990           | Min. 23.9 | 1983         |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.         | Feb.   | Mar.         | April  | May           | June   | July          | Aug.  | Sept.         | Oct.  | Nov.         | Dec.   |
|------------|--------------|--------|--------------|--------|---------------|--------|---------------|-------|---------------|-------|--------------|--------|
| 1          | 22.6         | 19.0   | 30.0         | 25.2   | 16.1          | 25.6   | 9.06          | 396   | 203           | 464   | 187          | 37.4   |
| 2          | 22.3         | 19.1   | 28.6         | 24.4   | 15.9          | 19.8   | 8.95          | 394   | 184           | 521   | 182          | 36.8   |
| 3          | 21.5         | 18.9   | 28.6         | 31.7   | 15.7          | 18.5   | 8.69          | 326   | 162           | 589   | 178          | 36.7   |
| 4          | 21.0         | 18.7   | 29.2         | 24.8   | 15.6          | 17.8   | 9.15          | 247   | 138           | 736   | 172          | 34.8   |
| 5          | 20.3         | 18.3   | 28.9         | 26.3   | 15.4          | 17.4   | 8.52          | 265   | 133           | 1,060 | 167          | 34.0   |
| 6          | 14.5         | 17.9   | 29.2         | 28.3   | 15.3          | 16.6   | 9.43          | 312   | 141           | 895   | 160          | 33.4   |
| 7          | 19.4         | 17.2   | 28.9         | 26.7   | 15.0          | 16.6   | 8.80          | 433   | 148           | 385   | 160          | 32.9   |
| 8          | 18.8         | 17.5   | 29.5         | 26.3   | 15.0          | 16.6   | 8.30          | 493   | 155           | 450   | 155          | 32.3   |
| 9          | 18.0         | 25.9   | 29.5         | 14.5   | 16.5          | 10.4   | 354           | 160   | 408           | 153   | 31.4         |        |
| 10         | 17.5         | 29.2   | 29.7         | 23.7   | 11.1          | 16.9   | 19.8          | 343   | 105           | 413   | 152          | 30.9   |
| 11         | 18.0         | 29.5   | 38.8         | 21.2   | 14.8          | 16.6   | 15.9          | 249   | 79.9          | 382   | 149          | 30.9   |
| 12         | 18.4         | 29.5   | 26.3         | 20.1   | 15.8          | 18.7   | 59.8          | 201   | 67.3          | 331   | 149          | 30.3   |
| 13         | 18.8         | 30.3   | 26.5         | 19.8   | 15.9          | 18.0   | 37.4          | 166   | 57.5          | 312   | 144          | 30.0   |
| 14         | 18.8         | 30.6   | 26.7         | 19.8   | 16.2          | 15.7   | 14.6          | 201   | 69.1          | 300   | 182          | 30.0   |
| 15         | 18.9         | 31.2   | 26.5         | 18.8   | 15.9          | 15.5   | 13.5          | 256   | 66.3          | 289 * | 120          | 30.0   |
| 16         | * 19.4       | 30.6   | 25.6         | * 18.0 | 15.6          | 27.9   | * 62.6        | 402   | 88.1          | 275   | 86.4         | 30.0   |
| 17         | 19.6         | 28.6   | 25.2         | 17.9   | 15.3          | 21.6   | 18.4          | 547   | 158 *         | 260   | 71.6         | * 29.7 |
| 18         | 19.6         | 27.3   | 24.9         | 17.3   | 16.9          | * 22.3 | 21.8          | 453   | 173           | 211   | 64.6         | 29.2   |
| 19         | 19.5         | 27.6   | * 24.4       | 18.2   | 11.2          | 15.6   | 39.6          | 476   | 142           | 732   | * 59.8       | 28.6   |
| 20         | 19.3         | 28.6   | 25.9         | 18.4   | 86.1          | 13.1   | 24.1          | 462 * | 123           | 225   | 55.8         | 28.3   |
| 21         | 19.1         | * 29.2 | 26.3         | 17.6   | * 38.2        | 12.3   | 36.0          | 436   | 193           | 219   | 53.5         | 28.6   |
| 22         | 18.5         | 28.6   | 25.9         | 16.8   | 33.1          | 11.7   | 26.6          | 371   | 267           | 208   | 51.0         | 28.0   |
| 23         | 18.2         | 29.2   | 25.9         | 15.9   | 27.7          | 11.9   | 34.6          | 368   | 490           | 193   | 49.3         | 27.5   |
| 24         | 18.4         | 28.9   | 24.8         | 31.7   | 24.5          | 11.5   | 53.0          | 365   | 402           | 193   | 47.0         | 29.5   |
| 25         | 18.2         | 28.6   | 24.0         | 48.1   | 24.2          | 11.1   | 75.0          | 374   | 470           | 201   | 45.0         | 31.7   |
| 26         | 18.3         | 28.6   | 23.3         | 30.9   | 26.4          | 10.7   | 148           | 362   | 379           | 202   | 43.0         | 33.1   |
| 27         | 18.6         | 29.5   | 23.7         | 26.1   | 21.5          | 10.0   | 357           | 394   | 340           | 198   | 41.6         | 33.7   |
| 28         | 18.4         | 28.6   | 24.0         | 20.7   | 20.6          | 9.49   | 250           | 348   | 343           | 190   | 40.2         | 30.0   |
| 29         | 18.4         | 24.8   | 16.8         | 20.8   | 9.23          | 162    | 292           | 365   | 191           | 39.1  | 34.6         |        |
| 30         | 18.5         | 25.2   | 16.4         | 20.9   | 8.92          | 189    | 256           | 411   | 189           | 38.2  | 34.6         |        |
| 31         | 19.6         | 25.2   | 20.1         |        |               | 309    | 225           |       | 188           |       |              | 34.0   |
| <b>Sum</b> | <b>726.7</b> |        | <b>695.8</b> |        | <b>474.14</b> |        | <b>10,757</b> |       | <b>10,943</b> |       | <b>986.4</b> |        |
|            | 594.4        |        | 838.0        |        | 754.1         |        | 2,052.04      |       | 6,208.2       |       | 3,156.1      |        |

## Current Year 1990

## Period 1968-1990

| Month         | Extreme Gage Metres |             | Extreme-Cubic Metres per Second |              | Average  | Volume—Thousands of Cubic Metres |            |                  |                  |                  |                |
|---------------|---------------------|-------------|---------------------------------|--------------|----------|----------------------------------|------------|------------------|------------------|------------------|----------------|
|               | High                | Low         | Day                             | High         | Low      | Total                            | Average    | Maximum          | Minimum          |                  |                |
| Jan.          | 0.66                | 0.59        | ! 1                             | 22.6         | 10       | 14.7                             | 19.2       | 51,356           | 74,868           | 239,323          | 38,661         |
| Feb.          | .74                 | .61         | 15                              | 32.6         | 7        | 16.8                             | 26.0       | 62,787           | 65,381           | 158,832          | 27,673         |
| Mar.          | .91                 | .66         | 11                              | 60.6         | 19       | 21.9                             | 27.0       | 72,403           | 82,549           | 277,246          | 24,409         |
| Apr.          | .89                 | .60         | 25                              | 56.1         | 123      | 15.3                             | 23.2       | 60,113           | 79,498           | 192,692          | 24,916         |
| May           | 1.57                | .58         | 19                              | 231          | 10       | 13.8                             | 24.3       | 65,154           | 95,365           | 247,568          | 35,297         |
| June          | .91                 | .52         | 19                              | 59.5         | 30       | 8.64                             | 15.8       | 40,966           | 116,278          | 321,920          | 27,708         |
| July          | 2.52                | .51         | 31                              | 408          | ! 8      | 7.96                             | 66.2       | 177,296          | 130,203          | 270,029          | 29,447         |
| Aug.          | 3.79                | .87         | 17                              | 640          | 15       | 53.5                             | 317        | 929,405          | 211,887          | 929,405          | 56,093         |
| Sept.         | 3.43                | .88         | 23                              | 572          | 14       | 55.5                             | 207        | 536,388          | 255,059          | 727,799          | 59,971         |
| Oct.          | 6.05                | 1.33        | ! 5                             | 1,270        | 128      | 184                              | 353        | 945,475          | 252,238          | 1,112,382        | 39,637         |
| Nov.          | 1.34                | .78         | 1                               | 190          | 30       | 37.9                             | 105        | 272,687          | 110,073          | 441,434          | 37,497         |
| Dec.          | .77                 | .70         | 1                               | 37.4         | 123      | 27.5                             | 31.8       | 85,225           | 74,016           | 217,549          | 39,502         |
| <b>Yearly</b> | <b>6.05</b>         | <b>0.51</b> | <b>=</b>                        | <b>1,270</b> | <b>=</b> | <b>7.96</b>                      | <b>105</b> | <b>3,299,259</b> | <b>1,547,415</b> | <b>3,299,259</b> | <b>754,478</b> |

\* Discharge measurement made on this day      ! And other days

\*\* Period 1968-1990

## 08-4424.10 PECOS RIVER NEAR LANGTRY, TEXAS

**DESCRIPTION:** Cableway, concrete control weir, bubbler gage, and water-stage recorders (graphic and digital) located on the right bank at latitude  $29^{\circ}48'10''$ , longitude  $101^{\circ}26'45''$ , about 12.1 kilometres east of Langtry, Texas, 15.3 river kilometres upstream from the Pecos High Railroad Bridge, 24.1 river kilometres from the confluence with the Rio Grande. This stream enters the Rio Grande at river kilometre 991, 38.0 river kilometres downstream from Langtry, Texas. The zero of the gage is 345.36 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 35 discharge measurements during the year, 11 by the United States Section and 24 by the Mexican Section of the Commission, and a continuous record of gage heights. Computations for high flows by shifting control methods. Low and medium flow computations based on stable control weir rating curves defined by meter measurements. Records available: July 1967 through 1990. Records are also available for Pecos River near Comstock, 15.3 river kilometres downstream, from March 17 through December 3, 1898 and May 1900 through October 7, 1954; for Pecos River near Shumla, 5.6 river kilometres upstream, from October 8, 1954 through June 1967; and for Pecos River at Mouth near Comstock, from March 1961 through July 2, 1968.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. A computerized radio telemetry system relays gage height data to the Amistad Dam office.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 16,300 m<sup>3</sup>/sec on September 20, 1974 with a gage height of 22.95 metres. The greatest flood of record, which exceeded a gage height of 30.5 metres at this station, occurred on June 28, 1954. The peak discharge was 26,800 m<sup>3</sup>/sec at the gaging station located near the railroad bridge 15.3 river kilometres downstream. Min. 1.65 m<sup>3</sup>/sec on July 27, 1974 with a gage height of 0.45 metres.

|  | Daily:   | Max. | 4,330 | Sept. 20, 1974                          | Min. | 1.69 | Avg. 20, 21, & 22, 1970 |
|--|----------|------|-------|---|------|------|-------------------------|
|  | Monthly: | Max. | 382   | Sept. 1974                              | Min. | 1.93 | August 1970             |
|  | Yearly:  | Max. | 42.5  | 1974                                    | Min. | 3.71 | 1970                    |
|  |          |      |       | Average Flow in Cubic Metres per Second |      |      |                         |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.   | Feb.   | Mar.   | April  | May    | June   | July   | Aug.   | Sept.  | Oct.   | Nov.   | Dec.   |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1          | 4.11   | 4.13   | 3.94   | 3.46   | 3.26   | 5.01   | 2.81   | 4.36   | 4.64   | 10.9   | 7.90   | 6.80   |
| 2          | 4.16   | 4.39   | 4.05   | 3.74   | 3.60   | 4.57   | 2.81   | 6.88   | 4.50   | 10.8   | 7.84   | 6.85   |
| 3          | 4.22   | 4.19   | 3.99   | 3.77   | 3.82   | 4.62   | 2.80   | 6.34   | 4.56   | 32.6   | 7.79   | 6.83   |
| 4          | 4.22   | 3.96   | 4.05   | 3.71   | 3.78   | 4.47   | 2.74   | 5.98   | 4.56   | 21.8   | 7.73   | 6.63   |
| 5          | 4.28   | 3.85   | 3.88   | 3.88   | 3.62   | 4.50   | 2.74   | 5.66   | 4.53   | 15.9   | 7.48   | 6.57   |
| 6          | 4.19   | 3.91   | 4.02   | 4.08   | 3.48   | 4.36   | 2.74   | 75.6   | 4.53   | 14.9   | 7.28   | 6.63   |
| 7          | 4.16   | 3.99   | 4.13   | 4.02   | 3.14   | 4.25   | 2.66   | 14.2   | 4.45   | 13.8   | 7.31   | 6.57   |
| 8          | 4.11   | 4.05   | 4.98   | 3.91   | 3.12   | 4.56   | 2.66   | 9.80   | 4.39   | 16.9   | 7.73   | 6.60   |
| 9          | 4.16   | 4.02   | 4.42   | 3.99   | 3.14   | 4.59   | 2.67   | 8.35   | 4.28   | 16.3   | 8.52   | 6.57   |
| 10         | 4.13   | 3.94   | 4.28   | 4.16   | 2.97   | 4.36   | 2.68   | 7.65   | 5.52   | 11.7   | 8.35   | 6.57   |
| 11         | 4.19   | 3.96   | 4.16   | 3.96   | 2.86   | 4.11   | 2.66   | 7.25   | 4.53   | 11.4   | 8.35   | 6.66   |
| 12         | 4.11   | 3.96   | 4.08   | 3.68   | 2.78   | 3.96   | 2.68   | 6.74   | 5.56   | 11.0   | 8.21   | 6.66   |
| 13         | 3.91   | 4.02   | 3.88   | 3.60   | 2.69   | 3.85   | 3.09   | 6.20   | 5.58   | 10.8   | 7.96   | 6.66   |
| 14         | 3.94   | 4.05   | 3.85   | 3.71   | 2.73   | 3.77   | 2.89   | 5.98   | 5.66   | 10.6   | 7.96   | 6.60   |
| 15         | 4.05   | 4.11   | 3.79   | 3.65   | 2.78   | 3.71   | 3.40   | 5.75   | 5.52   | 10.3   | 7.87   | 6.60   |
| 16         | * 4.16 | 3.94   | 3.85   | * 3.60 | 2.97   | 3.68   | * 3.62 | 5.49   | 5.24   | 9.97   | 7.84   | 6.51   |
| 17         | 4.11   | 3.88   | 3.68   | 3.65   | 2.97   | 3.62   | 3.57   | 5.55   | 5.18   | 10.2   | 7.82   | * 6.49 |
| 18         | 4.08   | 3.96   | 3.60   | 3.60   | 5.55   | * 3.57 | 3.57   | 5.52   | 4.87   | 9.35   | 7.76   | 6.29   |
| 19         | 4.02   | 4.08   | * 3.48 | 3.77   | 136    | 3.48   | 402    | 5.41   | 4.64   | 8.61   | * 7.67 | 6.20   |
| 20         | 4.05   | * 3.96 | 3.54   | 3.79   | 75.3   | 3.34   | 5.15   | 5.32   | 4.64   | 8.35   | 7.50   | 6.17   |
| 21         | 4.02   | 4.19   | 3.58   | 3.68   | * 27.3 | 3.31   | 3.68   | 5.38   | 4.70   | 8.33   | 7.39   | 6.23   |
| 22         | 4.11   | 4.16   | 3.57   | 3.65   | 15.3   | 3.29   | 7.48   | 5.58   | 22.0   | 8.67   | 7.33   | 6.12   |
| 23         | 4.13   | 3.99   | 3.54   | 3.62   | 11.0   | 3.26   | 172    | 5.52   | 100    | 8.41   | 7.36   | 5.55   |
| 24         | 4.19   | 3.94   | 3.60   | 3.54   | 8.55   | 3.20   | 8.64   | 5.49   | 58.1   | 8.41   | 7.22   | 5.49   |
| 25         | 4.08   | 3.94   | 3.62   | 3.51   | 7.39   | 3.09   | 8.16   | 5.32   | 21.6   | 8.84   | 7.16   | 5.35   |
| 26         | 4.05   | 3.88   | 3.68   | 3.88   | 6.54   | 3.00   | 5.04   | 5.15   | 16.4   | 8.64   | 7.05   | 5.47   |
| 27         | 4.08   | 3.82   | 3.65   | 3.62   | 5.98   | 2.95   | 4.47   | 5.21   | 14.0   | 8.21   | 7.00   | 5.55   |
| 28         | 4.11   | 3.94   | 4.08   | 3.37   | 5.61   | 2.89   | 4.36   | 5.01   | 13.6   | 8.07   | 6.83   | 5.58   |
| 29         | 4.02   | 3.85   | 3.46   | 5.15   | 2.86   | 4.22   | 4.73   | 13.1   | 8.07   | 6.74   | 5.78   |        |
| 30         | 4.02   | 3.77   | 3.37   | 4.90   | 2.82   | 4.08   | 4.73   | 12.5   | 7.99   | 6.74   | 5.78   |        |
| 31         | 4.11   | 3.68   |        | 6.06   |        | 3.99   | 4.64   |        | 7.87   |        | 6.61   |        |
| <b>Sum</b> |        | 112.21 |        | 111.43 |        | 113.15 |        | 260.79 |        | 357.69 |        | 193.97 |
|            | 127.28 |        | 120.23 |        | 374.30 |        | 686.06 |        | 374.11 |        | 227.69 |        |

## Current Year 1990

## Period 1967-1990

| Month         | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |          |             | Average     | Volume - Thousands of Cubic Metres |                |                  |                |
|---------------|---------------------|------|---------------------------------|----------|-------------|-------------|------------------------------------|----------------|------------------|----------------|
|               | High                | Low  | Day                             | High     | Low         |             | Total                              | Average        | Maximum          | Minimum        |
| Jan.          | 0.57                | 0.55 | 3                               | 4.45     | 113         | 3.85        | 4.11                               | 10,997         | 15,956           | 36,067         |
| Feb.          | .57                 | .54  | 2                               | 4.53     | 15          | 3.71        | 4.01                               | 9,695          | 14,048           | 31,318         |
| Mar.          | .61                 | .52  | 8                               | 5.61     | 19          | 3.09        | 3.88                               | 10,388         | 14,293           | 27,290         |
| Apr.          | .56                 | .52  | 10                              | 4.36     | 16          | 3.17        | 3.71                               | 9,628          | 17,251           | 44,098         |
| May           | 1.96                | .49  | 19                              | 239      | 11          | 2.53        | 12.1                               | 32,340         | 19,894           | 56,812         |
| June          | .61                 | .50  | 1                               | 5.69     | 30          | 2.66        | 3.77                               | 9,776          | 16,158           | 46,702         |
| July          | 5.69                | .49  | 19                              | 1,360    | 17          | 2.60        | 22.1                               | 59,276         | 21,393           | 94,844         |
| Aug.          | 2.00                | .55  | 6                               | 247      | 1           | 4.11        | 8.41                               | 22,532         | 24,045           | 199,892        |
| Sept.         | 1.82                | .55  | 23                              | 210      | 10          | 4.11        | 12.5                               | 32,323         | 60,889           | 992,293        |
| Oct.          | 1.10                | .67  | 3                               | 60.6     | 31          | 7.79        | 11.5                               | 30,904         | 29,742           | 140,507        |
| Nov.          | .71                 | .64  | 9                               | 9.12     | 129         | 6.66        | 7.59                               | 19,672         | 19,396           | 73,681         |
| Dec.          | .65                 | .59  | 1                               | 6.97     | 25          | 5.24        | 6.26                               | 16,759         | 16,833           | 46,697         |
| <b>Yearly</b> | 5.69                | 0.49 | <b>1,360</b>                    | <b>=</b> | <b>2.53</b> | <b>8.38</b> | <b>264,290</b>                     | <b>269,848</b> | <b>1,341,805</b> | <b>116,791</b> |

\* Discharge measurement made on this day

! And other days

## WATER BULLETIN NUMBER 60 -- INTERNATIONAL BOUNDARY AND WATER COMMISSION

08-4474.20 DEAD MANS CANYON NEAR COMSTOCK, TEXAS

In order to determine storm runoff formerly included with measured flows at a gaging station on the Pecos River before its relocation upstream incident to the completion of Amistad Dam, a gaging station was established during 1968 on Dead Mans Canyon.

**DESCRIPTION:** Cableway, control weir, bubbler gage, and digital recorder located on the left bank of the canyon at latitude  $29^{\circ}47'05''$ , longitude  $101^{\circ}19'25''$ , 3.7 kilometres upstream from its confluence with the Pecos River, which is 15.3 kilometres upstream from the Pecos River confluence with the Rio Grande. The zero of the gage is 359.05 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on current meter measurements, a continuous record of gage heights, and the weir discharge rating. Records available: March 1968 through 1990.

**REMARKS:** This stream is normally dry, its flow being confined to periods of storm runoff from its 228 square kilometres of watershed area. Only the days of flow are shown below.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 1,070 m<sup>3</sup>/sec on September 17, 1974 with a gage height of 3.90 metres. Maximum volumes: Monthly, 35,973,000 m<sup>3</sup> in September 1974; yearly, 37,654,000 m<sup>3</sup> in 1974.

Average Flow in Cubic Metres per Second

|          |      |      |                |      |
|----------|------|------|----------------|------|
| Daily:   | Max. | 166  | Sept. 18, 1974 | Min. |
| Monthly: | Max. | 13.9 | Sept. 1974     | Min. |
| Yearly:  | Max. | 1.20 | 1974           | Min. |

MEAN DAILY DISCHARGE IN M<sup>3</sup>/SEC 1990

| Month and Day |      |  |  |
|---------------|------|--|--|
| July 23       | 0.44 |  |  |
| Sept. 22      | 9.54 |  |  |
| 23            | 9.35 |  |  |
|               |      |  |  |
|               |      |  |  |
|               |      |  |  |
|               |      |  |  |
|               |      |  |  |
|               |      |  |  |

## ANNUAL SUMMARY

| Month  | Maximum Gage and Discharge |        |                     | Thousands of Cubic Metres |
|--------|----------------------------|--------|---------------------|---------------------------|
|        | Day                        | Metres | M <sup>3</sup> /Sec |                           |
| July   | 23                         | 0.38   | 1.46                | 37.6                      |
| Sept.  | 22                         | 0.74   | 28.3                | 1,632                     |
| Yearly |                            | 0.74   | 28.3                | 1,670                     |

## 88-4434.00 DEVILS RIVER AT PAFFORD CROSSING NEAR CUMSTOCK, TEXAS

**DESCRIPTION:** Concrete control wall with rectangular notch opening of 25.5 m<sup>3</sup>/sec capacity, cableway, bubbler gage, water-stage recorders (graphic & digital), located on the left bank at latitude 29° 40'35", longitude 101° 06'00", about 18.5 kilometres east of Comstock, Val Verde County, Texas, and 41.0 river kilometres from the confluence with the Rio Grande. The confluence is located at river kilometre 925, 1.1 river kilometres upstream from Amistad Dam. The zero of the gage is 345.00 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 34 discharge measurements during the year, 12 by the United States Section and 22 by the Mexican Section of the Commission, a stable rating curve based on meter measurements, and a continuous record of gage heights. Records available: 1960 through 1990. Records are also available from May 1900 through March 1911 for a station 38.3 river kilometres downstream; from December 1923 through September 1932 for a station 36.7 river kilometres downstream; from September 2, 1932 through August 1957 for a station 33.8 river kilometres downstream; from August 7, 1957 through January 1968 for a station 8.7 river kilometres upstream; and from August 1954 through May 31, 1968 for a station at the mouth 39.8 river kilometres downstream.

**REMARKS:** At this station the flow of this spring-fed stream is very uniform during periods of dry weather and is not modified by diversions or storage. A computerized radio telemetry system relays gage height data to the Amistad Dam office.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 7,080 m<sup>3</sup>/sec on September 18, 1974 with a gage height of 6.04 metres. Min. 1.38 m<sup>3</sup>/sec on August 20, 1969.

|          |      |       | Average Flow in Cubic Metres per Second |  |  |           |  |  |                 |  |  |  |
|----------|------|-------|---|--|--|-----------|--|--|-----------------|--|--|--|
| Daily:   | Max. | 3,480 | Sept. 18, 1974                          |  |  | Min. 1.52 |  |  | August 20, 1969 |  |  |  |
| Monthly: | Max. | 240   | Sept. 1974                              |  |  | Min. 1.82 |  |  | August 1968     |  |  |  |
| Yearly:  | Max. | 27.7  | 1974                                    |  |  | Min. 2.83 |  |  | 1968            |  |  |  |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day | Jan.   | Feb. | Mar. | April  | May    | June   | July  | Aug.   | Sept.  | Oct.   | Nov.   | Dec. |
|-----|--------|------|------|--------|--------|--------|-------|--------|--------|--------|--------|------|
| 1   | 6.32   | 6.09 | 6.09 | 6.09   | 5.86   | 6.09   | 5.68  | 39.4   | 10.3   | 18.4   | 14.4   | 12.9 |
| 2   | 6.32   | 6.09 | 6.09 | 6.09   | 17.8   | 6.09   | 5.61  | 74.5   | 10.3   | 17.9   | 14.3   | 12.1 |
| 3   | 6.32   | 6.09 | 5.98 | 6.09   | 11.4   | 6.09   | 5.61  | 52.1   | 10.8   | 19.1   | 14.4   | 13.7 |
| 4   | 6.32   | 6.09 | 5.98 | 6.09   | 15.4   | 6.09   | 5.68  | 29.7   | 10.4   | 17.7   | 14.6   | 13.5 |
| 5   | 6.32   | 6.09 | 5.98 | 6.09   | 13.0   | 6.09   | 5.74  | 15.6   | 10.8   | 17.1   | 14.4   | 13.5 |
| 6   | 6.32   | 6.09 | 5.98 | 5.98   | 9.23   | 6.09   | 5.61  | 113    | 10.2   | 16.9   | 14.4   | 13.6 |
| 7   | 6.32   | 6.09 | 5.98 | 5.98   | 7.50   | 5.86   | 5.52  | 136    | 10.0   | 16.7   | 14.6   | 13.3 |
| 8   | 6.32   | 6.09 | 5.98 | 5.98   | 7.11   | 5.86   | 5.64  | 68.0   | 9.91   | 16.5   | 15.1   | 13.9 |
| 9   | 6.32   | 6.09 | 5.98 | 5.98   | 7.14   | 5.86   | 5.64  | 39.1   | 9.77   | 17.1   | 14.6   | 13.4 |
| 10  | 6.32   | 6.09 | 5.98 | 5.98   | 7.25   | 5.98   | 5.72  | 25.2   | 9.71   | 16.8   | 14.4   | 13.5 |
| 11  | 6.32   | 6.09 | 5.98 | 5.98   | 7.14   | 5.98   | 5.78  | 23.2   | 10.4   | 16.9   | 14.4   | 13.6 |
| 12  | 6.32   | 6.09 | 5.86 | 5.98   | 6.97   | 5.92   | 5.98  | 17.4   | 10.1   | 16.3   | 14.4   | 13.6 |
| 13  | 6.32   | 6.20 | 5.86 | 5.86   | 7.11   | 5.78   | 6.12  | 14.5   | 9.88   | 16.0   | 14.3   | 13.6 |
| 14  | 6.32   | 6.20 | 5.86 | 5.86   | 7.08   | 5.78   | 7.22  | 13.6   | 9.77   | 15.7   | 14.3   | 13.4 |
| 15  | 6.32   | 6.20 | 5.86 | 5.86   | 7.08   | * 5.78 | 7.80  | 13.1   | 9.80   | * 15.6 | 14.3   | 13.4 |
| 16  | * 6.29 | 6.20 | 5.86 | * 5.86 | 7.22   | 5.78   | 190 * | 12.6   | 10.8   | 15.7   | 14.3   | 13.5 |
| 17  | 6.23   | 6.20 | 5.86 | 5.93   | 7.36   | 5.78   | 17.3  | 12.3   | * 12.1 | 15.9   | 14.3   | 13.5 |
| 18  | 6.26   | 6.20 | 5.86 | 5.75   | 7.56   | 5.72   | 23.4  | 12.0   | 260    | 15.5   | 14.3   | 13.1 |
| 19  | 6.23   | 6.20 | 5.86 | 5.83   | 7.00   | 5.64   | 230 * | 11.7   | 70.8   | 14.8   | * 14.3 | 13.1 |
| 20  | 6.23   | 6.20 | 5.86 | 5.86   | 6.77   | 5.58   | 39.4  | * 11.6 | 54.4   | 15.0   | 14.3   | 13.4 |
| 21  | 6.15   | 6.20 | 5.86 | 5.86   | * 6.51 | 5.58   | 19.9  | 11.3   | 68.3   | 15.3   | 14.3   | 13.5 |
| 22  | 6.15   | 6.20 | 5.86 | 5.86   | 6.32   | 5.61   | 16.3  | 11.2   | 232    | 15.2   | 14.3   | 12.6 |
| 23  | 6.15   | 6.15 | 5.98 | 5.86   | 6.32   | 5.55   | 97.7  | 11.0   | 793    | 14.8   | 14.3   | 12.8 |
| 24  | 6.15   | 6.20 | 5.98 | 5.86   | 6.32   | 5.64   | 185   | 10.8   | 156    | 14.8   | 14.1   | 12.9 |
| 25  | 6.17   | 6.20 | 5.98 | 5.86   | 6.32   | 5.58   | 72.6  | 10.8   | 72.5   | 14.8   | 14.1   | 12.9 |
| 26  | 6.17   | 6.20 | 5.98 | 5.81   | 6.20   | 5.59   | 29.7  | 10.7   | 43.3   | 14.5   | 14.2   | 13.0 |
| 27  | 6.20   | 6.09 | 5.98 | 5.86   | 6.20   | 5.58   | 21.0  | 10.6   | 32.9   | 14.4   | 14.2   | 13.1 |
| 28  | 6.20   | 6.09 | 5.98 | 5.86   | 6.20   | 5.55   | 17.8  | 10.5   | 26.9   | 14.4   | 13.9   | 13.2 |
| 29  | 6.20   | 6.09 | 5.98 | 5.86   | 6.20   | 5.55   | 16.3  | 10.6   | 23.2   | 14.4   | 13.8   | 13.3 |
| 30  | 6.20   | 6.09 | 5.86 | 5.86   | 6.20   | 5.58   | 15.4  | 11.4   | 20.2   | 14.3   | 13.8   | 13.2 |
| 31  | 6.09   | 6.09 | 5.86 | 6.20   | 6.20   | 14.8   | 10.6  | 14.4   | 14.4   | 14.4   | 14.4   | 12.8 |

|        |        |        |          |          |       |       |
|--------|--------|--------|----------|----------|-------|-------|
| Sum    | 172.01 | 177.57 | 173.64   | 857.4    | 892.5 | 413.3 |
| 103.87 | 184.50 | 241.97 | 1,095.59 | 2,028.54 | 429.4 |       |

## Current Year 1990

## Period 1960-1990

| Month  | Extreme Gage Metres |      |     | Extreme-Cubic Metres per Second |     |      | Average | Volume—Thousands of Cubic Metres |         |         |         |
|--------|---------------------|------|-----|---------------------------------|-----|------|---------|----------------------------------|---------|---------|---------|
|        | High                | Low  | Day | High                            | Day | Low  |         | Total                            | Average | Maximum | Minimum |
| Jan.   | 0.52                | 0.51 | 2   | 6.43                            | 121 | 6.09 | 6.25    | 16,750                           | 19,136  | 36,576  | 5,732   |
| Feb.   | .51                 | .51  | 5   | 6.32                            | 111 | 6.09 | 6.14    | 14,862                           | 16,595  | 32,792  | 4,933   |
| Mar.   | .51                 | .50  | 5   | 6.32                            | 112 | 5.86 | 5.95    | 15,941                           | 16,187  | 32,569  | 5,163   |
| Apr.   | .51                 | .50  | 11  | 6.09                            | 117 | 5.75 | 5.92    | 15,382                           | 17,115  | 47,831  | 5,575   |
| May    | 1.00                | .50  | 2   | 60.0                            | 111 | 5.86 | 7.81    | 20,906                           | 15,747  | 43,581  | 5,572   |
| June   | .51                 | .48  | 11  | 6.09                            | 128 | 5.32 | 5.79    | 15,002                           | 22,178  | 67,011  | 5,253   |
| July   | 1.90                | .48  | 16  | 335                             | 6   | 5.32 | 35.3    | 94,659                           | 28,485  | 230,071 | 4,976   |
| Aug.   | 1.47                | .60  | 6   | 317                             | 128 | 10.3 | 27.7    | 74,079                           | 47,567  | 504,380 | 4,878   |
| Sept.  | 2.41                | .58  | 23  | 1,310                           | 10  | 9.29 | 67.6    | 175,266                          | 57,424  | 671,005 | 6,167   |
| Oct.   | .78                 | .68  | 3   | 21.0                            | 129 | 14.3 | 15.9    | 42,552                           | 39,598  | 272,093 | 6,172   |
| Nov.   | .69                 | .67  | 8   | 15.2                            | 128 | 13.7 | 14.3    | 31,100                           | 21,110  | 46,721  | 5,590   |
| Dec.   | .68                 | .65  | 12  | 14.3                            | 121 | 12.5 | 13.3    | 35,709                           | 20,328  | 38,316  | 5,794   |
| Yearly | 2.41                | 0.48 | =   | 1,310                           | =   | 5.32 | 17.7    | 558,168                          | 324,770 | 872,181 | 99,420  |

\* Discharge measurement made on this day

† And other days

## WATER BULLETIN NUMBER 60 -- INTERNATIONAL BOUNDARY AND WATER COMMISSION

08-4401.40 BIG SATAN CREEK NEAR COMSTOCK, TEXAS

In order to determine storm runoff formerly included with measured flows at a gaging station on the Devils River before its relocation upstream incident to the completion of Amistad Dam, a gaging station was established during 1968 on Big Satan Creek.

**DESCRIPTION:** Cableway, control weir, bubbler gage, and digital recorder located on the right bank of the creek at latitude  $29^{\circ}39'50''$ , longitude  $100^{\circ}57'50''$ , 1.8 kilometres upstream from its confluence with the Devils River, which is 34.1 kilometres upstream from the Devils River confluence with the Rio Grande. The zero of the gage is 345.64 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on current meter measurements, a continuous record of gage heights, and the weir discharge rating. Records available: May 1968 through 1990.

**REMARKS:** This creek is normally dry, its flow being confined to periods of storm runoff from its 109 square kilometres of watershed area. Only the days of flow are shown below.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 1,590 m<sup>3</sup>/sec on August 15, 1971 with a gage height of 3.75 metres. Maximum volumes: Monthly, 15,053,000 m<sup>3</sup> in August 1971; yearly, 15,449,000 m<sup>3</sup> in 1971.

## Average Flow in Cubic Metres per Second

|          |      |      |               |
|----------|------|------|---------------|
| Daily:   | Max. | 127  | Aug. 15, 1971 |
| Monthly: | Max. | 5.61 | Aug. 1971     |
| Yearly:  | Max. | 0.49 | 1971          |

|      |      |             |
|------|------|-------------|
| Min. | Min. | see REMARKS |
| Min. | Min. |             |

MEAN DAILY DISCHARGE IN M<sup>3</sup>/SEC 1990

| Month and Day |      |  |  |
|---------------|------|--|--|
| May 2         | 17.3 |  |  |
| July 19       | 3.23 |  |  |
| 20            | 0.25 |  |  |
| 23            | 6.54 |  |  |
| Sept. 20      | 11.9 |  |  |
| 23            | 1.45 |  |  |

| Month  | Maximum Gage and Discharge |        |                     | Thousands of Cubic Metres |
|--------|----------------------------|--------|---------------------|---------------------------|
|        | Day                        | Metres | M <sup>3</sup> /Sec |                           |
| May    | 2                          | 1.24   | 112                 | 1,495                     |
| July   | 23                         | 1.00   | 60.6                | 866                       |
| Sept.  | 20                         | 1.50   | 183                 | 1,153                     |
| Yearly |                            | 1.50   | 183                 | 3,514                     |

## 08-4404.80 ROUGH CANYON NEAR DEL RIO, TEXAS

In order to determine storm runoff formerly included with measured flows at a gaging station on the Devils River before its relocation upstream incident to the completion of Amistad Dam, a gaging station was established during 1968 on Rough Canyon.

**DESCRIPTION:** Cableway, control weir, bubbler gage, and digital recorder located on the right bank at latitude  $29^{\circ}34'40''$ , longitude  $100^{\circ}56'00''$ , 6.3 kilometres upstream from its confluence with the Devils River, which is 17.9 Kilometres upstream from the Devils River confluence with the Rio Grande. The zero of the gage is 344.12 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on current meter measurements, a continuous record of gage heights, and the weir discharge rating. Records available: January 1968 through 1990.

**REMARKS:** This stream is normally dry, its flow being confined to periods of storm runoff from its 62 square kilometres of watershed area. Only the days of flow are shown below.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 199 m<sup>3</sup>/sec on August 12, 1972 with a gage height of 2.07 metres. Maximum volumes: Monthly, 10,152,000 m<sup>3</sup> in August 1971; yearly, 10,154,000 m<sup>3</sup> in 1971.

## Average Flow in Cubic Metres per Second

|          |      |      |               |
|----------|------|------|---------------|
| Daily:   | Max. | 60.6 | Aug. 16, 1971 |
| Monthly: | Max. | 3.79 | Aug. 1971     |
| Yearly:  | Max. | 0.32 | 1971          |

|      |      |             |
|------|------|-------------|
| Min. | Min. | see REMARKS |
| Min. | Min. |             |

MEAN DAILY DISCHARGE IN M<sup>3</sup>/SEC 1990

| Month    | Maximum Gage and Discharge |        |                     | Thousands of Cubic Metres |
|----------|----------------------------|--------|---------------------|---------------------------|
|          | Day                        | Metres | M <sup>3</sup> /Sec |                           |
| Mar. 30  | 0.13                       |        |                     |                           |
| May 2    | 0.36                       |        |                     |                           |
| 3        | 0.20                       |        |                     |                           |
| 22       | 0.09                       |        |                     |                           |
| July 19  | 4.22                       |        |                     |                           |
| 20       | 0.98                       |        |                     |                           |
| Sept. 20 | 3.23                       |        |                     |                           |
| 21       | 0.03                       |        |                     |                           |
| Oct. 9   | 0.06                       |        |                     |                           |
| 21       | 0.04                       |        |                     |                           |
|          |                            |        |                     |                           |
| Mar.     | 30                         | 0.37   | 1.38                | 11.2                      |
| May      | 22                         | 0.57   | 10.7                | 319                       |
| July     | 23                         | 1.17   | 66.0                | 2,052                     |
| Sept.    | 23                         | 0.59   | 12.3                | 611                       |
| Oct.     | 9                          | 0.35   | 0.65                | 5.2                       |
| Yearly   |                            | 1.17   | 66.0                | 2,998                     |

## 38-4494.35 NORTH FORK SAN PEDRO CREEK NEAR DEL RIO, TEXAS

In order to determine storm runoff formerly included with measured flows at a gaging station on the Devils River before its relocation upstream incident to the completion of Amistad Dam, a gaging station was established during 1968 on the north fork of San Pedro Creek.

**DESCRIPTION:** Cableway, control weir, bubbler gage, and digital recorder located on the right bank of the creek at latitude 29°31'20", longitude 100°53'00", 4.8 kilometres upstream from its confluence with the Middle Fork Branch, which is 10.1 kilometres upstream from its confluence with Devils River which itself is 7.2 river kilometres above Devils River confluence with the Rio Grande. The zero of the gage is 343.49 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on current meter measurements, a continuous record of gage heights, and the weir discharge rating. Records available: January 1968 through 1990.

**REMARKS:** This creek is normally dry, its flow being confined to periods of storm runoff from its 44 square kilometres of watershed area. Only the days of flow are shown below.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 144 m<sup>3</sup>/sec on August 12, 1972 with a gage height of 2.57 metres. Maximum volumes: Monthly, 4,198,000 m<sup>3</sup> in October 1969; yearly, 5,010,000 m<sup>3</sup> in 1969.

Average Flow in Cubic Metres per Second

|          |      |      |              |
|----------|------|------|--------------|
| Daily:   | Max. | 35.1 | Oct. 4, 1969 |
| Monthly: | Max. | 1.57 | Oct. 1969    |
| Yearly:  | Max. | 0.16 | 1969         |

|      |  |             |
|------|--|-------------|
| Min. |  |             |
| Min. |  | see REMARKS |
| Min. |  |             |

MEAN DAILY DISCHARGE IN M<sup>3</sup>/SEC

## ANNUAL SUMMARY

| Month and Day |    |      |         |      |    |      |          |      |
|---------------|----|------|---------|------|----|------|----------|------|
| Mar.          | 30 | 4.59 | 22      | 0.39 | 21 | 0.12 | Sept. 20 | 2.21 |
| Apr.          | 26 | 4.62 | July 19 | 5.01 | 23 | 13.0 | 23       | 2.42 |
| May           | 3  | 0.98 | 20      | 2.74 | 24 | 0.11 | 24       | 0.15 |
|               |    |      |         |      |    |      |          |      |

| Month  | Maximum Gage and Discharge |        |        | Thousands of Cubic Metres |
|--------|----------------------------|--------|--------|---------------------------|
|        | Day                        | Metres | M3/Sec |                           |
| Mar.   | 30                         | 0.87   | 21.6   | 397                       |
| Apr.   | 26                         | 0.80   | 18.3   | 399                       |
| May    | 3                          | 0.49   | 3.85   | 118                       |
| July   | 23                         | 1.82   | 83.0   | 1,813                     |
| Sept.  | 20                         | 0.73   | 14.9   | 413                       |
| Yearly |                            | 1.82   | 83.0   | 3,140                     |

## 08-4494.90 MIDDLE FORK SAN PEDRO CREEK NEAR DEL RIO, TEXAS

In order to determine storm runoff formerly included with measured flows at a gaging station on the Devils River before its relocation upstream incident to the completion of Amistad Dam, a gaging station was established during 1968 on the middle fork of San Pedro Creek.

**DESCRIPTION:** Cableway, control weir, bubbler gage, and digital recorder located on the right bank of the creek at latitude 29°29'30", longitude 100°52'50", 5.1 kilometres upstream from its confluence with the North Fork Branch, which is 10.1 kilometres above the confluence with Devils River, which itself is 7.2 river kilometres above the Devils River confluence with the Rio Grande. The zero of the gage is 346.56 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on current meter measurements, a continuous record of gage heights, and the weir discharge rating. Records available: December 1968 through 1990.

**REMARKS:** This creek is normally dry, its flow being confined to periods of storm runoff from its 31 square kilometres of watershed area. Only the days of flow are shown below.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 289 m<sup>3</sup>/sec on July 17, 1972 with a gage height of 1.78 metres. Maximum volumes: Monthly, 4,596,000 m<sup>3</sup> in July 1975; yearly, 4,596,000 m<sup>3</sup> in 1975.

Average Flow in Cubic Metres per Second

|          |      |      |               |
|----------|------|------|---------------|
| Daily:   | Max. | 39.4 | July 17, 1975 |
| Monthly: | Max. | 1.72 | July 1975     |
| Yearly:  | Max. | 0.14 | 1975          |

|      |  |             |
|------|--|-------------|
| Min. |  |             |
| Min. |  | see REMARKS |
| Min. |  |             |

MEAN DAILY DISCHARGE IN M<sup>3</sup>/SEC

## ANNUAL SUMMARY

| Month and Day |    |      |         |      |         |      |      |      |
|---------------|----|------|---------|------|---------|------|------|------|
| Apr.          | 26 | 1.10 | 2       | 0.42 | 11      | 0.50 | 29   | 0.50 |
|               | 27 | 0.40 | 3       | 0.34 | 12      | 0.43 | 30   | 0.52 |
|               | 28 | 0.36 | 4       | 0.24 | 13      | 0.35 | Oct. | 1    |
|               | 29 | 0.37 | 5       | 0.17 | 14      | 0.26 | 2    | 0.57 |
|               | 30 | 0.43 | 6       | 0.05 | 15      | 0.16 | 3    | 0.58 |
| May           | 1  | 0.33 | 7       | 0.01 | 16      | 0.03 | 4    | 0.59 |
|               | 2  | 0.30 | July 19 | 1.59 | Sept. 6 | 0.39 | 5    | 0.59 |
|               | 3  | 0.30 | 20      | 4.90 | 7       | 0.63 | 6    | 0.59 |
|               | 4  | 0.32 | 21      | 0.97 | 8       | 0.63 | 7    | 0.58 |
|               | 5  | 0.30 | 22      | 0.43 | 9       | 0.63 | 8    | 0.57 |
|               | 6  | 0.32 | 23      | 13.6 | 10      | 0.63 | 9    | 0.60 |
|               | 7  | 0.30 | 24      | 0.97 | 11      | 0.63 | 10   | 0.59 |
|               | 8  | 0.30 | 25      | 0.56 | 12      | 0.63 | 11   | 0.62 |
|               | 9  | 0.30 | 26      | 0.45 | 13      | 0.63 | 12   | 0.50 |
|               | 10 | 0.26 | 27      | 0.43 | 14      | 0.63 | 13   | 0.49 |
|               | 11 | 0.19 | 28      | 0.43 | 15      | 0.63 | 14   | 0.50 |
|               | 12 | 0.11 | 29      | 0.43 | 16      | 0.63 | 15   | 0.50 |
|               | 13 | 0.03 | 30      | 0.39 | 17      | 0.63 | 16   | 0.50 |
|               | 22 | 3.46 | 31      | 0.36 | 18      | 0.63 | 17   | 0.47 |
|               | 23 | 0.52 | Aug. 1  | 0.36 | 19      | 0.63 | 18   | 0.24 |
|               | 24 | 0.50 | 2       | 0.34 | 20      | 4.90 | 19   | 0.29 |
|               | 25 | 0.47 | 3       | 0.31 | 21      | 0.55 | 20   | 0.33 |
|               | 26 | 0.46 | 4       | 0.33 | 22      | 0.48 | 21   | 0.25 |
|               | 27 | 0.46 | 5       | 0.36 | 23      | 5.98 | 22   | 0.22 |
|               | 28 | 0.46 | 6       | 0.39 | 24      | 0.91 | 23   | 0.12 |
|               | 29 | 0.46 | 7       | 0.49 | 25      | 0.63 | 24   | 0.08 |
|               | 30 | 0.46 | 8       | 0.54 | 26      | 0.53 | 25   | 0.03 |
|               | 31 | 0.46 | 9       | 0.54 | 27      | 0.46 | 26   | 0.01 |

| Month | Maximum Gage and Discharge |        |        | Thousands of Cubic Metres |
|-------|----------------------------|--------|--------|---------------------------|
|       | Day                        | Metres | M3/Sec |                           |
| Apr.  | 26                         | 0.43   | 3.17   | 230                       |
| May   | 22                         | 0.67   | 18.5   | 956                       |
| June  | 1                          | 0.31   | 0.46   | 143                       |
| July  | 23                         | 11.16  | 98.8   | 2,204                     |
| Aug.  | 7                          | 0.32   | 0.54   | 512                       |
| Sept. | 20                         | 0.73   | 24.4   | 2,119                     |
| Oct.  | 8                          | 0.33   | 0.72   | 954                       |

## WATER BULLETIN NUMBER 60 -- INTERNATIONAL BOUNDARY AND WATER COMMISSION

## 08-4405.90 EVANS CREEK NEAR COMSTOCK, TEXAS

In order to determine storm runoff formerly included with measured flows at a gaging station on the Devils River before its relocation upstream incident to the completion of Amistad Dam, a gaging station was established during 1968 on Evans Creek.

**DESCRIPTION:** Cableway, control weir, bubbler gage, and digital recorder located on the left bank of the creek at latitude 29° 32' 15", longitude 101° 06' 10", 17.7 kilometres upstream from its confluence with the Devils River, which is 5.1 kilometres upstream from the Devils River confluence with the Rio Grande. The zero of the gage is 354.34 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on current meter measurements, a continuous record of gage heights, and the weir discharge rating. Records available: December 1967 through 1990.

**REMARKS:** This creek is normally dry, its flow being confined to periods of storm runoff from its 192 square kilometres of watershed area. Only the days of flow are shown below.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 493 m<sup>3</sup>/sec on June 2, 1971, with a gage height of 1.83 metres. Maximum volumes: Monthly, 11,448,000 m<sup>3</sup> in August 1971; yearly, 17,757,000 m<sup>3</sup> in 1971.

|          |      |      |               | Average Flow in Cubic Metres per Second |      |             |
|----------|------|------|---------------|---|------|-------------|
| Daily:   | Max. | 112  | Aug. 15, 1971 |   | Min. |             |
| Monthly: | Max. | 4.28 | Aug. 1971     |   | Min. | see REMARKS |
| Yearly:  | Max. | 0.56 | 1971          |   | Min. |             |

MEAN DAILY DISCHARGE IN M<sup>3</sup>/SEC 1990

| Month and Day |   |      |      |         |
|---------------|---|------|------|---------|
| May           | 2 | 0.04 | July | 16 0.74 |
|               |   |      |      | 18 39.4 |
|               |   |      |      | 19 53.0 |
|               |   |      |      | 20 2.58 |

## ANNUAL SUMMARY

| Month  | Maximum Gage and Discharge |        |                     | Thousands of Cubic Metres |
|--------|----------------------------|--------|---------------------|---------------------------|
|        | Day                        | Metres | M <sup>3</sup> /Sec |                           |
| May    | 2                          | 0.34   | 0.48                | 3.5                       |
| July   | 19                         | 1.46   | 303                 | 8,270                     |
| Yearly |                            | 1.46   | 303                 | 8,274                     |

## 35-4283.35 CARTINA SPRINGS NEAR CD. ACUNA, COAHUILA

**DESCRIPTION:** Cipolletti weir of 7.0 m<sup>3</sup>/sec capacity and staff gage located on a creek that runs almost parallel to Amistad Dam, about 40 metres from the confluence with the Rio Grande, at Latitude 29°26'50", longitude 101°03'30", and about 17.7 Kilometres northwest of Cd. Acuna, Coahuila. This creek enters the Rio Grande from the Mexican side at river kilometre 763, 400 river metres downstream from Amistad Dam and 20.3 river kilometres upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: 1969 through 1990.

**REMARKS:** At least six separate springs have emerged on the watershed of this small creek since operation of Amistad Dam began in May 1968. Prior to this time, flow in this creek was exclusively from storm runoff. All storm water from surface runoff passing this station is deducted and is not included in the tabulation below. On September 24, 1971, a flood destroyed part of the weir.

Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.   | Feb.   | Mar.   | April | May    | June  | July   | Aug.   | Sept.  | Oct.   | Nov.   | Dec.  |
|------------|--------|--------|--------|-------|--------|-------|--------|--------|--------|--------|--------|-------|
| 1          | 1.51   | 1.89   | 1.40   | 1.42  | 1.28   | 1.17  | 1.16   | 1.21   | 1.40   | 1.54   | 1.60   | 1.62  |
| 2          | 1.51   | 1.87   | 1.40   | 1.42  | 1.28   | 1.17  | 1.16   | 1.23   | 1.40   | 1.54   | 1.60   | 1.62  |
| 3          | 1.51   | 1.87   | 1.40   | 1.40  | 1.28   | 1.16  | 1.16   | 1.23   | 1.42   | 1.56   | 1.60   | 1.62  |
| 4          | 1.50   | 1.87   | 1.41   | 1.40  | 1.28   | 1.15  | 1.16   | 1.23   | 1.42   | 1.56   | 1.60   | 1.62  |
| 5          | 1.51   | 1.87   | 1.42   | 1.40  | 1.26   | 1.15  | 1.16   | 1.23   | 1.42   | 1.58   | 1.60   | 1.62  |
| 6          | 1.52   | 1.46   | 1.42   | 1.39  | 1.26   | 1.14  | 1.16   | 1.23   | 1.42   | 1.58   | 1.60   | 1.61  |
| 7          | 1.50   | * 1.46 | * 1.40 | 1.38  | 1.26   | 1.14  | 1.17   | 1.26   | 1.42   | 1.60   | * 1.60 | 1.60  |
| 8          | 1.50   | 1.45   | 1.40   | 1.38  | 1.26   | 1.14  | 1.18   | * 1.29 | 1.42   | 1.60   | 1.60   | 1.60  |
| 9          | 1.49   | 1.43   | 1.42   | 1.38  | * 1.24 | 1.14  | 1.17   | 1.26   | 1.42   | 1.60   | 1.60   | 1.60  |
| 10         | * 1.49 | 1.42   | 1.42   | 1.38  | 1.20   | 1.15  | 1.16   | 1.28   | 1.43   | * 1.60 | 1.59   | 1.62  |
| 11         | 1.49   | 1.42   | 1.42   | 1.38  | 1.20   | 1.14  | * 1.13 | 1.28   | 1.42   | 1.62   | 1.60   | 1.62  |
| 12         | 1.49   | 1.42   | 1.42   | 1.38  | 1.19   | 1.14  | 1.11   | 1.44   | 1.62   | 1.60   | * 1.61 | 1.61  |
| 13         | 1.49   | 1.42   | 1.42   | 1.38  | 1.18   | 1.14  | 1.11   | 1.28   | 1.44   | 1.62   | 1.60   | 1.62  |
| 14         | 1.49   | 1.42   | 1.40   | 1.37  | 1.18   | 1.14  | 1.11   | 1.28   | 1.43   | 1.62   | 1.60   | 1.62  |
| 15         | 1.49   | 1.41   | 1.42   | 1.35  | 1.18   | 1.14  | 1.11   | 1.28   | 1.44   | 1.62   | 1.60   | 1.61  |
| 16         | 1.51   | 1.40   | 1.42   | 1.37  | 1.18   | 1.14  | 1.11   | 1.28   | 1.44   | 1.62   | 1.60   | 1.62  |
| 17         | 1.50   | 1.41   | 1.42   | 1.36  | 1.18   | 1.14  | 1.11   | 1.30   | 1.44   | 1.62   | 1.60   | 1.62  |
| 18         | 1.50   | 1.42   | 1.42   | 1.36  | 1.18   | 1.13  | 1.11   | 1.39   | 1.44   | 1.62   | 1.60   | 1.61  |
| 19         | 1.49   | 1.40   | 1.42   | 1.38  | 1.18   | 1.12  | 1.11   | 1.30   | 1.44   | 1.62   | 1.62   | 1.62  |
| 20         | 1.51   | 1.42   | 1.42   | 1.38  | 1.18   | 1.15  | 1.11   | 1.30   | 1.44   | 1.62   | 1.60   | 1.62  |
| 21         | 1.50   | 1.40   | 1.44   | 1.39  | 1.18   | 1.18  | 1.11   | 1.33   | 1.44   | 1.62   | 1.62   | 1.62  |
| 22         | 1.51   | 1.40   | 1.44   | 1.36  | 1.18   | 1.18  | 1.11   | 1.35   | 1.44   | 1.61   | 1.62   | 1.60  |
| 23         | 1.49   | 1.40   | 1.44   | 1.36  | 1.18   | 1.17  | 1.11   | 1.33   | 1.47   | 1.60   | 1.62   | 1.60  |
| 24         | 1.49   | 1.40   | 1.43   | 1.36  | 1.18   | 1.16  | 1.11   | 1.36   | 1.50   | 1.60   | 1.62   | 1.61  |
| 25         | 1.49   | 1.41   | 1.42   | 1.34  | 1.18   | 1.17  | 1.13   | 1.36   | 1.51   | 1.60   | 1.62   | 1.62  |
| 26         | 1.51   | 1.41   | 1.42   | 1.33  | 1.18   | 1.17  | 1.13   | 1.36   | * 1.51 | 1.60   | 1.62   | 1.62  |
| 27         | 1.49   | 1.42   | 1.44   | 1.29  | 1.18   | 1.17  | 1.13   | 1.36   | 1.51   | 1.60   | 1.62   | 1.62  |
| 28         | 1.49   | 1.40   | 1.42   | 1.28  | 1.16   | 1.16  | 1.13   | 1.38   | 1.51   | 1.60   | 1.60   | 1.62  |
| 29         | 1.49   | 1.42   | 1.42   | 1.28  | 1.16   | 1.16  | 1.16   | 1.39   | 1.51   | 1.60   | 1.60   | 1.62  |
| 30         | 1.49   | 1.42   | 1.42   | 1.28  | 1.16   | 1.16  | 1.16   | 1.40   | 1.52   | 1.60   | 1.62   | 1.62  |
| 31         | 1.49   | 1.42   | 1.42   | 1.16  | 1.16   | 1.17  | 1.17   | 1.40   | 1.60   | 1.60   | 1.62   | 1.62  |
| <b>Sum</b> |        | 39.97  |        | 40.92 |        | 34.57 |        | 40.30  |        | 49.59  |        | 50.07 |
|            | 46.48  |        | 43.98  |       | 37.33  |       | 35.21  |        | 43.46  |        | 48.17  |       |

Current Year 1990

Period 1969-1990

| Month         | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |      |      | Average | Volume-Thousands of Cubic Metres |         |         |         |        |
|---------------|---------------------|------|---------------------------------|------|------|---------|----------------------------------|---------|---------|---------|--------|
|               | High                | Low  | Day                             | High | Day  |         | Total                            | Average | Maximum | Minimum |        |
| Jan.          | 0.41                | 0.40 | 6                               | 1.58 | 1.3  | 1.49    | 1.50                             | 4,012   | 3,544   | 5,155   | 449    |
| Feb.          | .40                 | .37  | 1                               | 1.51 | 1.13 | 1.40    | 1.43                             | 3,453   | 3,196   | 4,603   | 460    |
| Mar.          | .38                 | .37  | 120                             | 1.44 | 1.1  | 1.40    | 1.42                             | 3,800   | 3,483   | 5,046   | 648    |
| Apr.          | .38                 | .35  | 1 1                             | 1.42 | 127  | 1.28    | 1.36                             | 3,535   | 3,286   | 4,406   | 776    |
| May           | .35                 | .33  | 1 1                             | 1.28 | 128  | 1.16    | 1.20                             | 3,225   | 3,251   | 4,553   | 875    |
| June          | .31                 | .32  | 25                              | 1.28 | 19   | 1.12    | 1.15                             | 2,987   | 3,189   | 4,406   | 738    |
| July          | .33                 | .31  | 1 7                             | 1.18 | 112  | 1.11    | 1.14                             | 3,042   | 3,282   | 4,553   | 657    |
| Aug.          | .37                 | .33  | 179                             | 1.40 | 1    | 1.18    | 1.30                             | 3,482   | 3,329   | 4,460   | 666    |
| Sept.         | .41                 | .37  | 30                              | 1.58 | 1 1  | 1.40    | 1.45                             | 3,755   | 3,333   | 4,199   | 731    |
| Oct.          | .42                 | .41  | 111                             | 1.62 | 1 1  | 1.51    | 1.60                             | 4,285   | 3,640   | 4,707   | 1,924  |
| Nov.          | .42                 | .41  | 119                             | 1.62 | 10   | 1.58    | 1.61                             | 4,162   | 3,568   | 4,701   | 1,189  |
| Dec.          | .43                 | .42  | 14                              | 1.65 | 1 6  | 1.60    | 1.62                             | 4,326   | 3,733   | 5,019   | 1,328  |
| <b>Yearly</b> | 0.43                | 0.31 |                                 | 1.65 |      | 1.11    | 1.40                             | 44,064  | 40,830  | 50,930  | 11,200 |

\* Discharge measurement made on this day      ! And other days

## LURDOS AND RILDA SPRINGS NEAR CD. ACUNA, COAHUILA

## 03-4508.20 LURDOS SPRINGS

**DESCRIPTION:** Rectangular sharp-crested weir 815 l/sec capacity and staff gage located at latitude  $29^{\circ}26'35''$ , longitude  $101^{\circ}03'30''$ , at the base of the high bank of the Rio Grande, and about 17.9 kilometres northwest of Cd. Acuna, Coahuila. This creek enters the Rio Grande from the Mexican side at river kilometre 922, 19.6 river kilometres upstream from the International highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 282.33 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: 1969 through 1990.

**REMARKS:** This spring emerged since operation of Amistad Dam began in May 1968. All storm water from surface runoff passing this station is deducted.

| Month         | Current Year 1990   |             |                                 |             |          |             | Period 1969-1990 |                                  |              |              |              |
|---------------|---------------------|-------------|---------------------------------|-------------|----------|-------------|------------------|----------------------------------|--------------|--------------|--------------|
|               | Extreme Gage Metres |             | Extreme-Cubic Metres per Second |             |          |             | Total            | Volume-Thousands of Cubic Metres |              |              |              |
|               | High                | Low         | Day                             | High        | Day      | Low         |                  | Average                          | Maximum      | Minimum      |              |
| Jan.          | 0.11                | 0.11        | ! 1                             | 0.06        | ! 1      | 0.06        | 0.06             | 161                              | 146          | 139          | 107          |
| Feb.          | .11                 | .10         | ! 1                             | .06         | ! 1      | .06         | .06              | 145                              | 135          | 228          | 96.8         |
| Mar.          | .11                 | .10         | ! 1                             | .06         | ! 1      | .06         | .06              | 161                              | 149          | 258          | 107          |
| Apr.          | .11                 | .11         | ! 1                             | .06         | ! 1      | .06         | .06              | 156                              | 145          | 171          | 104          |
| May           | .11                 | .10         | ! 1                             | .06         | ! 1      | .06         | .06              | 161                              | 147          | 176          | 91.6         |
| June          | .10                 | .10         | ! 1                             | .06         | ! 1      | .06         | .06              | 156                              | 143          | 181          | 114          |
| July          | .10                 | .10         | ! 1                             | .06         | ! 1      | .06         | .06              | 161                              | 149          | 137          | 107          |
| Aug.          | .10                 | .10         | ! 1                             | .06         | ! 1      | .06         | .06              | 161                              | 151          | 187          | 117          |
| Sept.         | .11                 | .10         | ! 1                             | .06         | ! 1      | .06         | .06              | 156                              | 145          | 151          | 104          |
| Oct.          | .11                 | .11         | ! 1                             | .06         | ! 1      | .06         | .06              | 161                              | 149          | 187          | 107          |
| Nov.          | .11                 | .11         | ! 1                             | .06         | ! 1      | .06         | .06              | 156                              | 145          | 181          | 101          |
| Dec.          | .11                 | .10         | ! 1                             | .06         | ! 1      | .06         | .06              | 161                              | 147          | 187          | 80.4         |
| <b>Yearly</b> | <b>0.11</b>         | <b>0.10</b> | <b>—</b>                        | <b>0.06</b> | <b>—</b> | <b>0.06</b> | <b>0.06</b>      | <b>1,895</b>                     | <b>1,753</b> | <b>2,085</b> | <b>1,421</b> |

! Mean daily      ! And other days

## 03-4508.30 RILDA SPRINGS

**DESCRIPTION:** Rectangular sharp-crested weir of 1.50 m<sup>3</sup>/sec capacity and staff gage located at latitude  $29^{\circ}26'20''$ , longitude  $101^{\circ}03'35''$ , about 100 metres from the confluence with the Rio Grande and about 17.7 kilometres northwest of Cd. Acuna, Coahuila. This creek enters the Rio Grande from the Mexican side at river Kilometre 922, 19.0 river kilometres upstream from the International highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 276.50 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: 1969 through 1990.

**REMARKS:** This spring emerged since operation of Amistad Dam began in May 1968. All storm water from surface runoff passing this station is deducted.

| Month         | Current Year 1990   |             |                                 |             |          |             | Period 1969-1990 |                                  |              |              |              |
|---------------|---------------------|-------------|---------------------------------|-------------|----------|-------------|------------------|----------------------------------|--------------|--------------|--------------|
|               | Extreme Gage Metres |             | Extreme-Cubic Metres per Second |             |          |             | Total            | Volume-Thousands of Cubic Metres |              |              |              |
|               | High                | Low         | Day                             | High        | Day      | Low         |                  | Average                          | Maximum      | Minimum      |              |
| Jan.          | 0.10                | 0.09        | ! 1                             | 0.08        | ! 1      | 0.07        | 0.08             | 203                              | 212          | 321          | 71.0         |
| Feb.          | .09                 | .09         | ! 1                             | .07         | ! 1      | .07         | .07              | 169                              | 188          | 290          | 48.0         |
| Mar.          | .09                 | .08         | ! 1                             | .07         | ! 1      | .06         | .07              | 176                              | 201          | 297          | 54.0         |
| Apr.          | .09                 | .08         | ! 26                            | .08         | ! 1      | .06         | .07              | 176                              | 190          | 278          | 54.0         |
| May           | .10                 | .07         | ! 1                             | .08         | ! 28     | .05         | .07              | 178                              | 191          | 268          | 76.0         |
| June          | .07                 | .06         | ! 1                             | .05         | ! 18     | .04         | .05              | 118                              | 182          | 259          | 72.0         |
| July          | .07                 | .06         | ! 26                            | .06         | ! 1      | .04         | .05              | 130                              | 135          | 281          | 75.0         |
| Aug.          | .07                 | .07         | ! 1                             | .06         | ! 1      | .06         | .06              | 161                              | 136          | 295          | 80.1         |
| Sept.         | .07                 | .07         | ! 1                             | .06         | ! 1      | .06         | .06              | 150                              | 185          | 289          | 97.9         |
| Oct.          | .09                 | .08         | ! 20                            | .07         | ! 1      | .06         | .06              | 171                              | 201          | 299          | 107          |
| Nov.          | .09                 | .08         | ! 1                             | .07         | ! 21     | .06         | .07              | 173                              | 201          | 311          | 104          |
| Dec.          | .08                 | .08         | ! 1                             | .06         | ! 1      | .06         | .06              | 161                              | 211          | 321          | 107          |
| <b>Yearly</b> | <b>0.10</b>         | <b>0.06</b> | <b>—</b>                        | <b>0.08</b> | <b>—</b> | <b>0.04</b> | <b>0.06</b>      | <b>1,972</b>                     | <b>2,331</b> | <b>3,345</b> | <b>1,074</b> |

! Mean daily      ! And other days

## 36-4503.00 RIO GRANDE BELOW AMISTAD DAM NEAR CO. ACUNA, COAHUILA AND DEL RIO, TEXAS

**DESCRIPTION:** Cableway, gravity well, concrete control weir, and water-stage recorders (graphic and digital), located on the left bank at latitude 29° 25' 30", longitude 101° 02' 25", and river Kilometre 920, 3.5 river kilometres downstream from Amistad Dam and 17.4 river kilometres upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 274.00 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 50 discharge measurements during the year, 40 by the Mexican Section and 10 by the United States Section of the Commission, and a continuous record of gage heights. Computations for high flows by shifting control methods. Low and medium flow computations based on a stable control weir rating curve defined by meter measurements. Records available: September 1954 through 1990. Records are also available from May 1900 through April 1915 for a station 3.1 kilometres upstream; from December 1919 through March 1920 for a station 2.7 kilometres downstream near McKeen's Switch; from July 2, 1941 through August 1954 and October 1960 through 1967 for a station at the international highway bridge; and from December 1923 through July 2, 1941, and 1968 through 1990 for a station approximately 17.1 kilometres downstream.

**MARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. On May 31, 1968 Amistad Dam started impounding water. After this day, flow at this station is controlled largely by releases from Amistad Reservoir, 3.4 river kilometres upstream. A computerized radio telemetry system relays gage height data to the Amistad Dam office.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 32,790 m<sup>3</sup>/sec on June 28, 1954, determined by slope-area computation, with a gage height of 16.98 metres at the old station site 152 metres downstream. This is the greatest rate of discharge recorded at any point on the Rio Grande. Max. since Amistad Dam, 1,760 m<sup>3</sup>/sec on Sept. 21, 1974. Min. 0.63 m<sup>3</sup>/sec on February 14, 1969 with a gage height of 0.33 metres.

## Average Flow in Cubic Metres per Second

|          |      |       |                |      |      |                |
|----------|------|-------|----------------|------|------|----------------|
| Daily:   | Max. | 1,730 | Sept. 22, 1974 | Min. | 1.32 | April 13, 1971 |
| Monthly: | Max. | 609   | Sept. 1974     | Min. | 1.72 | Oct. 1971      |
| Yearly:  | Max. | 139   | 1974           | Min. | 16.3 | 1972           |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.   | Feb.    | Mar.   | April   | May   | June    | July   | Aug.    | Sept.  | Oct.    | Nov.   | Dec.    |
|------------|--------|---------|--------|---------|-------|---------|--------|---------|--------|---------|--------|---------|
| 1          | 68.8   | 216     | 78.6   | 88.9    | 158   | 94.9    | 62.0   | 39.6    | 42.2   | 294     | 129    | 68.0    |
| 2          | 68.7   | 213     | 79.6   | 87.9    | 259   | 94.2    | 59.8   | 38.9    | 40.4   | 320     | 124    | 69.0    |
| 3          | 67.2   | 216     | 78.5   | 125     | 278   | 94.5    | 61.4   | * 38.5  | 42.0   | 375     | 123    | 68.1    |
| 4          | 67.8   | 221     | 78.6   | 132     | 263   | 91.5    | 40.5   | 38.4    | 41.9   | 367     | 123    | 45.0    |
| 5          | 67.5   | 218     | 77.8   | 132     | 255   | 92.2    | 40.2   | 38.8    | 39.1   | 363     | 126    | 68.5    |
| 6          | 68.3   | 214     | 78.4   | 132     | 258   | * 91.2  | 38.7   | 37.7    | 39.1   | 368     | 126    | 66.5    |
| 7          | 68.5   | 228 *   | 79.0   | 132     | 261   | 92.3    | 39.9   | 37.5    | 39.8   | 366     | 126 *  | 67.5    |
| 8          | 68.2   | 238     | 78.6   | 134     | 261   | 89.3    | 39.6   | * 38.4  | 40.0   | 365     | 126    | 66.4    |
| 9          | 67.7   | 231     | 78.7   | 131     | 258 * | 92.0    | 39.5   | 37.9    | 39.6   | 367     | 125    | 67.3    |
| 10         | * 68.3 | 229     | 39.8   | 131     | 131   | 90.1    | 39.5   | 38.3    | 39.8   | 364 *   | 125    | 69.4    |
| 11         | 67.8   | 232     | 39.2   | 132 *   | 128   | 92.2    | * 40.0 | 37.4    | 39.8   | 364     | 71.9   | 66.9    |
| 12         | 68.4   | 225     | 39.1   | 132     | 127   | 91.3    | 39.4   | 36.6    | * 39.9 | 365     | 69.1   | * 69.5  |
| 13         | 67.8   | 134     | 38.3   | 132     | 128   | * 91.7  | 39.9   | 83.1    | 39.9   | 362     | 68.4   | 70.8    |
| 14         | 68.0   | 128 *   | * 39.4 | 133     | 131   | 68.2    | 39.7   | 134     | 40.6   | 364     | * 71.2 | 69.7    |
| 15         | 64.7   | 126 *   | 40.1   | 131     | 129   | 57.6    | 39.9   | 106 *   | 39.4   | 365     | 70.9   | 69.8    |
| 16         | 70.4   | 126     | * 39.0 | 132     | 131 * | 60.2    | 36.8   | * 66.5  | 65.4   | 363     | 69.8   | 69.8    |
| 17         | 67.0   | 77.8    | 40.4   | 132     | 131   | 58.1    | 38.8   | 67.0    | 64.7   | 362 *   | 68.4   | 70.5    |
| 18         | * 68.0 | 75.7    | 40.3   | 134 *   | 130   | 58.1    | 44.3   | 67.5    | 64.4   | 362     | 70.5   | 69.4    |
| 19         | * 67.3 | 73.8    | 40.8   | 134     | 130   | 59.9    | 39.8   | 68.0    | * 68.2 | 361     | 69.7   | * 70.4  |
| 20         | 66.8   | 77.2    | 41.6   | 134     | 131   | * 58.7  | 39.6   | 96.8    | 65.6   | 359     | 68.9   | * 69.9  |
| 21         | 66.9   | * 80.8  | 89.1   | 194     | 132   | 59.4    | 39.2   | 134     | 66.6   | 360     | * 68.8 | 70.6    |
| 22         | 81.5   | 76.8    | 90.0   | 197     | 129   | * 58.5  | 38.9   | 47.8    | 147    | 359     | 68.9   | 69.4    |
| 23         | 126    | 76.8    | 87.8   | 145     | 128 * | 59.9    | 38.4   | 41.6    | 146    | 359     | 68.4   | 70.4    |
| 24         | 122 *  | 78.4    | 88.3   | 195     | 128   | 59.6    | 39.3   | 41.7    | 187    | 359 *   | 68.8   | 69.2    |
| 25         | 123    | 77.3    | 88.2   | 194 *   | 127   | 60.9    | 38.9   | 42.4    | 301    | 359     | 67.6   | 70.0    |
| 26         | 122    | 77.6    | 89.7   | 200     | 129   | 61.3    | 38.0   | 41.7    | 298 *  | 136     | 68.2   | * 69.6  |
| 27         | 124    | 78.5    | 88.6   | 209     | 129   | * 61.9  | 36.9   | 42.6    | 300    | 119     | 67.0   | 70.1    |
| 28         | 124    | * 77.5  | * 89.1 | 194     | 128   | 61.4    | 38.2   | 38.4    | 303    | 118     | 67.4   | 68.7    |
| 29         | 124    | 87.2    | 196    | 132     | 128   | 62.2    | 39.0   | * 40.5  | 307    | 121     | 67.8   | 69.4    |
| 30         | 123    | 87.5    | 204    | 128 *   | 60.1  | 39.2    | 36.7   | 303     | 122    | 67.5    | 69.4   | 69.9    |
| 31         | 162 *  | 87.0    | 128    |         |       |         | 39.6   | 83.8    | 123 *  |         |        |         |
| <b>Sum</b> |        | 4,123.2 |        | 4,479.8 |       | 2,223.4 |        | 1,698.1 |        | 9,711   |        | 2,119.1 |
|            |        | 2,655.6 |        | 2,118.3 |       | 5,096   |        | 1,284.9 |        | 3,290.4 |        | 2,628.2 |

## Current Year 1990

## Period 1968-1990

| Month         | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |          |             | Average    | Volume—Thousands of Cubic Metres |                  |                  |                |        |
|---------------|---------------------|------|---------------------------------|----------|-------------|------------|----------------------------------|------------------|------------------|----------------|--------|
|               | High                | Low  | Day                             | High     | Day         |            | Total                            | Average          | Maximum          | Minimum        |        |
| Jan.          | 0.99                | 0.12 | 31                              | 219      | 14          | 3.05       | 85.7                             | 229,444          | 118,676          | 258,801        | 6,560  |
| Feb.          | 1.11                | .12  | 3                               | 268      | 22          | 3.05       | 147                              | 356,244          | 158,022          | 576,284        | 15,378 |
| Mar.          | .76                 | .10  | 22                              | 128      | 14          | 2.19       | 68.3                             | 183,021          | 177,422          | 489,022        | 8,969  |
| Apr.          | 1.11                | .12  | 25                              | 270      | 23          | 3.35       | 149                              | 387,055          | 172,984          | 473,106        | 34,007 |
| May           | 1.14                | .12  | 2                               | 282      | 1           | 3.35       | 164                              | 440,294          | 260,306          | 665,708        | 29,773 |
| June          | 1.79                | .11  | 11                              | 139      | 17          | 2.75       | 74.1                             | 192,102          | 195,150          | 404,091        | 20,251 |
| July          | .73                 | .11  | 1                               | 120      | 6           | 2.75       | 41.4                             | 111,015          | 167,216          | 452,033        | 28,595 |
| Aug.          | .79                 | .10  | 13                              | 139      | 12          | 1.96       | 54.8                             | 116,716          | 195,744          | 816,829        | 19,229 |
| Sept.         | 1.20                | .11  | 24                              | 313      | 5           | 2.75       | 110                              | 284,291          | 241,732          | 1,578,952      | 21,717 |
| Oct.          | 1.41                | .71  | 3                               | 394      | 27          | 112        | 313                              | 839,030          | 211,040          | 1,002,321      | 4,606  |
| Nov.          | .76                 | .12  | 10                              | 128      | 11          | 3.35       | 87.6                             | 227,076          | 125,643          | 619,571        | 5,599  |
| Dec.          | .74                 | .11  | 10                              | 122      | 6           | 2.75       | 68.4                             | 183,090          | 105,228          | 266,784        | 5,993  |
| <b>Yearly</b> | 1.79                | 0.10 | <b>394</b>                      | <b>=</b> | <b>1.96</b> | <b>114</b> | <b>3,579,378</b>                 | <b>2,129,222</b> | <b>4,398,671</b> | <b>514,100</b> |        |

\* Discharge measurement made on this day

33-1500.04 SPRING M-15 NEAR CD. ACUNA, COAHUILA

**DESCRIPTION:** Rectangular sharp-crested weir of 230 l/sec capacity and staff gage located at latitude  $29^{\circ}25'20''$ , longitude  $101^{\circ}02'40''$ , about 400 metres from the confluence with the Rio Grande and about 15.1 kilometres northwest of Cd. Acuna, Coahuila. This creek enters the Rio Grande from the Mexican side at river kilometre 919, 16.6 river kilometres upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 281.98 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: 1969 through 1990.

**REMARKS:** This spring emerged since operation of Amistad Dam began in May 1968. All storm water from surface runoff passing this station is deducted and is not included in the tabulation below.

**Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary**

| Day        | Jan. | Feb. | Mar. | April | May  | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|------------|------|------|------|-------|------|------|------|------|-------|------|------|------|
| 1          | .04  | .03  | .02  | .02   | .08  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 2          | .04  | .03  | .02  | .02   | .08  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 3          | .04  | .03  | .02  | .02   | .08  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 4          | .04  | .03  | .02  | .02   | .08  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 5          | .04  | .03  | .02  | .02   | .07  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 6          | .04  | .03  | .02  | .02   | .07  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 7          | .04  | .03  | .02  | .03   | .07  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 8          | .04  | .03  | .02  | .03   | .07  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 9          | .04  | .03  | .02  | .03   | .07  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 10         | .04  | .03  | .02  | .03   | .06  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 11         | .04  | .03  | .02  | .03   | .06  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 12         | .04  | .03  | .02  | .04   | .06  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 13         | .04  | .03  | .02  | .04   | .06  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 14         | .04  | .03  | .02  | .04   | .06  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 15         | .04  | .03  | .02  | .04   | .05  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 16         | .04  | .03  | .02  | .05   | .05  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 17         | .04  | .02  | .02  | .05   | .05  | .02  | .01  | .02  | .02   | .03  | .03  | .02  |
| 18         | .04  | .02  | .02  | .05   | .05  | .01  | .01  | .02  | .02   | .03  | .03  | .02  |
| 19         | .03  | .02  | .02  | .05   | .05  | .01  | .02  | .02  | .03   | .03  | .02  | .02  |
| 20         | .03  | .02  | .02  | .05   | .04  | .01  | .02  | .02  | .03   | .03  | .02  | .02  |
| 21         | .03  | .02  | .02  | .06   | .04  | .01  | .02  | .02  | .03   | .03  | .02  | .02  |
| 22         | .03  | .02  | .02  | .06   | .04  | .01  | .02  | .02  | .03   | .03  | .02  | .02  |
| 23         | .03  | .02  | .02  | .06   | .04  | .01  | .02  | .02  | .03   | .03  | .02  | .02  |
| 24         | .03  | .02  | .02  | .06   | .04  | .01  | .02  | .02  | .03   | .03  | .02  | .02  |
| 25         | .03  | .02  | .02  | .06   | .03  | .01  | .02  | .02  | .03   | .03  | .02  | .02  |
| 26         | .03  | .02  | .02  | .07   | .03  | .01  | .02  | .02  | .03   | .03  | .02  | .02  |
| 27         | .03  | .02  | .02  | .07   | .03  | .01  | .02  | .02  | .03   | .03  | .02  | .02  |
| 28         | .03  | .02  | .02  | .07   | .03  | .01  | .02  | .02  | .03   | .03  | .02  | .02  |
| 29         | .03  | .02  | .07  | .03   | .01  | .02  | .02  | .02  | .03   | .03  | .02  | .02  |
| 30         | .03  | .02  | .02  | .08   | .02  | .01  | .02  | .02  | .03   | .03  | .02  | .02  |
| 31         | .03  | .02  | .02  | .08   | .02  | .01  | .02  | .02  | .03   | .03  | .02  | .02  |
| <b>Sum</b> |      | 0.72 |      | 1.34  |      | 0.47 |      | 0.62 |       | 0.93 |      | 0.62 |
|            | 1.11 |      | 0.62 |       | 1.61 |      | 0.44 |      | 0.72  |      | 0.78 |      |

**Current Year 1990**

**Period 1969-1990**

| Month         | Extreme Gage Metres |      |      | Extreme Cube Metres per Second |      |      | Average | Volume—Thousands of Cubic Metres |         |         |         |
|---------------|---------------------|------|------|--------------------------------|------|------|---------|----------------------------------|---------|---------|---------|
|               | High                | Low  | Day  | High                           | Low  | Day  |         | Total                            | Average | Maximum | Minimum |
| Jan.          | 0.12                | 0.10 | ! 1  | 0.04                           | ! 19 | 0.03 | 0.04    | 95.9                             | 94.7    | 162     | 26.0    |
| Feb.          | .10                 | .09  | ! 1  | .03                            | ! 17 | .02  | .03     | 62.2                             | 83.6    | 152     | 24.1    |
| Mar.          | .09                 | .08  | ! 1  | .02                            | ! 1  | .02  | .02     | 53.6                             | 83.4    | 150     | 27.0    |
| Apr.          | .20                 | .08  | 30   | .08                            | ! 1  | .02  | .04     | 116                              | 79.5    | 130     | 26.0    |
| May           | .20                 | .06  | ! 1  | .08                            | ! 30 | .02  | .05     | 139                              | 85.5    | 139     | 27.0    |
| June          | .06                 | .06  | ! 1  | .02                            | ! 18 | .01  | .02     | 40.6                             | 73.4    | 149     | 26.0    |
| July          | .07                 | .06  | ! 19 | .02                            | ! 1  | .01  | .01     | 38.0                             | 74.3    | 131     | 26.0    |
| Aug.          | .08                 | .07  | ! 1  | .02                            | ! 1  | .02  | .02     | 53.6                             | 75.8    | 150     | 0       |
| Sept.         | .11                 | .08  | ! 19 | .03                            | ! 1  | .02  | .02     | 62.2                             | 81.0    | 204     | 0       |
| Oct.          | .11                 | .10  | ! 1  | .03                            | ! 1  | .03  | .03     | 80.4                             | 96.8    | 402     | 0       |
| Nov.          | .10                 | .09  | ! 1  | .03                            | ! 19 | .02  | .03     | 67.4                             | 91.6    | 249     | 26.0    |
| Dec.          | .09                 | .09  | ! 1  | .02                            | ! 1  | .02  | .02     | 53.6                             | 90.2    | 162     | 27.0    |
| <b>Yearly</b> | 0.20                | 0.06 | —    | 0.08                           | —    | 0.01 | 0.03    | 863                              | 1,010   | 1,680   | 317     |

0 Mean daily

! And other days

## JUANITO ARROYO DE LOS SABUCULOS NEAR CD. ACUNA, COAHUILA

**DESCRIPTION:** Cipolletti weir of 2 m<sup>3</sup>/sec capacity and staff gage located at latitude 29° 24' 25", longitude 101° 02' 20", about 200 metres from the confluence with the Rio Grande, and about 13.8 kilometres northwest of Cd. Acuna, Coahuila. This creek enters the Rio Grande from the Mexican side at river kilometre 913, 15.3 river kilometres upstream from the International highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharge determined by prorating between readings. Records available: 1969 through 1990.

**REMARKS:** At least 3 separate springs have emerged along this creek since operation of Amistad Dam began in May 1968. Prior to this time, flow in this creek was exclusively from storm runoff. All storm water from surface runoff passing this station is deducted and is not included in the tabulation below.

Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day   | Jan.  | Feb.  | Mar.  | April | May   | June   | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec. |      |
|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|------|------|
| 1     | 1.50  | 1.44  | 1.45  | 1.31  | 1.31  | 1.22   | 1.05  | 1.14  | 1.26  | 1.39  | 1.60  | 1.58 |      |
| 2     | 1.50  | 1.46  | 1.45  | 1.30  | 1.31  | 1.19   | 1.04  | 1.16  | 1.26  | 1.39  | 1.60  | 1.58 |      |
| 3     | 1.50  | 1.49  | 1.45  | 1.30  | 1.31  | 1.16   | 1.02  | 1.17  | 1.26  | 1.39  | 1.60  | 1.58 |      |
| 4     | 1.50  | 1.46  | 1.45  | 1.29  | 1.30  | 1.14   | 1.01  | 1.19  | 1.26  | 1.39  | 1.60  | 1.58 |      |
| 5     | 1.49  | 1.47  | 1.45  | 1.30  | 1.30  | 1.12   | 1.02  | 1.21  | 1.26  | 1.39  | 1.60  | 1.58 |      |
| 6     | 1.49  | 1.47  | 1.45  | 1.31  | 1.29  | 1.09   | 1.02  | 1.23  | 1.27  | 1.39  | 1.60  | 1.58 |      |
| 7     | 1.49  | 1.48  | 1.45  | 1.32  | 1.29  | 1.09   | 1.03  | 1.24  | 1.29  | 1.39  | 1.60  | 1.59 |      |
| 8     | 1.49  | 1.48  | 1.44  | 1.32  | 1.28  | 1.09   | 1.03  | 1.26  | 1.30  | 1.39  | 1.60  | 1.59 |      |
| 9     | 1.48  | 1.47  | 1.43  | 1.33  | 1.28  | 1.09   | 1.04  | 1.26  | 1.31  | 1.39  | 1.60  | 1.59 |      |
| 10    | 1.48  | 1.47  | 1.42  | 1.34  | 1.27  | 1.09   | 1.04  | 1.25  | 1.32  | 1.39  | 1.60  | 1.59 |      |
| 11    | 1.46  | 1.46  | 1.40  | 1.35  | 1.27  | 1.09   | 1.05  | 1.25  | 1.34  | 1.39  | 1.60  | 1.60 |      |
| 12    | 1.48  | 1.45  | 1.39  | 1.34  | 1.26  | 1.09   | 1.06  | 1.25  | 1.35  | 1.39  | 1.60  | 1.60 |      |
| 13    | 1.43  | 1.45  | 1.38  | 1.33  | 1.26  | * 1.09 | 1.06  | 1.25  | 1.36  | 1.39  | 1.60  | 1.59 |      |
| 14    | 1.48  | *     | 1.45  | *     | 1.37  | 1.32   | 1.25  | 1.09  | 1.07  | 1.24  | 1.37  | 1.56 |      |
| 15    | 1.48  | 1.46  | 1.37  | 1.31  | 1.25  | 1.08   | 1.07  | *     | 1.24  | 1.38  | 1.39  | 1.57 |      |
| 16    | 1.45  | 1.44  | 1.38  | 1.30  | *     | 1.24   | 1.08  | 1.08  | 1.24  | 1.40  | 1.59  | 1.55 |      |
| 17    | 1.45  | 1.43  | 1.38  | 1.29  | 1.24  | 1.08   | 1.08  | 1.24  | 1.41  | 1.39  | 1.60  | 1.54 |      |
| 18    | 1.49  | 1.43  | 1.38  | *     | 1.28  | 1.25   | 1.08  | *     | 1.09  | 1.24  | 1.42  | 1.53 |      |
| 19    | *     | 1.49  | 1.42  | 1.38  | 1.29  | 1.26   | 1.07  | 1.09  | 1.24  | 1.43  | 1.51  | 1.52 |      |
| 20    | 1.50  | 1.42  | 1.39  | 1.29  | 1.26  | 1.07   | 1.09  | 1.24  | 1.42  | 1.39  | 1.61  | 1.53 |      |
| 21    | 1.50  | 1.41  | 1.39  | 1.30  | 1.26  | 1.08   | 1.09  | 1.24  | 1.42  | 1.39  | 1.61  | 1.53 |      |
| 22    | 1.51  | 1.42  | 1.39  | 1.30  | 1.27  | 1.08   | 1.09  | 1.24  | 1.41  | 1.39  | 1.61  | 1.54 |      |
| 23    | 1.51  | 1.42  | 1.37  | 1.31  | 1.28  | 1.09   | 1.09  | 1.24  | 1.41  | 1.39  | 1.60  | 1.54 |      |
| 24    | 1.50  | 1.43  | 1.36  | 1.31  | 1.28  | 1.09   | 1.09  | 1.25  | 1.40  | 1.39  | 1.60  | 1.55 |      |
| 25    | 1.51  | 1.43  | 1.36  | 1.32  | 1.32  | 1.27   | 1.10  | 1.25  | 1.40  | 1.39  | 1.59  | 1.55 |      |
| 26    | 1.49  | 1.44  | 1.35  | 1.32  | 1.27  | 1.10   | 1.10  | 1.25  | 1.39  | 1.39  | 1.59  | *    | 1.56 |
| 27    | 1.48  | 1.44  | 1.34  | 1.32  | 1.26  | 1.11   | 1.10  | 1.25  | 1.39  | 1.39  | 1.58  | 1.57 |      |
| 28    | 1.47  | 1.45  | 1.33  | 1.32  | 1.25  | 1.10   | 1.11  | 1.26  | 1.39  | 1.39  | 1.58  | 1.57 |      |
| 29    | 1.46  | 1.42  | 1.32  | 1.31  | 1.25  | 1.08   | 1.12  | 1.26  | 1.39  | 1.39  | 1.58  | 1.58 |      |
| 30    | 1.44  | 1.39  | 1.32  | 1.31  | 1.24  | 1.13   | 1.13  | 1.26  | 1.39  | 1.39  | 1.58  | 1.58 |      |
| 31    | 1.43  | 1.31  | 1.31  | 1.28  | 1.13  | 1.13   | 1.13  | 1.26  | *     | 1.39  | 1.59  | 1.59 |      |
| Sum   | 40.47 | 43.09 | 39.34 | 39.35 | 33.00 | 33.18  | 39.30 | 40.66 | 43.09 | 49.61 | 47.95 |      |      |
| 45.08 | 43.09 |       |       |       |       |        |       |       |       |       |       |      |      |

## Current Year 1990

## Period 1969-1990

| Month  | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |        |     | Average | Volume - Thousands of Cubic Metres |         |         |         |        |
|--------|---------------------|------|---------------------------------|--------|-----|---------|------------------------------------|---------|---------|---------|--------|
|        | High                | Low  | Day                             | @ High | Day |         | Total                              | Average | Maximum | Minimum |        |
| Jan.   | 0.55                | 0.53 | 7                               | 1.52   | 31  | 1.83    | 1.40                               | 3,981   | 4,180   | 5,822   | 430    |
| Feb.   | .54                 | .52  | 7                               | 1.48   | 21  | 1.61    | 1.45                               | 3,497   | 3,736   | 5,189   | 470    |
| Mar.   | .54                 | .50  | 1                               | 1.45   | 31  | 1.31    | 1.39                               | 3,723   | 4,104   | 5,642   | 649    |
| Apr.   | .53                 | .49  | 11                              | 1.35   | 18  | 1.28    | 1.31                               | 3,399   | 3,884   | 5,359   | 784    |
| May    | .50                 | .48  | 1                               | 1.31   | 16  | 1.24    | 1.27                               | 3,400   | 3,915   | 5,600   | 889    |
| June   | .48                 | .44  | 1                               | 1.22   | 19  | 1.07    | 1.10                               | 2,851   | 3,647   | 5,021   | 836    |
| July   | .44                 | .42  | 19                              | 1.13   | 8   | 1.01    | 1.07                               | 2,867   | 3,679   | 5,287   | 949    |
| Aug.   | .46                 | .45  | 18                              | 1.26   | 1   | 1.14    | 1.24                               | 3,309   | 3,711   | 5,330   | 965    |
| Sept.  | .53                 | .43  | 19                              | 1.43   | 1   | 1.26    | 1.36                               | 3,513   | 3,784   | 5,448   | 965    |
| Oct.   | .52                 | .52  | 1                               | 1.39   | 1   | 1.39    | 1.39                               | 3,723   | 4,174   | 6,428   | 1,353  |
| Nov.   | .57                 | .56  | 116                             | 1.61   | 127 | 1.58    | 1.60                               | 4,183   | 4,173   | 5,979   | 1,581  |
| Dec.   | .57                 | .50  | 11                              | 1.60   | 19  | 1.52    | 1.57                               | 4,200   | 4,322   | 5,808   | 1,724  |
| Yearly | 0.57                | 0.42 | =                               | 1.61   | =   | 1.01    | 1.35                               | 42,606  | 47,369  | 63,942  | 12,150 |

\* Discharge measurement made on this day

@ Mean daily

! And other days

## 08-4509.06 SPRING M-5 NEAR CO. ACUNA, COAHUILA

**DESCRIPTION:** Rectangular sharp-crested weir of 0.5 m<sup>3</sup>/sec capacity and staff gage located at latitude 29°25'20", longitude 101°02'35", at the base of the high bank of the Rio Grande, and about 14.8 kilometres northwest of Cd. Acuna, Coahuila. This creek enters the Rio Grande from the Mexican side at river kilometre 919, 16.3 river kilometres upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 284.19 metres above mean sea level U. S. C. & G. S. datum.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: 1969 through 1990.

**REMARKS:** This spring emerged since operation of Amistad Dam began in May 1968. All storm water from surface runoff passing this station is deducted and is not included in the tabulation below.

Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day | Jan. | Feb. | Mar. | April | May  | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|-----|------|------|------|-------|------|------|------|------|-------|------|------|------|
| 1   | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 2   | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 3   | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 4   | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 5   | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 6   | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 7   | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 8   | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 9   | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 10  | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 11  | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 12  | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 13  | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 14  | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 15  | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 16  | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 17  | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 18  | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 19  | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 20  | .06  | .06  | .06  | .06   | .06  | .06  | .05  | .06  | .06   | .07  | .06  | .06  |
| 21  | .06  | .06  | .06  | .06   | .06  | .05  | .06  | .06  | .07   | .06  | .06  | .06  |
| 22  | .06  | .06  | .06  | .06   | .06  | .05  | .06  | .06  | .07   | .06  | .06  | .06  |
| 23  | .06  | .06  | .06  | .06   | .06  | .05  | .06  | .06  | .07   | .06  | .06  | .06  |
| 24  | .06  | .06  | .06  | .06   | .06  | .05  | .06  | .06  | .07   | .06  | .06  | .06  |
| 25  | .06  | .06  | .06  | .06   | .06  | .05  | .06  | .06  | .07   | .06  | .06  | .06  |
| 26  | .06  | .06  | .06  | .06   | .06  | .05  | .06  | .06  | .07   | .06  | .06  | .06  |
| 27  | .06  | .06  | .06  | .06   | .06  | .05  | .06  | .06  | .07   | .06  | .06  | .06  |
| 28  | .06  | .06  | .06  | .06   | .06  | .05  | .06  | .06  | .07   | .06  | .06  | .06  |
| 29  | .06  | .06  | .06  | .06   | .06  | .05  | .06  | .06  | .07   | .06  | .06  | .06  |
| 30  | .06  | .06  | .06  | .06   | .06  | .05  | .06  | .06  | .07   | .06  | .06  | .06  |
| 31  | .06  | .06  | .06  | .06   | .06  | .05  | .06  | .06  | .07   | .06  | .06  | .06  |
| Sum |      | 1.68 |      | 1.80  |      | 1.67 |      | 1.86 |       | 2.05 |      | 1.86 |
|     | 1.86 |      | 1.86 |       | 1.86 |      | 1.68 |      | 1.92  |      | 1.80 |      |

## Current Year 1990

## Period 1969-1990

| Month  | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |      |      | Average | Volume-Thousands of Cubic Metres |         |         |         |      |
|--------|---------------------|------|---------------------------------|------|------|---------|----------------------------------|---------|---------|---------|------|
|        | High                | Low  | Day                             | High | Day  |         | Total                            | Average | Maximum | Minimum |      |
|        | High                | Low  | Day                             | High | Day  |         |                                  |         |         |         |      |
| Jan.   | 0.10                | 0.10 | ! 1                             | 0.06 | ! 1  | 0.06    | 0.06                             | 161     | 192     | 241     | 107  |
| Feb.   | .11                 | .10  | ! 1                             | .06  | ! 1  | .06     | .06                              | 145     | 173     | 213     | 97.0 |
| Mar.   | .10                 | .10  | ! 1                             | .06  | ! 1  | .06     | .06                              | 161     | 187     | 227     | 80.1 |
| Apr.   | .10                 | .10  | ! 1                             | .06  | ! 1  | .06     | .06                              | 156     | 183     | 220     | 78.0 |
| May    | .10                 | .10  | ! 1                             | .06  | ! 1  | .06     | .06                              | 161     | 190     | 229     | 80.1 |
| June   | .10                 | .10  | ! 1                             | .06  | ! 18 | .05     | .06                              | 144     | 179     | 223     | 78.0 |
| July   | .10                 | .10  | ! 19                            | .06  | ! 1  | .05     | .05                              | 145     | 180     | 213     | 54.0 |
| Aug.   | .10                 | .10  | ! 1                             | .06  | ! 1  | .06     | .06                              | 161     | 186     | 241     | 54.0 |
| Sept.  | .11                 | .10  | ! 19                            | .07  | ! 1  | .06     | .06                              | 166     | 183     | 233     | 52.1 |
| Oct.   | .11                 | .11  | ! 1                             | .07  | ! 20 | .06     | .07                              | 177     | 190     | 241     | 54.0 |
| Nov.   | .11                 | .10  | ! 1                             | .06  | ! 1  | .06     | .06                              | 156     | 186     | 233     | 78.0 |
| Dec.   | .10                 | .10  | ! 1                             | .06  | ! 1  | .06     | .06                              | 161     | 193     | 241     | 80.1 |
| Yearly | 0.11                | 0.10 | ==                              | 0.07 | ==   | 0.05    | 0.06                             | 1,894   | 2,222   | 2,650   | 892  |

g Mean daily

! And other days

## J8-4509.10 ARROYO DEL BUEY NEAR C.D. ACUNA, COAHUILA

**DESCRIPTION:** Cipolletti weir of 1 m<sup>3</sup>/sec capacity, located at latitude 29°24'20", longitude 101°02'25", creek kilometre 300 metres from the confluence with the Rio Grande, and about 13.7 Kilometres northwest of Cd. Acuna, Coahuila. This stream enters the Rio Grande from the Mexican side at river kilometre 918, 5.6 river kilometres downstream from Amistad Dam and 15.2 kilometres upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: November 1961 through 1990.

**REMARKS:** The flow of this stream is not modified by diversions or storage. Prior to 1969 discharges were based on a continuous record of gage heights and the weir discharge table. Storm flow is deducted and not included in the tabulation below. This station was established for investigational purposes in connection with Amistad Dam to determine what effect storage in Amistad Reservoir will have on the flow of this stream. At approximately 0.5 creek kilometre upstream from the weir, four springs have emerged since Amistad Reservoir Storage began. Backwater from the Rio Grande will affect the flow of this stream when the flow in the river is approximately 566 m<sup>3</sup>/sec.

Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan. | Feb. | Mar. | April | May   | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|------------|------|------|------|-------|-------|------|------|------|-------|------|------|------|
| 1          | 0.20 | 0.20 | 0.33 | 0.20  | 0.59  | 0.19 | 0.18 | 0.20 | 0.20  | 0.23 | 0.21 | 0.21 |
| 2          | .20  | .20  | .33  | .20   | .60   | .19  | .18  | .20  | .20   | .23  | .21  | .21  |
| 3          | .20  | .20  | .33  | .19   | .59   | .19  | .18  | .20  | .20   | .23  | .21  | .21  |
| 4          | .20  | .21  | .32  | .19   | .57   | .19  | .18  | .20  | .20   | .23  | .21  | .21  |
| 5          | .20  | .21  | .32  | .20   | .56   | .19  | .18  | .20  | .20   | .23  | .21  | .21  |
| 6          | .20  | .22  | .31  | .22   | .55   | .19  | .18  | .20  | .20   | .23  | .21  | .21  |
| 7          | .20  | .22  | .31  | .23   | .53   | .19  | .18  | .20  | .20   | .23  | .21  | .21  |
| 8          | .20  | .23  | .30  | .25   | .52   | .19  | .18  | .20  | .20   | .23  | .21  | .21  |
| 9          | .20  | .23  | .30  | .26   | .50   | .19  | .18  | .20  | .20   | .23  | .21  | .21  |
| 10         | .20  | .24  | .30  | .28   | .49   | .19  | .18  | .20  | .21   | .23  | .21  | .21  |
| 11         | .20  | .24  | .29  | .29   | .48   | .19  | .18  | .20  | .21   | .23  | .21  | .21  |
| 12         | .20  | .25  | .29  | .31   | .46   | .19  | .19  | .20  | .21   | .22  | .21  | .21  |
| 13         | .20  | .25  | .28  | .32   | .45   | .19  | .19  | .20  | .21   | .22  | .21  | .21  |
| 14         | .20  | .26  | .28  | .34   | .44   | .19  | .19  | .20  | .21   | .22  | .21  | .21  |
| 15         | .20  | .26  | .27  | .35   | .42   | .19  | .19  | .20  | .21   | .22  | .21  | .21  |
| 16         | .20  | .26  | .27  | .37   | .41   | .19  | .19  | .20  | .21   | .22  | .21  | .21  |
| 17         | .20  | .27  | .27  | .38   | .39   | .18  | .19  | .20  | .21   | .22  | .21  | .21  |
| 18         | .20  | .27  | .26  | .39   | .38   | .18  | .19  | .20  | .21   | .22  | .21  | .21  |
| 19         | .20  | .28  | .26  | .41   | .37   | .18  | .19  | .20  | .21   | .22  | .21  | .21  |
| 20         | .20  | .28  | .25  | .42   | .35   | .18  | .19  | .20  | .22   | .22  | .21  | .20  |
| 21         | .20  | .29  | .25  | .44   | .34   | .18  | .19  | .20  | .22   | .22  | .21  | .20  |
| 22         | .20  | .29  | .25  | .45   | .33   | .18  | .19  | .20  | .22   | .22  | .21  | .20  |
| 23         | .20  | .30  | .24  | .47   | .31   | .18  | .19  | .20  | .22   | .22  | .21  | .20  |
| 24         | .20  | .30  | .24  | .48   | .30   | .18  | .19  | .20  | .22   | .22  | .21  | .20  |
| 25         | .20  | .31  | .23  | .50   | .29   | .18  | .19  | .20  | .22   | .22  | .21  | .20  |
| 26         | .20  | .31  | .23  | .51   | .27   | .18  | .20  | .20  | .22   | .22  | .21  | .20  |
| 27         | .20  | .32  | .22  | .53   | .26   | .18  | .20  | .20  | .22   | .22  | .21  | .20  |
| 28         | .20  | .32  | .22  | .54   | .24   | .18  | .20  | .20  | .22   | .22  | .21  | .20  |
| 29         | .20  | .22  | .56  | .23   | .18   | .20  | .20  | .20  | .23   | .21  | .21  | .20  |
| 30         | .20  | .21  | .57  | .22   | .18   | .20  | .20  | .20  | .23   | .21  | .21  | .20  |
| 31         | .20  | .21  | .21  | .20   | .18   | .20  | .20  | .20  | .21   | .21  | .20  | .20  |
| <b>Sum</b> |      | 7.22 |      | 10.85 |       | 5.56 |      | 6.20 |       | 6.89 |      | 6.39 |
|            | 6.20 |      | 8.39 |       | 12.64 |      | 5.84 |      | 6.34  |      | 6.30 |      |

Current Year 1990

Period 1961-1990

| Month         | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |        |       | Average | Volume—Thousands of Cubic Metres |         |         |         |
|---------------|---------------------|------|---------------------------------|--------|-------|---------|----------------------------------|---------|---------|---------|
|               | High                | Low  | Day                             | ø High | ø Low |         | Total                            | Average | Maximum | Minimum |
| Jan.          | 0.23                | 0.23 | ! 1                             | 0.20   | ! 1   | 0.20    | 536                              | 423     | 651     | 8.4     |
| Feb.          | .31                 | .23  | 127                             | .32    | ! 1   | .20     | 624                              | 386     | 624     | 6.7     |
| Mar.          | .31                 | .23  | ! 1                             | .33    | ! 30  | .21     | 725                              | 422     | 725     | 11.5    |
| Apr.          | .45                 | .23  | 30                              | .57    | ! 3   | .19     | 937                              | 451     | 937     | 7.8     |
| May           | .47                 | .23  | 2                               | .60    | ! 31  | .20     | 1,092                            | 489     | 1,092   | 13.4    |
| June          | .22                 | .22  | ! 1                             | .19    | ! 17  | .18     | 480                              | 426     | 664     | 7.8     |
| July          | .22                 | .22  | 126                             | .20    | ! 1   | .18     | 505                              | 411     | 657     | 8.0     |
| Aug.          | .23                 | .23  | 1 1                             | .20    | ! 1   | .20     | 536                              | 436     | 653     | 8.3     |
| Sept.         | .25                 | .23  | 129                             | .23    | ! 1   | .20     | 548                              | 452     | 648     | 8.1     |
| Oct.          | .25                 | .24  | ! 1                             | .23    | ! 28  | .21     | 595                              | 473     | 671     | 8.0     |
| Nov.          | .24                 | .23  | ! 1                             | .21    | ! 1   | .21     | 544                              | 429     | 638     | 7.8     |
| Dec.          | .23                 | .23  | ! 1                             | .21    | ! 20  | .20     | 552                              | 434     | 664     | 8.0     |
| <b>Yearly</b> | 0.47                | 0.22 | ==                              | 0.60   | ==    | 0.18    | 7,674                            | 5,232   | 7,674   | 268     |

## 08-4511.20 MARIS SPRING NEAR CO. ACUNA, COAHUILA

**DESCRIPTION:** Cipolletti weir of 3.0 m<sup>3</sup>/sec capacity and staff gage located at the spring about 30 metres from the right bank of the Rio Grande at latitude 29°24'00", longitude 101°01'40", and about 12.9 kilometres northwest of Cd. Acuna, Coahuila. This spring enters the Rio Grande at river Kilometre 917, 14.3 river kilometres upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila and 6 river kilometres downstream from Amistad Dam. The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: November 14, 1961 through February 1984 and September 1985 through 1990.

**REMARKS:** The flow of this spring is very uniform during periods of dry weather and is not modified by diversions or storage. This station was established for investigational purposes in connection with Amistad Dam to determine what effect storage in Amistad Reservoir will have on the flow of this spring. All storm water from surface runoff passing this station is deducted and is not included in the tabulation below. Prior to May 1969 the weir had an 315 l/sec capacity. Beginning March 1, 1984, discharge computations were temporarily discontinued due to leakage under the weir. Discharge computations were resumed on August 14, 1985.

Mean Daily Discharge in Cubic Metres per Second 1930 — Annual and Period Summary

| Day        | Jan.  | Feb.  | Mar.  | April | May   | June  | July | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|------------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|
| 1          | 0.35  | 0.35  | 0.34  | 0.35  | 0.36  | 0.36  | 0.32 | 0.31  | 0.35  | 0.36  | 0.44  | 0.38  |
| 2          | .35   | .35   | .34   | .36   | .36   | .36   | .32  | .32   | .36   | .36   | .44   | .38   |
| 3          | .35   | .35   | .34   | .37   | .36   | .36   | .32  | .33   | .36   | .36   | .44   | .38   |
| 4          | .35   | .35   | .34   | .38   | .36   | .36   | .32  | .34   | .36   | .36   | .43   | .37   |
| 5          | .35   | .35   | .34   | .38   | .36   | .36   | .32  | .35   | .36   | .36   | .43   | .37   |
| 6          | .34   | .35   | .34   | .38   | .36   | .36   | .32  | .36   | .36   | .36   | .43   | .37   |
| 7          | .34   | .35   | .34   | .38   | .36   | .36   | .32  | .37   | .36   | .36   | .43   | .37   |
| 8          | .34   | .35   | .34   | .37   | .36   | .35   | .31  | .38   | .36   | .36   | .42   | .37   |
| 9          | .33   | .35   | .34   | .37   | .36   | .35   | .31  | .38   | .37   | .36   | .42   | .38   |
| 10         | .33   | .35   | .34   | .37   | .36   | .35   | .31  | .38   | .37   | .36   | .41   | .38   |
| 11         | .33   | .35   | .34   | .37   | .36   | .35   | .31  | .38   | .37   | .36   | .41   | .38   |
| 12         | .33   | .35   | .34   | .37   | .36   | .34   | .31  | .39   | .37   | .36   | .40   | .38   |
| 13         | .33   | .35   | .34   | .37   | .36   | .34   | .31  | .39   | .37   | .36   | .40   | .38   |
| 14         | .32   | .35   | .34   | .37   | .36   | .34   | .31  | .39   | .37   | .36   | .39   | .38   |
| 15         | .32   | .35   | .34   | .37   | .36   | .34   | .31  | .39   | .37   | .36   | .39   | .38   |
| 16         | .32   | .34   | .34   | .36   | .36   | .34   | .31  | .39   | .37   | .36   | .39   | .37   |
| 17         | .32   | .34   | .34   | .36   | .36   | .33   | .31  | .39   | .37   | .36   | .39   | .37   |
| 18         | .32   | .34   | .34   | .36   | .36   | .33   | .31  | .38   | .37   | .36   | .39   | .37   |
| 19         | .33   | .34   | .34   | .36   | .36   | .33   | .31  | .37   | .37   | .36   | .39   | *     |
| 20         | .33   | .33   | .34   | .36   | .36   | * .33 | .31  | .37   | .37   | .36   | .39   | .37   |
| 21         | .34   | * .33 | .34   | .36   | .36   | .33   | .31  | .36   | .37   | .36   | * .39 | .37   |
| 22         | .34   | .33   | .34   | .36   | .36   | .33   | .31  | * .36 | .37   | .36   | .39   | .37   |
| 23         | .35   | .33   | .33   | .36   | .36   | .33   | .31  | .36   | .36   | .36   | .39   | .36   |
| 24         | * .35 | .33   | .33   | .36   | .36   | .33   | .31  | .36   | .36   | .36   | .39   | .36   |
| 25         | .35   | .34   | .33   | .36   | .36   | .33   | .31  | .36   | .36   | .36   | .39   | .36   |
| 26         | .35   | .34   | .33   | .36   | .36   | .33   | .31  | .35   | .36   | .36   | .39   | .36   |
| 27         | .35   | .34   | .32   | .36   | .36   | .33   | .31  | .35   | .36   | .36   | .39   | .36   |
| 28         | .35   | .34   | * .32 | .36   | .36   | .33   | .31  | .35   | .36   | .36   | .39   | .36   |
| 29         | .35   | .34   | .33   | .36   | .36   | .33   | .31  | .35   | .36   | .36   | .39   | .36   |
| 30         | .35   | .34   | .34   | * .36 | * .36 | .33   | .31  | .35   | .36   | .36   | .38   | .36   |
| 31         | .35   | .34   | .34   | .36   | .36   | .33   | .31  | .35   | .36   | .36   | .39   | .36   |
| <b>Sum</b> |       | 9.62  |       | 10.95 |       | 10.24 |      | 11.25 |       | 11.16 |       | 11.48 |
|            | 10.51 |       | 10.45 |       | 11.16 |       | 9.68 |       | 10.93 |       | 12.12 |       |

Current Year 1990

Period 1961-1990

| Month         | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |        |       | Average | Volume - Thousands of Cubic Metres |         |         |         |      |
|---------------|---------------------|------|---------------------------------|--------|-------|---------|------------------------------------|---------|---------|---------|------|
|               | High                | Low  | Day                             | ø High | ø Low |         | Total                              | Average | Maximum | Minimum |      |
| Jan.          | 0.17                | 0.15 | 1 1                             | 0.35   | 114   | 0.32    | 0.34                               | 908     | 665     | 1,152   | 5.4  |
| Feb.          | .17                 | .16  | 1 1                             | .35    | 120   | .33     | .34                                | 831     | 594     | 1,136   | 5.1  |
| Mar.          | .16                 | .15  | 1 1                             | .34    | 127   | .32     | .34                                | 903     | 650     | 1,179   | 6.0  |
| Apr.          | .18                 | .16  | 1 4                             | .38    | 1     | .35     | .37                                | 946     | 662     | 1,217   | 5.2  |
| May           | .17                 | .17  | 1 1                             | .36    | 1 1   | .36     | .36                                | 964     | 760     | 1,624   | 10.7 |
| June          | .17                 | .16  | 1 1                             | .36    | 117   | .33     | .34                                | 885     | 726     | 1,719   | 7.4  |
| July          | .15                 | .14  | 1 1                             | .32    | 1 8   | .31     | .31                                | 836     | 730     | 1,694   | 9.7  |
| Aug.          | .19                 | .14  | 112                             | .39    | 1     | .31     | .36                                | 972     | 761     | 1,525   | 7.6  |
| Sept.         | .17                 | .16  | 1 9                             | .37    | 1     | .35     | .36                                | 944     | 819     | 1,435   | 6.7  |
| Oct.          | .17                 | .17  | 1 1                             | .36    | 1     | .36     | .36                                | 964     | 873     | 1,752   | 5.7  |
| Nov.          | .22                 | .18  | 1 1                             | .44    | 30    | .38     | .40                                | 1,047   | 797     | 1,650   | 5.2  |
| Dec.          | .18                 | .17  | 1 1                             | .38    | 123   | .36     | .37                                | 992     | 707     | 1,464   | 5.4  |
| <b>Yearly</b> | 0.22                | 0.14 | —                               | 0.44   | —     | 0.31    | 0.35                               | 11,192  | 8,744   | 16,060  | 180  |

\* Discharge measurement made on this day

Ø Mean daily

! And other days

## 08-4511.30 EIGHT MILE CREEK NEAR DEL RIO, TEXAS

**DESCRIPTION:** Concrete wall with 90 V-notch weir of 0.20 m<sup>3</sup>/sec capacity at latitude 29° 24' 00", longitude 101° 00' 55", 1.3 creek kilometres from the confluence with the Rio Grande, and about 12.9 kilometres northwest of Del Rio, Texas. This stream enters the Rio Grande from the United States side at river kilometre 916, 7.4 river kilometres downstream from Amistad Dam, and 13.4 kilometres upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The elevation of the zero of the gage is 278.58 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 12 measurements during the year. Mean daily discharges determined by prorating between measurements. Records available: March 1961 through 1990.

**REMARKS:** The source of flow of this stream is from surface runoff during rainy periods and the subsequent flow from underground seepage as a result of such rains. All storm water from surface runoff passing this station is deducted and is not included in the tabulation below. This station was established for investigational purposes in connection with Amistad Dam to determine what effect storage in Amistad Reservoir may have on the flow of this stream. Bubbler gage and water-stage recorder were removed April 1, 1985.

## EXTREME FLOWS FROM RECORDS:

|          |           |                    | Average Flow in Cubic Metres per Second |             |  | Min. 0<br>Min. 0<br>Min. 0 | Occasionally<br>Occasionally<br>Several years |
|----------|-----------|--------------------|---|-------------|--|----------------------------|---|
| Daily:   | Max. 0.45 | July 23 & 24, 1976 | July 1976                               | 1974 & 1975 |  |                            |   |
| Monthly: | Max. 0.18 |                    |   |             |  |                            |   |
| Yearly:  | Max. 0.11 |                    |   |             |  |                            |   |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan. | Feb. | Mar. | April | May  | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|------------|------|------|------|-------|------|------|------|------|-------|------|------|------|
| 1          | 0.05 | 0.05 | 0.05 | 0.04  | 0.23 | 0.06 | 0.02 | 0.02 | 0.02  | 0.05 | 0.05 | 0.05 |
| 2          | .05  | .05  | .05  | .04   | .24  | .05  | .02  | .02  | .02   | .05  | .05  | .05  |
| 3          | *.05 | .05  | .05  | .04   | .23  | .05  | .01  | .02  | .02   | *.05 | .05  | .05  |
| 4          | .05  | .05  | .05  | .04   | .23  | .04  | .01  | .02  | .02   | .05  | .05  | .05  |
| 5          | .05  | .05  | .05  | *.04  | .22  | .03  | *.01 | .02  | .02   | .05  | .05  | *.05 |
| 6          | .05  | *.05 | *.05 | .05   | .22  | *.03 | .01  | .02  | .02   | .05  | *.05 | .05  |
| 7          | .05  | *.05 | *.05 | .06   | .21  | .03  | .01  | .02  | *.02  | .05  | *.05 | .05  |
| 8          | .05  | .05  | .05  | .07   | .20  | .03  | .01  | .02  | .02   | .05  | .05  | .05  |
| 9          | .05  | .05  | .05  | .07   | .20  | .03  | .01  | .02  | .02   | .05  | .05  | .05  |
| 10         | .05  | .05  | .05  | .08   | .19  | .03  | .02  | .02  | .03   | .05  | .05  | .05  |
| 11         | .05  | .05  | .05  | .08   | .18  | .03  | .02  | .02  | .03   | .05  | .05  | .05  |
| 12         | .05  | .05  | .05  | .09   | .18  | .03  | .02  | .02  | .03   | .05  | .05  | .05  |
| 13         | .05  | .05  | .05  | .10   | .17  | .03  | .02  | .02  | .03   | .05  | .05  | .05  |
| 14         | .05  | .05  | .05  | .11   | .17  | .03  | .02  | .02  | .03   | .05  | .05  | .05  |
| 15         | .05  | .05  | .05  | .12   | .16  | .02  | .02  | .02  | .03   | .05  | .05  | .05  |
| 16         | .05  | .05  | .05  | .12   | .15  | .02  | .02  | .02  | .03   | .05  | .05  | .05  |
| 17         | .05  | .05  | .05  | .13   | .15  | .02  | .02  | .02  | .03   | .05  | .05  | .05  |
| 18         | .05  | .05  | .05  | .14   | .14  | .02  | .02  | .02  | .03   | .05  | .05  | .05  |
| 19         | .05  | .05  | .05  | .14   | .14  | .02  | .02  | .02  | .04   | .05  | .05  | .06  |
| 20         | .05  | .05  | .05  | .15   | .13  | .02  | .02  | .02  | .04   | .05  | .05  | .06  |
| 21         | .05  | .05  | .05  | .16   | .12  | .02  | .02  | .02  | .04   | .05  | .05  | .06  |
| 22         | .05  | .05  | .05  | .16   | .12  | .02  | .02  | .02  | .04   | .05  | .05  | .06  |
| 23         | .05  | .05  | .05  | .17   | .11  | .02  | .02  | .02  | .04   | .05  | .05  | .06  |
| 24         | .05  | .05  | .05  | .18   | .10  | .02  | .02  | .02  | .04   | .05  | .05  | .06  |
| 25         | .05  | .05  | .05  | .19   | .10  | .02  | .02  | .02  | .04   | .05  | .05  | .06  |
| 26         | .05  | .05  | .05  | .20   | .09  | .02  | .02  | .02  | .05   | .05  | .05  | .06  |
| 27         | .05  | .05  | .05  | .20   | .09  | .02  | .02  | .02  | .05   | .05  | .05  | .06  |
| 28         | .05  | .05  | .05  | .21   | .08  | .02  | .02  | .02  | .05   | .05  | .05  | .06  |
| 29         | .05  | .05  | .05  | .22   | .08  | .02  | .02  | .02  | .05   | .05  | .05  | .06  |
| 30         | .05  | .05  | .05  | .22   | .07  | .02  | .02  | .02  | .05   | .05  | .05  | .06  |
| 31         | .05  | .05  | .05  | .22   | .07  | .02  | .02  | .02  | .05   | .05  | .05  | .06  |
| <b>Sum</b> |      | 1.40 | 3.62 | 0.82  | 0.62 | 1.55 | 1.55 | 1.55 | 1.55  | 1.55 | 1.55 | 1.68 |
|            | 1.55 | 1.55 | 4.77 | 0.55  | 0.55 | 0.98 | 1.50 |      |       |      |      |      |

## Current Year 1990

## Period 1961-1990

| Month         | Extreme Gage Metres |     |          | Extreme-Cubic Metres per Second |          |             | Average     | Volume—Thousands of Cubic Metres |              |              |            |
|---------------|---------------------|-----|----------|---------------------------------|----------|-------------|-------------|----------------------------------|--------------|--------------|------------|
|               | High                | Low | Day      | High                            | Day      | Low         |             | Total                            | Average      | Maximum      | Minimum    |
| Jan.          |                     |     |          | 121                             | 0.05     | 1 1         | 0.05        | 0.05                             | 134          | 160          | 363 0      |
| Feb.          |                     |     |          | 1 1                             | 0.05     | 1 1         | .05         | .05                              | 121          | 144          | 337 0      |
| Mar.          |                     |     |          | 1 1                             | 0.05     | 115         | .05         | .05                              | 134          | 148          | 334 0      |
| Apr.          |                     |     |          | 30                              | .22      | 1 1         | .04         | .12                              | 313          | 143          | 313 0      |
| May           |                     |     |          | 2                               | .24      | 31          | .07         | .15                              | 412          | 146          | 412 0      |
| June          |                     |     |          | 1                               | .06      | 127         | .02         | .03                              | 70.8         | 124          | 264 0      |
| July          |                     |     |          | 128                             | .02      | 1 3         | .01         | .02                              | 47.5         | 129          | 481 0      |
| Aug.          |                     |     |          | 1 1                             | .02      | 121         | .02         | .02                              | 53.6         | 125          | 369 0      |
| Sept.         |                     |     |          | 30                              | .05      | 1 1         | .02         | .03                              | 84.7         | 123          | 296 0      |
| Oct.          |                     |     |          | 1 2                             | .05      | 1           | .05         | .05                              | 134          | 142          | 412 0      |
| Nov.          |                     |     |          | 1 1                             | .05      | 1 1         | .05         | .05                              | 130          | 143          | 396 0      |
| Dec.          |                     |     |          | 119                             | .06      | 1 1         | .05         | .05                              | 145          | 151          | 349 0      |
| <b>Yearly</b> |                     |     | <b>=</b> | <b>0.24</b>                     | <b>=</b> | <b>0.01</b> | <b>0.06</b> | <b>1,780</b>                     | <b>1,678</b> | <b>3,567</b> | <b>4.2</b> |

\* Discharge measurement made on this day

§ Mean daily

! And other days

## 08-4511.40 MCKEE SPRING NEAR DEL RIO, TEXAS

**DESCRIPTION:** This spring is located on the left flood plain of the Rio Grande at latitude  $29^{\circ}23'35''$ , longitude  $101^{\circ}01'15''$ , about 46 metres from the edge of the low-flow channel and about 12.9 kilometres northwest of Del Rio, Texas. Water from this spring enters the Rio Grande at river kilometre 916, 7.7 river kilometres downstream from Amistad Dam. The zero of the gage is 272.67 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 12 discharge measurements during the year. Mean daily discharges determined by prorating between measurements. Records available: November 1961 through 1990.

**REMARKS:** The flow of this spring is uniform during periods of dry weather and is modified by periodic residential pumping. It is estimated that backwater from the Rio Grande will reach the emergence of this spring when the river flow is approximately 396 m<sup>3</sup>/sec. This station was established for investigational purposes in connection with Amistad Dam to determine what effect storage in Amistad Reservoir may have on the flow of this spring.

## EXTREME FLOWS FROM RECORDS:

## Average Flow in Cubic Metres per Second

|          |      |      |               |      |   |              |
|----------|------|------|---------------|------|---|--------------|
| Daily:   | Max. | 0.31 | Feb. 16, 1983 | Min. | 0 | Occasionally |
| Monthly: | Max. | 0.26 | Feb. 1983     | Min. | 0 | Occasionally |
| Yearly   | Max. | 0.22 | 1979          | Min. | 0 | 1963         |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.  | Feb.  | Mar.  | April | May  | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|------------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|
| 1          | 0.03  | 0.05  | 0.03  | 0.03  | 0.08 | 0.04  | 0.08  | 0.14  | 0.14  | 0.11  | 0.05  | 0.03  |
| 2          | .03   | .05   | .03   | .03   | .08  | .04   | .08   | .14   | .14   | .11   | .05   | .03   |
| 3          | * .03 | .05   | .03   | .03   | .08  | .04   | .08   | * .14 | .14   | .11   | .05   | .03   |
| 4          | .03   | .05   | .03   | .03   | .08  | .04   | .09   | .14   | .14   | .10   | .05   | .03   |
| 5          | .03   | .05   | .03   | * .03 | .08  | .03   | .09   | .14   | .14   | .10   | .04   | * .03 |
| 6          | .03   | .05   | * .03 | .03   | .08  | * .03 | .09   | .14   | .14   | .10   | .04   | .03   |
| 7          | .03   | * .05 | * .03 | .03   | .08  | .04   | .09   | .14   | * .14 | .10   | * .04 | .03   |
| 8          | .03   | .05   | .03   | .03   | .07  | .04   | .09   | .14   | .14   | .10   | .04   | .03   |
| 9          | .03   | .05   | .03   | .03   | .07  | .04   | * .10 | .14   | .14   | .10   | .04   | .03   |
| 10         | .03   | .05   | .03   | .04   | .07  | .04   | .10   | .14   | .14   | .10   | .04   | .03   |
| 11         | .03   | .05   | .03   | .04   | .07  | .04   | .10   | .14   | .14   | * .10 | .04   | .03   |
| 12         | .03   | .05   | .03   | .04   | .07  | .05   | .10   | .14   | .14   | .09   | .04   | .03   |
| 13         | .03   | .05   | .03   | .04   | .07  | .05   | .10   | .14   | .13   | .09   | .04   | .03   |
| 14         | .04   | .05   | .03   | .05   | .07  | .05   | .10   | .14   | .13   | .09   | .04   | .03   |
| 15         | .04   | .04   | .03   | .05   | .07  | .05   | .11   | .14   | .13   | .09   | .04   | .03   |
| 16         | .04   | .04   | .03   | .05   | .06  | .05   | .11   | .14   | .13   | .08   | .04   | .04   |
| 17         | .04   | .04   | .03   | .05   | .06  | .05   | .11   | .14   | .13   | .08   | .04   | .04   |
| 18         | .04   | .04   | .03   | .05   | .06  | .06   | .11   | .14   | .13   | .08   | .04   | .04   |
| 19         | .04   | .04   | .03   | .05   | .06  | .06   | .11   | .14   | .12   | .08   | .04   | .04   |
| 20         | .04   | .04   | .03   | .05   | .06  | .06   | .12   | .14   | .12   | .08   | .04   | .04   |
| 21         | .04   | .04   | .03   | .06   | .06  | .06   | .12   | .14   | .12   | .08   | .04   | .04   |
| 22         | .04   | .04   | .03   | .06   | .05  | .07   | .12   | .14   | .12   | .07   | .03   | .04   |
| 23         | .04   | .04   | .03   | .06   | .05  | .07   | .12   | .14   | .12   | .07   | .03   | .04   |
| 24         | .04   | .04   | .03   | .07   | .05  | .07   | .12   | .14   | .12   | .07   | .03   | .04   |
| 25         | .04   | .04   | .03   | .07   | .05  | .07   | .12   | .14   | .12   | .07   | .03   | .04   |
| 26         | .04   | .03   | .03   | .07   | .05  | .07   | .13   | .14   | .12   | .07   | .03   | .04   |
| 27         | .04   | .03   | .03   | .07   | .05  | .07   | .13   | .14   | .12   | .06   | .03   | .04   |
| 28         | .05   | .03   | .03   | .07   | .05  | .08   | .13   | .14   | .11   | .06   | .03   | .04   |
| 29         | .05   |       | .03   | .08   | .05  | .08   | .13   | .14   | .11   | .06   | .03   | .04   |
| 30         | .05   |       | .03   | .08   | .04  | .08   | .13   | .14   | .11   | .06   | .03   | .04   |
| 31         | .05   |       | .03   | .08   | .04  | .08   | .14   | .14   | .11   | .05   |       | .04   |
| <b>Sum</b> | 1.22  |       | 1.48  |       | 1.62 |       | 4.34  |       | 2.61  |       | 1.09  |       |
|            | 1.15  |       | 0.93  |       | 1.96 |       | 3.35  |       | 3.87  |       | 1.15  |       |

## Current Year 1990

## Period 1961-1990 \*

| Month  | Extreme Gage Metres |     | Extreme-Cubic Metres per Second |      | Average | Volume-Thousands of Cubic Metres |         |         |         |       |     |
|--------|---------------------|-----|---------------------------------|------|---------|----------------------------------|---------|---------|---------|-------|-----|
|        | High                | Low | Day                             | High | Day     | Total                            | Average | Maximum | Minimum |       |     |
| Jan.   |                     |     | 128                             | 0.05 | 1 1     | 0.03                             | 0.04    | 99.4    | 337     | 649   | 0   |
| Feb.   |                     |     | 1 5                             | .05  | 28      | .03                              | .04     | 105     | 314     | 628   | 0   |
| Mar.   |                     |     | 1 1                             | .03  | 1 6     | .03                              | .03     | 80.4    | 340     | 650   | 0   |
| Apr.   |                     |     | 30                              | .08  | 1 1     | .03                              | .05     | 128     | 334     | 604   | 0   |
| May    |                     |     | 1 2                             | .08  | 130     | .04                              | .06     | 169     | 365     | 633   | .7  |
| June   |                     |     | 30                              | .08  | 1 5     | .03                              | .05     | 140     | 333     | 580   | 0   |
| July   |                     |     | 31                              | .14  | 1 1     | .08                              | .11     | 289     | 347     | 692   | 0   |
| Aug.   |                     |     | 1 3                             | .14  | 1 1     | .14                              | .14     | 375     | 344     | 622   | 0   |
| Sept.  |                     |     | 1 1                             | .14  | 30      | .11                              | .13     | 334     | 334     | 591   | 0   |
| Oct.   |                     |     | 1                               | .11  | 31      | .05                              | .08     | 226     | 350     | 640   | 0   |
| Nov.   |                     |     | 1 1                             | .05  | 122     | .03                              | .04     | 99.4    | 328     | 636   | 0   |
| Dec.   |                     |     | 130                             | .04  | 1 1     | .03                              | .04     | 94.2    | 332     | 596   | 0   |
| Yearly |                     |     |                                 | 0.14 |         | 0.03                             | 0.07    | 2,139   | 4,058   | 6,978 | 0.7 |

\* Discharge measurement made on this day

@ Mean daily

! And other days

## 08-4511.50 ARROYO DE LA TREINTA Y UNA NEAR CO. ACUNA, COAHUILA

**DESCRIPTION:** Cipolletti weir of 1 m<sup>3</sup>/sec capacity, located at latitude 29°22'35", longitude 101°01'15", 900 creek metres from the confluence with the Rio Grande, and about 10.5 kilometres northwest of Cd. Acuna, Coahuila. This stream enters the Rio Grande from the Mexican side at river kilometre 913, 10.0 river kilometre downstream from Amistad Dam and 10.6 river Kilometres upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on periodic staff gage readings and the weir discharge table. Mean daily discharges determined by prorating between readings. Records available: November 1961 through 1990.

**REMARKS:** The flow of this stream is very uniform during periods of dry weather and is not modified by diversions or storage. Prior to 1969 discharges were based on a continuous record of gage heights and the weir discharge table. Storm flow is deducted and not included in the tabulation below. This station was established for investigational purposes in connection with Amistad Dam to determine what effect storage in Amistad Reservoir will have on the flow of this stream. It is estimated that backwater from the Rio Grande will affect the flow at this station only during times of extremely high release.

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day | Jan. | Feb. | Mar. | April | May  | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|-----|------|------|------|-------|------|------|------|------|-------|------|------|------|
| 1   | .06  | .05  | .06  | .07   | .09  | .08  | .07  | .08  | .08   | .11  | .09  | .08  |
| 2   | .06  | .05  | .06  | .07   | .09  | .08  | .07  | .08  | .08   | .11  | .09  | .08  |
| 3   | .05  | .05  | .06  | .07   | .09  | .08  | .07  | .08  | .08   | .11  | .09  | .08  |
| 4   | .06  | .05  | .06  | .07   | .09  | .08  | .07  | .08  | .08   | .11  | .09  | .08  |
| 5   | .06  | .05  | .06  | .07   | .09  | .08  | .07  | .08  | .08   | .11  | .09  | .08  |
| 6   | .06  | .05  | .06  | .07   | .09  | .08  | .07  | .08  | .08   | .11  | .09  | .08  |
| 7   | .06  | .05  | .06  | .07   | .09  | .08  | .07  | .08  | .08   | .11  | .09  | .08  |
| 8   | .06  | .05  | .06  | .07   | .09  | .08  | .07  | .08  | .08   | .11  | .09  | .08  |
| 9   | .06  | .05  | .06  | .07   | .09  | .08  | .07  | .08  | .08   | .11  | .09  | .08  |
| 10  | .06  | .05  | .06  | .07   | .09  | .08  | .07  | .08  | .08   | .11  | .09  | .08  |
| 11  | .06  | .05  | .06  | .07   | .09  | .08  | .07  | .08  | .09   | .11  | .09  | .08  |
| 12  | .06  | .05  | .06  | .08   | .09  | .08  | .07  | .08  | .09   | .10  | .09  | .08  |
| 13  | .06  | .05  | .06  | .08   | .09  | .08  | .07  | .08  | .09   | .10  | .09  | .08  |
| 14  | .06  | .05  | .06  | .08   | .09  | .08  | .07  | .08  | .09   | .10  | .09  | .08  |
| 15  | .06  | .05  | .06  | .08   | .09  | .08  | .07  | .08  | .09   | .10  | .09  | .08  |
| 16  | .06  | .06  | .06  | .08   | .09  | .08  | .07  | .08  | .09   | .10  | .09  | .08  |
| 17  | .06  | .06  | .06  | .08   | .09  | .08  | .07  | .08  | .09   | .10  | .09  | .08  |
| 18  | .06  | .06  | .06  | .08   | .08  | .07  | .07  | .08  | .09   | .10  | .09  | .08  |
| 19  | .05  | .06  | .07  | .08   | .08  | .07  | .08  | .08  | .09   | .10  | .09  | .08  |
| 20  | .05  | .06  | .07  | .08   | .08  | .07  | .08  | .08  | .09   | .10  | .09  | .07  |
| 21  | .05  | .06  | .07  | .08   | .08  | .07  | .08  | .08  | .10   | .10  | .08  | .07  |
| 22  | .05  | .06  | .07  | .08   | .08  | .07  | .08  | .08  | .10   | .10  | .08  | .07  |
| 23  | .05  | .06  | .07  | .08   | .08  | .07  | .08  | .08  | .10   | .10  | .08  | .07  |
| 24  | .05  | .06  | .07  | .08   | .08  | .07  | .08  | .08  | .10   | .10  | .08  | .07  |
| 25  | .05  | .06  | .07  | .08   | .08  | .07  | .08  | .08  | .10   | .10  | .08  | .07  |
| 26  | .05  | .06  | .07  | .09   | .08  | .07  | .08  | .08  | .10   | .10  | .08  | .07  |
| 27  | .05  | .06  | .07  | .09   | .08  | .07  | .08  | .08  | .10   | .10  | .08  | .07  |
| 28  | .05  | .06  | .07  | .09   | .08  | .07  | .08  | .08  | .10   | .09  | .08  | .07  |
| 29  | .05  | .07  | .09  | .08   | .07  | .08  | .08  | .08  | .11   | .09  | .08  | .07  |
| 30  | .05  | .07  | .09  | .08   | .07  | .08  | .07  | .08  | .11   | .09  | .08  | .07  |
| 31  | .05  | .07  | .09  | .08   | .07  | .08  | .07  | .08  | .11   | .09  | .08  | .07  |
| Sum |      | 1.53 |      | 2.34  |      | 2.27 |      | 2.48 |       | 3.17 |      | 2.36 |
|     | 1.73 |      | 1.99 |       | 2.65 |      | 2.30 |      | 2.74  |      | 2.60 |      |

## Current Year 1990

## Period 1961-1990

| Month  | Extreme Gage Metres |      |     | Extreme-Cubic Metres per Second |     |      | Average | Volume-Thousands of Cubic Metres |         |         |         |
|--------|---------------------|------|-----|---------------------------------|-----|------|---------|----------------------------------|---------|---------|---------|
|        | High                | Low  | Day | High                            | Day | Low  |         | Total                            | Average | Maximum | Minimum |
| Jan.   | 0.10                | 0.09 | 1   | 0.06                            | 119 | 0.05 | 0.06    | 149                              | 205     | 348     | 18.7    |
| Feb.   | .09                 | .09  | 116 | .06                             | 1 1 | .05  | .06     | 132                              | 186     | 317     | 17.1    |
| Mar.   | .11                 | .09  | 119 | .07                             | 1 1 | .06  | .06     | 172                              | 205     | 403     | 17.5    |
| Apr.   | .13                 | .12  | 26  | .09                             | 1 1 | .07  | .08     | 202                              | 221     | 373     | 13.0    |
| May    | .13                 | .13  | 1   | .09                             | 118 | .08  | .09     | 229                              | 214     | 323     | 7.3     |
| June   | .13                 | .11  | 1   | .08                             | 118 | .07  | .08     | 196                              | 204     | 313     | 5.2     |
| July   | .12                 | .11  | 119 | .08                             | 1 1 | .07  | .07     | 199                              | 195     | 312     | 0       |
| Aug.   | .12                 | .12  | 1   | .08                             | 1 1 | .08  | .08     | 214                              | 200     | 398     | 0       |
| Sept.  | .14                 | .12  | 129 | .11                             | 1 1 | .08  | .09     | 237                              | 211     | 337     | 16.2    |
| Oct.   | .15                 | .14  | 1   | .11                             | 128 | .09  | .10     | 274                              | 227     | 348     | 14.9    |
| Nov.   | .13                 | .13  | 1   | .09                             | 121 | .08  | .09     | 225                              | 212     | 382     | 17.5    |
| Dec.   | .12                 | .11  | 1   | .08                             | 120 | .07  | .08     | 204                              | 216     | 382     | 18.7    |
| Yearly | 0.15                | 0.09 | ==  | 0.11                            | ==  | 0.05 | 0.08    | 2,433                            | 2,496   | 4,026   | 308     |

## 08-4513.00 CANTU SPRING NEAR DEL RIO, TEXAS

**DESCRIPTION:** Concrete enclosure located at the spring source in the channel of a small tributary to Cienegas Creek at latitude 29° 23' 15", longitude 100° 56' 00", about 4.0 kilometres northwest of Del Rio, Texas and 5.6 creek kilometres from the confluence with the Rio Grande. Cienegas Creek enters the Rio Grande at river kilometre 906, 3.0 river kilometres upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on 12 discharge measurements during the year. Mean daily discharges determined by prorating between measurements. Records available: March 1961 through 1990.

**REMARKS:** The flow of this spring is very uniform and is not modified by diversions or storage. A weir was installed on May 24, 1961 and removed November 21, 1962. This station was established for investigational purposes in connection with Anistad Dam to determine what effect storage in Anistad Reservoir may have on the flow of this spring.

**EXTREME FLOWS FROM RECORDS:**

|          |      |      |               | Average Flow in Cubic Metres per Second |  |  |  |              |  |  |  |  |  |  |      |
|----------|------|------|---------------|---|--|--|--|--------------|--|--|--|--|--|--|------|
| Daily:   | Max. | 0.37 | March 2, 1989 | Min. 0                                  |  |  |  | Occasionally |  |  |  |  |  |  |      |
| Monthly: | Max. | 0.34 | March 1989    | Min. 0                                  |  |  |  | Occasionally |  |  |  |  |  |  |      |
| Yearly:  | Max. | 0.24 | 1989          |   |  |  |  |              |  |  |  |  |  |  | 1963 |

**Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary**

| Day        | Jan.  | Feb.  | Mar.        | April | May         | June  | July        | Aug.   | Sept.       | Oct.  | Nov.        | Dec.  |             |
|------------|-------|-------|-------------|-------|-------------|-------|-------------|--------|-------------|-------|-------------|-------|-------------|
| 1          | 0.13  | 0.14  | 0.12        | 0.13  | 0.22        | 0.18  | 0.14        | * 0.22 | 0.23        | 0.29  | 0.29        | 0.23  |             |
| 2          | .13   | .14   | .12         | .13   | * .23       | .18   | .14         | .22    | .23         | .29   | .29         | .23   |             |
| 3          | * .13 | .14   | .12         | .13   | .22         | .18   | .14         | .22    | * .23       | * .29 | .29         | .23   |             |
| 4          | .13   | .14   | .12         | .13   | .22         | .17   | .14         | .22    | .23         | * .29 | .29         | .23   |             |
| 5          | .13   | .15   | .12         | * .13 | .22         | .17   | * .14       | .22    | .23         | .29   | .29         | * .22 |             |
| 6          | .13   | * .15 | * .11       | .14   | .22         | * .17 | .14         | .22    | .23         | .29   | * .29       | .22   |             |
| 7          | .13   | * .15 | * .11       | .14   | .22         | .17   | .14         | .22    | * .23       | .29   | * .29       | .22   |             |
| 8          | .13   | .15   | .11         | .14   | .22         | .17   | .15         | .22    | .23         | .29   | .29         | .23   |             |
| 9          | .13   | .14   | .11         | .15   | .22         | .17   | .15         | .22    | .24         | .29   | .28         | .23   |             |
| 10         | .13   | .14   | .12         | .15   | .21         | .16   | .15         | .22    | .24         | .29   | .28         | .23   |             |
| 11         | .13   | .14   | .12         | .15   | .21         | .16   | .16         | .22    | .24         | .29   | .28         | .23   |             |
| 12         | .13   | .14   | .12         | .16   | .21         | .16   | .16         | .22    | .24         | .29   | .28         | .23   |             |
| 13         | .13   | .14   | .12         | .16   | .21         | .16   | .16         | .22    | .24         | .29   | .27         | .23   |             |
| 14         | .13   | .14   | .12         | .16   | .21         | .16   | .17         | .22    | .25         | .29   | .27         | .23   |             |
| 15         | .13   | .14   | .12         | .17   | .21         | .16   | .17         | .22    | .25         | .29   | .27         | .23   |             |
| 16         | .14   | .14   | .12         | .17   | .20         | .16   | .17         | .22    | .25         | .29   | .27         | .23   |             |
| 17         | .14   | .14   | .12         | .18   | .20         | .16   | .18         | .22    | .25         | .29   | .27         | .23   |             |
| 18         | .14   | .13   | .12         | .18   | .20         | .16   | .18         | .22    | .25         | .29   | .26         | .23   |             |
| 19         | .14   | .13   | .12         | .18   | .20         | .16   | .18         | .22    | .26         | .29   | .26         | .23   |             |
| 20         | .14   | .13   | .12         | .18   | .20         | .16   | .18         | .22    | .26         | .29   | .26         | .23   |             |
| 21         | .14   | .13   | .12         | .19   | .20         | .15   | .19         | .22    | .26         | .29   | .26         | .23   |             |
| 22         | .14   | .13   | .12         | .19   | .20         | .15   | .19         | .22    | .27         | .29   | .25         | .23   |             |
| 23         | .14   | .13   | .12         | .20   | .19         | .15   | .19         | .22    | .27         | .29   | .25         | .23   |             |
| 24         | .14   | .13   | .12         | .20   | .19         | .15   | .20         | .22    | .27         | .29   | .25         | .23   |             |
| 25         | .14   | .12   | .12         | .20   | .19         | .15   | .20         | .22    | .27         | .29   | .25         | .24   |             |
| 26         | .14   | .12   | .13         | .21   | .19         | .15   | .20         | .22    | .27         | .29   | .24         | .24   |             |
| 27         | .14   | .12   | .13         | .21   | .19         | .15   | .21         | .22    | .28         | .29   | .24         | .24   |             |
| 28         | .14   | .12   | .13         | .21   | .18         | .15   | .21         | .22    | .28         | .29   | .24         | .24   |             |
| 29         | .14   | .12   | .13         | .22   | .18         | .14   | .21         | .22    | .28         | .29   | .24         | .24   |             |
| 30         | .14   | .13   | .13         | .22   | .18         | .14   | .22         | .22    | .28         | .29   | .24         | .24   |             |
| 31         | .14   | .13   | .13         | .18   | .22         | .18   | .22         | .22    | .28         | .29   | .24         | .24   |             |
| <b>Sum</b> |       |       | <b>3.81</b> |       | <b>5.11</b> |       | <b>4.80</b> |        | <b>6.83</b> |       | <b>8.99</b> |       | <b>7.17</b> |
|            | 4.19  |       | 3.74        |       | 6.32        |       | 5.38        |        | 7.54        |       | 8.03        |       |             |

**Current Year 1990****Period 1961-1990**

| Month         | Extreme Gage Metres |     |          | Extreme-Cubic Metres per Second |          |             | Average     | Volume—Thousands of Cubic Metres |              |              |
|---------------|---------------------|-----|----------|---------------------------------|----------|-------------|-------------|----------------------------------|--------------|--------------|
|               | High                | Low | Day      | High                            | Day      | Low         |             | Total                            | Average      | Maximum      |
| Jan.          |                     |     |          | .31                             | 0.14     | ! 3         | 0.13        | 0.14                             | 362          | 411          |
| Feb.          |                     |     |          | 1.5                             | 1.27     |             | .14         | 329                              | 369          | 749          |
| Mar.          |                     |     |          | 1.30                            | .13      | ! 6         | .11         | 323                              | 398          | 907          |
| Apr.          |                     |     |          | 30                              | .22      | ! 1         | .13         | 442                              | 379          | 780          |
| May           |                     |     |          | 2                               | .23      | 31          | .18         | 546                              | 389          | 750          |
| June          |                     |     |          | 1                               | .18      | 129         | .14         | 415                              | 363          | 675          |
| July          |                     |     |          | 31                              | .22      | ! 4         | .14         | 465                              | 374          | 671          |
| Aug.          |                     |     |          | 31                              | .23      | ! 1         | .22         | 590                              | 377          | 656          |
| Sept.         |                     |     |          | 129                             | .28      | ! 1         | .23         | 651                              | 384          | 651          |
| Oct.          |                     |     |          | 1 3                             | .29      | 1           | .29         | 777                              | 428          | 777          |
| Nov.          |                     |     |          | 1 1                             | .29      | 30          | .24         | 694                              | 403          | 712          |
| Dec.          |                     |     |          | 31                              | .24      | ! 5         | .22         | 619                              | 417          | 734          |
| <b>Yearly</b> |                     |     | <b>=</b> | <b>0.29</b>                     | <b>=</b> | <b>0.11</b> | <b>0.20</b> | <b>6,213</b>                     | <b>4,695</b> | <b>8,063</b> |

\* Discharge measurement made on this day

θ Mean daily

! And other days

## 08-4515.00 CIENEGAS CREEK NEAR DEL RIO, TEXAS

**DESCRIPTION:** Measurement sections located, one each, on the right bank of the Cienegas Creek at latitude  $29^{\circ}21'10''$ , longitude  $100^{\circ}56'35''$ , 0.8 creek kilometre from the confluence with the Rio Grande; and for the Briggs Farm ditch, on the right bank at latitude  $29^{\circ}21'40''$ , longitude  $100^{\circ}56'30''$ , 884 metres from the ditch intake which branches off the right bank of Cienegas Creek immediately upstream from a small diversion dam across the creek, and about 4.0 kilometres west of Del Rio, Texas. The point of diversion is 2.9 creek kilometres from the confluence with the Rio Grande. Cienegas Creek enters the Rio Grande at river kilometre 906, 3.0 river kilometres upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila.

**RECORDS:** Based on 12 and 12 discharge measurements at Cienegas Creek and Briggs Farm ditch, respectively, during the year. Mean daily discharge computations determined by combining the two records for the total yield of the springs. Records available: March 1965 through 1990. Discharge measurement data available since November 1962. Records are also available from September 1931 through June 1935 for a station 0.5 creek kilometre downstream. The station was moved 0.3 creek kilometre upstream in June 1983.

**REMARKS:** Low flow of this stream is from springs, one of which is Cantu Spring, whose discharge is shown on the previous page. This flow of this stream is modified by irrigation diversions through the Briggs Farm ditch. All storm flow passing this station is deducted and is not included in the tabulation. These stations were established for investigational purposes in connection with Amistad Dam to determine what effect storage in Amistad Reservoir may have on the flow of these springs.

**EXTREME FLOWS FROM RECORDS:**

|          |      | Average Flow in Cubic Metres per Second |                 |      |      |  |                |  |  |      |
|----------|------|---|-----------------|------|------|--|----------------|--|--|------|
| Daily:   | Max. | 1.21                                    | August 12, 1972 | Min. | 0.01 |  | April 21, 1966 |  |  |      |
| Monthly: | Max. | 0.70                                    | July 1976       | Min. | 0.02 |  | August 1967    |  |  |      |
| Yearly:  | Max. | 0.51                                    | 1977            | Min. | 0.03 |  |                |  |  | 1968 |

**Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary**

| Day        | Jan.  | Feb.  | Mar.  | April | May   | June  | July  | Aug.   | Sept. | Oct.  | Nov.  | Dec.  |
|------------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|
| 1          | 0.25  | 0.27  | 0.25  | 0.26  | 0.33  | 0.32  | 0.27  | * 0.37 | 0.40  | 0.47  | 0.36  | 0.32  |
| 2          | .25   | .27   | .25   | .26   | * .33 | .31   | .27   | .37    | .40   | .47   | .35   | .31   |
| 3          | * .25 | .27   | .25   | .26   | .33   | .31   | .27   | .37    | .40   | * .47 | .35   | .31   |
| 4          | .25   | .27   | .24   | .26   | .33   | .31   | .26   | .37    | .40   | .47   | .34   | .31   |
| 5          | .25   | .27   | .24   | .26   | .33   | .31   | * .26 | .37    | .40   | .46   | .34   | * .32 |
| 6          | .25   | * .27 | * .24 | .26   | .33   | * .31 | .27   | .38    | .40   | .46   | * .33 | .32   |
| 7          | .25   | * .27 | * .24 | .26   | .33   | .31   | .27   | .38    | * .40 | .46   | * .33 | .32   |
| 8          | .25   | .27   | .24   | .27   | .33   | .31   | .28   | .38    | .41   | .45   | .33   | .32   |
| 9          | .25   | .27   | .24   | .27   | .33   | .31   | .28   | .38    | .41   | .45   | .33   | .32   |
| 10         | .25   | .27   | .24   | .27   | .33   | .31   | .29   | .38    | .41   | .44   | .33   | .32   |
| 11         | .25   | .27   | .24   | .27   | .33   | .31   | .29   | .38    | .42   | .44   | .33   | .33   |
| 12         | .25   | .27   | .24   | .28   | .33   | .30   | .29   | .38    | .42   | .44   | .33   | .33   |
| 13         | .26   | .27   | .25   | .28   | .33   | .30   | .30   | .38    | .42   | .43   | .33   | .33   |
| 14         | .26   | .27   | .25   | .29   | .33   | .30   | .30   | .38    | .42   | .43   | .33   | .33   |
| 15         | .26   | .27   | .25   | .29   | .33   | .30   | .31   | .38    | .43   | .42   | .33   | .34   |
| 16         | .26   | .27   | .25   | .29   | .32   | .30   | .31   | .38    | .43   | .42   | .33   | .34   |
| 17         | .26   | .26   | .25   | .29   | .32   | .29   | .31   | .39    | .43   | .42   | .33   | .34   |
| 18         | .26   | .26   | .25   | .29   | .32   | .29   | .32   | .39    | .43   | .41   | .33   | .34   |
| 19         | .26   | .26   | .25   | .30   | .32   | .29   | .32   | .39    | .44   | .41   | .33   | .35   |
| 20         | .26   | .26   | .25   | .30   | .32   | .29   | .32   | .39    | .44   | .40   | .32   | .35   |
| 21         | .26   | .26   | .25   | .30   | .32   | .29   | .33   | .39    | .44   | .40   | .33   | .35   |
| 22         | .26   | .25   | .25   | .31   | .32   | .29   | .33   | .39    | .44   | .40   | .32   | .35   |
| 23         | .26   | .26   | .25   | .31   | .32   | .28   | .33   | .39    | .45   | .39   | .32   | .35   |
| 24         | .26   | .25   | .25   | .31   | .32   | .28   | .34   | .39    | .45   | .39   | .32   | .36   |
| 25         | .27   | .25   | .25   | .31   | .32   | .28   | .34   | .39    | .45   | .39   | .32   | .36   |
| 26         | .27   | .25   | .25   | .32   | .32   | .28   | .35   | .39    | .45   | .38   | .32   | .36   |
| 27         | .27   | .25   | .25   | .32   | .32   | .28   | .35   | .39    | .46   | .38   | .32   | .36   |
| 28         | .27   | .25   | .25   | .32   | .32   | .27   | .35   | .39    | .46   | .37   | .32   | .36   |
| 29         | .27   | .25   | .25   | .32   | .32   | .27   | .36   | .39    | .46   | .37   | .32   | .37   |
| 30         | .27   | .25   | .25   | .33   | .32   | .27   | .36   | .39    | .46   | .36   | .32   | .37   |
| 31         | .27   | .25   | .25   | .32   | .32   | .37   | .40   |        |       | .36   |       | .37   |
| <b>Sum</b> |       | 7.37  |       | 8.66  |       | 8.87  |       | 11.89  |       | 13.01 |       | 10.53 |
|            | 8.01  |       | 7.67  |       | 10.07 |       | 9.60  |        | 12.83 |       | 9.89  |       |

**Current Year 1990****Period 1965-1990**

| Month         | Extreme Gage Metres |     | Extreme-Cubic Metres per Second |      | Average | Volume-Thousands of Cubic Metres |         |         |         |        |      |
|---------------|---------------------|-----|---------------------------------|------|---------|----------------------------------|---------|---------|---------|--------|------|
|               | High                | Low | Day                             | High | Day     | Total                            | Average | Maximum | Minimum |        |      |
| Jan.          |                     |     | 129                             | 0.27 | 1.3     | 0.25                             | 0.26    | 692     | 978     | 1,532  | 163  |
| Feb.          |                     |     | 6                               | .27  | 126     | .25                              | .26     | 637     | 905     | 1,427  | 121  |
| Mar.          |                     |     | 31                              | .26  | 1.5     | .24                              | .25     | 663     | 933     | 1,462  | 85.6 |
| Apr.          |                     |     | 30                              | .33  | 1.1     | .26                              | .29     | 748     | 865     | 1,388  | 59.2 |
| May           |                     |     | 1.2                             | .33  | 129     | .32                              | .32     | 870     | 865     | 1,430  | 81.7 |
| June          |                     |     | 1                               | .32  | 129     | .27                              | .30     | 766     | 807     | 1,322  | 18.1 |
| July          |                     |     | 31                              | .37  | 1.4     | .26                              | .31     | 829     | 807     | 1,884  | 9.3  |
| Aug.          |                     |     | 31                              | .40  | 1.1     | .37                              | .38     | 1,027   | 818     | 1,531  | 8.0  |
| Sept.         |                     |     | 30                              | .46  | 1.1     | .40                              | .43     | 1,109   | 802     | 1,287  | 16.2 |
| Oct.          |                     |     | 3                               | .47  | 31      | .36                              | .42     | 1,124   | 943     | 1,400  | 19.1 |
| Nov.          |                     |     | 1                               | .36  | 128     | .32                              | .33     | 854     | 911     | 1,378  | 31.1 |
| Dec.          |                     |     | 31                              | .37  | 1.2     | .31                              | .34     | 910     | 952     | 1,441  | 78.6 |
| <b>Yearly</b> |                     |     | =                               | 0.47 | =       | 0.24                             | 0.32    | 10,229  | 10,586  | 15,992 | 856  |

\* Discharge measurement made on this day

! And other days

@ Mean daily

## 08-4518.00 RIO GRANDE AT DEL RIO, TEXAS AND CO. ACUNA, COAHUILA

**DESCRIPTION:** Cableway, bubbler gage, concrete control weir, water-stage recorders (graphic and digital) and data collection platform located on the left bank at latitude 29°20'07", longitude 100°55'41", and river kilometre 903, 366 metres upstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila and 20.4 river kilometres downstream from Amistad Dam. The zero of the gage is 264.93 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 35 discharge measurements during the year, 12 by the United States Section and 23 by the Mexican Section of the Commission, and a continuous record of gage heights. Computations for high flows by shifting control methods. Low and medium flow computations based on a stable control weir rating curve defined by meter measurements. Records available: December 1923 through July 2, 1941 and January 1968 through 1990. Records are available from May 1900 through April 1915 for a station 19.6 kilometres upstream; from December 1919 through March 1920 for a station 14.0 kilometres upstream near McKee's Switch; from July 2, 1941 through 1954 and October 1960 through 1967 for a station 366 metres downstream at the international highway bridge; and from September 1954 through 1990 for a station, Rio Grande below Amistad Dam, 17.0 kilometres upstream.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. Except for tributary inflows and small intervening diversions below Amistad Dam, flow at this station after May 31, 1968 is controlled largely by releases from Amistad Reservoir. The data collection platform, operated in cooperation with the National Weather Service, relays gage height data upon interrogation by telephone via commercial circuits.

**EXTREME FLOWS FROM RECORDS:** The greatest recorded flow of 32,300 m<sup>3</sup>/sec occurred on June 28, 1954, with a gage height of 11.66 metres at a station 366 metres downstream. The lowest recorded flow was 3.51 m<sup>3</sup>/sec which occurred March 5 and 6, 1969, with a gage height of 0.38 metres.

|          |      |       | Average Flow in Cubic Metres per Second** |  |  |      |  |  |      |               |  |  |
|----------|------|-------|---|--|--|------|--|--|------|---------------|--|--|
| Daily:   | Max. | 1,810 | Sept. 22, 1974                            |  |  | Min. |  |  | 4.64 | Aug. 13, 1971 |  |  |
| Monthly: | Max. | 632   | Sept.                                     |  |  | Min. |  |  | 5.32 | October 1971  |  |  |
| Yearly:  | Max. | 146   | 1974                                      |  |  | Min. |  |  | 19.9 | 1972          |  |  |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day | Jan. | Feb. | Mar.   | April | May | June   | July | Aug. | Sept.  | Oct. | Nov. | Dec.   |
|-----|------|------|--------|-------|-----|--------|------|------|--------|------|------|--------|
| 1   | 68.8 | 214  | 84.7   | 86.9  | 184 | 96.9   | 54.4 | 38.5 | 42.2   | 278  | 122  | 61.2   |
| 2   | 68.8 | 208  | 84.7   | 86.7  | 270 | 86.9   | 53.2 | 37.9 | 39.9   | 292  | 121  | 60.0   |
| 3   | 68.3 | 212  | 84.4   | 121   | 283 | 89.2   | 54.4 | 37.4 | 40.8   | 354  | 120  | 60.3   |
| 4   | 68.8 | 217  | 85.2   | 130   | 267 | 87.5   | 43.6 | 37.1 | 41.6   | 346  | 124  | 37.4   |
| 5   | 70.5 | 214  | 84.7   | 131   | 254 | 86.1   | 36.2 | 37.4 | 39.6   | 340  | 126  | 64.3   |
| 6   | 68.3 | 202  | 85.0   | 130   | 256 | 85.8   | 36.0 | 37.1 | 37.9   | 346  | 126  | 56.4   |
| 7   | 69.7 | 217  | 84.7   | 130   | 254 | 84.7   | 37.1 | 37.4 | 38.5   | 346  | 125  | 55.8   |
| 8   | 68.5 | 239  | 79.0   | 131   | 254 | 83.8   | 37.1 | 37.4 | 38.5   | 346  | 127  | 56.4   |
| 9   | 70.2 | 227  | 79.9   | 130   | 251 | 86.4   | 36.5 | 37.4 | 38.2   | 357  | 124  | 56.4   |
| 10  | 70.5 | 225  | 44.5   | 130   | 144 | 83.5   | 33.4 | 37.9 | 39.1   | 357  | 123  | 56.6   |
| 11  | 70.0 | 237  | 43.6   | 131   | 125 | 85.8   | 36.0 | 37.7 | 39.4   | 354  | 78.2 | 56.1   |
| 12  | 69.1 | 217  | 40.8   | 132   | 125 | 83.0   | 36.8 | 37.4 | 39.1   | 351  | 67.4 | 56.1   |
| 13  | 70.0 | 145  | 40.2   | 132   | 127 | 85.0   | 36.2 | 69.7 | 38.5   | 346  | 68.8 | 58.6   |
| 14  | 69.1 | 129  | 40.2   | 133   | 130 | 68.8   | 39.6 | 133  | 38.2   | 346  | 70.0 | 57.8   |
| 15  | 70.0 | 128  | * 40.5 | 131   | 128 | 55.2   | 39.6 | 116  | 40.2   | 346  | 71.4 | 59.2   |
| 16  | 69.1 | 128  | 40.5   | 132   | 128 | 56.9   | 39.1 | 68.5 | 60.9   | 343  | 73.1 | 58.6   |
| 17  | 69.7 | 77.9 | 40.8   | 132   | 127 | 54.9   | 37.7 | 68.8 | 64.6   | 337  | 68.5 | 59.8   |
| 18  | 69.1 | 73.1 | 40.8   | 133   | 126 | 54.4   | 39.6 | 67.7 | * 64.0 | 346  | 70.2 | 58.6   |
| 19  | 69.7 | 74.8 | 40.2   | 134   | 125 | 54.7   | 40.2 | 67.1 | 65.7   | 348  | 68.0 | 64.3   |
| 20  | 68.8 | 76.7 | 41.1   | 135   | 127 | 53.8   | 39.4 | 86.1 | 65.1   | 340  | 67.1 | * 65.1 |
| 21  | 68.3 | 94.0 | 79.9   | 185   | 128 | * 54.1 | 37.9 | 130  | 65.1   | 346  | 64.9 | 68.0   |
| 22  | 79.0 | 83.0 | 85.2   | 194   | 127 | 54.1   | 37.7 | 55.5 | 137    | 346  | 66.6 | 71.1   |
| 23  | 135  | 84.4 | 83.5   | 136   | 125 | 54.4   | 39.4 | 41.6 | 165    | 346  | 66.8 | 71.9   |
| 24  | 127  | 81.8 | 83.8   | 200   | 124 | 54.1   | 38.2 | 41.3 | 183    | 348  | 66.0 | 70.0   |
| 25  | 127  | 81.8 | 84.4   | 211   | 121 | 54.4   | 37.9 | 41.3 | 289    | 348  | 65.4 | 70.5   |
| 26  | 125  | 81.3 | 85.2   | 225   | 125 | 54.1   | 37.7 | 41.6 | 286    | 154  | 64.3 | 70.0   |
| 27  | 125  | 82.7 | 84.4   | 213   | 125 | 54.1   | 37.7 | 48.4 | 283    | 118  | 63.2 | 69.7   |
| 28  | 123  | 82.7 | 84.7   | 200   | 124 | 54.1   | 36.8 | 39.9 | 286    | 118  | 63.7 | 69.7   |
| 29  | 123  |      |        |       | 202 | 54.4   | 36.8 | 39.6 | 289    | 120  | 65.7 | 70.2   |
| 30  | 124  |      |        |       | 211 | 53.2   | 36.8 | 30.9 | 286    | 123  | 63.4 | 69.7   |
| 31  | 151  |      |        |       | 125 |        | 37.9 | 41.6 |        | 123  |      | 73.3   |

|     |         |         |         |         |         |         |
|-----|---------|---------|---------|---------|---------|---------|
| Sum | 4,133.2 | 4,508.6 | 2,064.3 | 1,679.2 | 9,309   | 1,933.1 |
|     | 2,694.3 | 2,135.2 | 5,062   | 1,220.9 | 3,181.1 | 2,590.7 |

| Month         | Current Year 1990   |             |          | Period 1968-1990                 |          |             |            |
|---------------|---------------------|-------------|----------|----------------------------------|----------|-------------|------------|
|               | Extreme Gage Metres |             |          | Volume—Thousands of Cubic Metres |          |             |            |
|               | High                | Low         | Day      | High                             | Day      | Average     | Total      |
| Jan.          | 1.09                | 0.45        | 31       | 214                              | 6        | 9.26        | 86.9       |
| Feb.          | .41                 | .41         | 276      | 19                               | 5.64     | 148         | 357,108    |
| Mar.          | .90                 | .45         | 23       | 123                              | 14       | 9.94        | 68.9       |
| Apr.          | 1.50                | .49         | 25       | 464                              | 1        | 14.8        | 150        |
| May           | 1.22                | .55         | 12       | 286                              | 1        | 23.1        | 163        |
| June          | .93                 | .44         | 1        | 134                              | 30       | 8.95        | 68.8       |
| July          | .85                 | .43         | 3        | 105                              | 5        | 7.99        | 39.4       |
| Aug.          | .94                 | .42         | 114      | 139                              | 30       | 7.05        | 54.2       |
| Sept.         | 1.26                | .45         | 26       | 309                              | 6        | 10.3        | 106        |
| Oct.          | 1.35                | .87         | 3        | 374                              | 127      | 109         | 300        |
| Nov.          | .93                 | .46         | 1 5      | 135                              | 26       | 11.0        | 86.4       |
| Dec.          | .89                 | .45         | 31       | 119                              | 114      | 9.26        | 62.4       |
| <b>Yearly</b> | <b>1.50</b>         | <b>0.41</b> | <b>=</b> | <b>464</b>                       | <b>=</b> | <b>5.64</b> | <b>111</b> |
|               |                     |             |          |                                  |          | 3,500,203   | 2,203,125  |
|               |                     |             |          |                                  |          |             | 4,617,893  |
|               |                     |             |          |                                  |          |             | 627,328    |

\* Discharge measurement made on this day      ! And other days      \*\* Period 1968-1990

# Values for January 1968 are Rio Grande near Del Rio less Arroyo de las Vacas flow

## 08-1820.00 ARROYO DE LAS VACAS AF Cd. ACUNA, COAHUILA

**DESCRIPTION:** Cableway with sit-down cable car, concrete wall with a V-shape concrete control weir of 10 m<sup>3</sup>/sec capacity, gravity well, and water-stage recorder located on the left bank at Cd. Acuna, Coahuila, latitude 29° 19' 45", longitude 100° 57' 20" and 2.9 creek kilometres from the confluence with the Rio Grande. This stream enters the Rio Grande at river kilometre 903 on the upstream side of the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila and 20.8 river Kilometres downstream from Amistad Dam. The zero of the gage is 270.00 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 12 discharge measurements during the year, a stable rating curve up to 10 m<sup>3</sup>/sec, which is the capacity of the weir, and a continuous record of gage heights. Computations by shifting control methods for flows exceeding the capacity of the weir. Records available: Occasional estimates from June 1935 to March 19, 1938 and continuous record from March 20, 1938 through 1990.

**REMARKS:** Low flow of this stream is from springs and is modified by irrigation diversions upstream. On June 17, 1961, a flood destroyed the station, leaving the control wall under several feet of silt. The station was reconstructed in September and a V-shape concrete control weir with a capacity of 10 m<sup>3</sup>/sec, constructed at this station, started operating December 14, 1961. On June 28, 1954, backwater from the Rio Grande reached an elevation of 275.08 metres at this station.

Records prior to 1965 were published under the title "Arroyo Las Vacas near Cd. Acuna, Coahuila."

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 1,800 m<sup>3</sup>/sec with a gage height of 7.70 metres on June 17, 1961. Min. no flow on several occasions.

## Average Flow in Cubic Metres per Second\*\*

|          |      |      |               |      |      |                   |
|----------|------|------|---------------|------|------|-------------------|
| Daily:   | Max. | 678  | June 17, 1961 | Min. | 0    | December 23, 1956 |
| Monthly: | Max. | 29.8 | June 1961     | Min. | 0.01 | October 1952      |
| Yearly:  | Max. | 2.74 | 1961          | Min. | 0.08 | 1952              |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.  | Feb.  | Mar.  | April  | May   | June  | July   | Aug.  | Sept. | Oct.  | Nov. | Dec. |
|------------|-------|-------|-------|--------|-------|-------|--------|-------|-------|-------|------|------|
| 1          | 0.07  | .10   | 0.14  | 0.47   | 0.26  | 0.12  | 0.08   | 0.80  | 0.08  | 0.31  | 0.18 | 0.24 |
| 2          | .08   | .10   | .12   | .38    | .33   | .12   | .08    | .59   | .08   | .34   | .19  | .24  |
| 3          | .07   | .09   | .11   | .33    | .48   | .12   | .07    | .33   | .11   | 1.24  | .17  | .23  |
| 4          | .07   | .09   | .10   | .38    | .32   | .12   | .07    | .24   | .28   | .48   | .16  | .27  |
| 5          | .08   | .10   | .10   | .37    | .27   | .11   | .07    | .15   | .09   | .38   | .18  | .31  |
| 6          | .09   | .10   | .11   | .35    | .24   | .11   | .08    | .13   | .07   | .34   | .20  | .32  |
| 7          | .08   | .10   | .11   | .28    | .23   | * .11 | .07    | .11   | .08   | .34   | .24  | .27  |
| 8          | .08   | .10   | .11   | .19    | .22   | .11   | .07    | .13   | .07   | .38   | .31  | .22  |
| 9          | .12   | .10   | .10   | .20    | .20   | .11   | .08    | .14   | .07   | 3.74  | .27  | .21  |
| 10         | .08   | .10   | .11   | .26    | * .20 | .10   | .08    | .14   | .49   | .65   | .24  | .21  |
| 11         | * .08 | * .09 | 13.2  | .23    | .20   | .10   | .08    | .12   | 2.61  | .55   | .26  | .20  |
| 12         | * .10 | * .09 | .38   | .27    | .18   | .10   | .08    | .15   | .20   | .52   | .27  | .19  |
| 13         | .08   | .09   | .21   | .30    | .18   | .10   | .07    | .16   | .16   | .52   | .27  | .19  |
| 14         | .08   | .09   | .20   | .28    | .19   | .10   | .07    | .14   | .15   | .51   | .28  | .19  |
| 15         | .08   | .08   | .19   | .26    | .17   | .09   | .08    | .15   | 10.1  | .45   | .30  | .20  |
| 16         | .08   | .08   | .19   | .22    | .16   | .09   | .19    | * .12 | 18.1  | .42   | .28  | .21  |
| 17         | .08   | .09   | .18   | .16    | .08   | .08   | .09    | * .17 | 2.08  | .30   | .27  | .24  |
| 18         | .08   | .09   | .17   | .18    | 1.81  | .09   | .12    | .16   | .62   | .28   | .27  | .23  |
| 19         | .08   | .10   | .17   | 2.05   | .50   | .09   | .40    | .14   | .42   | .28   | .27  | .22  |
| 20         | .08   | .10   | .19   | * .47  | .25   | .08   | .28    | .10   | 1.54  | .27   | .26  | .21  |
| 21         | .08   | .14   | .20   | .36    | .18   | .08   | .16    | .09   | .55   | .26   | .26  | .20  |
| 22         | .08   | .10   | * .20 | .32    | .51   | .08   | .13    | * .12 | .42   | .28   | .27  | .22  |
| 23         | .08   | .10   | .18   | .29    | .24   | .08   | * 12.0 | .08   | 39.4  | .28   | .24  | .21  |
| 24         | .08   | .10   | .16   | .25    | .19   | .07   | .38    | .09   | 3.01  | .30   | .22  | .19  |
| 25         | .09   | .10   | .16   | 14.6   | .17   | .07   | .19    | .09   | 1.10  | .27   | .22  | .21  |
| 26         | .09   | .10   | .17   | * 25.6 | .16   | .08   | .16    | .08   | .71   | .27   | .23  | .20  |
| 27         | .08   | .12   | .21   | 1.30   | .14   | .08   | .14    | .09   | .53   | .27   | .22  | .20  |
| 28         | .10   | .15   | .20   | .53    | .12   | .08   | .13    | .08   | .42   | .22   | .19  | .20  |
| 29         | .09   | .20   | .35   | .12    | .08   | .13   | .08    | .36   | .22   | * .22 | .20  | .20  |
| 30         | .10   | 18.5  | .29   | .12    | .08   | .10   | .08    | .35   | .23   | .22   | .20  | .20  |
| 31         | .08   | .83   | .12   | .28    | .08   | .08   | .28    | * .20 | .20   | .19   |      |      |
| <b>Sum</b> |       | 2.79  |       | 51.54  |       | 2.83  |        | 5.10  |       | 15.10 |      | 6.83 |
|            |       | 2.59  |       | 37.20  |       | 8.62  |        | 18.55 |       | 84.25 |      | 7.19 |

## Current Year 1990

## Period 1938-1990

| Month         | Extreme Gage Metres |      |     | Extreme-Cubic Metres per Second |     |      | Average | Volume—Thousands of Cubic Metres |         |         |         |
|---------------|---------------------|------|-----|---------------------------------|-----|------|---------|----------------------------------|---------|---------|---------|
|               | High                | Low  | Day | High                            | Day | Low  |         | Total                            | Average | Maximum | Minimum |
| Jan.          | 0.15                | 0.10 | 9   | 0.19                            | 1.1 | 0.07 | 0.08    | 224                              | 490     | 1,122   | 38.9    |
| Feb.          | .17                 | .10  | 28  | .31                             | 113 | .08  | .10     | 241                              | 594     | 7,339   | 41.1    |
| Mar.          | 1.42                | .12  | 11  | 82.8                            | 1.3 | .10  | 1.20    | 3,214                            | 700     | 3,214   | 73.0    |
| Apr.          | 2.00                | .14  | 26  | 161                             | 11  | .16  | 1.72    | 4,453                            | 1,691   | 20,488  | 93.0    |
| May           | .49                 | .12  | 18  | 5.60                            | 129 | .11  | .28     | 745                              | 1,519   | 11,200  | 111     |
| June          | .13                 | .10  | 2   | .14                             | 24  | .06  | .09     | 245                              | 2,895   | 77,117  | 54.0    |
| July          | 1.46                | .09  | 23  | 88.1                            | 1.3 | .05  | .60     | 1,603                            | 1,639   | 20,240  | 33.1    |
| Aug.          | .33                 | .10  | 1   | 1.81                            | 26  | .07  | .16     | 441                              | 1,547   | 24,531  | 52.1    |
| Sept.         | 1.55                | .10  | 23  | 99.0                            | 6   | .06  | 2.81    | 7,279                            | 3,019   | 61,139  | 46.0    |
| Oct.          | .89                 | .15  | 9   | 27.6                            | 31  | .19  | .49     | 1,305                            | 1,997   | 25,217  | 27.9    |
| Nov.          | .19                 | .14  | 8   | .36                             | 1.4 | .16  | .24     | 621                              | 520     | 3,522   | 25.9    |
| Dec.          | .18                 | .15  | 6   | .34                             | 111 | .19  | .22     | 590                              | 447     | 1,315   | 27.1    |
| <b>Yearly</b> | 2.00                | 0.09 | ==  | 161                             | ==  | 0.05 | 0.66    | 20,961                           | 17,058  | 86,376  | 2,555   |

## UB-4528.00 SAN FELIPE SPRINGS AT DEL RIO, TEXAS

**DESCRIPTION:** Two large and at least two smaller springs rise near the northeast city limits of Del Rio, Texas in or near the channel of San Felipe Creek at latitude 29°22'20" and longitude 100°53'00". The total yield of these springs consists of waters measured in the Val Verde Canal at Del Rio, Texas and in San Felipe Creek at Moore Park, Del Rio, Texas and diversions by the city of Del Rio. Diversions by the San Felipe Irrigation Company through the Val Verde Canal are measured at a gaging station consisting of a paved measuring section and gravity well and water-stage recorder located on the left side of the canal under the U. S. Highway 277 Bridge across San Felipe Creek at latitude 29°21'55" and longitude 100°53'10". The bridge is located about 1.0 creek kilometre downstream from the source of the springs and 6.3 creek Kilometres from the confluence of the creek with the Rio Grande. The gaging station on San Felipe Creek at Moore Park consists of gravity well and water-stage recorder located on the left bank about 91 metres downstream from the U. S. Highway 277 Bridge at latitude 29°21'50" and longitude 100°53'10". This stream enters the Rio Grande at river Kilometre 902, 0.8 river kilometre downstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zeros of the gages for the two stations are, respectively, 287.30 metres and 283.70 metres above sea level, U. S. C. & G. S. datum.

**RECORDS:** Records for the Val Verde Canal and San Felipe Creek at Moore Park are based on 24 discharge measurements at each station respectively, by wading during the year, and continuous records of gage heights. Computations by shifting control methods. Records for the Del Rio Pumping Plant are furnished by the city of Del Rio Water Department. Records available: Total yield of the springs, February 1961 through 1990.

**REMARKS:** The flows tabulated below represent only the total yield of the springs. All storm runoff has been eliminated from the tabulations.

| Average Flow in Cubic Metres per Second |      |      |               |  |      |      |  |  |  |  |               |
|---|------|------|---------------|--|------|------|--|--|--|--|---------------|
| Daily:                                  | Max. | 4.84 | July 23, 1976 |  | Min. | 0.83 |  |  |  |  | July 29, 1964 |
| Monthly:                                | Max. | 4.33 | December 1976 |  | Min. | 0.97 |  |  |  |  | August 1964   |
| Yearly:                                 | Max. | 4.22 | 1977          |  | Min. | 1.43 |  |  |  |  | 1963          |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day | Jan. | Feb. | Mar. | April | May  | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|-----|------|------|------|-------|------|------|------|------|-------|------|------|------|
| 1   | 3.06 | 2.89 | 2.61 | 2.66  | *    | 2.95 | 3.26 | 3.12 | 2.95  | 3.20 | 3.06 | 3.94 |
| 2   | 3.06 | 2.83 | 2.55 | 2.74  | 3.03 | 3.34 | 2.95 | 2.95 | 3.20  | *    | 3.03 | 3.91 |
| 3   | *    | 3.06 | 2.83 | 2.56  | *    | 2.81 | 3.00 | 3.31 | *     | 3.12 | 3.12 | 3.94 |
| 4   | 3.09 | 2.81 | 2.59 | 2.86  | 2.97 | 3.34 | 3.31 | 2.95 | 3.20  | 3.17 | 3.94 | *    |
| 5   | 2.97 | 2.83 | 2.62 | 2.80  | 2.92 | *    | 3.37 | 3.31 | 2.95  | *    | 3.31 | 3.94 |
| 6   | 3.12 | *    | 2.86 | 2.66  | 2.89 | 3.06 | 3.46 | 3.34 | 2.92  | 3.46 | 3.17 | *    |
| 7   | 3.00 | 2.86 | 2.59 | 2.86  | 2.97 | 3.37 | 3.40 | *    | 2.89  | 3.51 | 3.26 | 3.96 |
| 8   | 3.09 | 2.89 | 2.59 | 2.89  | 3.03 | 3.43 | 3.26 | 2.97 | 3.57  | 3.46 | 3.99 | 4.05 |
| 9   | 3.03 | 2.92 | 2.59 | 2.89  | 3.14 | 3.37 | 3.31 | 3.00 | 3.54  | 3.37 | 3.79 | 4.08 |
| 10  | 2.89 | 2.89 | 2.57 | 2.83  | 3.00 | 3.37 | 3.14 | 3.17 | 3.57  | 3.46 | 3.62 | 4.13 |
| 11  | 3.00 | 2.89 | 2.60 | 2.83  | 3.09 | 3.57 | 3.06 | 3.14 | 3.43  | 3.51 | 3.57 | 4.08 |
| 12  | 2.97 | 2.86 | 2.50 | 2.83  | 3.09 | 3.57 | 2.92 | 3.12 | 3.46  | 3.60 | 3.57 | 4.02 |
| 13  | 3.00 | 2.89 | 2.50 | 2.92  | 3.06 | 3.62 | 2.97 | 3.17 | 3.48  | 3.65 | 3.57 | 4.02 |
| 14  | 3.00 | 2.81 | 2.50 | 2.89  | 3.20 | 3.74 | 2.83 | 3.14 | 3.54  | 3.77 | 3.57 | 3.88 |
| 15  | 3.09 | 2.75 | 2.48 | 2.83  | 3.29 | 3.54 | 2.83 | 3.17 | 3.65  | 3.91 | 3.57 | 3.82 |
| 16  | 3.20 | 2.76 | 2.48 | 2.82  | *    | 3.34 | 3.34 | 2.83 | 3.31  | 3.51 | *    | 3.71 |
| 17  | *    | 3.20 | 2.71 | 2.45  | *    | 2.83 | 3.37 | 3.34 | *     | 3.12 | 3.03 | 4.05 |
| 18  | 3.17 | 2.73 | 2.42 | 2.70  | 3.31 | 3.40 | 3.43 | 3.12 | *     | 3.57 | 4.11 | *    |
| 19  | 3.14 | 2.74 | 2.45 | 2.64  | 3.34 | 3.40 | 3.48 | 3.12 | 3.48  | 4.11 | 3.85 | 3.85 |
| 20  | 3.12 | *    | 2.57 | 2.65  | 3.14 | *    | 3.40 | 3.29 | 3.26  | 3.62 | 4.05 | *    |
| 21  | 3.12 | *    | 2.54 | 2.68  | 2.60 | 3.17 | 3.40 | 3.14 | *     | 3.26 | 3.48 | 3.86 |
| 22  | 3.09 | 2.44 | 2.72 | 2.63  | 3.09 | 3.65 | 3.03 | 3.26 | 3.43  | 3.99 | 3.85 | 3.77 |
| 23  | 3.06 | 2.60 | 2.58 | 2.69  | 3.03 | 3.62 | 2.97 | 3.37 | 3.57  | 3.99 | 3.85 | 3.74 |
| 24  | 3.03 | 2.54 | 2.64 | 2.73  | 3.20 | 3.57 | 2.92 | 3.21 | 3.43  | 4.05 | 3.88 | 3.77 |
| 25  | 3.03 | 2.52 | 2.65 | 2.67  | 3.03 | 3.62 | 2.95 | 3.40 | 3.34  | 4.02 | 3.88 | 3.74 |
| 26  | 2.95 | 2.58 | 2.64 | 2.95  | 3.06 | 3.54 | 3.00 | 3.40 | 3.29  | 4.02 | 3.94 | 3.85 |
| 27  | 2.89 | 2.57 | 2.64 | 3.09  | 3.06 | 3.51 | 3.03 | 3.40 | 3.20  | 3.91 | 3.94 | 3.85 |
| 28  | 2.89 | 2.58 | 2.64 | 2.97  | 3.06 | 3.51 | 2.92 | 3.31 | 3.29  | 4.13 | 3.91 | 3.94 |
| 29  | 2.89 | 2.60 | 2.64 | 3.09  | 3.06 | 3.40 | 2.92 | 3.23 | 2.95  | 3.91 | 3.96 | 3.91 |
| 30  | 2.89 | 2.65 | 2.95 | 3.06  | 3.26 | 2.89 | 3.31 | 3.03 | 3.94  | 3.96 | 3.94 | 3.99 |
| 31  | 2.86 | 2.62 | 3.06 | 3.06  | 2.83 | 3.26 | 2.83 | 3.26 | 3.91  | 3.91 | 3.91 | 3.99 |

|     |       |       |        |       |        |        |
|-----|-------|-------|--------|-------|--------|--------|
| Sum | 76.69 | 84.54 | 103.62 | 97.79 | 114.97 | 122.03 |
|     | 93.96 | 79.94 | 96.18  | 95.62 | 102.02 | 114.86 |

## Current Year 1990      Period 1961-1990

| Month  | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |      |      | Average | Volume - Thousands of Cubic Metres |         |         |         |        |
|--------|---------------------|------|---------------------------------|------|------|---------|------------------------------------|---------|---------|---------|--------|
|        | High                | Low  | Day                             | High | Low  |         | Total                              | Average | Maximum | Minimum |        |
| Jan.   | 116                 | 320  | 31                              | 2,86 | 3.03 | 8,118   | 8,532                              | 11,558  | 2,805   |         |        |
| Feb.   | 9                   | 2,92 | 22                              | 2,44 | 2.74 | 6,626   | 7,594                              | 10,129  | 2,614   |         |        |
| Mar.   | 22                  | 2,72 | 18                              | 2,42 | 2.58 | 6,907   | 8,300                              | 11,137  | 2,917   |         |        |
| Apr.   | 127                 | 3,09 | 21                              | 2,60 | 2.82 | 7,304   | 8,005                              | 10,610  | 2,826   |         |        |
| May    | 17                  | 3,37 | 5                               | 2,92 | 3.10 | 8,310   | 8,408                              | 11,471  | 3,505   |         |        |
| June   | 14                  | 3,74 | 1                               | 3,26 | 3.45 | 8,953   | 8,149                              | 11,162  | 3,060   |         |        |
| July   | 19                  | 3,48 | 114                             | 2,83 | 3.08 | 8,262   | 8,388                              | 11,523  | 2,731   |         |        |
| Aug.   | 125                 | 3,40 | 7                               | 2,89 | 3.15 | 8,449   | 8,358                              | 11,751  | 2,608   |         |        |
| Sept.  | 15                  | 3,65 | 29                              | 2,95 | 3.40 | 8,815   | 8,155                              | 11,038  | 3,152   |         |        |
| Oct.   | 28                  | 4,13 | 2                               | 3,03 | 3.71 | 9,933   | 8,630                              | 11,408  | 3,094   |         |        |
| Nov.   | 8                   | 3,99 | 111                             | 3,57 | 3.83 | 9,924   | 8,344                              | 11,058  | 2,941   |         |        |
| Dec.   | 10                  | 4,13 | 123                             | 3,74 | 3.94 | 10,543  | 8,693                              | 11,633  | 2,948   |         |        |
| Yearly |                     |      | ==                              | 4.13 | ==   | 2.42    | 3.24                               | 102,144 | 99,556  | 133,083 | 45,119 |

\* Discharge measurement made on this day      0 Mean daily      ! And other days

## 08-4530.00 SAN FELIPE CREEK NEAR DEL RIO, TEXAS

**DESCRIPTION:** Bubbler gage, and water-stage recorders (graphic and digital) located on the left bank at latitude 29°19'50", longitude 100°53'20", immediately upstream from the Silos Farm road bridge, 1.8 creek kilometres from the confluence with the Rio Grande, and about 3.2 kilometres south-southeast of the Del Rio, Texas. This stream enters the Rio Grande at river Kilometre 902, 0.8 river kilometre downstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 267.44 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 46 discharge measurements during the year, 24 by the United States Section and 22 by the Mexican Section of the Commission, and a continuous record of gage heights. Computations by shifting control methods. Records available: September 1931 through 1950.

**REMARKS:** Municipal diversions at Del Rio and irrigation diversions greatly modify the flow of this spring-fed creek at this station. Backwater from the Rio Grande reaches this station when the Rio Grande at Del Rio reaches a stage of 4.6 metres, or a flow of about 1,700 m<sup>3</sup>/sec. On June 28, 1954 combined creek flow and backwater from the Rio Grande reached a stage of 7.47 metres, the highest of record, at this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 1,270 m<sup>3</sup>/sec on June 14, 1935 with a gage height of 7.07 metres. Min. 0.01 m<sup>3</sup>/sec on July 20, 1953.

## Average Flow in Cubic Metres per Second

| Daily   | Max. | 459  | June 14, 1935 | Min. | 0.04 | July 21, 1953 |
|---------|------|------|---------------|------|------|---------------|
| Monthly | Max. | 22.8 | June 1935     | Min. | 0.13 | July 1953     |
| Yearly  | Max. | 3.85 | 1935          | Min. | 0.71 | 1953          |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day | Jan.  | Feb.   | Mar.  | April  | May    | June   | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|-----|-------|--------|-------|--------|--------|--------|------|------|-------|------|------|------|
| 1   | 3.12  | 2.36   | 2.70  | 2.55   | 3.09   | 2.57   | 2.60 | 3.09 | 2.33  | 3.09 | 3.62 | 3.74 |
| 2   | 3.17  | 2.31   | 2.64  | 2.54   | 3.26   | 2.51   | 2.52 | 3.03 | 2.46  | 3.20 | 3.65 | 3.77 |
| 3   | 3.29  | 2.23   | 2.49  | 2.60   | 3.17   | 2.43   | 2.16 | 2.97 | 2.53  | 3.48 | 3.62 | 3.65 |
| 4   | 3.31  | 2.20   | 2.51  | 2.50   | 2.95   | 2.46   | 2.00 | 2.86 | 2.56  | 3.23 | 3.62 | 3.62 |
| 5   | 3.31  | 2.26   | 2.51  | 2.27   | 3.03   | 2.44   | 2.05 | 2.80 | 2.43  | 3.23 | 3.51 | 3.68 |
| 6   | 3.34  | 2.34   | 2.34  | 2.42   | 3.00   | 2.31   | 2.04 | 2.72 | 2.37  | 3.23 | 3.51 | 3.68 |
| 7   | 3.31  | 2.36   | 2.48  | 2.38   | 2.79   | 2.30   | 2.09 | 2.26 | 2.26  | 3.26 | 3.62 | 3.65 |
| 8   | 3.23  | 2.41   | 2.50  | 2.41   | 2.95   | 2.39   | 2.12 | 2.53 | 2.23  | 3.31 | 3.74 | 3.68 |
| 9   | 3.23  | 2.35   | 2.52  | 2.43   | 2.66   | 2.39   | 2.08 | 2.54 | 2.26  | 3.62 | 3.74 | 3.68 |
| 10  | 3.23  | 2.28   | 2.50  | 2.52   | 2.39   | 2.42   | 2.10 | 2.37 | 2.23  | 3.29 | 3.65 | 3.65 |
| 11  | 3.20  | 2.29   | 3.29  | 2.46   | 2.55   | 2.38   | 2.12 | 2.31 | 3.09  | 3.31 | 3.74 | 3.74 |
| 12  | 3.26  | 2.24   | 2.67  | 2.49   | 2.44   | 2.10   | 2.08 | 2.36 | 2.61  | 3.34 | 3.79 | 3.74 |
| 13  | 3.14  | 2.22   | 2.68  | 2.55   | 2.44   | 1.96   | 2.40 | 2.39 | 2.57  | 3.37 | 3.94 | 3.71 |
| 14  | 3.00  | 2.23   | 2.78  | 2.40   | 2.21   | 1.84   | 2.52 | 2.36 | 2.64  | 3.40 | 4.05 | 3.82 |
| 15  | 3.03  | 2.16   | 2.74  | 2.44   | 2.23   | 1.86   | 2.67 | 2.40 | 2.83  | 3.40 | 4.02 | 3.94 |
| 16  | 2.89  | 2.23   | 2.67  | 2.47   | 2.02   | 2.09   | 2.83 | 2.27 | 4.87  | 3.57 | 3.85 | 3.96 |
| 17  | 2.83  | 2.29   | 2.62  | 3.40   | 1.97   | 2.18   | 2.60 | 2.56 | 3.74  | 3.68 | 3.82 | 3.91 |
| 18  | 2.86  | 2.24   | 2.62  | 2.72   | 2.43   | 2.17   | 2.71 | 2.67 | 3.77  | 3.60 | 3.79 | 3.94 |
| 19  | 2.83  | 2.12   | 2.60  | 3.99   | 2.24   | 2.09   | 3.17 | 2.67 | 3.91  | 3.68 | 3.77 | 3.96 |
| 20  | 2.80  | 2.13   | 2.70  | 2.80   | 2.42   | 2.06   | 7.14 | 2.63 | 9.71  | 3.68 | 3.71 | 3.99 |
| 21  | 2.79  | 2.51   | 2.92  | 2.65   | 2.44   | 2.03   | 3.00 | 2.60 | 4.08  | 3.74 | 3.65 | 3.99 |
| 22  | 2.78  | 2.35   | 2.80  | 2.55   | 5.07   | 1.83   | 2.86 | 2.30 | 3.99  | 3.68 | 3.62 | 3.96 |
| 23  | 2.72  | 2.51   | 2.56  | 2.42   | 2.44   | 1.83   | 18.1 | 2.14 | 9.32  | 3.68 | 3.60 | 3.94 |
| 24  | 2.70  | 2.48   | 2.63  | 2.46   | 2.36   | 1.77   | 4.02 | 2.16 | 4.05  | 3.65 | 3.60 | 3.96 |
| 25  | 2.68  | 2.44   | 2.56  | 8.01   | 2.39   | 1.81   | 3.37 | 2.20 | 3.37  | 3.71 | 3.62 | 3.96 |
| 26  | 2.58  | 2.47   | 2.59  | 19.1   | 2.47   | 1.78   | 3.29 | 2.20 | 3.17  | 3.68 | 3.65 | 3.99 |
| 27  | 2.62  | 2.51   | 2.59  | 3.77   | 2.48   | 1.84   | 3.20 | 2.14 | 3.06  | 3.65 | 3.60 | 3.99 |
| 28  | 2.61  | 2.72   | 2.51  | 3.34   | 2.52   | 1.98   | 3.09 | 2.21 | 3.03  | 3.62 | 3.62 | 4.05 |
| 29  | 2.50  | 2.50   | 2.50  | 3.23   | 2.56   | 2.12   | 3.03 | 2.43 | 3.12  | 3.74 | 3.74 | 4.19 |
| 30  | 2.45  | 3.68   | 3.03  | 2.57   | 2.42   | 2.89   | 2.46 | 3.12 | 3.65  | 3.77 | 4.13 | 4.11 |
| 31  | 2.39  | 2.59   | 2.68  | 2.66   | 3.06   | 2.35   | 2.85 | 2.85 | 3.62  | 3.62 | 3.62 | 4.11 |
| Sum | 65.24 | 102.90 | 64.36 | 77.30  | 108.39 | 111.28 |      |      |       |      |      |      |
|     | 91.20 | 82.49  | 82.22 | 101.91 | 103.71 | 111.23 |      |      |       |      |      |      |

## Current Year 1990

## Period 1932-1990

| Month  | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |      |     | Average | Volume—Thousands of Cubic Metres |         |         |         |
|--------|---------------------|------|---------------------------------|------|-----|---------|----------------------------------|---------|---------|---------|
|        | High                | Low  | Day                             | High | Day |         | Total                            | Average | Maximum | Minimum |
| Jan.   | 0.34                | 0.25 | 10                              | 3.57 | 30  | 2.20    | 2.94                             | 7,880   | 6,534   | 10,985  |
| Feb.   | .37                 | .23  | 21                              | 3.40 | 19  | 1.94    | 2.33                             | 5,637   | 5,435   | 10,642  |
| Mar.   | .84                 | .24  | 30                              | 9.26 | 6   | 2.17    | 2.66                             | 7,127   | 5,227   | 10,304  |
| Apr.   | 2.57                | .25  | 26                              | 61.5 | 15  | 2.20    | 3.43                             | 8,891   | 5,592   | 12,836  |
| May    | 1.25                | .28  | 22                              | 15.7 | 117 | 1.91    | 2.65                             | 7,104   | 6,446   | 21,697  |
| June   | .34                 | .21  | 1                               | 2.83 | 123 | 1.66    | 2.15                             | 9,561   | 6,619   | 59,059  |
| July   | 2.40                | .22  | 23                              | 52.7 | 10  | 1.80    | 3.29                             | 8,805   | 5,616   | 27,232  |
| Aug.   | .41                 | .28  | 1                               | 3.20 | 10  | 1.97    | 2.49                             | 6,679   | 5,089   | 9,355   |
| Sept.  | 1.83                | .29  | 20                              | 30.6 | 7   | 2.11    | 3.46                             | 8,961   | 6,577   | 35,373  |
| Oct.   | .67                 | .34  | 9                               | 7.02 | 1   | 3.03    | 3.50                             | 9,365   | 6,722   | 17,551  |
| Nov.   | .46                 | .20  | 9                               | 4.64 | 16  | 2.05    | 3.71                             | 9,610   | 5,801   | 10,567  |
| Dec.   | .49                 | .35  | 11                              | 5.13 | 3   | 3.48    | 3.86                             | 10,349  | 6,027   | 10,660  |
| Yearly | 2.57                | 0.20 | ==                              | 61.5 | ==  | 1.66    | 3.04                             | 95,969  | 71,685  | 121,046 |
|        |                     |      |                                 |      |     |         |                                  |         |         | 22,441  |

\* Discharge measurement made on this day      ! And other days

08-4539.00 DIVERSIONS FROM THE RIO GRANDE  
MAVERICK CANAL AT MILE 13 NEAR QUEMADO, TEXAS

**DESCRIPTION:** Light-weight cableway for making current meter measurements from the bank, bubbler gage, and water-stage recorders (graphic and digital), located on the left bank of a gunnite-lined section of the canal at latitude  $29^{\circ}03'00''$ , longitude  $100^{\circ}39'40''$ , 0.8 canal kilometre downstream from the Tequesquite Creek Siphon, 5.6 canal kilometres upstream from the Las Moras Creek Siphon, about 12.1 kilometres north-northwest of Quemado, Maverick County, Texas and 20.6 kilometres from the canal intake. The canal intake is at river kilometre 875, 28.0 river kilometres downstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on 24 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Gage heights at this station are affected by gate operation at Las Moras Siphon. Records available: June 21, 1949 through 1990.

**REMARKS:** At canal kilometre 51.2 a portion of the diverted water returns to the river through the Maverick Power Plant, and the remainder enters the Maverick Canal Extension. In 1990, 5,103 hectares of land were irrigated between this station and the power plant, and 10,206 hectares were irrigated from the extension, making a total of 15,309 hectares. A total of 1,219,676 m<sup>3</sup> returned to the Rio Grande at the power plant and through irrigation system returns published in following pages of this bulletin.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 52.4 m<sup>3</sup>/sec on February 15, 1989. Min. no flow several days in June, July, and November 1954; and October 1978.

Average Flow in Cubic Metres per Second\*\*

|          |      |      |                 |      |      |                  |
|----------|------|------|-----------------|------|------|------------------|
| Daily:   | Max. | 50.4 | August 19, 1990 | Min. | 0    | Oct. 2 & 3, 1978 |
| Monthly: | Max. | 47.5 | April 1990      | Min. | 8.35 | February 1977    |
| Yearly:  | Max. | 42.2 | 1980 & 1981     | Min. | 17.9 | 1972             |

**Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary**

| Day | Jan.    | Feb.   | Mar.    | April  | May     | June   | July    | Aug.   | Sept.   | Oct.   | Nov.    | Dec.   |
|-----|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|
| 1   | 33.1    | 34.8   | 41.1    | 48.7   | 48.7    | 42.8   | 38.5    | 42.8   | 47.0    | 44.7   | 45.0    | 42.5   |
| 2   | * 33.4  | 39.6   | 41.9    | * 46.4 | 49.0    | 42.5   | 38.5    | * 40.8 | 45.3    | * 45.9 | 45.3    | 42.8   |
| 3   | 33.1    | 45.9   | 42.2    | 47.9   | 49.3    | 42.2   | * 37.7  | 39.1   | 46.2    | 45.6   | 44.7    | 43.3   |
| 4   | 34.0    | 44.7   | 42.5    | 48.4   | 49.6    | * 41.9 | 36.2    | 39.1   | 46.2    | 45.3   | 43.9    | * 42.2 |
| 5   | 34.0    | * 45.6 | * 42.5  | 47.3   | 49.6    | 42.5   | 35.4    | 38.8   | 43.9    | * 45.9 | * 44.2  | 38.8   |
| 6   | 33.4    | 43.3   | 43.6    | 47.3   | 49.0    | 43.0   | 33.4    | 37.4   | * 37.7  | 40.5   | 43.9    | 42.2   |
| 7   | 33.7    | 44.2   | 44.7    | 47.6   | 49.6    | 44.2   | 32.3    | 37.4   | 34.8    | 33.4   | 43.6    | 41.9   |
| 8   | 32.3    | 45.6   | 45.9    | 48.8   | 49.6    | 44.2   | 32.9    | 37.1   | 35.4    | 31.7   | 43.6    | 42.5   |
| 9   | 33.7    | 45.3   | 46.4    | 48.4   | 48.7    | 43.9   | 32.6    | 36.5   | 35.1    | 33.7   | 43.3    | 42.8   |
| 10  | 33.7    | 45.0   | 45.0    | 47.9   | 48.1    | 42.5   | 33.4    | 36.5   | 37.9    | 34.8   | 43.9    | 42.2   |
| 11  | 34.0    | 45.9   | 41.9    | 46.4   | 48.4    | 43.3   | 34.3    | 35.4   | 38.2    | 33.1   | 43.9    | 42.2   |
| 12  | 34.0    | 45.9   | 41.9    | 47.3   | 48.7    | 43.0   | 35.1    | 36.2   | 36.8    | 31.4   | 42.2    | 41.1   |
| 13  | 33.4    | 46.4   | 38.5    | 45.9   | 48.4    | 43.0   | 35.4    | * 43.3 | 36.5    | 32.6   | 41.3    | 40.8   |
| 14  | 33.4    | 46.7   | 38.8    | 45.3   | 48.7    | 42.2   | 35.4    | 48.7   | 35.4    | 33.7   | 41.6    | 40.8   |
| 15  | 33.4    | 47.0   | 38.2    | 46.2   | 49.0    | 40.2   | 34.8    | 49.0   | 34.8    | * 34.6 | 41.1    | 41.3   |
| 16  | * 33.4  | 47.0   | 41.3    | * 47.6 | * 47.9  | 38.5   | 35.1    | 48.7   | 37.7    | 34.0   | 42.2    | 41.3   |
| 17  | 33.7    | 46.2   | 41.9    | 47.6   | 47.0    | 38.5   | * 35.4  | 48.7   | 42.8    | 33.4   | 42.5    | 41.3   |
| 18  | 32.9    | 45.3   | 42.2    | 47.6   | 47.0    | 39.4   | 37.1    | 49.6   | 42.2    | 32.9   | 42.5    | * 41.1 |
| 19  | 32.6    | 45.9   | * 41.9  | 48.7   | 46.4    | * 39.9 | 39.4    | 50.0   | * 45.6  | 33.4   | * 41.9  | 41.9   |
| 20  | 32.3    | * 47.0 | 40.5    | 48.1   | 46.4    | 39.6   | 41.3    | 48.7   | 47.6    | 33.1   | 42.8    | 42.2   |
| 21  | 32.9    | 45.3   | 43.0    | 47.9   | 45.9    | 39.1   | 40.8    | 47.0   | 46.7    | 32.6   | 42.8    | 41.9   |
| 22  | 32.3    | 43.6   | 46.7    | 46.4   | 46.4    | 38.2   | 40.2    | 45.6   | 48.4    | 32.3   | 43.3    | 41.1   |
| 23  | 33.1    | 43.9   | 47.9    | 46.4   | 45.9    | 37.4   | 40.8    | 45.9   | 49.0    | 32.0   | 43.0    | 41.1   |
| 24  | 33.4    | 44.2   | 47.0    | 46.2   | 46.2    | 39.6   | 35.1    | 46.2   | 48.4    | 32.0   | 43.6    | 41.9   |
| 25  | 33.4    | 43.9   | 47.3    | 47.0   | 45.0    | 39.6   | 43.6    | 46.7   | 43.9    | 32.3   | 43.9    | 42.5   |
| 26  | 32.9    | 42.2   | 47.0    | 45.0   | 44.2    | 37.1   | 41.9    | 45.3   | 43.3    | 33.1   | 43.9    | 42.2   |
| 27  | 34.0    | 41.9   | 46.7    | 47.9   | 44.5    | 37.4   | 40.5    | 42.5   | 42.5    | 43.0   | 43.6    | 41.3   |
| 28  | 34.0    | 40.8   | 46.4    | 47.9   | 44.5    | 37.1   | 39.6    | 37.4   | 43.6    | 45.3   | 43.9    | 41.1   |
| 29  | 33.4    |        | 46.7    | 48.4   | 43.9    | 37.4   | 41.1    | 39.1   | 43.6    | 45.0   | 43.6    | 40.8   |
| 30  | 34.3    |        | 47.3    | 48.7   | 44.5    | 38.2   | 41.1    | 43.9   | 43.9    | 45.0   | 43.0    | 40.5   |
| 31  | 34.6    |        | 48.1    |        | 43.9    |        | 42.5    | 47.6   |         | 45.3   |         | 41.6   |
| Sum | 1,243.1 |        | 1,424.8 |        | 1,218.4 |        | 1,331.4 |        | 1,151.6 |        | 1,291.2 |        |
|     | 1,035.8 |        | 1,357.0 |        | 1,464.0 |        | 1,161.4 |        | 1,260.4 |        | 1,298.0 |        |

Current Year 1990

Period 1968-1990

| Month  | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |      |     | Average | Volume—Thousands of Cubic Metres |           |           |           |         |
|--------|---------------------|------|---------------------------------|------|-----|---------|----------------------------------|-----------|-----------|-----------|---------|
|        | High                | Low  | Day                             | High | Low |         | Total                            | Average   | Maximum   | Minimum   |         |
| Jan.   | 2.55                | 2.09 | 5                               | 35.4 | 26  | 34.6    | 33.4                             | 89,493    | 88,316    | 120,225   | 25,730  |
| Feb.   | 3.04                | 2.54 | 19                              | 47.9 | 1   | 30.6    | 44.4                             | 107,404   | 84,632    | 108,750   | 20,233  |
| Mar.   | 3.19                | 2.45 | 31                              | 49.3 | 15  | 44.5    | 43.8                             | 117,295   | 94,696    | 121,154   | 34,141  |
| Apr.   | 3.15                | 2.90 | 26                              | 49.3 | 12  | 43.3    | 47.5                             | 123,103   | 95,620    | 123,103   | 50,229  |
| May    | 3.08                | 2.92 | 11                              | 50.4 | 129 | 33.1    | 47.2                             | 126,490   | 101,442   | 126,490   | 49,910  |
| June   | 3.04                | 2.56 | 11                              | 45.3 | 28  | 23.4    | 40.6                             | 105,270   | 98,893    | 116,310   | 38,497  |
| July   | 2.87                | 1.98 | 25                              | 44.7 | 24  | 31.4    | 37.5                             | 100,345   | 99,950    | 120,518   | 44,129  |
| Aug.   | 3.01                | 2.26 | 19                              | 51.0 | 8   | 29.5    | 42.9                             | 115,033   | 100,878   | 119,784   | 45,279  |
| Sept.  | 3.09                | 2.19 | 24                              | 51.0 | 6   | 30.9    | 42.0                             | 108,899   | 96,518    | 117,876   | 40,659  |
| Oct.   | 2.91                | 2.26 | 5                               | 46.7 | 12  | 37.4    | 37.1                             | 99,986    | 95,545    | 120,787   | 27,426  |
| Nov.   | 2.94                | 2.61 | 126                             | 46.2 | 115 | 32.9    | 43.3                             | 112,147   | 84,550    | 115,209   | 27,737  |
| Dec.   | 2.92                | 2.42 | 3                               | 45.6 | 5   | 23.4    | 41.7                             | 111,560   | 84,411    | 120,494   | 29,007  |
| Yearly | 3.19                | 1.98 | ==                              | 51.0 | ==  | 23.4    | 41.7                             | 1,316,487 | 1,125,481 | 1,337,047 | 565,712 |

\* Discharge measurement made on this day

† And other days

\*\* Period 1968-1990

## 08-4550.00 PINTO CREEK NEAR DEL RIO, TEXAS

**DESCRIPTION:** Solid ledge rock and concrete, control, bubbler gage, and digital water-stage recorder located on the right bank at latitude 29° 08' 45", longitude 100° 43' 05", 2.6 creek kilometre from the confluence with the Rio Grande, and about 30.6 kilometres southeast of Del Rio, Texas. This stream enters the Rio Grande at river kilometre 864, 9.1 river kilometres downstream from the Maverick County Water Control and Improvement District No. 1 diversion dam. The zero of the gage is 248.01 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 32 discharge measurements during the year, 12 by the United States Section and 20 by the Mexican Section of the Commission, and a continuous record of gage heights. Records available: September 1955 through 1990 at this station, and November 22, 1928 through August 1955 at a site 6.3 kilometres upstream.

**REMARKS:** Small irrigation diversions modify the flow of this spring-fed creek at this station. When the flow in the Rio Grande at the confluence of this creek exceeds about 2,270 m<sup>3</sup>/sec, backwater may reach this station. Backwater from the Rio Grande flood of June 1954 reached a gage height of 8.78 metres, or an elevation of 256.79 metres above mean sea level, at this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 5,270 m<sup>3</sup>/sec on June 24, 1948 with a gage height of 9.75 metres. Min. frequently no flow.

## Average Flow in Cubic Metres per Second

|          |      |      |               |      |      |            |
|----------|------|------|---------------|------|------|------------|
| Daily:   | Max. | 799  | June 24, 1948 | Min. | 0    | Frequently |
| Monthly: | Max. | 27.0 | June 1948     | Min. | 0    | Frequently |
| Yearly:  | Max. | 2.97 | 1932          | Min. | 0.04 | 1980       |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan. | Feb. | Mar. | April | May  | June | July  | Aug. | Sept. | Oct.  | Nov.  | Dec. |
|------------|------|------|------|-------|------|------|-------|------|-------|-------|-------|------|
| 1          | 0.05 | 0.06 | 0.09 | 0.12  | 0.16 | 0.12 | 0.06  | 0.33 | 0.33  | 0.37  | 0.29  | 0.36 |
| 2          | .05  | .07  | .09  | .13   | .15  | .11  | .06   | .39  | .16   | .36   | .31   | .37  |
| 3          | .05  | .07  | .08  | .14   | .16  | .11  | .06   | .57  | .23   | .37   | .31   | .38  |
| 4          | .05  | .07  | .08  | .15   | .14  | .11  | .06   | .29  | .28   | .37   | .32   | .35  |
| 5          | .05  | .07  | .08  | .14   | .12  | .10  | .06   | .24  | .28   | .37   | .33   | .31  |
| 6          | .05  | .08  | .08  | .12   | .12  | .09  | .05   | .22  | .26   | .36   | .35   | .31  |
| 7          | .05  | .10  | .07  | .12   | .11  | .09  | .05   | .21  | .24   | .35   | .37   | .31  |
| 8          | .05  | .08  | .08  | .11   | .11  | .09  | .05   | .20  | .24   | .34   | .53   | .30  |
| 9          | .05  | .07  | .08  | .11   | .11  | .09  | .05   | .20  | .23   | .47   | .50   | .28  |
| 10         | .05  | .06  | .08  | .10   | .10  | .09  | .05   | .20  | .24   | .37   | .42   | .28  |
| 11         | .05  | .06  | .08  | .10   | .10  | .09  | .05   | .20  | 1.06  | .37   | .40   | .29  |
| 12         | .05  | .06  | .09  | .10   | .10  | .08  | .05   | .20  | .35   | .37   | .39   | .32  |
| 13         | .05  | .06  | .08  | .10   | .10  | .08  | .05   | .21  | .30   | .37   | .39   | .33  |
| 14         | .05  | .06  | .07  | .09   | .10  | .08  | .05   | .21  | .30   | .37   | .38   | .33  |
| 15         | .05  | .06  | .07  | .11   | .09  | .08  | .05   | .21  | .31   | .36   | .39   | .33  |
| 16         | .05  | .06  | .07  | .11   | .09  | .08  | .05   | .23  | .68   | .36   | .40   | .33  |
| 17         | .06  | .06  | .07  | .10   | .10  | .08  | .06   | .32  | .67   | .35   | .40   | .33  |
| 18         | .06  | .06  | .07  | 1.40  | .10  | .08  | .13   | .27  | .45   | .33   | .40   | .31  |
| 19         | .06  | .06  | .07  | 1.34  | .10  | .07  | .72   | .24  | .38   | .31   | .40   | .29  |
| 20         | .06  | .06  | .07  | .43   | .10  | .07  | 4.39  | .58  | .30   | .38   | .37   | .28  |
| 21         | .06  | .12  | .06  | .19   | .10  | .07  | .37   | .22  | .43   | .31   | .38   | .29  |
| 22         | .06  | .11  | .06  | .16   | .78  | .07  | .16   | .21  | .39   | .32   | .45   | .31  |
| 23         | .06  | .11  | .06  | .15   | .53  | .07  | 32.0  | .19  | .95   | .33   | .37   | .30  |
| 24         | .06  | .10  | .06  | .13   | .29  | .07  | 10.1  | .18  | .57   | .34   | .37   | .30  |
| 25         | .06  | .10  | .06  | 7.87  | .17  | .07  | 1.60  | .18  | .46   | .34   | .37   | .30  |
| 26         | .06  | .10  | .06  | 56.1  | .13  | .07  | .55   | .17  | .42   | .33   | .37   | .30  |
| 27         | .06  | .10  | .07  | 7.93  | .12  | .07  | .31   | .18  | .40   | .31   | .37   | .32  |
| 28         | .06  | .09  | .10  | 1.44  | .12  | .07  | .24   | .17  | .39   | .31   | .40   | .33  |
| 29         | .06  | .09  | .09  | .44   | .12  | .06  | .20   | .18  | .38   | .31   | .39   | .33  |
| 30         | .06  | .09  | 1.98 | .22   | .11  | .06  | .18   | .20  | .37   | .30   | .37   | .34  |
| 31         | .06  | .14  | .14  | .11   | .11  | .07  | .17   | .27  | .29   | .29   | .32   | .32  |
| <b>Sum</b> |      | 2.16 |      | 79.75 |      | 2.87 |       | 7.33 |       | 10.71 |       | 9.83 |
|            | 1.70 |      | 4.29 |       | 4.84 |      | 52.03 |      | 12.33 |       | 11.50 |      |

## Current Year 1990

## Period 1929-1990

| Month         | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |      |     | Average | Volume—Thousands of Cubic Metres |         |         |         |       |
|---------------|---------------------|------|---------------------------------|------|-----|---------|----------------------------------|---------|---------|---------|-------|
|               | High                | Low  | Day                             | High | Day |         | Total                            | Average | Maximum | Minimum |       |
| Jan.          | 0.21                | 0.20 | 122                             | 0.07 | 1 1 | 0.05    | 0.05                             | 147     | 680     | 2,784   | 0     |
| Feb.          | .27                 | .19  | 21                              | .16  | 1 9 | .06     | .08                              | 187     | 715     | 7,106   | 0     |
| Mar.          | .90                 | .21  | 30                              | 10.3 | 121 | .06     | .14                              | 371     | 643     | 3,085   | 0     |
| Apr.          | 1.98                | .24  | 5                               | 94.6 | 112 | .09     | 2.66                             | 6,890   | 1,538   | 33,464  | 0     |
| May           | .61                 | .24  | 22                              | 2.61 | 113 | .09     | .16                              | 418     | 2,241   | 36,248  | 0     |
| June          | .26                 | .21  | 1                               | .12  | 128 | .06     | .08                              | 213     | 4,826   | 69,981  | 0     |
| July          | 2.03                | .20  | 23                              | 99.1 | 111 | .05     | 1.68                             | 4,495   | 1,777   | 37,030  | 0     |
| Aug.          | .57                 | .30  | 3                               | 1.53 | 128 | .16     | .24                              | 633     | 1,806   | 60,070  | 0     |
| Sept.         | .62                 | .28  | 11                              | 2.71 | 2   | .13     | .41                              | 1,065   | 2,498   | 60,397  | 0     |
| Oct.          | .41                 | .34  | 9                               | .53  | 130 | .29     | .35                              | 925     | 1,257   | 11,022  | 0     |
| Nov.          | .40                 | .34  | 1 8                             | .54  | 1   | .29     | .38                              | 994     | 607     | 3,196   | 0     |
| Dec.          | .38                 | .34  | 1 3                             | .39  | 1 9 | .27     | .32                              | 849     | 695     | 3,041   | 0     |
| <b>Yearly</b> | 2.03                | 0.19 | ==                              | 99.1 | ==  | 0.05    | 0.54                             | 17,187  | 19,293  | 94,053  | 1,178 |

\* Discharge measurement made on this day

! And other days

## 08-4555.00 RIO SAN DIEGO NEAR JIMENEZ, COAHUILA

**DESCRIPTION:** Cableway, masonry and concrete Cipolletti weir of 22 m<sup>3</sup>/sec capacity, gravity well, and water-stage recorder located on the left bank of Rio San Diego, and gravity well and water-stage recorder on Acequia do Dolores, an irrigation canal that runs along the left bank of the river under the cable, located at latitude 29°04'20", longitude 100°47'35", about 6.0 kilometres west of Jimenez, Coahuila, and 7.0 river kilometres from the confluence with the Rio Grande. Part of the canal flow measured here returns to the river downstream. This stream enters the Rio Grande at river kilometre 95.6, 16.8 river kilometres downstream from Maverick County Water Control and Improvement District No. 1 diversion dam and 46.4 river kilometres downstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 253.51 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** For the river, based on the weir discharge table and a continuous record of gage heights; and for the canal, on 37 discharge measurements during the year, and a continuous record of gage heights. The flow tabulated below includes the flow of the canal, and prior to 1964, records do not include this flow. Records available: 1922 through 1990. Records from 1922 through September 1932 are considered doubtful.

**REMARKS:** Reservoirs and irrigation diversions upstream from these stations modify the flow of this spring-fed stream. On December 24, 1955, the zero of the gage was 0.80 metres; in November 1961 an additional 0.06 metres, and the capacity of the weir was increased from 20 m<sup>3</sup>/sec to 22 m<sup>3</sup>/sec.

**EXTREME FLOWS FROM RECORDS:**\*\* Momentary: Max. 2,320 m<sup>3</sup>/sec on June 17, 1961 with a gage height of 6.31 metres. Min. no flow occurred on several occasions.

## Average Flow in Cubic Metres per Second\*\*

|          |      |       |               |      |      |              |
|----------|------|-------|---------------|------|------|--------------|
| Daily:   | Max. | 1,040 | July 18, 1975 | Min. | 0    | Occasionally |
| Monthly: | Max. | 67.5  | Oct. 1932     | Min. | 0.23 | July 1956    |
| Yearly:  | Max. | 17.6  | 1976          | Min. | 0.68 | 1956         |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.   | Feb.   | Mar.   | April  | May    | June   | July   | Aug.   | Sept.  | Oct.   | Nov.   | Dec.   |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1          | 1.10   | 1.02   | 1.41   | 1.83   | 3.80   | 3.48   | 0.62   | 12.6   | 8.66   | 24.4   | 13.3   | 10.8   |
| 2          | 1.10   | 1.12   | 1.56   | 1.57   | 3.93   | 3.16   | .68    | 13.8   | 8.66   | 22.4   | 13.3   | 10.5   |
| 3          | 1.10   | .98    | 1.43   | 1.85   | 3.95   | 2.88   | .73    | 13.4   | 8.89   | 21.2   | 13.1   | 10.2   |
| 4          | 1.10   | .98    | 1.34   | 1.87   | 3.21   | 2.50   | .73    | 12.6   | 8.07   | 20.1   | 13.0   | 10.1   |
| 5          | 1.10   | .98    | 1.26   | 1.51   | 2.89   | 2.18   | .61    | 12.0   | 7.68   | 19.4   | 13.0   | 10.1   |
| 6          | 1.10   | 1.16   | 1.18   | 1.42   | 2.63   | 2.09   | .61    | 11.4   | 6.19   | 18.7   | 12.9   | 10.0   |
| 7          | 1.10   | 1.08   | 1.10   | 1.27   | 2.25   | 1.84   | .61    | 10.6   | 7.22   | 18.9   | 12.9   | 9.82   |
| 8          | 1.10   | 1.08   | 1.11   | 1.27   | * 2.17 | 1.76   | .67    | 10.1   | 6.85   | 19.0   | 13.2   | 9.64   |
| 9          | * 1.10 | 1.08   | 1.11   | 1.27   | 1.98   | 1.40   | .72    | 9.60   | 6.67   | 20.6   | 12.9   | 9.51   |
| 10         | 1.10   | 1.08   | 1.11   | * 1.24 | 1.76   | 1.31   | * .72  | 9.47   | 6.89   | 18.3   | 12.5   | 9.50   |
| 11         | 1.10   | 1.08   | 1.19   | 1.05   | 1.68   | * 1.15 | .71    | 9.16   | * 7.31 | 18.0   | 12.3   | * 9.50 |
| 12         | 1.10   | .94    | 1.12   | .96    | 1.59   | * .91  | .71    | 8.97   | 6.66   | 17.9   | 12.3   | 9.36   |
| 13         | 1.02   | * .94  | * 1.26 | 1.05   | 1.42   | .85    | .73    | 8.96   | 6.93   | 17.3   | 12.1   | 9.20   |
| 14         | 1.10   | .94    | 1.10   | 1.12   | 1.34   | .86    | .73    | * 8.60 | 8.61   | 17.0   | 12.0   | 8.89   |
| 15         | 1.10   | .94    | 1.10   | 1.05   | * 1.34 | .86    | .73    | 8.36   | 11.5   | 16.7   | 12.0   | 8.89   |
| 16         | * 1.10 | .94    | 1.10   | .98    | 1.34   | .86    | .95    | 7.74   | 28.5   | * 16.2 | 12.0   | 8.90   |
| 17         | 1.10   | .94    | 1.10   | * .98  | 1.18   | .86    | * 1.03 | 8.44   | 17.3   | 15.8   | 12.0   | 8.88   |
| 18         | 1.10   | .95    | 1.09   | 1.08   | 17.6   | .86    | 1.16   | 9.16   | * 13.8 | 15.6   | 12.0   | 8.41   |
| 19         | 1.10   | .95    | 1.24   | 1.73   | 19.7   | * .86  | 30.6   | 9.32   | 13.2   | 15.4   | 11.6   | 8.26   |
| 20         | 1.10   | * 1.01 | * 1.16 | 1.82   | 14.9   | .79    | * 61.2 | 9.61   | 29.7   | 15.2   | 11.6   | 8.31   |
| 21         | 1.19   | 4.13   | 1.08   | 1.55   | 11.9   | .71    | 21.7   | * 9.61 | 15.1   | 15.0   | 11.6   | 8.34   |
| 22         | 1.20   | 2.40   | 1.23   | 1.43   | 16.2   | .71    | 17.6   | 9.60   | 15.0   | 14.8   | 11.2   | 8.06   |
| 23         | * 1.10 | 1.62   | 1.09   | 1.42   | 11.2   | .71    | * 63.4 | 9.60   | 58.9   | * 14.8 | * 11.2 | 8.06   |
| 24         | 1.10   | 1.30   | 1.10   | * 1.42 | 8.96   | .71    | * 27.8 | * 9.49 | 43.6   | 14.5   | 11.6   | 8.06   |
| 25         | 1.10   | 1.10   | 1.25   | 45.8   | 7.71   | .66    | 18.4   | 8.89   | 34.4   | 14.1   | 11.6   | 7.92   |
| 26         | 1.04   | * 1.03 | 1.34   | 150    | 6.88   | * .62  | 16.3   | 8.85   | 32.2   | 13.9   | 11.6   | 7.77   |
| 27         | 1.01   | * .95  | * 1.43 | 7.68   | 6.15   | .56    | 15.1   | 8.97   | 30.5   | 13.7   | * 11.6 | 7.77   |
| 28         | 1.10   | 1.01   | 1.43   | 4.24   | 5.56   | .50    | 14.2   | * 8.93 | 29.1   | 13.7   | 11.2   | 7.89   |
| 29         | 1.10   | 1.43   | 4.02   | 4.97   | .62    | 13.4   | 8.82   | 27.6   | 13.5   | 10.8   | 8.06   |        |
| 30         | * 1.10 | 3.37   | 3.91   | 4.20   | .62    | 12.9   | 8.66   | 26.5   | 13.2   | 10.8   | 7.99   |        |
| 31         | .99    | 2.30   |        | 3.89   |        |        | 12.8   | 8.66   |        | 13.3   |        | 7.77   |
| <b>Sum</b> |        |        | 33.86  | 248.39 | 37.88  |        |        | 303.97 | 522.6  |        |        | 276.46 |
|            |        |        | 33.95  | 41.12  | 178.28 |        |        | 338.85 | 532.19 |        |        | 363.2  |

## Current Year 1990

## Period 1933-1990

| Month         | Extreme Gage Metres |             | Extreme-Cubic Metres per Second |            |          | Average     | Volume - Thousands of Cubic Metres |                |                |                |               |     |
|---------------|---------------------|-------------|---------------------------------|------------|----------|-------------|------------------------------------|----------------|----------------|----------------|---------------|-----|
|               | High                | Low         | Day                             | High       | Low      |             | Total                              | Average        | Maximum        | Minimum        |               |     |
| Jan.          | 0.06                | 0.05        | 121                             | 1.26       | 113      | 0.95        | 1.10                               | 2,933          | 10,313         | 44,936         | 2,294         |     |
| Feb.          | .17                 | .04         | 21                              | 6.30       | 112      | .94         | 1.21                               | 2,926          | 8,079          | 31,774         | 1,307         |     |
| Mar.          | .17                 | .04         | 30                              | 6.56       | 21       | 0           | 1.08                               | 3,553          | 7,058          | 33,353         | 1,653         |     |
| Apr.          | 2.93                | .04         | 26                              | 702        | 12       | 0           | .96                                | 21,461         | 8,456          | 49,672         | 1,369         |     |
| May           | .74                 | .05         | 18                              | 62.9       | 117      | 1.17        | 5.75                               | 15,403         | 14,518         | 148,018        | 1,062         |     |
| June          | .12                 | .02         | 1                               | 3.79       | 127      | .50         | 1.26                               | 3,273          | 14,308         | 133,586        | 670           |     |
| July          | 1.35                | .03         | 23                              | 179        | 15       | 0           | .61                                | 10.9           | 29,277         | 17,134         | 167,937       | 604 |
| Aug.          | .32                 | .19         | 1                               | 15.9       | 16       | 7.49        | 9.81                               | 26,263         | 14,397         | 112,553        | 910           |     |
| Sept.         | 1.05                | .18         | 23                              | 117        | 6        | 0           | 6.19                               | 15,981         | 20,963         | 116,770        | 1,459         |     |
| Oct.          | .43                 | .28         | 1                               | 25.5       | 30       | 0           | 13.2                               | 45,153         | 23,580         | 88,601         | 2,094         |     |
| Nov.          | .29                 | .25         | 8                               | 13.7       | 28       | 10.8        | 12.1                               | 31,380         | 16,886         | 79,017         | 990           |     |
| Dec.          | .25                 | .20         | 1!                              | 10.8       | 125      | 7.77        | 8.92                               | 23,886         | 12,099         | 55,901         | 1,394         |     |
| <b>Yearly</b> | <b>2.93</b>         | <b>0.02</b> | <b>=</b>                        | <b>702</b> | <b>=</b> | <b>0.50</b> | <b>7.97</b>                        | <b>251,489</b> | <b>167,791</b> | <b>557,474</b> | <b>21,500</b> |     |

\* Discharge measurement made on this day

† Mean daily

‡ And other days

\*\* Period 1933-1990

## 08-4557.00 RIO GRANDE NEAR JIMENEZ, COAHUILA AND QUEMADO, TEXAS

**DESCRIPTION:** Cableway, control weir of .36 m<sup>3</sup>/sec capacity, gravity well, and water-stage recorder located on the right bank at latitude 29° 03' 00", longitude 100° 39' 50", and river kilometre 853; 2.4 kilometres south-southeast of Jimenez, Coahuila, 3.0 river kilometres downstream from Rio San Diego, about 12.1 kilometres north-northwest of Quemado, Maverick County, Texas, 19.8 river kilometres downstream from the Maverick County Water Control and Improvement District No. 1 diversion dam, and 49.4 river kilometres downstream from the international highway bridge between Del Rio, Texas and Cd. Acuna, Coahuila. The zero of the gage is 234.39 metres above mean sea level, U.S. C. & G. S. datum.

**RECORDS:** Based on 32 discharge measurements during the year, 23 by the Mexican Section and 9 by the United States Section of the Commission, and a continuous record of gage heights. Computations by shifting control methods prior to completion of the weir and for flows exceeding the capacity of the weir thereafter. Computations for flows within the capacity of the weir were based on a stable control weir rating curve defined by meter measurements. Records available: 1965 through 1990. Records, excluding some high flow periods, are also available from 1956 through May 1965 for a station 14.0 river kilometres upstream. Records prior to 1976 were published under title "Rio Grande below Maverick Dam near Quemado, Texas." **REMARKS:** This station was placed in operation January 1, 1965 and replaces the station "Rio Grande below Maverick Dam near Del Rio, Texas," which stopped operating June 1, 1965. Irrigation diversions 21.5 river kilometres upstream largely control the flow at this station. The weir was placed in operation June 1, 1967, at which time the zero of the gage was set 1.00 metre higher.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 2,260 m<sup>3</sup>/sec on July 18, 1975 with a gage height of 7.68 metres. Min. 0.08 m<sup>3</sup>/sec several days in April 1963 with a gage height of 0.06 metres.

## Average Flow in Cubic Metres per Second

|          |      |       |               |      |      |                       |
|----------|------|-------|---------------|------|------|-----------------------|
| Daily:   | Max. | 1,900 | July 18, 1975 | Min. | 0.08 | April 25 and 26, 1983 |
| Monthly: | Max. | 602   | Sept. 1974    | Min. | 0.80 | June 1969             |
| Yearly:  | Max. | 124   | 1974          | Min. | 8.11 | 1968                  |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.    | Feb.    | Mar.    | April   | May     | June    | July    | Aug.   | Sept.   | Oct.    | Nov.    | Dec.    |      |
|------------|---------|---------|---------|---------|---------|---------|---------|--------|---------|---------|---------|---------|------|
| 1          | 43.2    | 188     | 51.3    | 53.6    | 219     | 65.8    | 27.4    | 24.4   | 15.2    | 281     | 101     | 43.2    |      |
| 2          | 53.3    | 180     | 49.5    | 56.4    | 181     | 58.8    | 28.5    | 23.9   | 17.0    | 276     | 100     | 42.5    |      |
| 3          | 58.8    | 176     | 49.4    | 82.0    | 250     | 59.4    | 29.2    | 22.0   | 18.2    | 347     | 100     | 42.3    |      |
| 4          | 54.8    | 174     | 48.7    | 92.7    | 240     | 59.9    | 30.3    | 20.2   | 18.8    | 341     | 99.4    | 42.9    |      |
| 5          | 53.8    | 184     | 49.3    | 92.5    | 217     | 54.4    | 16.4    | 18.8   | 20.6    | 336     | 99.6    | 26.5    |      |
| 6          | 56.6    | 178 *   | 48.0    | 92.6    | 216     | 54.0    | 16.0    | 18.8   | 19.2    | 337 *   | 100     | 43.0    |      |
| 7          | 55.9    | 184     | 49.1    | 91.7    | 216     | 52.3    | 15.4    | 18.0   | 17.9    | 340 *   | 101     | 42.8    |      |
| 8          | 56.0    | 217     | 47.9    | 92.1    | 223     | 53.3    | 16.1    | 17.7   | 17.6    | 350 *   | 104     | 42.6    |      |
| 9          | 49.2    | 202     | 48.2    | * 92.6  | 223     | 53.8    | * 15.3  | 17.8   | 17.4    | 373     | 102     | 41.9    |      |
| 10         | 41.6    | 194     | 47.5    | 92.0    | 149     | 53.7    | 14.9    | 17.2   | * 19.9  | 361     | 100     | * 42.8  |      |
| 11         | 41.9    | 215     | 26.9    | 92.4    | 91.6    | * 53.0  | 13.2    | 18.0   | 24.2    | 359     | * 63.8  | 43.6    |      |
| 12         | 41.8    | 186     | * 18.4  | 93.4    | 90.5    | 54.6    | 13.9    | 17.2   | 20.2    | 360     | * 47.8  | 43.8    |      |
| 13         | 43.6    | 151     | 16.5    | 93.7    | 90.0    | 54.6    | 13.6    | * 16.3 | 18.7    | 356     | 47.4    | 44.2    |      |
| 14         | 43.4    | 96.1    | 15.6    | 93.9    | 91.1    | 53.1    | 14.4    | 95.0   | 20.6    | 360     | 45.6    | 45.2    |      |
| 15         | * 42.2  | 91.1    | 15.6    | 93.0    | 93.5    | 36.2    | 14.6    | 104    | 22.1    | 358     | 47.6    | 44.2    |      |
| 16         | 41.8    | 89.7    | 14.0    | 93.8    | 93.7    | 28.0    | 16.9    | 47.8   | 54.3    | 358     | 47.6    | 44.7    |      |
| 17         | 43.3    | 56.0    | 13.8    | 93.5    | 93.8    | 29.3    | 12.3    | 42.0   | 68.6    | 356     | 45.7    | 44.4    |      |
| 18         | 44.4    | 41.2    | 13.8    | 96.0    | 108     | 28.6    | 11.2    | 42.2   | 49.1    | 355     | 45.6    | 44.8    |      |
| 19         | 44.7    | 40.4    | 14.0    | 104     | 112     | 27.8    | 35.8    | 41.1   | 47.6    | 355     | 45.6    | 42.7    |      |
| 20         | 44.2    | * 44.3  | * 13.2  | 99.1    | 104     | 28.4    | 104     | * 40.7 | 74.6    | 354     | 44.8    | 43.0    |      |
| 21         | 43.6    | 55.0    | 14.8    | 114     | 102     | 28.7    | 43.0    | 55.2   | 353     | 45.2    | 43.2    | 43.2    |      |
| 22         | * 42.8  | 48.3    | 52.5    | 162     | 113     | 29.4    | 27.1    | 63.8   | 84.2    | 355 *   | 43.7    | 43.8    |      |
| 23         | 98.1    | 45.8    | 50.3    | 145 *   | 103     | 30.4    | 256 *   | 18.5   | 242     | 354     | 44.1    | 43.6    |      |
| 24         | * 97.4  | 45.4    | 52.9    | 145     | * 99.4  | 28.4    | 188 *   | 16.5   | 190 *   | 354     | 43.4    | * 43.0  |      |
| 25         | 96.4    | 46.0    | 52.3    | 164     | 97.8    | * 27.2  | 40.9    | 16.0   | 296     | 352     | 44.4    | 41.4    |      |
| 26         | 95.8    | * 46.7  | * 53.0  | 1,280   | 98.5    | 28.9    | 29.2    | * 16.7 | 300     | 226     | * 43.6  | 42.4    |      |
| 27         | 97.2    | 47.9    | 52.8    | 454     | 98.5    | 28.2    | 24.3    | * 17.2 | 292     | 100     | * 44.1  | 42.4    |      |
| 28         | 98.3    | 50.2    | 53.0    | 254     | * 97.8  | 28.1    | 24.3    | 22.6   | 294     | 98.8    | 43.3    | 43.2    |      |
| 29         | 97.6    |         |         | 263     | 95.9    | 28.4    | 20.7    | 20.2   | 296     | 98.6    | 43.2    | 43.6    |      |
| 30         | 98.2    |         |         | 102     | 253     | 97.8    | 28.2    | 19.9   | 20.2    | 296     | 101     | * 43.5  | 44.1 |
| 31         | 100     |         |         | 56.6    | 92.8    |         |         | 20.0   | 13.7    | 100     |         |         | 43.0 |
| <b>Sum</b> |         | 3,273.1 |         | 5,025.0 |         | 1,244.9 |         | 983.7  |         | 9,405.4 |         | 1,324.8 |      |
|            | 1,919.9 |         | 1,243.9 |         | 4,198.7 |         | 1,152.8 |        | 2,927.2 |         | 1,927.0 |         |      |

## Current Year 1990

## Period 1968-1990

| Month         | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |       |     | Average | Volume—Thousands of Cubic Metres |           |           |           |
|---------------|---------------------|------|---------------------------------|-------|-----|---------|----------------------------------|-----------|-----------|-----------|
|               | High                | Low  | Day                             | High  | Day |         | Total                            | Average   | Maximum   | Minimum   |
| Jan.          | 0.96                | 0.16 | 31                              | 139   | 111 | 5.94    | 61.9                             | 165,879   | 64,896    | 216,587   |
| Feb.          | 1.30                | .15  | 5                               | 229   | 119 | 5.32    | 117                              | 282,796   | 104,383   | 495,044   |
| Mar.          | 1.13                | .12  | 30                              | 188   | 115 | 3.13    | 40.1                             | 107,473   | 110,124   | 361,072   |
| Apr.          | 5.98                | .21  | 26                              | 1,670 | 1   | 8.85    | 168                              | 434,160   | 113,799   | 434,160   |
| May           | 1.41                | .44  | 1                               | 256   | 2   | 29.2    | 135                              | 362,768   | 190,695   | 608,339   |
| June          | .81                 | .22  | 1 2                             | 99.4  | 126 | 9.53    | 41.5                             | 107,559   | 130,445   | 359,889   |
| July          | 3.12                | .09  | 23                              | 720   | 18  | 1.73    | 37.2                             | 99,602    | 122,194   | 384,576   |
| Aug.          | .84                 | .22  | 114                             | 107   | 31  | 9.19    | 31.7                             | 84,992    | 146,492   | 876,843   |
| Sept.         | 1.62                | .20  | 23                              | 309   | 1 9 | 8.20    | 97.6                             | 252,910   | 195,125   | 1,559,252 |
| Oct.          | 1.93                | .80  | 9                               | 388   | 128 | 9.74    | 303                              | 812,627   | 184,875   | 1,025,389 |
| Nov.          | .84                 | .29  | 1 8                             | 106   | 124 | 14.4    | 64.2                             | 166,493   | 90,252    | 615,683   |
| Dec.          | .77                 | .24  | 114                             | 89.0  | 25  | 10.9    | 42.7                             | 114,463   | 60,929    | 223,394   |
| <b>Yearly</b> | 5.98                | 0.09 | ==                              | 1,670 | ==  | 1.73    | 94.9                             | 2,991,722 | 1,514,209 | 3,909,891 |
|               |                     |      |                                 |       |     |         |                                  |           |           | 256,561   |

\* Discharge measurement made on this day      ! And other days

## J3-4571.00 RIO SAN RODRIGO AT EL MURAL, COAHUILA

**DESCRIPTION:** Bubbler gage and water-stage recorder located on the left bank of El Moral, Coahuila, latitude  $28^{\circ}53'20''$ , longitude  $100^{\circ}37'55''$ , 1.6 river kilometres from the confluence with the Rio Grande, and about 25 kilometres northwest of Piedras Negras, Coahuila. This stream enters the Rio Grande at river Kilometre 834, 39.3 river kilometres downstream from the Maverick County Water Control and Improvement District No. 1 diversion dam and 35.2 river kilometres upstream from the international highway bridge between Eagle Pass, Texas and Piedras Negras, Coahuila. The zero of the gage is 228.89 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 18 discharge measurements during the year, 17 by the Mexican Section and 1 by the United States Section of the Commission, and a continuous record of gage heights. Computations by shifting control methods. Records available: 1962 through 1990.

**REMARKS:** Prior to 1976 this station was published under the heading "Rio San Rodrigo near Mouth at El Moral, Coahuila." The flow of this spring-fed stream is modified by diversions above this station. The concrete control weir, placed in operation on November 25, 1969, was destroyed by the Flood of July 12, 1976, and the station was relocated on October 15, 1976.

**EXTREME FLOWS FROM RECORDS\*\*\*:** Momentary: Max. 3,970 m<sup>3</sup>/sec on July 18, 1975 with a gage height of 5.62 metres. Min. frequently no flow.

## Average Flow in Cubic Metres per Second

| Daily   | Max. | 1,260 | July 18, 1975 | Min. | 0    | Frequently |
|---------|------|-------|---------------|------|------|------------|
| Monthly | Max. | 209   | July 1976     | Min. | 0    | Frequently |
| Yearly  | Max. | 23.7  | 1976          | Min. | 0.15 | 1963       |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day | Jan. | Feb. | Mar.  | April | May   | June  | July   | Aug.  | Sept.  | Oct.   | Nov.   | Dec.   |
|-----|------|------|-------|-------|-------|-------|--------|-------|--------|--------|--------|--------|
| 1   | 0    | 0    | .04   | 0     | 2.86  | .36   | 0.27   | 17.9  | 0.13   | 54.6   | 12.7   | 11.0   |
| 2   | 0    | 0    | .12   | 0     | 2.51  | .36   | .26    | 27.1  | .13    | 50.0   | 13.1   | 11.0   |
| 3   | 0    | 0    | .10   | 0     | 2.12  | .36   | .23    | 13.1  | .74    | 48.1   | 13.1   | 10.7   |
| 4   | 0    | 0    | .04   | 0     | 1.78  | .47   | .24    | 8.79  | 1.79   | 46.4   | 13.4   | 10.5   |
| 5   | 0    | 0    | .01   | 0     | 1.48  | .54   | .23    | 6.02  | 1.95   | 44.8   | 13.4   | 10.3   |
| 6   | 0    | 0    | 0     | 0     | 1.18  | .54   | .23    | 3.85  | 1.30   | 43.1   | 13.4   | 10.2   |
| 7   | 0    | 0    | 0     | 0     | .94   | .54   | .19    | 2.56  | 1.63   | 41.7   | 13.4   | 10.2   |
| 8   | 0    | 0    | 0     | 0     | .77   | .47   | .19    | 1.65  | 1.78   | 40.1   | 13.4   | 10.2   |
| 9   | 0    | 0    | 0     | 0     | .70   | .47   | * .19  | 1.02  | 1.75   | 38.6   | 13.4   | 10.2   |
| 10  | 0    | 0    | 0     | 0     | .61   | .47   | * .19  | .50   | * 1.66 | 37.2   | 13.4   | * 10.2 |
| 11  | 0    | 0    | * .02 | 0     | .61   | * .47 | .17    | .24   | 2.33   | 35.8   | 13.4   | 10.2   |
| 12  | 0    | 0    | .09   | 0     | .61   | .47   | .15    | .11   | 2.38   | 34.4   | * 13.4 | 10.2   |
| 13  | 0    | 0    | .02   | 0     | .61   | .47   | .13    | * .06 | 2.34   | 33.0   | 13.1   | 10.1   |
| 14  | 0    | 0    | 0     | 0     | .61   | .46   | .13    | .04   | 2.33   | 31.6   | 12.8   | 9.95   |
| 15  | 0    | 0    | 0     | * .01 | * .61 | .44   | .13    | .06   | 3.00   | 30.3   | 12.8   | 9.95   |
| 16  | 0    | 0    | 0     | .03   | .61   | .39   | .13    | .06   | 5.26   | 29.0   | 12.6   | 9.95   |
| 17  | 0    | 0    | 0     | .03   | .61   | .36   | .13    | .06   | 4.31   | 27.8   | 12.6   | 9.95   |
| 18  | 0    | 0    | 0     | 0     | .95   | .36   | 1.40   | .06   | 3.69   | 26.6   | 12.4   | 9.72   |
| 19  | 0    | 0    | 0     | 0     | .98   | .40   | * 69.4 | .06   | 3.27   | 25.2   | 12.3   | 9.40   |
| 20  | 0    | 0    | 0     | 0     | .73   | .46   | 110 *  | .06   | 15.4   | 24.0   | 12.3   | 9.29   |
| 21  | 0    | 10.6 | 0     | 0     | .63   | .42   | 42.6   | .73   | 5.48   | 22.6   | 12.0   | 9.29   |
| 22  | 0    | .89  | 0     | .02   | 13.7  | .42   | 20.2   | 1.85  | 3.94   | 21.4   | 12.0   | 9.03   |
| 23  | 0    | .30  | 0     | .04   | 2.56  | .37   | 70.6   | 1.80  | 51.5   | 20.2   | 11.9   | * 8.84 |
| 24  | 0    | .15  | 0     | .05   | 1.05  | .32   | 91.2   | 1.02  | 112 *  | 19.0   | 11.8   | * 8.84 |
| 25  | 0    | .09  | 0     | 1.03  | .69   | * .32 | 16.6   | .70   | 97.8   | 17.7   | 11.8   | * 8.84 |
| 26  | 0    | .02  | 0     | 481   | .56   | .31   | 11.1   | * .43 | 86.0   | 16.6   | * 11.7 | * 8.84 |
| 27  | 0    | 0    | 0     | 43.8  | .45   | .33   | 7.10   | * .24 | 73.4   | 15.4   | 11.6   | * 8.84 |
| 28  | 0    | 0    | 0     | 6.62  | .42   | .32   | 4.67   | .16   | 68.6   | 15.1   | 11.4   | * 8.84 |
| 29  | 0    | 0    | 0     | 4.19  | * .42 | .31   | 3.38   | .12   | 63.4   | 14.6   | 11.3   | * 8.84 |
| 30  | 0    | 0    | .01   | 3.26  | .42   | .28   | 2.40   | .10   | 61.2   | * 14.4 | 11.0   | 8.84   |
| 31  | 0    | 0    | 0     | .39   | .39   | .18   | 1.88   | .10   | 12.0   | 12.0   | 8.60   |        |

|     |       |        |        |        |       |        |
|-----|-------|--------|--------|--------|-------|--------|
| Sum | 12.05 | 540.08 | 12.26  | 90.35  | 931.3 | 300.85 |
| 0   | 0.45  | 43.17  | 455.72 | 680.49 | 376.7 |        |

## Current Year 1990

## Period 1962-1990

| Month  | Extreme Gage Metres |     | Extreme-Cubic Metres per Second |      |     | Average | Volume—Thousands of Cubic Metres |         |         |         |
|--------|---------------------|-----|---------------------------------|------|-----|---------|----------------------------------|---------|---------|---------|
|        | High                | Low | Day                             | High | Day |         | Total                            | Average | Maximum | Minimum |
| Jan.   | 0                   | 0   | ! 1                             | 0    | ! 1 | 0       | 0                                | 4,781   | 16,382  | 0       |
| Feb.   | 1.02                | 0   | 21                              | 30.2 | ! 1 | 0       | 1,041                            | 3,537   | 12,251  | 0       |
| Mar.   | .31                 | 0   | ! 1                             | .12  | ! 1 | 0       | .01                              | 38.9    | 2,785   | 9,653   |
| Apr.   | 5.78                | 0   | 26                              | 779  | ! 1 | 0       | 18.0                             | 46,663  | 6,104   | 100     |
| May    | 1.30                | .34 | 22                              | 49.6 | 31  | .32     | 1.39                             | 3,730   | 5,093   | 36,113  |
| June   | .37                 | .34 | ! 5                             | .54  | 126 | .27     | .41                              | 1,059   | 7,610   | 127,224 |
| July   | 2.84                | .32 | 19                              | 220  | 112 | .13     | 14.7                             | 39,374  | 37,438  | 560,793 |
| Aug.   | 1.23                | .29 | 1                               | 44.8 | 14  | .04     | 2.91                             | 7,806   | 13,694  | 109,801 |
| Sept.  | 2.12                | .32 | 24                              | 128  | ! 1 | .13     | 22.7                             | 58,794  | 20,761  | 65,176  |
| Oct.   | 1.43                | .70 | 1                               | 60.2 | 31  | 11.6    | 30.0                             | 80,464  | 18,874  | 80,464  |
| Nov.   | .74                 | .69 | ! 4                             | 13.4 | 30  | 11.0    | 12.6                             | 32,547  | 12,220  | 103,631 |
| Dec.   | .69                 | .64 | ! 1                             | 11.0 | 31  | 8.60    | 9.70                             | 25,993  | 7,471   | 25,993  |
| Yearly | 5.78                | 0   | =                               | 779  | =   | 0       | 9,43                             | 297,510 | 140,288 | 748,138 |
|        |                     |     |                                 |      |     |         |                                  |         |         | 4,750   |

## 08-4575.00 RETURN FLOW TO THE RIO GRANDE FROM THE MAVERICK CANAL

## AT MAVERICK POWER PLANT NEAR EAGLE PASS, TEXAS

**DESCRIPTION:** A part of the water diverted from the river into the Maverick Canal is returned to the Rio Grande through the hydroelectric power plant located on the left bank of the Rio Grande at latitude 28° 43' 50", longitude 100° 33' 10", about 14.5 Kilometres north-northwest of Eagle Pass, Texas, and about 51.8 canal kilometres downstream from the point of diversion. The return enters the Rio Grande at river kilometre 816.

**RECORDS:** Based on records furnished by the Maverick County Water Control and Improvement District No. 1, showing hourly discharge in cubic feet per second based on hourly manometer readings, through each turbine at the Central Power and Light Company hydroelectric power plant. The mean daily discharges computed from the manometer readings have been multiplied by a factor to make them agree with periodic current meter measurements of flows made under stable flow conditions by hydrographers of the Commission. There were 28 discharge measurements made during the year. Records available: 1949 through 1990.

**REMARKS:** This power plant began operating April 16, 1932 with hydroelectric power generating facilities for 12,000 kw. Because the September 1932 flood washed out the upper end of the Maverick Canal, this plant did not operate from September 2, 1932 until March 17, 1937. Since then it has operated continuously except for 44 days in 1953 when shortage of water prevented operation, and from June 30 through July 19 during flood of 1954, and while the canal was being repaired. The plant's operation is now governed by the amount of water released from Amistad Reservoir, which began operations on May 31, 1968.

## Average Flow in Cubic Metres per Second\*\*

|          |           |                   |           |               |
|----------|-----------|-------------------|-----------|---------------|
| Daily:   | Max. 44.7 | February 28, 1982 | Min. 0    | Occasionally  |
| Monthly: | Max. 44.4 | April 1990        | Min. 1.20 | December 1971 |
| Yearly:  | Max. 36.7 | 1990              | Min. 6.57 | 1972          |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.   | Feb.    | Mar.   | April   | May    | June    | July   | Aug.    | Sept.  | Oct.    | Nov.   | Dec.    |
|------------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 1          | 29.7   | 30.9    | 40.2   | 43.0    | 47.3   | 38.8    | 26.4   | 37.9    | 34.6   | 43.6    | * 39.4 | 39.9    |
| 2          | 29.2   | 36.5    | 41.3   | * 43.3  | 46.4   | 37.1    | 27.6   | 37.4    | 35.1   | 42.8    | 39.9   | 39.9    |
| 3          | * 28.9 | 41.1    | 41.3   | 44.2    | 47.6   | 36.8    | * 26.5 | 36.5    | 34.0   | 42.2    | 39.9   | * 40.5  |
| 4          | 29.7   | 42.2    | 41.1   | 45.0    | * 47.3 | 34.8    | 25.6   | 36.2    | * 34.6 | 40.8    | 40.5   | 40.5    |
| 5          | 29.7   | 43.0    | * 40.5 | 44.5    | * 47.0 | * 32.6  | 26.5   | 36.0    | 36.0   | 40.5    | 40.5   | 36.2    |
| 6          | 29.7   | * 41.6  | 39.6   | 43.6    | 46.2   | 32.9    | 23.2   | * 35.4  | 34.3   | 38.5    | 40.2   | 39.6    |
| 7          | 30.0   | 41.3    | 39.9   | 43.9    | 46.2   | 33.4    | 22.7   | 35.1    | 33.1   | 31.2    | 41.1   | 39.4    |
| 8          | 30.0   | 41.3    | 40.5   | 45.0    | 45.6   | 34.3    | 23.0   | 35.4    | 33.1   | 28.6    | 43.3   | 40.8    |
| 9          | 30.0   | 39.9    | 40.5   | 44.5    | 43.9   | 34.8    | 22.3   | 34.8    | 33.1   | 28.0    | 43.6   | 41.6    |
| 10         | * 29.5 | 39.9    | 40.2   | 43.6    | 43.3   | 35.7    | 22.4   | 35.1    | 36.0   | 27.7    | 43.0   | 40.2    |
| 11         | 28.6   | 41.6    | 35.7   | 43.3    | 41.6   | 35.4    | 22.5   | 34.3    | 34.0   | 27.8    | 43.0   | 39.9    |
| 12         | 29.7   | * 41.1  | * 36.2 | 42.8    | 41.3   | 33.7    | 24.0   | 34.0    | 35.4   | 29.7    | 42.2   | 38.5    |
| 13         | 29.5   | 40.5    | 33.7   | 43.6    | 41.1   | 32.6    | 23.4   | 34.0    | 34.3   | 30.8    | 41.1   | 37.7    |
| 14         | 30.0   | 41.3    | 33.1   | 45.6    | 40.5   | 31.4    | 24.1   | * 34.8  | 33.1   | 30.9    | 41.1   | 37.1    |
| 15         | 29.7   | 41.3    | 32.3   | 45.6    | 39.6   | 28.9    | 25.9   | 37.9    | 33.1   | 30.3    | 40.2   | 38.8    |
| 16         | * 29.2 | 40.5    | 32.9   | 43.9    | * 39.1 | 28.2    | * 25.3 | 38.2    | 34.8   | * 31.4  | 40.8   | 39.6    |
| 17         | 28.9   | 39.9    | 33.1   | 44.2    | 37.9   | 30.0    | 27.8   | 38.5    | 39.4   | 30.3    | 40.5   | 38.8    |
| 18         | 27.8   | 39.9    | 33.1   | 40.8    | 39.9   | 28.9    | 28.6   | 39.1    | * 39.4 | 29.7    | 40.8   | * 37.9  |
| 19         | 27.9   | 40.2    | 32.0   | * 42.8  | 40.5   | 28.3    | 31.7   | 39.4    | * 39.4 | 30.0    | 40.5   | 38.5    |
| 20         | 27.8   | 40.5    | * 30.6 | 46.2    | 40.8   | 27.1    | 36.0   | 39.6    | 41.1   | 31.7    | * 40.5 | 39.4    |
| 21         | * 28.9 | * 42.5  | 30.9   | 43.6    | 40.5   | * 26.5  | 37.4   | 38.2    | 42.8   | 30.6    | 40.8   | 39.6    |
| 22         | * 27.3 | 41.1    | 37.7   | 43.9    | 43.3   | 25.7    | 36.8   | 37.1    | 41.6   | 28.9    | 41.9   | 38.8    |
| 23         | * 27.4 | 41.3    | 38.5   | 44.2    | 43.3   | 26.2    | 35.7   | 35.4    | 43.0   | 28.3    | 41.3   | 39.4    |
| 24         | 28.9   | 42.2    | 38.2   | 43.0    | 41.9   | 28.9    | 30.3   | 34.8    | 43.6   | 28.3    | 41.3   | 41.1    |
| 25         | 28.3   | 42.2    | 38.8   | 43.0    | 42.8   | 28.6    | 38.8   | 34.3    | 43.6   | 28.2    | 42.5   | 41.6    |
| 26         | 29.5   | * 41.1  | 39.4   | 43.6    | 41.9   | 25.3    | 38.5   | 34.8    | 43.6   | 28.3    | 42.5   | 40.8    |
| 27         | 29.5   | 40.8    | 39.9   | 47.9    | 41.1   | 24.0    | 37.4   | 34.0    | 43.3   | 36.0    | 41.3   | 39.4    |
| 28         | 30.6   | 39.6    | 41.1   | 48.1    | 40.5   | 24.0    | 36.0   | 31.7    | 43.6   | 43.3    | 40.5   | 38.2    |
| 29         | 29.5   | 40.2    | 48.1   | 39.9    | 23.8   | 36.2    | 27.5   | 43.6    | 41.3   | 40.2    | 36.8   |         |
| 30         | 29.2   | 41.6    | 47.9   | 39.1    | 24.0   | 36.5    | 26.4   | 43.6    | 40.2   | 39.9    | 38.2   |         |
| 31         | 29.2   | 42.5    | 38.2   | 42.5    | 38.2   | 36.5    | 27.2   | 39.4    | 39.4   | 39.4    | 39.9   |         |
| <b>Sum</b> |        | 1,135.3 |        | 1,332.7 |        | 912.7   |        | 1,091.0 |        | 1,039.1 |        | 1,218.6 |
|            |        | 903.8   |        | 1,166.6 |        | 1,315.6 |        | 915.6   |        | 1,140.2 |        | 1,234.3 |

## Current Year 1990

## Period 1968-1990

| Month         | Extreme Gage Metres |     |     | Extreme-Cubic Metres per Second |      |      | Average | Volume - Thousands of Cubic Metres |         |           |         |
|---------------|---------------------|-----|-----|---------------------------------|------|------|---------|------------------------------------|---------|-----------|---------|
|               | High                | Low | Doy | High                            | Day  | Low  |         | Total                              | Average | Maximum   | Minimum |
| Jan.          |                     |     |     | 28                              | 30.6 | 22   | 27.3    | 29.2                               | 78,088  | 70,562    | 116,090 |
| Feb.          |                     |     |     | 5                               | 43.0 | 1    | 30.9    | 40.5                               | 98,090  | 67,917    | 98,205  |
| Mar.          |                     |     |     | 31                              | 42.5 | 20   | 30.6    | 37.6                               | 100,794 | 68,630    | 105,961 |
| Apr.          |                     |     |     | 128                             | 48.1 | 18   | 40.8    | 44.4                               | 115,145 | 67,442    | 115,145 |
| May           |                     |     |     | 3                               | 47.6 | 17   | 37.9    | 42.4                               | 113,668 | 76,721    | 113,668 |
| June          |                     |     |     | 1                               | 38.8 | 29   | 23.8    | 30.4                               | 78,857  | 68,707    | 102,070 |
| July          |                     |     |     | 25                              | 38.8 | 9    | 22.3    | 29.5                               | 79,108  | 67,344    | 96,639  |
| Aug.          |                     |     |     | 20                              | 39.6 | 30   | 26.4    | 35.2                               | 94,262  | 70,007    | 96,174  |
| Sept.         |                     |     |     | 124                             | 43.6 | 17   | 33.1    | 38.0                               | 98,513  | 75,155    | 98,817  |
| Oct.          |                     |     |     | 1                               | 43.6 | 10   | 27.7    | 33.5                               | 89,778  | 76,787    | 105,521 |
| Nov.          |                     |     |     | 9                               | 43.6 | 1    | 39.4    | 41.1                               | 106,644 | 67,096    | 106,644 |
| Dec.          |                     |     |     | 19                              | 41.6 | 5    | 36.2    | 39.3                               | 105,287 | 67,371    | 112,566 |
| <b>Yearly</b> |                     |     |     | 48.1                            | —    | 22.3 | 36.7    | 1,158,234                          | 843,839 | 1,158,234 | 207,661 |

\* Discharge measurement made on this day

o Mean daily

! And other days

\*\* Period 1968-1990

## 08-4576.00 MAVERICK CANAL EXTENSION BELOW THE POWER PLANT

## NEAR EAGLE PASS, TEXAS

**DESCRIPTION:** Gage well and digital water-stage recorder located on the downstream side of a wooden pile bridge at latitude 28°49'50", longitude 100°32'40", about 1.6 kilometres downstream from the heading of this canal extension, about 14.5 kilometres north-northwest of Eagle Pass, Texas, and about 52.8 canal kilometres downstream from the point of diversion from the Rio Grande, which is located at river kilometre 874.9. The elevation of the zero of the gage has not been determined.

**RECORDS:** Based on 14 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: 1939 through 1990.

**REMARKS:** The main Maverick Canal divided into two branches at a point about 14.5 kilometres north-northwest of Eagle Pass, Texas, and about 51.2 canal kilometres downstream from the point at which water from the Rio Grande is diverted. One branch leads to the Maverick Power Plant and back to the Rio Grande, while the other branch forms this Maverick Canal Extension, which is used to transmit irrigation water. Irrigation from this canal extension began in June 1938. In 1990, 10,226 hectares of land north and south of Eagle Pass were irrigated. A total of 22,328 thousand cubic metres of water from this canal extension returned to the river through the irrigation system which extends approximately 108 canal kilometres downstream.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 16.4 m<sup>3</sup>/sec on July 25, 1964. Min. occasionally no flow.

Average Flow in Cubic Metres per Second\*\*

|          |      |      |                  |      |      |              |
|----------|------|------|------------------|------|------|--------------|
| Daily:   | Max. | 15.6 | June 6 & 7, 1968 | Min. | 0    | Occasionally |
| Monthly: | Max. | 14.9 | June 1968        | Min. | 0.51 | January 1985 |
| Yearly:  | Max. | 8.33 | 1972             | Min. | 1.65 | 1986         |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Doy | Jan.   | Feb.   | Mar.  | April  | May   | June   | July   | Aug.  | Sept.  | Oct.  | Nov. | Dec.   |
|-----|--------|--------|-------|--------|-------|--------|--------|-------|--------|-------|------|--------|
| 1   | 2.19   | 1.72   | 0.15  | 1.45   | 0.19  | 3.82   | 6.37   | 0.47  | 3.62   | 0.45  | 3.00 | 1.60   |
| 2   | 2.23   | 1.72   | .15   | * 1.33 | .21   | 4.13   | 6.26   | * .41 | 3.62   | * .89 | 3.00 | 1.87   |
| 3   | * 2.10 | 1.70   | .16   | 1.20   | .21   | 4.84   | * 6.32 | .40   | 3.14   | 1.66  | 3.00 | * 1.95 |
| 4   | 1.69   | 1.69   | .16   | 1.19   | * .20 | * 4.22 | 6.29   | * .39 | * 2.57 | 2.14  | 2.97 | 1.67   |
| 5   | 1.65   | 1.67   | * .16 | 1.22   | .81   | 3.91   | 6.32   | .39   | 2.04   | 2.49  | 3.00 | 1.65   |
| 6   | 1.69   | * 1.82 | .25   | 1.39   | 1.26  | 3.94   | 6.43   | * .39 | 2.01   | 2.53  | 3.00 | 1.63   |
| 7   | 1.76   | 2.31   | .35   | 1.31   | 1.30  | 3.57   | 6.43   | * .40 | 1.99   | 2.79  | 3.68 | 1.61   |
| 8   | 1.77   | 2.29   | .48   | 1.11   | 1.57  | 3.60   | 6.32   | * .41 | 1.98   | 3.00  | 1.34 | 1.61   |
| 9   | 1.80   | 2.27   | .62   | 1.09   | 2.00  | 3.62   | 6.12   | * .42 | 1.96   | 2.86  | .82  | 1.61   |
| 10  | 1.89   | 2.25   | .78   | 1.18   | 2.08  | 3.65   | 6.09   | * .44 | 1.46   | 2.86  | .81  | 1.86   |
| 11  | 2.06   | 2.24   | .94   | 1.34   | 2.73  | 3.65   | 6.15   | .98   | 1.35   | 2.29  | .80  | 2.12   |
| 12  | 2.06   | 2.24   | 1.08  | 1.33   | 3.46  | 4.02   | 6.23   | 1.67  | 1.34   | 2.06  | .80  | 2.10   |
| 13  | 2.56   | 2.22   | 1.02  | 1.35   | 3.51  | 4.13   | 6.17   | 2.16  | 1.95   | 2.08  | 1.03 | 2.10   |
| 14  | 1.93   | 2.33   | .84   | 1.43   | 3.57  | 4.30   | 6.20   | 2.78  | 2.51   | 2.10  | 1.27 | 2.08   |
| 15  | 1.96   | 2.51   | .66   | 1.51   | 3.62  | 4.28   | 6.23   | 3.06  | 2.50   | 2.12  | 1.26 | 2.07   |
| 16  | * 2.48 | 2.50   | .63   | 1.51   | 3.60  | 4.30   | 5.86   | 3.00  | 2.29   | 2.16  | 1.26 | 1.97   |
| 17  | 2.86   | 2.50   | .62   | 1.52   | 3.62  | 4.45   | 5.66   | 2.83  | 1.62   | 2.01  | 1.26 | 1.66   |
| 18  | 2.81   | 2.47   | .62   | 1.52   | 3.54  | 4.79   | 5.69   | 2.60  | 1.43   | 1.53  | 1.26 | 1.64   |
| 19  | 2.77   | 2.28   | .69   | 1.35   | 3.46  | 5.32   | 5.07   | 2.56  | 1.46   | 1.48  | 1.06 | 1.65   |
| 20  | 2.92   | 1.86   | 1.28  | 1.06   | 3.51  | 6.09   | 2.55   | .62   | 1.51   | .93   | 1.63 |        |
| 21  | 3.06   | 1.56   | 1.52  | .76    | 3.51  | 6.49   | .54    | 2.66  | .16    | 1.52  | .93  | 1.62   |
| 22  | 2.83   | * 1.08 | 1.52  | .22    | 2.63  | 6.43   | .48    | 2.71  | .18    | 1.56  | .92  | 1.29   |
| 23  | 2.25   | .52    | 1.53  | .44    | 1.93  | 6.32   | .48    | 2.60  | .20    | 1.61  | .93  | .89    |
| 24  | 1.83   | .14    | 1.51  | .71    | 2.01  | 6.37   | .45    | 2.20  | .23    | 1.64  | .93  | .89    |
| 25  | 1.80   | .15    | 1.50  | 1.28   | 2.09  | 6.40   | .45    | 3.09  | .26    | 1.57  | .94  | .88    |
| 26  | 1.80   | .15    | 1.50  | .73    | 2.17  | 6.46   | .44    | 3.06  | .29    | 1.53  | 1.13 | 1.03   |
| 27  | 1.78   | .15    | 1.50  | 0      | 2.74  | 6.49   | .44    | 3.03  | .32    | 1.57  | 1.61 | 1.50   |
| 28  | 2.21   | .15    | 1.47  | 0      | 3.03  | 6.57   | .43    | 3.26  | .35    | 1.61  | 1.60 | 1.90   |
| 29  | 2.44   | .14    | 1.47  | 0      | 2.73  | 6.68   | .42    | 3.40  | .38    | 2.10  | 1.61 | 1.88   |
| 30  | 1.74   | .14    | 1.48  | 0      | 3.03  | 6.66   | .42    | 3.40  | .42    | 2.57  | 1.61 | 1.40   |
| 31  | 1.74   | .14    | 1.46  |        | 3.48  |        | .42    | 3.51  |        | 2.97  |      | .97    |

|       |       |       |        |       |       |       |
|-------|-------|-------|--------|-------|-------|-------|
| Sum   | 46.49 | 30.53 | 149.50 | 61.21 | 61.26 | 50.33 |
| 66.66 | 28.10 | 73.90 | 123.73 | 44.25 | 46.76 |       |

## Current Year 1990

## Period 1968-1990

| Month  | Average Rainfall**<br>Millimetres |           | Extreme-Cubic Metres per Second |      |     | Average | Volume - Thousands of Cubic Metres |         |         |         |
|--------|-----------------------------------|-----------|---------------------------------|------|-----|---------|------------------------------------|---------|---------|---------|
|        | 1990                              | 1939-1990 | Day                             | High | Low |         | Total                              | Average | Maximum | Minimum |
| Jan.   | 10                                | 20        | 21                              | 3.09 | .1  | 1.35    | 2.15                               | 5,759   | 10,732  | 22,494  |
| Feb.   | 117                               | 24        | 14                              | 2.53 | 123 | .14     | 1.66                               | 4,017   | 9,842   | 22,210  |
| Mar.   | 37                                | 10        | 30                              | 1.60 | 1   | .15     | .91                                | 2,428   | 15,576  | 28,860  |
| Apr.   | 52                                | 45        | 25                              | 2.08 | 126 | 0       | 1.02                               | 2,638   | 17,555  | 31,947  |
| May    | 89                                | 77        | 18                              | 3.77 | 1   | .03     | 2.38                               | 6,385   | 15,267  | 34,773  |
| June   | 5                                 | 58        | 30                              | 6.77 | 4   | 3.23    | 4.98                               | 12,917  | 18,133  | 37,218  |
| July   | 120                               | 37        | 1                               | 6.54 | 31  | .41     | 3.99                               | 10,690  | 20,117  | 35,591  |
| Aug.   | 41                                | 50        | 31                              | 3.68 | 1   | .39     | 1.97                               | 5,289   | 18,318  | 30,017  |
| Sept.  | 89                                | 70        | 2                               | 3.71 | 20  | .14     | 1.48                               | 3,823   | 12,335  | 21,821  |
| Oct.   | 22                                | 56        | 10                              | 3.20 | 1   | .43     | 1.98                               | 5,293   | 10,974  | 20,357  |
| Nov.   | 33                                | 19        | 1                               | 3.03 | 13  | .78     | 1.56                               | 4,040   | 10,731  | 23,181  |
| Dec.   | 1                                 | 18        | 30                              | 2.21 | 26  | .85     | 1.62                               | 4,349   | 10,361  | 20,752  |
| Yearly | 6uz                               | 490       | —                               | 6.77 | —   | 0       | 2.14                               | 67,628  | 169,911 | 262,901 |
|        |                                   |           |                                 |      |     |         |                                    |         |         | 52,016  |

\* Discharge measurement made on this day ! And other days

\*\* Period 1968-1990

\*\* On the United States side from Maverick Power Plant to Cuervo Creek

## 08-4577.00 RETURN FLOW TO THE RIO GRANDE

## FROM THE MAVERICK IRRIGATION DISTRICT

## ABOVE EAGLE PASS, TEXAS

**DESCRIPTION:** Part of the water diverted from the Rio Grande into the Maverick Canal is returned to the river through various drains and spillways of the irrigation system located between Maverick Diversion Dam and Eagle Pass, Texas. These return flows are measured at gaging stations consisting of sharp-crested Cipolletti weirs or control structures equipped with continuous water-stage recorders located at Hughes Ranch, gate leakage at Las Moras Creek, Lateral 1, Lateral 2 Spill, Canon Grande, Quemado Creek, Lateral 15 Spill, Houchin Spill, and Elm Creek; and a Parshall flume at the Lateral 2 Sand Trap Spill into Las Moras Creek immediately below the canal siphon.

**RECORDS:** Based on the weir discharge table and a continuous record of gage heights. All storm flow occurring at these stations is deducted from the records and is not shown below. Records available: April 1959 through 1990. Records prior to 1976 were published under the title "Return Flow to the Rio Grande from Maverick Canal-Maverick Dam to Eagle Pass, Texas."

**REMARKS:** In addition to the flows listed below, water from the Maverick Canal is returned to the Rio Grande in this reach at the Maverick Power Plant shown on a prior page of this bulletin.

## EXTREME FLOWS FROM RECORDS:

|          |      | Average Flow in Cubic Metres per Second** |                |      |      |                    |
|----------|------|---|----------------|------|------|--------------------|
| Daily:   | Max. | 26.3                                      | Sept. 29, 1975 | Min. | 0.07 | August 4 & 8, 1985 |
| Monthly: | Max. | 4.36                                      | June 1968      | Min. | 0.14 | September 1985     |
| Yearly:  | Max. | 3.57                                      |                | Min. | 0.41 |                    |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan. | Feb.  | Mar. | April | May  | June  | July | Aug.  | Sept. | Oct.  | Nov. | Dec.  |
|------------|------|-------|------|-------|------|-------|------|-------|-------|-------|------|-------|
| 1          | 0.75 | 1.65  | 1.01 | 1.10  | 1.51 | 1.62  | 1.42 | 1.46  | 1.33  | 1.17  | 1.56 | 1.53  |
| 2          | .91  | 1.25  | 1.03 | 1.09  | 1.39 | 1.54  | 1.26 | 1.50  | 1.51  | 1.24  | 1.82 | 1.61  |
| 3          | .88  | 1.22  | 1.04 | 1.11  | 1.28 | 1.54  | 1.36 | 1.59  | 1.27  | 1.31  | 2.02 | 1.37  |
| 4          | 1.12 | 1.34  | 1.04 | 1.09  | 1.48 | 1.58  | 1.25 | 1.65  | 1.31  | 1.29  | 2.20 | 1.40  |
| 5          | 1.12 | 1.37  | 1.03 | 1.26  | 1.44 | 1.64  | 1.14 | 1.65  | 1.33  | 1.35  | 2.02 | 1.64  |
| 6          | .93  | 1.44  | 1.01 | 1.30  | 1.34 | 1.85  | .96  | 1.58  | 1.26  | 1.26  | 1.80 | 1.84  |
| 7          | .85  | 1.56  | 1.02 | 1.30  | 1.22 | 1.73  | .99  | 1.54  | 1.09  | 1.12  | 1.76 | 1.68  |
| 8          | 1.03 | 1.32  | 1.00 | 1.20  | 1.56 | 1.70  | 1.08 | 1.72  | .93   | 1.09  | 1.58 | 1.41  |
| 9          | 1.13 | 1.58  | 1.11 | 1.12  | 1.40 | 1.52  | .90  | 1.67  | .90   | 1.59  | 1.85 | 1.25  |
| 10         | 1.15 | 1.60  | 1.05 | 1.10  | 1.55 | 1.36  | .74  | 1.73  | .86   | .88   | 1.75 | 1.34  |
| 11         | 1.09 | 1.38  | .96  | 1.26  | 1.67 | 1.34  | .88  | 1.67  | .91   | 1.01  | 1.57 | 1.42  |
| 12         | .91  | 1.40  | .91  | 1.46  | 1.58 | 1.35  | .80  | 1.61  | .94   | 1.11  | 1.42 | 1.70  |
| 13         | .77  | 1.99  | 1.12 | 1.52  | 1.58 | 1.46  | 1.01 | 1.56  | .90   | 1.08  | 1.23 | 1.76  |
| 14         | .74  | 2.05  | 1.09 | 1.24  | 1.70 | 1.83  | .79  | 1.61  | .88   | 1.16  | 1.42 | 1.63  |
| 15         | .79  | 1.89  | 1.19 | 1.13  | 2.01 | 1.99  | .79  | 1.77  | .91   | 1.29  | 1.76 | 1.34  |
| 16         | 1.02 | 1.89  | 1.22 | 1.17  | 2.27 | 1.91  | .94  | 1.65  | .99   | 1.37  | 1.69 | 1.25  |
| 17         | 1.10 | 1.81  | 1.27 | 1.08  | 2.25 | 1.57  | .94  | 1.71  | 1.11  | 1.42  | 1.47 | 1.37  |
| 18         | 1.22 | 1.50  | 1.21 | 1.23  | 2.09 | 1.66  | .84  | 1.64  | 1.17  | 1.28  | 1.23 | 1.39  |
| 19         | .90  | 1.29  | .95  | 1.28  | 1.88 | 1.65  | .92  | 1.65  | 1.21  | 1.19  | 1.54 | 1.34  |
| 20         | .91  | 1.26  | 1.02 | 1.20  | 1.82 | 1.85  | 1.04 | 1.57  | 1.25  | 1.15  | 1.44 | 1.34  |
| 21         | .85  | 1.31  | 1.31 | 1.38  | 1.61 | 1.67  | 1.12 | 1.50  | 1.29  | 1.07  | 1.28 | 1.38  |
| 22         | .91  | 1.29  | 1.72 | 1.32  | 1.58 | 1.68  | 1.18 | 1.66  | 1.33  | 1.05  | 1.19 | 1.46  |
| 23         | .92  | 1.30  | 1.53 | 1.24  | 1.62 | 1.80  | 1.24 | 1.67  | 1.46  | 1.10  | 1.40 | 1.27  |
| 24         | .95  | 1.30  | 1.72 | 1.31  | 1.66 | 1.49  | 1.29 | 1.73  | 1.43  | 1.29  | 1.12 | 1.13  |
| 25         | 1.24 | 1.79  | 1.81 | 1.16  | 1.58 | 1.29  | 1.34 | 1.72  | 1.39  | 1.40  | 1.11 | 1.10  |
| 26         | 1.15 | 1.23  | 1.56 | 1.22  | 1.52 | 1.30  | 1.33 | 1.41  | 1.35  | 1.52  | 1.08 | 1.18  |
| 27         | 1.22 | 1.07  | 1.44 | 1.28  | 1.51 | 1.38  | 1.39 | 1.28  | 1.47  | 1.37  | 1.20 | 1.28  |
| 28         | 1.01 | 1.02  | 1.41 | 1.35  | 1.52 | 1.37  | 1.48 | 1.25  | 1.31  | 1.72  | 1.51 | 1.35  |
| 29         | 1.23 |       | 1.27 | 1.42  | 1.46 | 1.43  | 1.56 | 1.34  | 1.19  | 1.85  | 1.69 | 1.46  |
| 30         | 1.48 |       | 1.09 | 1.61  | 1.45 | 1.56  | 1.54 | 1.56  | 1.18  | 1.53  | 1.56 | 1.55  |
| 31         | 1.35 |       | 1.14 |       | 1.61 |       | 1.46 | 1.48  |       | 1.69  |      | 1.48  |
| <b>Sum</b> |      | 40.60 |      | 37.53 |      | 47.66 |      | 49.12 |       | 39.95 |      | 44.25 |
|            |      | 31.63 |      | 37.28 |      | 50.14 |      | 34.98 |       | 35.46 |      | 46.27 |

## Current Year 1990

## Period 1968-1990

| Month         | Extreme Gage Metres |     | Extreme-Cubic Metres per Second |             |           | Average     | Volume-Thousands of Cubic Metres |               |               |                |               |
|---------------|---------------------|-----|---------------------------------|-------------|-----------|-------------|----------------------------------|---------------|---------------|----------------|---------------|
|               | High                | Low | Day                             | Ø High      | Ø Low     |             | Total                            | Average       | Maximum       | Minimum        |               |
| Jan.          |                     |     | 30                              | 1.48        | 14        | 0.74        | 1.02                             | 2,733         | 3,759         | 9,424          | 1,252         |
| Feb.          |                     |     | 14                              | 2.05        | 28        | 1.02        | 1.45                             | 3,508         | 3,452         | 7,556          | 1,158         |
| Mar.          |                     |     | 25                              | 1.81        | 12        | .91         | 1.20                             | 3,221         | 4,554         | 7,940          | 1,383         |
| Apr.          |                     |     | 30                              | 1.61        | 17        | 1.08        | 1.25                             | 3,243         | 4,649         | 9,615          | 1,016         |
| May           |                     |     | 16                              | 2.27        | 7         | 1.22        | 1.62                             | 4,333         | 4,456         | 10,087         | 1,048         |
| June          |                     |     | 15                              | 1.99        | 25        | 1.29        | 1.59                             | 4,118         | 4,618         | 11,334         | 610           |
| July          |                     |     | 29                              | 1.56        | 10        | .74         | 1.13                             | 3,022         | 4,765         | 10,060         | 405           |
| Aug.          |                     |     | 15                              | 1.77        | 28        | 1.25        | 1.58                             | 4,244         | 4,806         | 11,423         | 486           |
| Sep.          |                     |     | 2                               | 1.51        | 10        | .86         | 1.18                             | 3,064         | 4,025         | 9,472          | 356           |
| Oct.          |                     |     | 29                              | 1.85        | 10        | .88         | 1.29                             | 3,452         | 4,019         | 8,097          | 1,337         |
| Nov.          |                     |     | 4                               | 2.20        | 26        | 1.08        | 1.54                             | 3,998         | 3,856         | 10,726         | 1,019         |
| Dec.          |                     |     | 6                               | 1.84        | 25        | 1.10        | 1.43                             | 3,823         | 3,468         | 7,122          | 1,277         |
| <b>Yearly</b> |                     |     | <b>==</b>                       | <b>2.27</b> | <b>==</b> | <b>0.74</b> | <b>1.36</b>                      | <b>42,758</b> | <b>50,427</b> | <b>112,857</b> | <b>12,834</b> |

## 08-4680.00 RIO GRANDE AT PIEDRAS NEGRAS, COAHUILA

## AND EAGLE PASS, TEXAS

**DESCRIPTION:** Cableway, gravity well, water-stage recorder, and data collection platform located on the left bank at latitude 28° 42' 50", longitude 100° 30' 25", and river kilometre 800, 1.0 river kilometre upstream from the international highway bridge between Eagle Pass, Texas and Piedras Negras, Coahuila and 124 river kilometres downstream from Amistad Dam. The zero of the gage is 208.15 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 39 discharge measurements during the year, 27 by the Mexican Section and 12 by the United States Section of the Commission, and a continuous record of gage heights. Computations by shifting control methods. Records available: May 1900 through March 1914; August 1914 through April 1916; September 1916; September and October 1917; October 1918; September and October 1919; August and September 1920; June 1922; September, November, and December 1923; and 1924 through 1990. Records prior to 1976 were published under the title "Rio Grande at Eagle Pass, Texas."

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. The data collection platform is coupled to leased telephone circuits. This system is operated in cooperation with the National Weather Service. EXTREME FLOWS FROM RECORDS: Momentary: Max. 27,300 m³/sec, determined by slope-area calculations, on June 29, 1954 with a gage height of 16.31 metres. Well-authenticated information indicates the occurrence of a flood in June 1865 with an estimated discharge of 35,000 m³/sec and a gage height of 17.07 metres on the present gage, and also that these were the only floods since 1745 with flows greater than 23,400 m³/sec. Min. 0.69 m³/sec on June 22, 1953 with a gage height of 0.02 metres.

| Average Flow in Cubic Metres per Second** |      |       |               |  |  |  |  |  |      |      |                |
|---|------|-------|---------------|--|--|--|--|--|------|------|----------------|
| Daily:                                    | Max. | 2,870 | July 19, 1975 |  |  |  |  |  | Min. | 4.90 | April 25, 1984 |
| Monthly:                                  | Max. | 622   | Sept. 1974    |  |  |  |  |  | Min. | 9.16 | June 1969      |
| Yearly:                                   | Max. | 147   | 1974          |  |  |  |  |  | Min. | 27.5 | 1972           |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day | Jan.   | Feb.   | Mar.   | April  | May   | June   | July   | Aug.   | Sept.  | Oct.   | Nov.   | Dec.   |
|-----|--------|--------|--------|--------|-------|--------|--------|--------|--------|--------|--------|--------|
| 1   | 56.6   | 169 *  | 84.6   | 89.1   | 238   | 124    | 50.7   | 108    | 53.0   | 340    | 147    | 89.6   |
| 2   | 64.5   | 199    | 83.7   | * 88.9 | 204   | 98.6   | 54.6   | 121    | 56.0   | 326    | 145    | 89.5   |
| 3   | 64.7   | 197    | 83.2   | 93.8   | 282 * | 94.9   | 52.4   | 88.8   | * 57.4 | 356    | 149    | * 90.5 |
| 4   | 65.0   | 197    | 81.6   | 126    | 284   | * 91.3 | 53.9   | 80.2   | 59.1   | 388    | 146    | 91.2   |
| 5   | 65.2   | 205    | * 80.0 | 128    | 262   | 84.5   | 44.8   | 72.7   | 63.4   | 381    | 144 *  | 68.8   |
| 6   | 66.2   | 203    | 77.8   | 129    | 257   | 83.4   | 34.8   | * 68.8 | 57.7   | 379    | 146    | 94.6   |
| 7   | 66.7   | 198    | 78.0   | 128    | 258   | 82.3   | 33.8   | 65.0   | 54.6   | 383    | 149    | 94.0   |
| 8   | * 65.8 | 226    | 78.7   | 128    | 257   | 83.0   | 34.2   | 63.0   | 54.6   | 380    | 152    | 96.2   |
| 9   | 63.6   | 221    | 78.3   | 129    | 257   | 82.2   | 33.9   | 61.2   | 54.4   | 379    | 153    | 98.4   |
| 10  | 64.7   | 211    | 79.0   | 128    | 230   | 84.6   | 33.9   | 59.9   | 54.8   | 382    | 151    | 99.9   |
| 11  | 64.6   | 229    | 52.6   | 128    | 133   | 82.4   | 31.3   | 58.8   | 63.2   | 378    | 145    | 102    |
| 12  | 65.0   | 211    | 53.0   | 128    | 129   | 83.1   | 32.4   | 57.1   | 62.0   | 377    | 101    | 104    |
| 13  | 65.4   | 206    | 44.6   | 130    | 127   | 81.3   | 32.2   | 60.0   | 59.3   | 378    | 94.3   | 106    |
| 14  | 65.6   | 128    | 43.2   | 131    | 127 * | 82.5   | 32.4   | 92.4   | 57.5   | 379    | 92.7   | 107    |
| 15  | 65.6   | 123    | 41.9   | 130    | 128   | 65.2   | 35.6   | 148    | 57.0   | 382 *  | 93.7   | 108    |
| 16  | 62.3   | 120    | 41.8   | 128 *  | 126   | 53.6   | * 35.8 | 125    | 90.5   | 380    | 93.9   | 110    |
| 17  | * 67.3 | 115    | 41.6   | 129    | 126   | 55.4   | 34.7   | 86.8   | 126 *  | 378    | 93.3   | 108 *  |
| 18  | 64.6   | 76.9   | 41.5   | 131    | 132   | * 52.6 | 37.8   | 86.0   | 99.9   | 374    | 91.5   | 107    |
| 19  | 65.4   | * 74.0 | * 41.5 | 142    | 153   | 51.2   | 110 *  | 85.8   | 97.2   | 376    | * 91.2 | 103    |
| 20  | 64.2   | 73.5   | 41.2   | 139    | 142   | * 50.8 | 390 *  | * 85.0 | 134    | 378    | 89.5   | 104 *  |
| 21  | 64.1   | 119    | * 40.6 | 134    | 138 * | 50.2   | 180    | 112 *  | 118    | 375    | 89.8   | 103    |
| 22  | 63.0   | 92.9   | 74.9   | 191    | 216 * | 50.2   | 103    | 144    | 108    | 375 *  | 90.3   | 102    |
| 23  | * 79.4 | 80.9   | 82.2   | 190    | 158   | 51.8   | 174    | 74.2   | 228    | 376 *  | 90.1   | 99.8   |
| 24  | 115    | 80.0   | 81.6   | 144 *  | 140   | 51.6   | 435 *  | 62.2   | 387 *  | 374    | 88.7   | 101    |
| 25  | 113    | 80.0   | 82.7   | 186    | 136   | 51.8   | 130 *  | 58.8   | 369    | 373    | 90.9   | 99.3   |
| 26  | 114    | 79.6   | 83.7   | 924    | 134   | 50.9   | 94.5   | 58.1   | 398    | 348    | 91.0   | 99.0   |
| 27  | 115    | * 79.2 | 85.2   | 491    | 134   | 49.2   | 80.8   | 57.4   | 375    | 167    | 90.8   | 98.3   |
| 28  | 116    | 82.1   | 85.4   | 261    | 133   | 49.2   | 72.9   | 60.7   | 366    | 157    | 88.7   | 97.4   |
| 29  | 116    | 85.0   | 223    | 130    | 49.6  | 68.1   | 53.8   | 355    | 153    | 88.9   | 96.4   |        |
| 30  | 116    | 115    | 214    | 132    | 50.2  | 64.8   | 53.1   | 352    | 154    | * 90.9 | 98.6   |        |
| 31  | 117    | 109    | 128    |        |       | 63.1   | 48.3   | 48.3   | 152    |        |        | 99.6   |

|         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|
| Sum     | 4,076.1 | 5,441.8 | 2,071.6 | 2,452.1 | 10,477  | 3,066.1 |
| 2,421.5 | 2,173.1 | 5,431   | 2,665.4 | 4,467.6 | 3,367.2 |         |

## Current Year 1990

## Period 1968-1990

| Month  | Extreme Gage Metres |      |     | Extreme-Cubic Metres per Second |     |      | Average | Volume—Thousands of Cubic Metres |           |           |           |        |
|--------|---------------------|------|-----|---------------------------------|-----|------|---------|----------------------------------|-----------|-----------|-----------|--------|
|        | High                | Low  | Day | High                            | Day | Low  |         | Total                            | Average   | Maximum   | Minimum   |        |
| Jan.   | 1.38                | 2.80 | 23  | 120                             | 1   | 38.9 | 78.1    | 209,218                          | 147,885   | 352,873   | 32,306    |        |
| Feb.   | 2.15                | .95  | 8   | 242                             | 20  | 51.5 | 146     | 352,175                          | 179,928   | 552,784   | 43,917    |        |
| Mar.   | 1.71                | .83  | 30  | 177                             | 115 | 35.7 | 70.1    | 187,756                          | 189,252   | 489,954   | 25,778    |        |
| Apr.   | 5.61                | 1.00 | 26  | 1,380                           | 1   | 58.5 | 181     | 470,172                          | 191,025   | 476,450   | 29,641    |        |
| May    | 2.23                | 1.41 | 22  | 294                             | 17  | 124  | 175     | 469,238                          | 279,533   | 726,361   | 44,643    |        |
| June   | 1.44                | .83  | 1   | 129                             | 122 | 35.7 | 69.1    | 178,986                          | 223,914   | 587,171   | 23,749    |        |
| July   | 3.40                | .77  | 24  | 608                             | 111 | 27.6 | 86.0    | 230,291                          | 239,087   | 961,964   | 32,194    |        |
| Aug.   | 1.56                | .88  | 1   | 160                             | 31  | 42.5 | 79.1    | 211,861                          | 231,735   | 916,828   | 70,131    |        |
| Sept.  | 2.71                | .91  | 25  | 413                             | 10  | 45.8 | 149     | 386,001                          | 295,787   | 1,611,956 | 99,541    |        |
| Oct.   | 2.68                | 1.51 | 1   | 404                             | 31  | 151  | 151     | 338                              | 905,213   | 288,089   | 1,099,952 | 72,334 |
| Nov.   | 1.54                | 1.02 | 8   | 154                             | 120 | 63.6 | 112     | 290,926                          | 176,964   | 704,157   | 56,497    |        |
| Dec.   | 1.50                | .97  | 16  | 148                             | 5   | 55.8 | 98.9    | 264,911                          | 144,618   | 356,398   | 32,313    |        |
| Yearly | 201.50              | 0.77 | ==  | 1,380                           | ==  | 27.6 | 132     | 4,156,748                        | 2,587,817 | 4,629,360 | 870,430   |        |

\* Discharge measurement made on this day

† And other days

\*\* Period 1968-1990

## 08-4581.50 RIO ESCONDIDO AT VILLA DE FUENTE, COAHUILA

**DESCRIPTION:** Cableway, gravity well, concrete control weir of 50 m<sup>3</sup>/sec capacity, and water-stage recorder located on the right bank of the Rio Escondido on the outskirts of Villa de Fuente, Coahuila, at latitude 28°40'05", longitude 100°31'00", about 5.0 kilometres southwest of Piedras Negras, Coahuila, 6.0 river kilometres from the confluence with the Rio Grande, and 10.9 river kilometres downstream from the confluence of Rio San Antonio with Rio Escondido. Rio Escondido enters the Rio Grande at river kilometre 794, 5.0 river kilometres downstream from the international highway bridge between Eagle Pass, Texas and Piedras Negras, Coahuila. The zero of the gage is 218.96 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 23 discharge measurements during the year, 22 by the Mexican Section and 1 by the United States Section of the Commission, and a continuous record of gage heights. Records available: 1922 through 1990. Records from 1922 through September 1932 are considered doubtful.

**REMARKS:** Diversions and drainage returns modify the flow of this spring-fed stream at this station. Backwater from the Rio Grande reached an elevation of 222.48 metres during the flood of June 1954. Prior to November 1954, the gage well was located at the present cableway site. The weir was destroyed by a flood on September 24, 1964. On November 25, 1969, the concrete control weir was finished and placed in operation.

**EXTREME FLOWS FROM RECORDS\*\*:** Momentary: Max. 680 m<sup>3</sup>/sec on June 29, 1936 with a gage height of 5.83 metres. Min. frequently no flow.

## Average Flow in Cubic Metres per Second\*\*

|          |      |      |                |      |      |                |
|----------|------|------|----------------|------|------|----------------|
| Daily:   | Max. | 371  | Sept. 24, 1964 | Min. | 0    | Occasionally   |
| Monthly: | Max. | 23.4 | Sept. 1964     | Min. | 0.01 | September 1965 |
| Yearly:  | Max. | 7.28 | 1987           | Min. | 0.07 | 1956           |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.  | Feb.   | Mar.   | April  | May    | June  | July  | Aug.  | Sept.  | Oct.   | Nov.   | Dec.   |
|------------|-------|--------|--------|--------|--------|-------|-------|-------|--------|--------|--------|--------|
| 1          | 0.70  | * 0.95 | 1.58   | 0.90   | 1.54   | 0.80  | 0.20  | 1.61  | 0.41   | 4.24   | 3.16   | 2.65   |
| 2          | .69   | .81    | 1.27   | * .90  | 1.38   | .63   | .18   | 2.88  | .42    | 4.24   | 3.07   | 2.65   |
| 3          | .69   | .72    | 1.35   | .90    | * 1.56 | .46   | .18   | 1.23  | * .45  | 4.34   | 3.07   | * 2.63 |
| 4          | .69   | .73    | 1.24   | .93    | 1.52   | * .37 | .18   | 1.14  | .60    | 4.32   | 3.07   | 2.63   |
| 5          | .72   | .72    | * 1.21 | .90    | 1.46   | .35   | .17   | 1.02  | .56    | 4.24   | * 3.12 | 2.70   |
| 6          | .75   | .70    | 1.21   | .88    | 1.46   | .32   | .17   | * .98 | .46    | 4.19   | 3.16   | 2.69   |
| 7          | .74   | .69    | 1.16   | .84    | 1.44   | .30   | .17   | 1.00  | .44    | 4.03   | 3.12   | 2.65   |
| 8          | * .72 | .66    | 1.16   | .83    | 1.34   | .29   | .17   | .94   | .44    | 3.81   | 3.25   | 2.65   |
| 9          | .72   | .66    | 1.16   | .72    | .97    | .29   | .17   | .94   | .42    | 4.30   | 3.20   | 2.57   |
| 10         | .72   | .64    | 1.12   | .86    | .90    | .29   | .16   | .92   | .38    | 4.06   | 3.12   | 2.57   |
| 11         | .70   | .78    | 1.10   | 1.51   | .99    | .28   | .16   | .86   | .79    | 4.02   | 3.02   | 2.57   |
| 12         | .68   | .75    | 1.07   | 1.07   | 1.06   | .27   | .16   | .87   | .60    | 4.02   | 2.90   | 2.49   |
| 13         | .69   | .74    | 1.03   | .95    | .91    | .26   | .15   | .80   | .50    | 4.13   | 2.81   | 2.44   |
| 14         | .69   | .87    | 1.07   | .99    | * .79  | .26   | .14   | .79   | .78    | 4.24   | 2.81   | 2.42   |
| 15         | .72   | .94    | 1.31   | 1.20   | .92    | .26   | .15   | .76   | * 4.24 | 2.85   | 2.54   |        |
| 16         | .93   | .87    | 1.24   | * 1.24 | .74    | .35   | * .17 | .74   | 2.68   | 4.10   | 2.96   | 2.62   |
| 17         | * .78 | .78    | 1.04   | 1.21   | .52    | .29   | .60   | .64   | * 1.20 | 3.98   | 2.73   | * 2.36 |
| 18         | 1.01  | .72    | .98    | 1.06   | .77    | * .25 | 2.17  | .60   | .97    | 3.85   | 2.78   | 2.32   |
| 19         | .98   | * .72  | * .98  | 2.40   | .79    | .23   | 7.45  | .58   | 2.98   | 3.76   | * 2.81 | 2.44   |
| 20         | 1.01  | .76    | .98    | 1.40   | .70    | .23   | 6.57  | * .54 | 1.80   | 3.81   | 2.81   | 2.57   |
| 21         | .96   | 2.86   | .98    | 1.20   | .62    | .21   | 32.2  | .51   | 1.16   | 3.70   | 2.81   | 2.57   |
| 22         | .98   | 1.62   | .98    | 1.31   | 1.02   | .22   | 4.61  | .50   | 1.05   | 3.71   | 2.73   | 2.49   |
| 23         | .97   | 1.04   | .98    | 1.28   | .66    | .20   | 1.89  | .47   | 7.51   | 3.69   | 2.81   | 2.57   |
| 24         | .98   | .93    | .98    | 1.30   | .62    | .20   | 1.17  | .46   | 3.74   | 3.66   | 2.81   | 2.63   |
| 25         | .96   | .87    | .94    | 1.26   | .57    | .20   | .86   | .47   | 4.10   | 3.57   | 2.81   | 2.45   |
| 26         | .98   | .85    | .96    | 5.94   | .55    | .20   | .78   | .45   | 4.13   | 3.48   | 2.73   | 2.27   |
| 27         | .96   | .83    | .98    | 2.74   | .54    | .20   | .69   | .44   | 4.13   | 3.43   | 2.73   | * 2.24 |
| 28         | .98   | 1.67   | 1.00   | 1.78   | .50    | .19   | .66   | .44   | 4.13   | 3.34   | 2.71   | 2.20   |
| 29         | .98   | .96    | 1.64   | 1.64   | .48    | .19   | .63   | .46   | 4.13   | 3.25   | 2.65   | 2.20   |
| 30         | .98   | .90    | 1.57   | .45    | .19    | .63   | .44   | 4.11  | 4.11   | 3.25   | 2.61   | 2.14   |
| 31         | .97   | .90    | .90    | .61    | 1.01   | .44   | .36   |       |        |        |        | 2.07   |
| <b>Sum</b> |       | 25.88  |        | 41.71  |        | 8.78  |       | 24.92 |        | 120.16 |        | 76.99  |
|            | 26.03 | 33.82  |        | 28.38  |        | 64.60 |       | 55.91 |        | 87.22  |        |        |

## Current Year 1990

## Period 1933-1990

| Month         | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |      |       | Average | Volume—Thousands of Cubic Metres |         |         |         |       |
|---------------|---------------------|------|---------------------------------|------|-------|---------|----------------------------------|---------|---------|---------|-------|
|               | High                | Low  | Day                             | High | Day   |         | Total                            | Average | Maximum | Minimum |       |
| Jan.          | 0.30                | 0.26 | 118                             | 1.02 | 12    | 0.66    | 0.84                             | 2,249   | 4,123   | 23,350  | 54.0  |
| Feb.          | .55                 | .25  | 21                              | 4.80 | 10    | .63     | .92                              | 2,236   | 3,123   | 17,803  | 48.0  |
| Mar.          | .42                 | .29  | 1                               | 2.34 | 129   | .90     | 1.09                             | 2,922   | 2,594   | 14,070  | 114   |
| Apr.          | .79                 | .23  | 26                              | 12.1 | 1 9   | .51     | 1.39                             | 3,604   | 2,881   | 27,075  | 100   |
| May           | .44                 | .22  | 22                              | 2.57 | 30    | .44     | .92                              | 2,452   | 4,681   | 31,417  | 190   |
| June          | .29                 | .12  | 1                               | .86  | 127   | .19     | .29                              | 759     | 3,603   | 31,888  | 74.4  |
| July          | 1.51                | .09  | 21                              | 74.3 | 1 3   | .14     | .28                              | 5,581   | 2,996   | 32,593  | 65.0  |
| Aug.          | .58                 | .21  | 2                               | 5.38 | .28   | .41     | .80                              | 2,153   | 4,433   | 37,135  | 24.1  |
| Sept.         | .98                 | .20  | 23                              | 21.6 | 1 9   | .38     | 1.86                             | 4,831   | 6,417   | 60,665  | 22.0  |
| Oct.          | .55                 | .47  | 9                               | 4.91 | 130   | 3.16    | 3.88                             | 10,382  | 5,965   | 35,302  | 54.0  |
| Nov.          | .48                 | .44  | 8                               | 3.25 | 30    | 2.57    | 2.91                             | 7,536   | 4,649   | 31,737  | 54.0  |
| Dec.          | .45                 | .40  | 1 5                             | 2.73 | 31    | 2.07    | 2.48                             | 6,652   | 4,088   | 27,140  | 83.0  |
| <b>Yearly</b> | 1.51                | 0.09 | =====                           | 74.3 | ===== | 0.14    | 1.63                             | 51,357  | 49,553  | 229,996 | 2,165 |

\* Discharge measurement made on this day

† And other days

\*\* Period 1932-1990

08-4586.00 RETURN FLOW TO THE RIO GRANDE  
FROM THE MAVERICK IRRIGATION DISTRICT  
BELOW EAGLE PASS, TEXAS

**DESCRIPTION:** Part of the water diverted from the Rio Grande into the Maverick Canal is returned to the river through various drains and spillways of the irrigation system located between Eagle Pass, Texas and the El Indio Gaging Station. These return flows are measured at gaging stations consisting of sharp-crested Cipolletti weirs or control structures equipped with continuous water-stage recorders located at Canon Diablo, Lateral 50 Spill, Rosita Creek, Lateral 60-K Spill, Sauz Creek, Indio Creek, and Cuervo Creek.

**RECORDS:** Based on the weir discharge table, stable station control rating tables, and a continuous record of gage heights. All storm flow occurring at these stations is deducted from the records and is not shown below. Records available: April 1959 through 1990. Records prior to 1976 were published under the title "Return Flow to the Rio Grande from Maverick Canal, Eagle Pass to San Antonio Crossing."

**EXTREME FLOWS FROM RECORDS:**

|         |      |      |  | Average Flow in Cubic Metres per Second** |         |      |      |  |       |          |  |  |  |  |  |
|---------|------|------|--|---|---------|------|------|--|-------|----------|--|--|--|--|--|
| Daily   | Max. | 9.91 |  | July                                      | 5, 1968 | Min. | 0.04 |  | April | 22, 1986 |  |  |  |  |  |
| Monthly | Max. | 7.00 |  | July                                      | 1968    | Min. | 0.12 |  | April | 1986     |  |  |  |  |  |
| Yearly  | Max. | 5.10 |  |   | 1971    | Min. | 0.42 |  |       |          |  |  |  |  |  |
|         |      |      |  |   |         |      |      |  |       |          |  |  |  |  |  |

**Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary**

| Day        | Jan.  | Feb.  | Mar.  | April | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1          | 0.72  | 0.98  | 0.67  | 0.95  | 0.28  | 0.46  | 1.04  | 0.34  | 0.31  | 0.47  | 0.48  | 0.52  |
| 2          | .60   | .82   | .62   | 1.03  | .26   | .42   | .74   | .35   | .31   | .48   | .49   | .54   |
| 3          | .46   | .62   | .56   | 1.06  | .24   | .34   | .57   | .31   | .34   | .49   | .48   | .54   |
| 4          | .42   | .51   | .48   | 1.42  | .23   | .35   | .88   | .33   | .33   | .49   | .49   | .60   |
| 5          | .61   | .55   | .47   | 1.26  | .20   | .29   | 1.05  | .45   | .33   | .48   | .50   | .55   |
| 6          | .65   | .58   | .47   | 1.00  | .20   | .25   | 1.01  | .42   | .34   | .48   | .52   | .53   |
| 7          | .51   | .50   | .45   | .75   | .25   | .24   | .93   | .40   | .37   | .47   | .51   | .43   |
| 8          | .56   | .41   | .44   | .73   | .18   | .21   | 1.22  | .42   | .44   | .48   | .52   | .30   |
| 9          | .58   | .41   | .44   | .74   | .18   | .60   | 1.41  | .45   | .42   | .49   | .56   | .21   |
| 10         | .62   | .38   | .46   | .80   | .19   | .54   | 1.34  | .47   | .48   | .51   | .65   | .16   |
| 11         | .68   | .42   | .55   | .65   | .49   | .31   | .69   | .45   | .46   | .53   | .54   | .14   |
| 12         | .63   | .56   | .67   | .43   | .84   | .26   | .95   | .42   | .44   | .49   | .53   | .15   |
| 13         | .64   | .77   | .62   | .49   | .67   | .39   | 1.60  | .41   | .44   | .48   | .52   | .17   |
| 14         | .84   | .83   | .72   | .39   | .74   | .44   | 1.40  | .37   | .47   | .49   | .52   | .22   |
| 15         | .82   | .76   | .84   | .27   | 1.45  | .42   | 1.48  | .33   | .48   | .48   | .51   | .24   |
| 16         | .81   | .69   | .85   | .34   | 1.23  | .60   | 1.61  | .30   | .49   | .48   | .50   | .27   |
| 17         | .68   | .87   | .77   | .51   | 1.15  | .69   | 1.24  | .28   | .48   | .48   | .51   | .29   |
| 18         | .71   | .91   | .70   | .40   | 1.57  | .50   | 1.07  | .34   | .46   | .48   | .55   | .25   |
| 19         | .82   | .83   | .65   | .40   | 1.35  | .46   | .93   | .34   | .44   | .49   | .56   | .27   |
| 20         | .68   | 1.00  | .69   | .41   | 1.48  | .38   | .88   | .37   | .45   | .49   | .53   | .28   |
| 21         | .82   | .93   | .71   | .42   | 1.63  | .33   | .72   | .38   | .50   | .48   | .50   | .30   |
| 22         | .94   | .73   | .76   | .61   | 1.87  | .38   | .65   | .40   | .45   | .47   | .50   | .31   |
| 23         | 1.08  | .69   | .75   | .89   | 1.44  | .41   | .56   | .47   | .45   | .48   | .49   | .34   |
| 24         | 1.23  | .68   | .71   | .77   | 1.35  | .67   | .48   | .39   | .45   | .47   | .50   | .39   |
| 25         | 1.16  | .65   | .72   | .69   | 1.28  | .67   | .44   | .33   | .46   | .47   | .50   | .36   |
| 26         | 1.07  | .61   | .75   | .48   | 1.14  | .62   | .41   | .31   | .45   | .46   | .50   | .37   |
| 27         | 1.02  | .57   | .79   | .38   | 1.04  | .57   | .39   | .31   | .46   | .54   | .50   | .39   |
| 28         | .95   | .65   | .93   | .36   | 1.00  | .45   | .37   | .32   | .47   | .48   | .50   | .41   |
| 29         | 1.02  | .88   | .84   | .34   | .84   | .77   | .36   | .35   | .46   | .48   | .51   | .43   |
| 30         | .98   | .91   | .31   | .73   | 1.05  | .21   | .34   | .39   | .46   | .51   | .51   | .46   |
| 31         | .90   | .93   | .93   | .61   | .28   | .33   | .33   | .33   | .48   | .48   | .49   | .49   |
| <b>Sum</b> |       | 18.91 |       | 19.28 |       | 14.07 |       | 11.53 |       | 15.05 |       | 10.91 |
|            | 24.21 |       | 20.96 |       | 26.11 |       | 27.09 |       | 12.89 |       | 15.48 |       |

**Current Year 1990**

| Month         | Extreme Gage Metres |     | Extreme-Cubic Metres per Second |             | Average      | Volume—Thousands of Cubic Metres |             |                |               |
|---------------|---------------------|-----|---------------------------------|-------------|--------------|----------------------------------|-------------|----------------|---------------|
|               | High                | Low | Day                             | Day         |              | Total                            | Average     | Maximum        | Minimum       |
| Jan.          |                     |     | 24                              | 1.23        | 4            | 0.42                             | 0.78        | 2,092          | 6,951         |
| Feb.          |                     |     | 20                              | 1.00        | 10           | .38                              | .68         | 1,634          | 5,796         |
| Mar.          |                     |     | 31                              | .93         | 8            | .44                              | .68         | 1,811          | 7,589         |
| Apr.          |                     |     | 4                               | 1.42        | 15           | .27                              | .64         | 1,666          | 8,289         |
| May           |                     |     | 22                              | 1.87        | 8            | .18                              | .84         | 2,256          | 7,571         |
| June          |                     |     | 30                              | 1.05        | 8            | .21                              | .47         | 1,216          | 7,971         |
| July          |                     |     | 16                              | 1.61        | 31           | .33                              | .47         | 2,341          | 7,835         |
| Aug.          |                     |     | 10                              | .47         | 17           | .28                              | .37         | .996           | 7,214         |
| Sept.         |                     |     | 21                              | .50         | 1            | .31                              | .43         | 1,114          | 6,125         |
| Oct.          |                     |     | 27                              | .54         | 26           | .46                              | .49         | 1,300          | 5,636         |
| Nov.          |                     |     | 10                              | .65         | 1            | .48                              | .52         | 1,337          | 5,895         |
| Dec.          |                     |     | 4                               | .60         | 11           | .14                              | .35         | 943            | 6,214         |
| <b>Yearly</b> |                     |     | <b>=====</b>                    | <b>1.87</b> | <b>=====</b> | <b>0.14</b>                      | <b>0.59</b> | <b>18,706</b>  | <b>83,186</b> |
|               |                     |     |                                 |             |              |                                  |             | <b>161,048</b> | <b>13,217</b> |

## 08-4587.00 RIO GRANDE NEAR EL INDIO, TEXAS

## AND VILLA GUERRERO, COAHUILA

**DESCRIPTION:** Cableway, bubbler gage, concrete control weir, and water-stage recorders (graphic and digital) located on the left bank at latitude 28° 20' 45", longitude 100° 18' 35", and river kilometre 741, 0.9 river kilometre downstream from Cuervo Creek, which marks the lower end of the Maverick County Water Control and Improvement District No. 1, 3.1 river kilometres upstream from Tovar Creek, 8.0 kilometres northeast of Villa Guerrero, Coahuila, about 18.5 kilometres south of El Indio, Texas, and 57.8 river kilometres downstream from the international highway bridge between Eagle Pass, Texas and Piedras Negras, Coahuila. The zero of the gage is 176.78 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 14 discharge measurements during the year and a continuous record of gage heights. Computations for high flows by shifting control methods. Low and medium flow computations based on a stable control weir rating curve defined by meter measurements. Records available: March, April, May, October, November, and December 1952 with some days missing; January through August 20, 1953; September 23, 1953 through June 14, 1954; and May 27, 1955 through 1990 with several days missing prior to September 1955. Records prior to 1976 were published under the title "Rio Grande at San Antonio Crossing near El Indio, Texas."

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 25,800 m³/sec. in June 1954, determined by slope-area computation, with an elevation of 190.29 metres. Min. 1.54 m³/sec. on June 24, 1953 with an elevation of 177.38 metres at a station 518 metres upstream from the present site.

| Average Flow in Cubic Metres per Second** |      |       |               |  |      |      |  |  |  |                    |  |
|---|------|-------|---------------|--|------|------|--|--|--|--------------------|--|
| Daily:                                    | Max. | 2,730 | July 19, 1975 |  | Min. | 9.26 |  |  |  | June 29 & 30, 1972 |  |
| Monthly:                                  | Max. | 617   | Sept. 1974    |  | Min. | 14.2 |  |  |  | June 1969          |  |
| Yearly:                                   | Max. | 150   | 1974          |  | Min. | 34.8 |  |  |  | 1972               |  |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.   | Feb.    | Mar.   | April   | May   | June    | July   | Aug.    | Sept.  | Oct.    | Nov.  | Dec.    |
|------------|--------|---------|--------|---------|-------|---------|--------|---------|--------|---------|-------|---------|
| 1          | 68.0   | 136     | 122    | 96.3    | 250   | 142     | 57.5   | 97.1    | 53.0   | 340     | 152   | 93.7    |
| 2          | 68.5   | 191     | 103    | 93.7    | 237   | 116     | 57.8   | 136     | 58.6   | 331     | 154   | 93.2    |
| 3          | * 76.7 | 193     | 92.6   | * 98.8  | 270 * | 106     | 58.6   | 106 *   | 66.3   | 334 *   | 155   | 92.6    |
| 4          | 76.2   | 194     | 89.5   | 121     | 292   | 106     | 56.6   | 88.9    | 68.5   | 382     | 155   | 92.0    |
| 5          | 75.9   | 206     | 86.9   | 129     | 292   | 103     | * 58.3 | 81.0    | * 69.4 | 382     | 155   | * 90.9  |
| 6          | 78.2   | 215     | * 84.4 | 129     | 295   | * 94.3  | 44.5   | 74.8    | 66.3   | 374     | 156 * | 75.3    |
| 7          | 77.3   | 210 *   | 83.5   | 131     | 289   | 96.0    | 37.7   | 71.1    | 60.9   | 371     | 159   | 92.6    |
| 8          | 76.2   | 217     | 84.7   | 132     | 286   | 95.7    | 36.8   | 67.1    | 58.6   | 374     | 164   | 92.3    |
| 9          | 75.0   | 238     | 84.7   | 131     | 292   | 94.9    | 38.2   | 64.6    | 57.5   | 374     | 164   | 92.9    |
| 10         | 73.3   | 240     | 84.1   | 131     | 289   | 97.4    | 37.1   | 64.0    | 57.5   | 379     | 161   | 93.2    |
| 11         | 72.8   | 227     | 81.0   | 130     | 190   | 94.0    | 36.8   | 62.3    | 64.6   | 377     | 158   | 93.2    |
| 12         | 72.5   | 238     | 60.6   | 130     | 152   | 94.6    | 34.0   | 60.6    | 68.5   | 377     | 120   | 92.6    |
| 13         | 71.9   | 223     | 53.2   | 130     | 148   | 94.3    | 37.7   | 59.2    | 63.7   | 377     | 104   | 91.5    |
| 14         | 73.9   | 177     | 48.1   | 130     | 143   | 92.9    | 36.8   | 60.0    | 60.3   | 374     | 102   | 91.5    |
| 15         | 73.3   | 148     | 47.3   | 130     | 139   | 94.3    | 37.9   | 136     | 62.3   | 374     | 101   | 91.8    |
| 16         | * 73.6 | 140     | 45.9   | 131     | 142   | 92.6    | 75.3   | 140     | 70.2   | 377     | 102   | 93.2    |
| 17         | * 70.0 | 138     | 45.6   | 131     | 142   | 73.9    | 47.6   | 95.2    | 127    | 377     | 101   | 93.7    |
| 18         | 72.2   | 104     | 45.3   | 132     | 148   | 60.9    | 50.1   | 90.6    | 115    | 374     | 101   | 92.0    |
| 19         | 72.8   | 89.8    | 45.0   | 134     | 171   | 62.0    | 72.8   | 90.1    | 106    | 368     | 101   | 91.2    |
| 20         | 73.6   | 90.1    | 47.0   | 149     | 167   | 62.0    | 564    | 89.5    | 132    | 368     | 100   | 91.2    |
| 21         | 72.2   | 234 *   | 73.9   | 152     | 161   | 61.5    | 334    | 92.6    | 143    | 368     | 98.3  | 91.8    |
| 22         | 70.5   | 149 *   | 89.2   | 189     | 254   | 60.0    | 154    | 142     | 110    | 368     | 98.6  | 90.1    |
| 23         | 69.7   | 104     | 87.2   | 216     | 211   | 60.6    | 121    | 108     | 177    | 371     | 98.6  | 90.3    |
| 24         | 116    | 98.6    | 90.9   | 173     | 166   | 58.3    | 470    | 68.8    | 371    | 97.7    | 90.9  | 91.2    |
| 25         | 119    | 94.6    | 94.3   | 216     | 158   | 59.2    | 188    | 62.9    | 360    | 374     | 97.7  | 92.3    |
| 26         | 119    | 92.6    | 96.3   | 564     | 154   | 58.1    | 115    | 61.7    | 394    | 368     | 98.3  | 91.5    |
| 27         | 119    | 90.6    | 97.7   | 946     | 155   | 56.1    | 92.6   | 61.5    | 385    | 206     | 96.3  | 90.6    |
| 28         | 119    | 106     | 96.0   | 312     | 151   | 53.5    | 79.9   | 59.8    | 365    | 158     | 95.4  | 89.5    |
| 29         | 119    | 94.3    | 284    | 148     | 54.9  | 73.3    | 62.3   | 360     | 157    | 93.2    | 87.5  |         |
| 30         | 119    | 119     | 246    | 145     | 54.7  | 68.3    | 56.9   | 348     | 152    | 94.6    | 88.4  |         |
| 31         | 119    | 122     | 146    | 56.0    | 66.0  | 56.6    | 91.1   | 152     |        |         | 89.5  |         |
| <b>Sum</b> |        | 4,584.3 |        | 5,797.8 |       | 2,449.7 |        | 2,567.2 |        | 10,429  |       | 2,823.0 |
|            |        | 2,633.3 |        | 2,495.2 |       | 6,183   |        | 3,238.2 |        | 4,499.2 |       | 3,633.7 |

## Current Year 1990

## Period 1968-1990

| Month         | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |              |             | Average    | Volume—Thousands of Cubic Metres |                  |                  |                  |         |        |
|---------------|---------------------|------|---------------------------------|--------------|-------------|------------|----------------------------------|------------------|------------------|------------------|---------|--------|
|               | High                | Low  | Day                             | High         | Day         |            | Total                            | Average          | Maximum          | Minimum          |         |        |
| Jan.          | 2.37                | 2.06 | 128                             | 119          | 17          | 51.5       | 84.9                             | 227,517          | 162,366          | 344,184          | 58,194  |        |
| Feb.          | 2.63                | 2.12 | 21                              | 292          | 27          | 70.8       | 164                              | 396,084          | 190,815          | 548,741          | 63,322  |        |
| Mar.          | 2.48                | 2.01 | 30                              | 164          | 16          | 42.2       | 80.5                             | 215,585          | 200,482          | 521,829          | 46,184  |        |
| Apr.          | 4.22                | 2.16 | 27                              | 1,440        | 2           | 72.2       | 193                              | 500,930          | 204,469          | 500,930          | 46,115  |        |
| May           | 2.70                | 2.40 | 22                              | 340          | 15          | 138        | 199                              | 534,211          | 301,633          | 740,332          | 62,566  |        |
| June          | 2.41                | 2.01 | 1                               | 144          | 29          | 43.6       | 81.7                             | 211,654          | 250,300          | 681,150          | 36,768  |        |
| July          | 3.50                | 1.94 | 20                              | 935          | 12          | 31.7       | 104                              | 279,780          | 256,705          | 972,830          | 45,920  |        |
| Aug.          | 2.47                | 2.03 | 2                               | 150          | 31          | 49.0       | 82.8                             | 221,806          | 252,791          | 1,016,428        | 82,422  |        |
| Sept.         | 2.79                | 2.03 | 24                              | 402          | 1           | 48.4       | 150                              | 388,731          | 313,029          | 1,598,663        | 102,781 |        |
| Oct.          | 2.77                | 2.44 | 1                               | 4            | 385         | 130        | 152                              | 901,066          | 304,970          | 1,064,503        | 81,268  |        |
| Nov.          | 2.46                | 2.15 | 1                               | 6            | 166         | 29         | 73.3                             | 121              | 313,952          | 194,600          | 681,981 | 58,933 |
| Dec.          | 2.35                | 2.10 | 17                              | 117          | 6           | 62.3       | 91.1                             | 243,907          | 157,978          | 341,125          | 61,451  |        |
| <b>Yearly</b> | 4.22                | 1.94 | <b>1,440</b>                    | <b>1,440</b> | <b>31.7</b> | <b>141</b> | <b>4,435,223</b>                 | <b>2,790,138</b> | <b>4,731,321</b> | <b>1,105,710</b> |         |        |

\* Discharge measurement made on this day

! And other days

\*\* Period 1968-1990

08-1690.00 RIO GRANDE AT LAREDO, TEXAS  
AND VIEJO LAREDO, TAMAULIPAS

**DESCRIPTION:** Bubble gage and water-stage recorder located at the Lincoln Juarez International Bridge on the left bank at latitude 27° 30' 05", longitude 99° 30' 13" and river Kilometre 580. The zero of the gage is 107.12 metres above mean sea level U. S. C. & G. S. datum.

**RECORDS:** Based on 32 measurements during the year made from the bridge and a continuous record of gage heights. Computations by shifting control methods. Records available: May 1900 through 1913; (gage height records only) January through March 1914; May, June, and October 1914; September 1916; September and October 1917; October 1918; September and October 1919; August and September 1920; June, November, and December 1922; 1923 through March 2, 1989 at a station 1.3 kilometres downstream of present site; March 3, 1989 through May 1990 at a station 0.5 kilometres upstream of present site; and June 1990 through December 1990 at the present site.

**HEMURKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. This station also serves as a flood warning station for the National Weather Service.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max: 20,300 m<sup>3</sup>/sec on June 30, 1954 determined by slope-area calculations, with a gage height of 18.44 metres at a site 0.5 kilometres upstream. Much well authenticated information established the occurrence of a greater flood in 1956 with a gage height of 19.05 metres on a gage 1.3 kilometres downstream with a discharge of approximately 27,000 m<sup>3</sup>/sec and that these were the only floods since 1745 with flows greater than 17,000 m<sup>3</sup>/sec. Min: No flow several days in June and July 1953, and July 24, 1956.

## Average Flow in Cubic Metres per Second \*\*

| Daily:   | Max: | 3,270 | June 30, 1971 | Min: | 7.00 | July 2, 1972 |
|----------|------|-------|---------------|------|------|--------------|
| Monthly: | Max: | 579   | Sept. 1974    | Min: | 14.1 | June 1969    |
| Yearly:  | Max: | 152   | 1974          | Min: | 38.2 | 1972         |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day | Jan.   | Feb.  | Mar.   | April | May   | June   | July   | Aug.   | Sept.  | Oct.  | Nov.  | Dec.   |
|-----|--------|-------|--------|-------|-------|--------|--------|--------|--------|-------|-------|--------|
| 1   | 69.4   | 139 * | 137 *  | 137   | 237 * | 144 *  | 50.1   | * 71.4 | 50.1   | 371   | 178 * | 97.1   |
| 2   | 71.6   | 185   | 131    | 106   | 243   | 140    | 53.0   | 181    | 48.1   | 362 * | 175   | 97.7   |
| 3   | 73.3   | 218   | 112    | 108 * | 223   | 112    | * 54.9 | 179    | 79.6   | 348   | 175   | 97.4   |
| 4   | 74.2   | 215   | 108    | 97.1  | 283   | 103    | 55.2   | 125    | 88.4   | 365   | 176   | * 95.7 |
| 5   | 74.2   | 217   | 104    | 123   | 303   | 98.3   | 53.0   | 96.9   | * 91.2 | 413   | 174   | 95.4   |
| 6   | 76.7   | 224   | 100    | 140   | 286   | 94.0   | 53.8   | 83.5   | 75.9   | 405   | 172   | 96.0   |
| 7   | 80.1   | 222   | 94.0   | 138   | 278   | 86.4   | 44.7   | 73.3   | 67.7   | 405   | 184   | 73.9   |
| 8   | 79.0   | 217   | 102    | 136   | 281   | 85.8   | 36.2   | 66.8   | 60.0   | 411   | 194   | 97.4   |
| 9   | 78.7   | 239   | 99.7   | 136   | 277   | 84.1   | 34.3   | 62.6   | 56.1   | 450   | 186   | 96.3   |
| 10  | 79.6   | 234   | 99.7   | 137   | 277   | 86.9   | 32.6   | 59.8   | 54.9   | 439   | 180   | 98.3   |
| 11  | 79.3   | 226   | 99.7   | 136   | 268   | 87.5   | 32.9   | 57.2   | 71.4   | 428 * | 177   | 100    |
| 12  | 79.0   | 240   | 71.1   | 134   | 175   | * 88.9 | 31.4   | 54.1   | 91.8   | 413   | 172   | 101    |
| 13  | 80.1   | 227 * | * 66.3 | 134   | 186.1 | 48.4   | 52.7   | 97.1   | 411    | 136   | 102   |        |
| 14  | 81.3   | 220   | 55.5   | 137   | 145   | 85.5   | 107    | 52.1   | 72.2   | 411   | 117 * | 102    |
| 15  | 83.5   | 147   | 44.7   | 139   | 142 * | 86.1   | 58.9   | 47.9   | 62.6   | 408   | 113   | 103    |
| 16  | 83.8   | 137   | 42.5   | 138   | 140   | 87.8   | 126    | 125    | 80.4   | 408   | 111   | 106    |
| 17  | * 86.1 | 133   | 41.6   | 136 * | 140   | 65.4   | 170 *  | 140    | 79.9   | 405   | 112   | 108    |
| 18  | 83.5   | 132   | 40.8   | 214   | 140   | 53.8   | 140    | 88.1   | 130 *  | 402   | 111   | 109 *  |
| 19  | 86.4   | 93.5  | 40.2   | 166   | 144   | 56.9   | 102    | 77.0   | 123    | 399   | 110   | 106    |
| 20  | 83.3   | 86.1  | 39.9   | 152   | 161   | 53.8   | 102    | 75.6   | 109    | 399   | 109   | 106    |
| 21  | 83.0   | 199   | 38.2   | 156   | 159   | 51.0   | 598    | * 74.2 | 136    | 399   | 107   | 105    |
| 22  | 82.4   | 240   | 36.8   | 148   | 154   | 51.3   | 391 *  | 77.9   | 147    | 399   | 104   | 106    |
| 23  | 80.7   | 131   | 36.8   | 195   | 237   | 50.7   | 171    | 138    | 121    | 399   | 104   | 104    |
| 24  | 79.3   | 103   | 72.8   | 210   | 197   | 51.3   | 142    | 106    | 217    | 394 * | 104   | 105    |
| 25  | 79.3   | 98.3  | 83.0   | 164   | 159   | 53.5   | 433    | 57.8   | 411    | 394   | 104   | 105    |
| 26  | 113    | 97.7  | 84.1   | 252   | 153   | 53.0   | 170    | 51.5   | 385 *  | 396   | 103   | 107    |
| 27  | 134    | 99.4  | 87.5   | 592   | 150   | 51.3   | 112    | 50.4   | 422    | 385   | 105   | 105    |
| 28  | 134    | 97.1  | 88.4   | 759   | 152   | 50.1   | 89.8   | 51.3   | 399    | 219   | 103   |        |
| 29  | 133    |       | 91.2   | 300   | 148   | 48.1   | 77.0   | 58.3   | 385    | 181   | 102   | 103    |
| 30  | 133    |       | 92.0   | 250   | 145   | 48.4   | 71.1   | 56.1   | 374    | 178   | 98.6  | 103    |
| 31  | 132    |       | 94.9   | 144   |       | 65.7   | 49.6   | 65.7   | 176    |       |       | 103    |

|         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|
| Sum     | 4,817.1 | 5,770.1 | 2,295.0 | 2,540.1 | 11,573  | 3,137.2 |
| 2,766.8 | 2,435.4 | 6,092   | 3,707.0 | 4,586.4 | 4,096.6 |         |

## Current Year 1990

## Period 1968-1990

| Month  | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |      |     | Average | Volume - Thousands of Cubic Metres |           |           |           |           |
|--------|---------------------|------|---------------------------------|------|-----|---------|------------------------------------|-----------|-----------|-----------|-----------|
|        | High                | Low  | Day                             | High | Day |         | Total                              | Average   | Maximum   | Minimum   |           |
| Jan.   | 0.80                | 0.40 | 26                              | 135  | 3   | 58.9    | 89.3                               | 239,052   | 164,148   | 352,918   | 61,395    |
| Feb.   | 1.35                | .57  | 112                             | 240  | 20  | 86.1    | 172                                | 416,197   | 194,364   | 555,809   | 48,383    |
| Mar.   | .90                 | .20  | 1                               | 149  | 22  | 33.4    | 78.6                               | 210,419   | 202,739   | 488,071   | 45,757    |
| Apr.   | 4.56                | .53  | 28                              | 946  | 4   | 75.6    | 192                                | 498,537   | 209,249   | 498,537   | 43,304    |
| May    | 1.59                | .74  | 14                              | 306  | 18  | 139     | 197                                | 526,349   | 321,050   | 817,599   | 110,911   |
| June   | .81                 | .17  | 1                               | 148  | 29  | 41.1    | 76.5                               | 198,288   | 286,902   | 857,878   | 36,616    |
| July   | 3.66                | .08  | 21                              | 748  | 112 | 28.2    | 120                                | 320,285   | 264,724   | 1,034,298 | 39,804    |
| Aug.   | 1.34                | .72  | 2                               | 259  | 31  | 42.8    | 81.9                               | 219,465   | 261,361   | 979,770   | 81,016    |
| Sept.  | 2.13                | .20  | 27                              | 430  | 2   | 42.8    | 153                                | 396,265   | 322,081   | 1,500,845 | 100,872   |
| Oct.   | 2.37                | .84  | 9                               | 484  | 31  | 174     | 373                                | 999,907   | 350,926   | 1,180,391 | 69,266    |
| Nov.   | 1.01                | .44  | 7                               | 203  | 30  | 80.4    | 137                                | 353,946   | 206,724   | 723,165   | 55,719    |
| Dec.   | .69                 | .35  | 18                              | 128  | 7   | 64.6    | 101                                | 271,054   | 162,850   | 379,380   | 63,297    |
| Yearly | 4.56                | 0.08 | ==                              | 946  | ==  | 28.2    | 147                                | 4,649,764 | 2,941,118 | 4,799,562 | 1,209,723 |

\* Discharge measurement made on this day

! And other days

\*\* Period 1968-1990

## 06-4507.00 RIO SALADO NEAR LAS TORTILLAS, TAMAULIPAS

**DESCRIPTION:** Cableway, control weir with notch opening of .72 m<sup>3</sup>/sec capacity, gravity well, and water-stage recorder located on the right bank at latitude 26°50'10", longitude 99°43'50", 3 river kilometres downstream from the confluence of Rio Sabinas with Rio Salado, 10 Kilometres southeast of the town of Las Tortillas, Tamaulipas, and 39.9 river kilometres upstream from Falcon Dam. The zero of the gage is 99.28 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 23 discharge measurements during the year, 19 by the Mexican Section and 4 by the United States Section of the Commission, a stable rating curve up to .72 m<sup>3</sup>/sec, and a continuous record of gage heights. Computations by shifting control methods for flows greater than .72 m<sup>3</sup>/sec. Records available: September 9, 1953 through 1990. Records are also available for a station at old Cd. Guerrero, 35 Kilometres downstream, from 1900 through 1913 and 1923 through September 8, 1953.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 1,840 m<sup>3</sup>/sec on September 16, 1971 with a gage height of 12.31 metres. Min. Frequently no flow. The maximum discharge was measured at the highway bridge 20.9 river kilometres downstream from the station. Extreme flow data for the Rio Salado at Cd. Guerrero prior to September 8, 1953 may be found in previous bulletins.

## Average Flow in Cubic Metres per Second\*\*

|          |      |       |                |           |            |
|----------|------|-------|----------------|-----------|------------|
| Daily:   | Max. | 1,780 | Sept. 16, 1971 | Min. 0    | Frequently |
| Monthly: | Max. | 384   | Sept. 1971     | Min. 0    | Frequently |
| Yearly:  | Max. | 93.6  | 1971           | Min. 1.61 | 1956       |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.   | Feb.   | Mar.   | April  | May    | June   | July   | Aug.   | Sept.  | Oct.   | Nov.  | Dec.  |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|
| 1          | 1.02   | * 1.14 | * 2.18 | 1.73   | 1.42   | 1.46   | 1.59   | * 4.47 | 0.13   | * 11.5 | 0.77  | 0.65  |
| 2          | 1.08   | 1.12   | 4.38   | * 2.78 | * 1.19 | 1.38   | * 1.76 | 5.53   | .03    | 8.06   | .60   | * .85 |
| 3          | * 1.13 | 1.12   | 5.45   | 2.78   | 1.14   | 1.52   | 1.56   | 26.6   | 2.04   | 5.57   | .72   | .78   |
| 4          | 1.13   | 1.08   | 3.55   | 2.54   | .86    | 1.50   | 1.47   | 21.4   | 7.50   | 6.32   | .66   | .58   |
| 5          | 1.13   | 1.04   | 2.94   | 1.95   | .82    | * 1.35 | 1.20   | 6.63   | 7.62   | 6.17   | * .72 | .42   |
| 6          | 1.14   | .92    | 2.88   | 1.43   | .98    | 1.10   | 1.19   | 5.37   | 5.83   | 4.39   | .68   | .40   |
| 7          | 1.14   | .29    | 2.53   | 1.66   | 1.29   | 1.06   | 1.27   | 5.50   | 4.54   | 8.92   | .56   | .43   |
| 8          | 1.14   | .08    | 2.40   | 1.84   | 2.06   | * 1.16 | 1.11   | 4.79   | 3.27   | 3.67   | .86   | .54   |
| 9          | 1.14   | .11    | 2.86   | 1.94   | 1.71   | .87    | 1.45   | 4.07   | 2.90   | 2.83   | 1.10  | .61   |
| 10         | 1.14   | .18    | 2.55   | 1.80   | 1.54   | 1.16   | 1.43   | 3.95   | 2.32   | 2.77   | 1.05  | .49   |
| 11         | 1.15   | .28    | 2.55   | 1.66   | 1.48   | 1.50   | 1.31   | 3.76   | 1.63   | 2.89   | .89   | .49   |
| 12         | 1.15   | .45    | 2.97   | 1.53   | 1.69   | 1.57   | .97    | 3.50   | 1.37   | 2.07   | .69   | .38   |
| 13         | 1.15   | .63    | 3.24   | 1.95   | 1.70   | 1.40   | * .63  | 3.27   | 5.19   | 1.59   | .54   | .42   |
| 14         | 1.15   | .88    | 2.73   | 2.50   | 1.62   | 1.48   | .25    | 3.17   | 11.2   | 1.46   | * .41 | * .77 |
| 15         | 1.16   | 1.14   | * 1.70 | 2.94   | * 1.34 | 1.41   | 6.54   | * 2.64 | 4.77   | * 1.65 | * .71 | .84   |
| 16         | 1.16   | 1.36   | 1.59   | * 3.23 | .91    | 1.44   | 8.92   | 2.75   | * 3.18 | 1.62   | .90   | .81   |
| 17         | 1.16   | 1.40   | 1.82   | 2.57   | 1.08   | 1.62   | 4.23   | 2.67   | * 2.43 | 1.34   | .96   | .50   |
| 18         | 1.16   | 1.36   | 1.32   | 1.84   | 1.03   | * 1.75 | 87.3   | 2.41   | 2.00   | 1.16   | 1.00  | .14   |
| 19         | 1.16   | * 1.38 | 1.34   | 2.00   | .78    | 1.75   | 86.4   | 2.41   | 1.65   | 1.23   | 1.08  | .41   |
| 20         | 1.17   | 1.39   | 1.41   | 2.69   | .90    | 2.31   | 70.5   | 2.52   | 1.60   | .95    | .88   | .28   |
| 21         | 1.17   | 6.24   | 1.06   | 1.38   | 1.33   | 2.74   | 32.0   | 2.38   | 1.33   | .97    | .86   | .12   |
| 22         | 1.17   | 13.5   | .75    | .87    | 1.36   | 1.74   | 50.3   | 2.30   | 1.18   | 1.02   | .90   | .09   |
| 23         | 1.17   | 9.65   | .77    | 1.18   | 1.26   | 1.65   | 17.0   | 1.74   | .93    | .97    | .74   | .06   |
| 24         | 1.17   | 5.46   | .54    | 2.18   | 10.1   | 1.82   | 7.56   | 1.50   | 10.3   | .81    | .74   | .06   |
| 25         | 1.18   | 6.16   | .42    | 3.89   | 4.66   | 2.38   | 4.68   | 1.37   | 8.23   | .82    | .80   | .32   |
| 26         | 1.18   | 3.27   | .91    | 1.77   | 2.27   | 2.24   | 4.92   | .89    | 6.85   | .65    | .79   | .90   |
| 27         | 1.18   | 2.27   | 1.62   | 2.59   | 1.59   | 1.97   | 4.52   | .74    | 3.57   | .78    | .85   | .93   |
| 28         | 1.18   | 2.46   | 2.11   | 2.61   | 1.96   | 1.88   | 4.52   | .77    | 2.28   | .82    | .82   | .85   |
| 29         | 1.18   | 2.55   | 1.67   | 1.86   | 2.09   | 4.48   | 1.09   | 1.98   | .80    | .68    | .66   | .96   |
| 30         | 1.19   | 2.29   | 1.75   | 1.27   | 1.74   | 4.14   | 1.03   | 3.29   | .70    | .73    | .97   | .97   |
| 31         | 1.19   | 1.77   | 1.29   |        |        |        | 4.25   | .69    | .74    |        |       | 1.00  |
| <b>Sum</b> |        | 62.36  |        | 63.25  |        | 49.04  |        | 131.91 |        | 85.24  |       | 17.05 |
|            |        | 35.72  |        | 67.18  |        | 54.49  |        | 419.05 |        | 111.14 |       | 23.69 |

## Current Year 1990

## Period 1954-1990

| Month         | Extreme Gage Metres |       | Extreme-Cubic Metres per Second |      |     | Average | Volume—Thousands of Cubic Metres |         |         |           |        |
|---------------|---------------------|-------|---------------------------------|------|-----|---------|----------------------------------|---------|---------|-----------|--------|
|               | High                | Low   | Day                             | High | Day |         | Total                            | Average | Maximum | Minimum   |        |
| Jan.          | 0                   | 0     | 130                             | 1.19 | 1   | 1.02    | 1.15                             | 3,086   | 11,779  | 73,777    | 0      |
| Feb.          | 8.62                | 6.96  | 22                              | 20.0 | 18  | .06     | 2.23                             | 5,388   | 9,885   | 82,495    | 0      |
| Mar.          | 8.62                | 2.19  | 2                               | 7.26 | 24  | .30     | 2.17                             | 5,804   | 6,030   | 36,622    | 0      |
| Apr.          | 8.62                | .60   | 25                              | 4.98 | 22  | .58     | 2.11                             | 5,465   | 14,834  | 250,371   | 0      |
| May           | 8.62                | 1.36  | 24                              | 19.0 | 5   | .58     | 1.76                             | 4,708   | 33,443  | 447,498   | 0      |
| June          | 0                   | 0     | 21                              | 2.98 | 9   | .87     | 1.63                             | 4,237   | 37,242  | 304,449   | 0      |
| July          | 8.69                | 2.12  | 19                              | 135  | 15  | .09     | 13.5                             | 36,206  | 35,738  | 544,632   | 0      |
| Aug.          | 8.69                | 3.40  | 3                               | 40.4 | 31  | .30     | 4.26                             | 11,397  | 26,583  | 259,069   | 0      |
| Sept.         | 8.69                | 6.65  | 24                              | 16.9 | 2   | .03     | 3.70                             | 9,602   | 106,284 | 996,178   | 2,651  |
| Oct.          | 8.77                | 8.62  | 7                               | 13.8 | 30  | .58     | 2.75                             | 7,365   | 66,591  | 679,326   | 136    |
| Nov.          | 0                   | 0     | 9                               | 1.12 | 113 | .40     | .79                              | 2,047   | 33,968  | 416,916   | 0      |
| Dec.          | 8.77                | 10.28 | 31                              | 1.00 | 123 | .06     | .55                              | 1,473   | 20,718  | 217,216   | 0      |
| <b>Yearly</b> | 8.77                | 0     | =                               | 135  | =   | 0.03    | 3.07                             | 96,778  | 403,091 | 2,961,034 | 50,866 |

\* Discharge measurement made on this day

! And other days

\*\* Period September 1953-1990

## 38-4613.00 RIO GRANDE BELOW FALCON DAM NEAR FALCON, TEXAS

AND NUEVA CO. GUERRERO, TAMAULIPAS

**DESCRIPTION:** The discharges reported below represent water measured as it leaves Falcon Reservoir through turbine penstocks, bypass valves, spillway gates, and leakage. Falcon Dam, astride the Rio Grande, is located at latitude  $26^{\circ}33'35''$ , longitude  $99^{\circ}10'00''$ , and river kilometre 442; about 11.3 kilometres southwest of Falcon, Texas and 139 river kilometres downstream from the old international highway bridge between Laredo, Texas and Nuevo Laredo, Tamaulipas. A gravity well and water-stage recorder located 4.1 river kilometres downstream and a cableway located 1.6 kilometre farther downstream are used to measure the flow of this station at times when spillway gates are in operation.

**RECORDS:** Based on daily Simplex meter records of releases through the six turbines, established rating curves for the four hollow-jet bypass valves, estimates of gate leakage, and measurements of flow at the cable during spillway gate operations. During 1990 there were 5 discharge measurements made by the United States Section of the Commission. Records available: 1958 through 1990. Records are also available from December 17, 1952 through 1957 for a station at Chapeno, 4.1 kilometres downstream, where discharges included arroyo inflow below Falcon Dam, which inflow is eliminated from the records reported below.

**REMARKS:** Computation of flow was made jointly by the United States and Mexican Sections of the Commission from a consolidation of the basic data gathered by each Section incident to the international operation of Falcon Reservoir.

**EXTREME FLOWS FROM RECORDS:** \*\* Momentary: Max. 2,340 m<sup>3</sup>/sec on September 18, 1971. Min. 0.04 m<sup>3</sup>/sec on March 24 and 25, 1957 (at Chapeno gaging station).

## Average Flow in Cubic Metres per Second\*\*

|          |      |       |                |      |      |                     |
|----------|------|-------|----------------|------|------|---------------------|
| Daily:   | Max. | 2,160 | Sept. 18, 1971 | Min. | 0.04 | March 24 & 25, 1957 |
| Monthly: | Max. | 920   | Oct. 1958      | Min. | 0.07 | November 1973       |
| Yearly:  | Max. | 196   | 1958           | Min. | 44.7 | 1970                |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day            | Jan. | Feb. | Mar.            | April          | May            | June | July         | Aug. | Sept.          | Oct. | Nov.    | Dec. |
|----------------|------|------|-----------------|----------------|----------------|------|--------------|------|----------------|------|---------|------|
| 1              | 38.8 | 320  | 7.65            | 102            | 179            | 422  | 129          | 67.4 | 71.9           | 36.5 | 35.4    | 33.4 |
| 2              | 38.8 | 295  | 11.0            | 70.0           | 182            | 399  | 114          | 71.9 | 76.2           | 52.1 | 32.9    | 37.7 |
| 3              | 38.8 | 306  | 23.2            | 74.8           | 197            | 371  | 93.5         | 60.6 | 58.3           | 55.8 | 45.0    | 39.1 |
| 4              | 44.2 | 295  | 11.8            | 94.6           | 206            | 340  | 88.6         | 82.1 | 19.2           | 62.0 | 44.7    | 38.5 |
| 5              | 53.0 | 300  | 3.34            | 99.7           | 207            | 334  | 66.8         | 68.8 | 27.3           | 66.8 | 51.0    | 25.6 |
| 6              | 61.2 | 274  | 13.2            | 99.1           | 205            | 306  | 50.7         | 60.6 | 20.0           | 61.2 | 55.5    | 17.9 |
| 7              | 62.0 | 255  | 23.4            | 99.7           | 178            | 289  | 55.8         | 52.7 | 24.4           | 46.7 | 51.0    | 23.1 |
| 8              | 57.8 | 236  | 19.1            | 106            | 103            | 272  | 44.5         | 51.3 | 38.2           | 29.7 | 30.3    | 32.0 |
| 9              | 52.4 | 204  | 43.6            | 106            | 92.3           | 263  | 51.5         | 48.1 | 39.1           | 30.3 | 13.5    | 33.7 |
| 10             | 73.6 | 186  | 46.2            | 106            | 64.3           | 253  | 51.3         | 22.9 | 33.4           | 38.2 | 11.2    | 43.3 |
| 11             | 73.1 | 183  | 45.3            | 95.2           | 37.9           | 189  | 51.3         | 45.3 | 27.8           | 41.6 | 16.9    | 62.9 |
| 12             | 74.2 | 184  | 39.9            | 72.5           | 37.9           | 182  | 39.4         | 45.6 | 27.4           | 45.0 | 16.9    | 57.8 |
| 13             | 101  | 156  | 35.1            | 66.6           | 37.7           | 163  | 16.7         | 45.0 | 22.7           | 55.8 | 20.8    | 51.8 |
| 14             | 117  | 131  | 29.7            | 83.5           | 39.1           | 151  | 34.6         | 45.6 | 22.5           | 62.6 | 17.6    | 66.0 |
| 15             | 118  | 101  | 28.6            | 90.1           | 53.0           | 168  | 35.4         | 44.7 | 22.7           | 65.7 | 17.4    | 76.2 |
| 16             | 132  | 110  | 33.7            | 90.1           | 111            | 158  | 45.0         | 47.9 | 25.3           | 66.8 | 27.0    | 79.0 |
| 17             | 161  | 105  | 56.6            | 83.5           | 141            | 140  | 46.3         | 42.2 | 28.2           | 61.5 | 33.7    | 70.8 |
| 18             | 181  | 106  | 57.2            | 97.1           | 236            | 139  | 65.4         | 56.4 | 19.5           | 54.7 | 59.1    | 73.9 |
| 19             | 197  | 101  | 60.6            | 98.8           | 312            | 120  | 70.8         | 62.0 | 17.4           | 61.5 | 39.1    | 78.7 |
| 20             | 209  | 39.6 | 56.4            | 105            | 312            | 125  | 59.5         | 65.1 | 26.0           | 61.5 | 32.9    | 84.7 |
| 21             | 220  | 27.3 | 51.0            | 137            | 312            | 126  | 59.5         | 63.4 | 22.4           | 58.6 | 38.8    | 77.9 |
| 22             | 241  | 12.6 | 51.0            | 158            | 312            | 133  | 59.2         | 61.2 | 19.5           | 50.1 | 39.4    | 80.7 |
| 23             | 251  | 3.34 | 56.6            | 157            | 362            | 148  | 60.9         | 60.6 | 21.6           | 53.0 | 34.0    | 80.1 |
| 24             | 286  | 3.34 | 68.0            | 187            | 411            | 159  | 61.2         | 66.0 | 28.6           | 50.1 | 46.4    | 97.1 |
| 25             | 283  | 3.34 | 67.1            | 222            | 428            | 155  | 54.9         | 71.9 | 31.4           | 44.2 | 46.2    | 104  |
| 26             | 303  | 11.7 | 66.6            | 218            | 405            | 153  | 49.3         | 73.3 | 31.7           | 44.5 | 61.0    | 103  |
| 27             | 334  | 11.9 | 72.5            | 223            | 402            | 186  | 61.5         | 78.2 | 34.0           | 55.5 | 45.6    | 121  |
| 28             | 337  | 11.8 | 71.1            | 175            | 402            | 150  | 78.4         | 97.7 | 34.0           | 56.1 | 38.8    | 110  |
| 29             | 357  |      | 55.5            | 175            | 425            | 133  | 79.0         | 112  | 35.1           | 55.8 | 24.6    | 133  |
| 30             | 360  |      | 67.4            | 178            | 473            | 133  | 78.2         | 86.9 | 34.3           | 50.4 | 27.3    | 137  |
| 31             | 340  |      | 86.7            | 425            |                |      | 39.6         | 72.5 |                | 45.0 |         | 130  |
| <b>Sum</b>     |      |      | 3,972.92        | 3,670.3        | 6,220          |      | 1,929.9      |      | 1,619.3        |      | 2,199.9 |      |
| <b>5,195.9</b> |      |      | <b>1,359.09</b> | <b>7,288.2</b> | <b>1,890.8</b> |      | <b>940.1</b> |      | <b>1,024.0</b> |      |         |      |

## Current Year 1990

## Period 1958-1990

| Month         | Extreme Gage Metres |             | Extreme-Cubic Metres per Second |             | Average     | Volume—Thousands of Cubic Metres |                  |                  |                  |
|---------------|---------------------|-------------|---------------------------------|-------------|-------------|----------------------------------|------------------|------------------|------------------|
|               | High                | Low         | Day                             | Day         |             | Total                            | Average          | Maximum          | Minimum          |
| Jan.          |                     |             | 30                              | 360         | 1.1         | 38.8                             | 168              | 448,926          | 260,884          |
| Feb.          |                     |             | 1                               | 320         | 123         | 3.34                             | 142              | 343,260          | 180,849          |
| Mar.          |                     |             | 31                              | 86.7        | 5           | 3.34                             | 43.8             | 117,425          | 159,717          |
| Apr.          |                     |             | 27                              | 223         | 13          | 66.6                             | 122              | 317,114          | 378,452          |
| May           |                     |             | 30                              | 473         | 13          | 37.7                             | 235              | 629,700          | 466,230          |
| June          |                     |             | 1                               | 422         | 19          | 120                              | 207              | 537,408          | 317,096          |
| July          |                     |             | 1                               | 129         | 13          | 16.7                             | 61.0             | 163,365          | 195,458          |
| Aug.          |                     |             | 29                              | 112         | 10          | 22.9                             | 62.3             | 166,743          | 272,197          |
| Sep.          |                     |             | 2                               | 76.2        | 19          | 17.4                             | 31.3             | 81,225           | 212,677          |
| Oct.          |                     |             | 15                              | 66.8        | 8           | 29.7                             | 52.2             | 139,908          | 284,668          |
| Nov.          |                     |             | 6                               | 55.5        | 10          | 11.2                             | 34.1             | 88,474           | 144,822          |
| Dec.          |                     |             | 30                              | 137         | 6           | 17.9                             | 71.0             | 190,071          | 122,716          |
| <b>Yearly</b> | <b>====</b>         | <b>====</b> | <b>473</b>                      | <b>====</b> | <b>3.34</b> | <b>102</b>                       | <b>3,223,619</b> | <b>2,995,766</b> | <b>6,188,898</b> |
|               |                     |             |                                 |             |             |                                  |                  |                  | <b>1,410,843</b> |

\* Discharge measurement made on this day

\* Mean daily

\*\* Period 1968-1990

## 08-4620.00 RIO ALAMO AT CD. MIER, TAMAULIPAS

**DESCRIPTION:** Cableway, reinforced concrete weir of 5 m<sup>3</sup>/sec capacity, gravity well, and water-stage recorder located on the right bank at a point called "El Paso del Cantaro," latitude 26°27'00", longitude 99°09'05", about 1.0 kilometre north of Cd. Mier, Tamaulipas, and 8.0 river kilometres from the confluence with the Rio Grande. This stream enters the Rio at river kilometre 422, 20.0 river kilometres downstream from Falcon Dam. The weir is located about 91 metres downstream from the recorder. The zero of the gage is at mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 1 discharge measurements made at high flows during the year, 1 by the Mexican Section and 0 by the United States Section of the Commission, the weir discharge table at low flows, and a continuous record of gage heights. High flow computations by shifting control methods. Records available: July 1923 through 1990.

**REMARKS:** Small reservoirs and irrigation diversions modify the flow of this spring-fed stream at this station. On June 11, 1952, the zero of the gage was raised 0.40 metres to coincide with the weir crest elevation. Prior to January 1, 1969, the zero of the gage was 57.41 metres above mean sea level, U. S. C. & G. S. datum.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 4,100 m<sup>3</sup>/sec on September 11, 1948 with a gage height of 10.23 metres. Min. periods of no flow have occurred at times during all years of record except 1934, 1935, 1968, 1972, 1974, 1976, 1977, 1979, and 1981.

## Average Flow in Cubic Metres per Second\*\*

|          |      |       |                |      |      |            |
|----------|------|-------|----------------|------|------|------------|
| Daily:   | Max. | 2,470 | Sept. 11, 1948 | Min. | 0    | Frequently |
| Monthly: | Max. | 207   | Sept. 1967     | Min. | 0    | Frequently |
| Yearly:  | Max. | 23.7  | 1967           | Min. | 0.47 | 1929       |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan. | Feb.  | Mar. | April | May  | June | July | Aug.  | Sept. | Oct. | Nov. | Dec. |
|------------|------|-------|------|-------|------|------|------|-------|-------|------|------|------|
| 1          | 0.23 | 0     | 0.03 | 0     | 0.19 | 0    | 0    | 0     | 0     | 0.01 | 0    | 0    |
| 2          | .23  | 0     | .05  | 0     | .11  | 0    | 0    | 28.5  | .21   | 0    | 0    | 0    |
| 3          | .23  | 0     | .04  | 0     | .06  | 0    | 0    | 4,91  | 1.35  | 0    | 0    | 0    |
| 4          | .23  | 0     | .09  | 0     | .03  | 0    | 0    | .88   | .16   | 0    | 0    | 0    |
| 5          | .23  | 0     | .09  | 0     | .03  | 0    | 0    | .23   | 3.30  | .05  | 0    | 0    |
| 6          | .20  | 0     | .06  | 0     | .03  | 0    | 0    | .09   | 1.60  | .21  | 0    | 0    |
| 7          | .20  | 0     | .05  | 0     | .02  | 0    | 0    | .34   | 1.02  | .06  | .51  | 0    |
| 8          | .20  | 0     | .06  | 0     | .02  | 0    | 0    | 1.67  | .61   | .01  | .49  | 0    |
| 9          | .22  | 0     | .07  | 0     | 0    | 0    | 0    | 2.33  | .40   | .06  | .04  | 0    |
| 10         | .23  | 0     | .07  | 0     | 0    | 0    | 0    | 5.66  | * .23 | .03  | 0    | 0    |
| 11         | .23  | 0     | .07  | 0     | 0    | 0    | 0    | 2.73  | .13   | .01  | 0    | 0    |
| 12         | .23  | 0     | .07  | 0     | 0    | 0    | 0    | 1.39  | .08   | 0    | 0    | 0    |
| 13         | .43  | 0     | .05  | 0     | 0    | 0    | 0    | 1.31  | 1.07  | 0    | 0    | 0    |
| 14         | .20  | 0     | .03  | 0     | 0    | 0    | 0    | 1.06  | .87   | 0    | 0    | 0    |
| 15         | .19  | 0     | 0    | 0     | 0    | 0    | 0    | .63   | .25   | 0    | 0    | 0    |
| 16         | .16  | 0     | 0    | 0     | 0    | 0    | 0    | .37   | .12   | 0    | 0    | 0    |
| 17         | .13  | 0     | 0    | 0     | 0    | 0    | 0    | .19   | .03   | 0    | 0    | 0    |
| 18         | .12  | 0     | 0    | 0     | 0    | 0    | 0    | .07   | .01   | 0    | 0    | 0    |
| 19         | .12  | 0     | 0    | 0     | 0    | 0    | 0    | .01   | .03   | 0    | 0    | 0    |
| 20         | .09  | 1.09  | 0    | 0     | 0    | 0    | 0    | 0     | 1.39  | 0    | 0    | 0    |
| 21         | .07  | 34.0  | 0    | 0     | 0    | 0    | 0    | 0     | .56   | 0    | 0    | 0    |
| 22         | .07  | 10.2  | 0    | 0     | 0    | 0    | 0    | 0     | .26   | 0    | 0    | 0    |
| 23         | .07  | .82   | 0    | 1.21  | 0    | 0    | 0    | 0     | 39.2  | 0    | 0    | 0    |
| 24         | .07  | .33   | 0    | 1.25  | 0    | 0    | 0    | 0     | 5.25  | 0    | 0    | 0    |
| 25         | .06  | .17   | 0    | .61   | 0    | 0    | 0    | 0     | 3.40  | 0    | 0    | 0    |
| 26         | .05  | .10   | 0    | .18   | 0    | 0    | 0    | 0     | 1.15  | 0    | 0    | 0    |
| 27         | .05  | .04   | 0    | 3.64  | 0    | 0    | 0    | 0     | .48   | 0    | 0    | 0    |
| 28         | .05  | .01   | 0    | 4.36  | 0    | 0    | 0    | 0     | .30   | 0    | 0    | 0    |
| 29         | .05  | 0     | 0    | 1.68  | 0    | 0    | 0    | 0     | .08   | 0    | 0    | 0    |
| 30         | .06  | 0     | 0    | .65   | 0    | 0    | 0    | 0     | .03   | 0    | 0    | 0    |
| 31         | .07  | 0     | 0    | 0     | 0    | 0    | 0    | 0     | 0     | 0    | 0    | 0    |
| <b>Sum</b> |      | 46.76 |      | 13.58 |      | 0    |      | 52.37 |       | 0.44 |      | 0    |
|            | 4.77 |       | 0.83 |       | 0.49 |      | 0    |       | 63.57 |      | 1.04 |      |

## Current Year 1990

## Period 1924-1990

| Month         | Extreme Gage Metres |       |     | Extreme-Cubic Metres per Second |      |      | Average | Volume - Thousands of Cubic Metres |         |         |         |
|---------------|---------------------|-------|-----|---------------------------------|------|------|---------|------------------------------------|---------|---------|---------|
|               | High                | Low   | Day | High                            | Day  | Low  |         | Total                              | Average | Maximum | Minimum |
| Jan.          | 57.46               | 57.42 | 13  | 0                               | 0.43 | 1.25 | 0.05    | 0.15                               | 412     | 3,719   | 43,048  |
| Feb.          | 58.65               | 57.40 | 21  | 77.0                            | 1 1  | 0    | 1.67    | 4,040                              | 3,811   | 65,959  | 0       |
| Mar.          | 57.43               | 57.41 | 1 1 | .10                             | 1 1  | 0    | .03     | 71.7                               | 2,771   | 24,423  | 0       |
| Apr.          | 57.93               | 0     | 23  | 10.9                            | 1    | 0    | .45     | 1,173                              | 6,879   | 44,664  | 0       |
| May           | 57.47               | 57.41 | 1   | .30                             | 1 8  | 0    | .02     | 42.3                               | 13,881  | 168,987 | 0       |
| June          | 0                   | 0     | 1 1 | 0                               | 1 1  | 0    | 0       | 0                                  | 14,501  | 102,663 | 0       |
| July          | 0                   | 0     | 1 1 | 0                               | 1 1  | 0    | 0       | 0                                  | 8,775   | 76,779  | 0       |
| Aug.          | 58.60               | 57.41 | 2   | 70.5                            | 120  | 0    | 1.69    | 4,525                              | 18,017  | 253,727 | 0       |
| Sept.         | 58.57               | 57.38 | 23  | 66.9                            | 1 1  | 0    | 2.12    | 5,492                              | 45,756  | 535,808 | 167     |
| Oct.          | 57.47               | 57.40 | 5   | .30                             | 1 2  | 0    | .01     | 38.0                               | 20,307  | 238,925 | 0       |
| Nov.          | 57.68               | 57.40 | 7   | 2.82                            | 1 1  | 0    | .03     | 89.9                               | 4,745   | 31,041  | 0       |
| Dec.          | 0                   | 0     | 1 1 | 0                               | 1 1  | 0    | 0       | 0                                  | 3,866   | 19,713  | 0       |
| <b>Yearly</b> | 58.65               | 0     | =   | 77.0                            | =    | 0    | 0.50    | 15,884                             | 147,028 | 747,092 | 14,677  |

\* Discharge measurement made on this day

0 Mean daily

! And other days

\*\* Period 1924-1990

## 38-4312.00 RIO SAN JUAN AT CAMARGO, TAMAULIPAS

**DESCRIPTION:** Cableway, gravity well, and water-stage recorder located on the left bank opposite Camargo, Tamaulipas at latitude  $26^{\circ}18'40''$ , longitude  $98^{\circ}50'15''$ , 5.0 river kilometres from the confluence with the Rio Grande, and 15.0 river kilometres downstream from Marte R. Gomez Dam. This stream enters the Rio Grande at river Kilometre 384; 6.0 river kilometres upstream from the Rio Grande gaging station at Rio Grande City, 58.1 river kilometres downstream from Falcon Dam. The zero is at mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 20 discharge measurements during the year, 20 by the Mexican Section and 0 by the United States Section of the Commission, and a continuous record of gage heights. Computations by shifting control methods. Discharge prorated between measurements during times of extremely low flow. Records available: January 1954 through 1990.

**REMARKS:** Except for storm inflow, diversions, and drainage returns below Marte R. Gomez Dam, the flow at this station is controlled by spills from Marte R. Gomez Reservoir and leakage through the dam. Backwater from the Rio Grande frequently reaches this station. Prior to July 1, 1968 the zero of the gage was 39.76 metres above mean sea level, U. S. C. & G. S. datum.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 3,270 m<sup>3</sup>/sec on September 25, 1967 with a gage height of 12.81 metres. Min. no flow on several occasions in 1989 and 1990.

## Average Flow in Cubic Metres per Second

|          |      |       |                |      |      |                         |
|----------|------|-------|----------------|------|------|-------------------------|
| Daily:   | Max. | 3,250 | Sept. 25, 1967 | Min. | 0    | July 5, & Sept. 4, 1989 |
| Monthly: | Max. | 894   | Sept. 1967     | Min. | 0    | July 1990               |
| Yearly:  | Max. | 113   | 1967           | Min. | 0.05 | 1990                    |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.  | Feb.  | Mar.  | April | May   | June   | July | Aug.  | Sept. | Oct.  | Nov.  | Dec. |
|------------|-------|-------|-------|-------|-------|--------|------|-------|-------|-------|-------|------|
| 1          | 0.05  | 0.14  | 0.06  | 0.06  | 0.10  | * 0.07 | 0.01 | 0     | 0.11  | 0.04  | 0.01  | 0.01 |
| 2          | .05   | * .14 | * .06 | .06   | .09   | .07    | 0    | 0     | .11   | * .03 | 0     | .01  |
| 3          | .05   | .13   | .06   | * .06 | .09   | .07    | 0    | 0     | .12   | .03   | 0     | .01  |
| 4          | .06   | .13   | .06   | .06   | .08   | .07    | 0    | 0     | * .13 | .03   | 0     | .01  |
| 5          | .06   | .12   | .06   | .06   | .08   | .07    | 0    | 0     | .14   | .03   | 0     | .01  |
| 6          | .06   | .12   | .06   | .06   | .08   | .07    | 0    | 0     | .14   | .03   | 0     | .01  |
| 7          | .06   | .11   | .06   | .07   | .07   | .07    | 0    | 0     | .14   | .03   | 0     | .01  |
| 8          | .05   | .11   | .06   | .07   | .07   | .07    | 0    | 0     | .15   | .03   | 0     | 0    |
| 9          | * .06 | .10   | .06   | .07   | .07   | .06    | 0    | 0     | .16   | .03   | .01   | 0    |
| 10         | .06   | .09   | .06   | .07   | .06   | .06    | 0    | 0     | .16   | .02   | .01   | 0    |
| 11         | .06   | .09   | .06   | .07   | .06   | .06    | 0    | 0     | .16   | .02   | .01   | 0    |
| 12         | .07   | .08   | .06   | .07   | .05   | .06    | 0    | 0     | .17   | .02   | .01   | 0    |
| 13         | .07   | .08   | .06   | .07   | .05   | .06    | 0    | 0     | .18   | .02   | .01   | 0    |
| 14         | .07   | .07   | .06   | .08   | .05   | .06    | 0    | 0     | .18   | .02   | .02   | 0    |
| 15         | .07   | .07   | .06   | .08   | .04   | .06    | 0    | 0     | .18   | .02   | .02   | 0    |
| 16         | .07   | * .06 | * .06 | .08   | * .04 | .06    | 0    | 0     | .19   | .02   | * .02 | 0    |
| 17         | .08   | * .06 | .06   | .08   | * .04 | .06    | 0    | 0     | .20   | * .02 | * .02 | 0    |
| 18         | .08   | .06   | .06   | .08   | .04   | .06    | 0    | 0     | .20   | .02   | * .02 | 0    |
| 19         | * .08 | .06   | .06   | .08   | .05   | * .06  | 0    | 0     | .20   | .02   | * .02 | 0    |
| 20         | .08   | .06   | .06   | .08   | .05   | .06    | 0    | * .01 | * .21 | .02   | * .02 | 0    |
| 21         | .09   | .06   | .06   | .09   | .05   | .05    | 0    | .02   | .20   | .02   | .02   | .01  |
| 22         | .09   | .06   | .06   | .09   | .05   | .05    | 0    | .03   | .18   | .01   | .02   | .01  |
| 23         | .10   | .06   | .06   | .09   | .05   | .04    | 0    | .03   | .17   | .02   | .01   | .01  |
| 24         | .10   | .06   | .06   | .09   | .06   | .04    | 0    | .04   | .15   | .01   | .01   | .01  |
| 25         | .11   | .06   | .06   | .09   | .06   | .03    | 0    | .05   | .14   | .01   | .01   | .01  |
| 26         | .11   | .06   | .06   | .09   | .06   | .03    | 0    | .06   | .12   | .01   | .01   | .01  |
| 27         | .11   | .06   | .06   | .10   | .06   | .03    | 0    | .07   | .11   | .01   | .01   | .01  |
| 28         | .12   | .06   | .06   | .10   | .06   | .02    | 0    | .07   | .09   | .01   | .01   | .01  |
| 29         | .12   | .06   | .06   | .10   | .06   | .02    | 0    | .08   | .08   | .01   | .01   | .01  |
| 30         | .13   | .06   | * .10 | .07   | .01   | 0      | 0    | .09   | .06   | .01   | * .01 | .01  |
| 31         | .13   | .06   | .06   | .07   | .01   | .07    | 0    | .10   | .01   | .01   |       | .01  |
| <b>Sum</b> |       | 2.36  |       | 2.36  |       | 1.60   |      | 0.65  |       | 0.63  |       | 0.18 |
|            | 2.51  |       | 1.86  |       | 1.91  |        | 0.01 |       | 4.53  |       | 0.32  |      |

## Current Year 1990

## Period 1954-1990

| Month         | Extreme Gage Metres |     | Extreme-Cubic Metres per Second |      |     |      | Average | Volume—Thousands of Cubic Metres |         |           |         |  |
|---------------|---------------------|-----|---------------------------------|------|-----|------|---------|----------------------------------|---------|-----------|---------|--|
|               |                     |     | High                            |      | Low |      |         | Total                            | Average | Maximum   | Minimum |  |
|               | High                | Low | Day                             | Day  | Day | Day  |         |                                  |         |           |         |  |
| Jan.          |                     |     | 130                             | 0.13 | 1 1 | 0.05 | 0.08    | 217                              | 11,198  | 118,255   | 109     |  |
| Feb.          |                     |     | 1                               | .14  | 116 | .06  | .08     | 204                              | 6,612   | 79,341    | 89.9    |  |
| Mar.          |                     |     | 1                               | .06  | 1 1 | .06  | .06     | 161                              | 3,384   | 30,236    | 86.3    |  |
| Apr.          |                     |     | 127                             | .10  | 1 1 | .06  | .08     | 204                              | 3,020   | 44,252    | 189     |  |
| May           |                     |     | 1                               | .10  | 115 | .04  | .06     | 165                              | 4,135   | 35,412    | 90.0    |  |
| June          |                     |     | 1                               | .07  | 30  | .01  | .05     | 138                              | 17,832  | 412,732   | 92.0    |  |
| July          |                     |     | 1                               | .01  | 1 2 | 0    | 0       | 9                                | 30,980  | 421,146   | .9      |  |
| Aug.          |                     |     | 31                              | .10  | 1 1 | 0    | .02     | 56.2                             | 22,918  | 337,855   | 56.2    |  |
| Sept.         |                     |     | 20                              | .21  | 30  | .06  | .15     | 391                              | 140,088 | 2,316,975 | 76.8    |  |
| Oct.          |                     |     | 1                               | .04  | 122 | .01  | .02     | 54.4                             | 119,534 | 1,111,982 | 54.4    |  |
| Nov.          |                     |     | 114                             | .02  | 1 2 | 0    | .01     | 27.6                             | 33,111  | 283,824   | 27.6    |  |
| Dec.          |                     |     | 1                               | .01  | 1 8 | 0    | .01     | 15.6                             | 19,769  | 190,900   | 15.6    |  |
| <b>Yearly</b> |                     |     | =                               | 0.21 | =   | 0    | 0.05    | 1,635                            | 412,581 | 3,566,105 | 1,635   |  |

\* Discharge measurement made on this day

θ Mean daily

! And other days

## CONTRIBUTIONS TO THE RIO GRANDE FROM

## THE LOWER RIO SAN JUAN IRRIGATION DISTRICT

## FALCON DAM TO RIO GRANDE CITY

**DESCRIPTION:** The Lower Rio San Juan Irrigation District in Mexico lies along the Rio Grande between Cd. Miguel Aleman and Rio Bravo, Tamaulipas and is irrigated with water impounded by Marte R. Gomez Dam situated on the Rio San Juan 20.0 river kilometres upstream from the confluence with the Rio Grande. The Rio San Juan enters the Rio Grande at river kilometre 384. Drain water from this irrigation district enters the Rio Grande between Falcon Dam and the Rio Grande City Gaging Station through the Rio San Juan channel, Rancherias Drain, and Los Fresnos Drain; and between the Rio Grande City Station and Anzalduas Dam through Puertecitos, Los Indios, Huizache, and Morillo Drains. Only the portion of water reaching the Rio Grande via drains located upstream from the Rio Grande City Gaging Station is shown below. Drain water reaching the Rio Grande through the Rio San Juan channel is included in the Rio San Juan tabulation.

**RECORDS:** Water entering the Rio Grande through the Rio San Juan Channel, composed of spills and leakage from Marte R. Gomez Dam, storm inflow and drainage below the dam, is measured at the Rio San Juan Gaging Station at Camargo, Tamaulipas, 5.0 river kilometres upstream from the confluence with the Rio Grande. The discharge through Rancherias Drain was determined by prorating between 22 current meter measurements made during the year. There were no drainage flows through Los Fresnos Drain in 1990. All storm water measured at these two drains was deducted and is not included in the tabulation below. Records available: 1953 through 1990. Records prior to 1976 include Rio San Juan flow.

Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.  | Feb.   | Mar.  | April | May   | June   | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|------------|-------|--------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|
| 1          | 0.94  | * 0.61 | 0.18  | 0.22  | 0.25  | * 0.20 | 0.20  | 0.05  | 0.18  | 0.06  | 0.06  | 0.02  |
| 2          | .94   | * .64  | * .18 | .22   | .26   | .20    | .20   | * .04 | .19   | * .04 | .06   | .03   |
| 3          | .04   | .61    | .18   | * .22 | .26   | .20    | * .20 | .04   | .20   | .04   | .06   | .03   |
| 4          | .04   | .58    | .18   | .22   | .27   | .20    | .19   | .04   | * .21 | .04   | .06   | .03   |
| 5          | .04   | .55    | .18   | .22   | .27   | .20    | .18   | .04   | * .22 | .04   | .06   | .03   |
| 6          | .04   | .51    | .19   | .22   | .28   | .21    | .17   | .04   | .22   | .05   | * .06 | .04   |
| 7          | .04   | .48    | .19   | .22   | .28   | .21    | .17   | .04   | .23   | .05   | .06   | .04   |
| 8          | .04   | .45    | .19   | .23   | .28   | .21    | .16   | .04   | .24   | .05   | .06   | .04   |
| 9          | * .04 | .42    | .19   | .23   | .29   | .21    | .15   | .04   | .24   | .05   | .05   | .05   |
| 10         | .06   | .39    | .19   | .23   | .29   | .21    | .14   | .04   | .25   | .05   | .05   | .05   |
| 11         | .07   | .36    | .19   | .23   | .30   | .21    | .13   | .04   | .26   | .05   | .05   | .05   |
| 12         | .09   | .33    | .19   | .23   | .30   | .21    | .12   | .04   | .26   | .05   | .05   | .05   |
| 13         | .10   | .29    | .20   | .23   | .31   | .21    | .11   | .04   | .27   | .05   | .05   | .06   |
| 14         | .12   | .26    | .20   | .23   | .31   | .21    | .11   | .04   | .28   | .06   | .04   | * .06 |
| 15         | .14   | .23    | .20   | .23   | .32   | .22    | .10   | .04   | .29   | .06   | .04   | .06   |
| 16         | .15   | * .20  | * .20 | .23   | * .32 | .22    | .09   | .04   | .29   | .06   | * .04 | .06   |
| 17         | .17   | .20    | .20   | .24   | .31   | .22    | * .08 | .04   | .30   | * .06 | .04   | .06   |
| 18         | .18   | .20    | .20   | .24   | .31   | .22    | .08   | .04   | .31   | .06   | .04   | .06   |
| 19         | * .20 | .20    | .20   | .24   | .30   | .22    | .08   | .04   | .31   | .06   | .04   | .06   |
| 20         | .23   | .19    | .20   | .24   | .29   | .22    | .07   | * .04 | * .32 | .06   | .03   | .06   |
| 21         | .26   | .19    | .21   | .24   | .28   | .22    | .07   | .05   | .30   | .06   | .03   | .05   |
| 22         | .29   | .19    | .21   | .24   | .28   | .22    | .07   | .06   | .27   | .06   | .03   | .05   |
| 23         | .32   | .19    | .21   | .24   | .27   | .21    | .07   | .07   | .25   | .06   | .03   | .05   |
| 24         | .36   | .19    | .21   | .24   | .26   | .21    | .06   | .09   | .23   | .06   | .03   | .05   |
| 25         | .39   | .19    | .21   | .24   | .25   | .21    | .06   | .10   | .20   | .06   | .03   | .05   |
| 26         | .42   | .19    | .21   | .25   | .25   | .21    | .06   | .11   | .18   | .06   | .03   | .05   |
| 27         | .45   | .18    | .21   | .25   | .24   | .21    | .06   | .12   | .16   | .06   | .02   | .05   |
| 28         | .48   | .18    | .21   | .25   | .23   | .21    | .05   | .13   | .13   | .06   | .02   | .05   |
| 29         | .51   | .21    | .25   | .25   | .22   | .21    | .05   | .14   | .11   | .06   | .02   | .05   |
| 30         | .55   | .22    | * .25 | .25   | .22   | .20    | .05   | .15   | .09   | .06   | * .02 | .05   |
| 31         | .58   | .22    | .25   | .21   | .05   | .05    | .16   | .06   | .06   | .06   | .05   | .05   |
| <b>Sum</b> | 9.20  | 7.02   | 6.32  | 1.99  | 1.70  | 1.49   |       |       |       |       |       |       |
|            | 6.48  | 6.16   | 8.51  | 3.38  | 6.99  | 1.26   |       |       |       |       |       |       |

## Current Year 1990

## Period 1954-1990

| Month         | Extreme Gage Metres |     | Extreme-Cubic Metres per Second |             | Average | Volume—Thousands of Cubic Metres |             |              |              |              |            |
|---------------|---------------------|-----|---------------------------------|-------------|---------|----------------------------------|-------------|--------------|--------------|--------------|------------|
|               | High                | Low | Day                             | High        | Low     | Total                            | Average     | Maximum      | Minimum      |              |            |
| Jan.          |                     |     | 31                              | 0.58        | 1       | 0.04                             | 0.21        | 560          | 296          | 1,127        | 0          |
| Feb.          |                     |     | 2                               | .64         | 27      | .18                              | .33         | 795          | 431          | 1,157        | 0          |
| Mar.          |                     |     | 30                              | .22         | 1       | .18                              | .20         | 532          | 319          | 962          | 31.9       |
| Apr.          |                     |     | 16                              | .25         | 1       | .22                              | .23         | 607          | 406          | 1,338        | 23.9       |
| May           |                     |     | 15                              | .32         | 31      | .21                              | .27         | 735          | 784          | 1,777        | 77.1       |
| June          |                     |     | 15                              | .22         | 1       | .20                              | .21         | 546          | 703          | 1,560        | 68.7       |
| July          |                     |     | 1                               | .20         | 28      | .05                              | .11         | 292          | 343          | 692          | 40.1       |
| Aug.          |                     |     | 31                              | .16         | 2       | .04                              | .06         | 172          | 262          | 612          | 32.1       |
| Sept.         |                     |     | 20                              | .32         | 30      | .09                              | .23         | 604          | 295          | 1,296        | 19.1       |
| Oct.          |                     |     | 1                               | .06         | 2       | .04                              | .05         | 147          | 264          | 1,321        | 23.9       |
| Nov.          |                     |     | 1                               | .06         | 27      | .02                              | .04         | 109          | 210          | 783          | 8.0        |
| Dec.          |                     |     | 13                              | .06         | 1       | .02                              | .05         | 129          | 182          | 636          | 22.0       |
| <b>Yearly</b> |                     |     |                                 | <b>0.64</b> |         | <b>0.02</b>                      | <b>0.17</b> | <b>5,228</b> | <b>4,495</b> | <b>8,237</b> | <b>611</b> |

\* Discharge measurement made on this day

® Mean daily

! And other days

08-4646.00 DIVERIONS FROM THE RIO GRANDE  
UNITED STATES SIDE, FALCON DAM TO RIO GRANDE CITY

Beginning June 1971, the Texas Water Rights Commission, now the Texas Water Commission, assumed control of the United States portion of the water in Falcon Reservoir and in the Rio Grande below Falcon Dam, the disposition of such waters being made by its Rio Grande Watermaster. Previous to that, since June 1956, such waters had been under the jurisdiction of the 93rd District Court of Texas administered by its Special Water Master.

During 1990, 1,799 irrigable hectares and several towns and rural homes were allotted Rio Grande water in the river reach between Falcon Dam and the Rio Grande City gaging station. Such irrigable area was 0.6% of the total irrigable area below Falcon Dam allotted Rio Grande water.

The total diversion during 1990 in this river reach was 17,800,000 m<sup>3</sup>, or 1.1% of the total water diverted from the Rio Grande below Falcon Dam. Records of diversions in this river reach were determined by means of flow meters. More than one crop per year is often grown on parts of this land.

Records prior to 1976 were published under the title "Diversions from the Rio Grande, United States Side-Falcon Dam to Fort Ringgold."

## EXTREME FLOWS FROM RECORDS:

|          |      | Average Flow in Cubic Metres per Second |                 |  |           |              |  |
|----------|------|---|-----------------|--|-----------|--------------|--|
| Daily:   | Max. | 3.51                                    | April 6-9, 1984 |  | Min. 0    | Occasionally |  |
| Monthly: | Max. | 1.58                                    | April 1984      |  | Min. 0.06 | March 1957   |  |
| Yearly:  | Max. | 0.65                                    | 1989            |  | Min. 0.20 | 1968         |  |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.  | Feb.         | Mar.  | April        | May   | June         | July  | Aug.         | Sept. | Oct.         | Nov.  | Dec.         |
|------------|-------|--------------|-------|--------------|-------|--------------|-------|--------------|-------|--------------|-------|--------------|
| 1          | .044  | 0.80         | 0.30  | 0.32         | 0.93  | 1.23         | 0.47  | 0.48         | 1.24  | 0.58         | 1.24  | 1.67         |
| 2          | .57   | .98          | .32   | .47          | .98   | 1.08         | .43   | .56          | .27   | .53          | 1.20  | .42          |
| 3          | .43   | .99          | .23   | .62          | .88   | .68          | .33   | .51          | .24   | .54          | 1.44  | .53          |
| 4          | .43   | .83          | .20   | .66          | .99   | .86          | .29   | .54          | .29   | .58          | .54   | .69          |
| 5          | .46   | .98          | .43   | .67          | .52   | .65          | .37   | .28          | .37   | .46          | .63   | .62          |
| 6          | .52   | 1.01         | .55   | .78          | .36   | .67          | .41   | .52          | .34   | .24          | .54   | .64          |
| 7          | .42   | .97          | .69   | .73          | .38   | .61          | .37   | .47          | .39   | .21          | .42   | .58          |
| 8          | .40   | 1.01         | .64   | .33          | .27   | .74          | .31   | .44          | .38   | .47          | .36   | .46          |
| 9          | .50   | .95          | .72   | .45          | .32   | .58          | .51   | .46          | .35   | .39          | .33   | .32          |
| 10         | .72   | 1.12         | .96   | .64          | .28   | .46          | .47   | .43          | .28   | .26          | .26   | .57          |
| 11         | .76   | .93          | .73   | .86          | .38   | .47          | .56   | .28          | .27   | .42          | .19   | .63          |
| 12         | .84   | 1.24         | .92   | .84          | .56   | .52          | .35   | .25          | .38   | .46          | .22   | .70          |
| 13         | .92   | 1.14         | .95   | .70          | .58   | .78          | .40   | .33          | .36   | .56          | .29   | .67          |
| 14         | .53   | 1.20         | .73   | .49          | .70   | .61          | .42   | .31          | .44   | .46          | .37   | .79          |
| 15         | .79   | 1.44         | .86   | .18          | .60   | .60          | .26   | .55          | .46   | .62          | .52   | .66          |
| 16         | .73   | 1.12         | 1.23  | .35          | .67   | .61          | .31   | .58          | .29   | .71          | .56   | .54          |
| 17         | .75   | .93          | 1.01  | .98          | .87   | .50          | .35   | .53          | .38   | .58          | .48   | .61          |
| 18         | .81   | .54          | .80   | 1.07         | .85   | .87          | .38   | .39          | .33   | .59          | .33   | .61          |
| 19         | .85   | .50          | 1.10  | 1.10         | .84   | .86          | .33   | .39          | .33   | .58          | .56   | .76          |
| 20         | .86   | .45          | 1.01  | 1.33         | .84   | .63          | .30   | .46          | .35   | .64          | .56   | .65          |
| 21         | .50   | .31          | 1.02  | .76          | .94   | .80          | .34   | .50          | .35   | .56          | .49   | .64          |
| 22         | .73   | .29          | .95   | .62          | .98   | 1.11         | .27   | .62          | .28   | .66          | .26   | .45          |
| 23         | .82   | .27          | 1.24  | .76          | .90   | .94          | .59   | .57          | .24   | .83          | .41   | .42          |
| 24         | .86   | .32          | 1.03  | .85          | .81   | .62          | .55   | .61          | .30   | .77          | .52   | .34          |
| 25         | .96   | .13          | .79   | .75          | 1.11  | 1.01         | .62   | .46          | .24   | .82          | .04   | .34          |
| 26         | .85   | .13          | .77   | .54          | 1.03  | .91          | .59   | .01          | .38   | .96          | .04   | .34          |
| 27         | .64   | .13          | .65   | .60          | .01   | .97          | .56   | .01          | .42   | .84          | .04   | .46          |
| 28         | .17   | .13          | .93   | .53          | .01   | .90          | .66   | .01          | .69   | .05          | .04   | .50          |
| 29         | .01   |              | 1.49  | 0            | .01   | 1.14         | 0     | .01          | .53   | .05          | .04   | .57          |
| 30         | .01   |              | 1.50  | 0            | .01   | .74          | 0     | .01          | 0     | .05          | .04   | .03          |
| 31         | .01   |              | 1.32  |              | .01   | 0            | .01   |              | 0     |              |       | .03          |
| <b>Sum</b> |       | <b>20.84</b> |       | <b>18.98</b> |       | <b>23.15</b> |       | <b>11.58</b> |       | <b>15.47</b> |       | <b>17.24</b> |
|            | 18.29 |              | 26.07 |              | 18.62 |              | 11.80 |              | 11.17 |              | 12.96 |              |

## Current Year 1990

## Period 1957-1990

| Month         | Average Rainfall**<br>Millimetres |            | Extreme-Cubic Metres per Second |             |           | Average  | Volume-Thousands of Cubic Metres |               |               |               |              |
|---------------|-----------------------------------|------------|---------------------------------|-------------|-----------|----------|----------------------------------|---------------|---------------|---------------|--------------|
|               | 1990                              | 1957-1990  | Day                             |             | High      |          | Total                            | Average       | Maximum       | Minimum       |              |
|               |                                   |            | Day                             | Day         | Day       | Day      |                                  |               |               |               |              |
| Jan.          | 5                                 | 25         | 25                              | 0.96        | 29        | 0.01     | 0.59                             | 1,580         | 903           | 1,828         | 196          |
| Feb.          | 75                                | 28         | 15                              | 1.44        | 25        | .13      | .74                              | 1,801         | 1,086         | 2,198         | 275          |
| Mar.          | 29                                | 13         | 30                              | 1.50        | 4         | .20      | .84                              | 2,252         | 1,487         | 2,379         | 549          |
| Apr.          | 58                                | 38         | 20                              | 1.33        | 29        | 0        | .63                              | 1,640         | 1,637         | 4,088         | 440          |
| May           | 13                                | 66         | 25                              | 1.11        | 127       | .01      | .60                              | 1,609         | 1,222         | 3,237         | 260          |
| June          | 1                                 | 64         | 1                               | 1.23        | 10        | .46      | .77                              | 2,000         | 1,163         | 3,217         | 258          |
| July          | 63                                | 39         | 28                              | .66         | 129       | 0        | .38                              | 1,020         | 915           | 1,703         | 343          |
| Aug.          | 94                                | 61         | 22                              | .62         | 126       | .01      | .37                              | 1,001         | 869           | 1,798         | 343          |
| Sept.         | 69                                | 115        | 1                               | 1.28        | 30        | 0        | .37                              | 965           | 740           | 1,745         | 220          |
| Oct.          | 28                                | 42         | 26                              | .96         | 31        | 0        | .50                              | 1,337         | 1,002         | 2,109         | 448          |
| Nov.          | 65                                | 27         | 3                               | 1.44        | 125       | .04      | .43                              | 1,120         | 758           | 1,793         | 260          |
| Dec.          | 2                                 | 23         | 1                               | 1.67        | 130       | .03      | .56                              | 1,490         | 702           | 1,490         | 179          |
| <b>Yearly</b> | <b>502</b>                        | <b>547</b> | <b>==</b>                       | <b>1.67</b> | <b>==</b> | <b>0</b> | <b>0.56</b>                      | <b>17,815</b> | <b>12,484</b> | <b>20,497</b> | <b>6,154</b> |

0 Mean daily

! And other days

\*\* United States side - average of several stations in the reach

08-4647.00 RIO GRANDE AT RIO GRANDE CITY, TEXAS  
NEAR CAMARGO, TAMAULIPAS

**DESCRIPTION:** Cableway, bubbler gage, gravity well, water-stage recorders (graphic and digital), and digital transmitter located on the left bank at Fort Ringgold, latitude 26°22'00", longitude 98°48'10", and river kilometre 378; about 1.6 kilometre downstream from Rio Grande City, Texas, and 6.0 river kilometres downstream from Rio San Juan. The zero of the gage is 30.48 metres above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 23 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: January 1955 through 1990. Records prior to 1976 were published under the title "Rio Grande at Fort Ringgold, Rio Grande City, Texas." Records composed of the addition of discharges of the Rio Grande at Roma, Texas and the Rio San Juan at Santa Rosalia, Tamaulipas are available for May, June, and October 1914; September 1916; September and October 1917; October 1918; September and October 1919; August and September 1920; June 1922; September 1923; and 1924 through 1931. Records are also available for the station "Rio Grande near Rio Grande City" 4.8 kilometres downstream, for 1932 through 1954.

**REMARKS:** Reservoirs, diversions, and drainage returns modify the river flow at this station. Except for tributary inflows and intervening diversions below Falcon Dam, flow at this station is controlled largely by releases from Falcon Reservoir, 64.1 river kilometres upstream. The transmitter relays gage height data via radio to the Meroedes Office of the Commission, and to the Anzalduas Dam control room, where it is recorded automatically.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 6,230 m<sup>3</sup>/sec on September 22 and 23, 1967 with a gage height of 18.71 metres. Min. no flow occurred several days in June and July 1953.

Average Flow in Cubic Metres per Second\*\*

|          |      |       |                |      |      |               |
|----------|------|-------|----------------|------|------|---------------|
| Daily:   | Max. | 5,860 | Sept. 23, 1967 | Min. | 0.36 | March 5, 1985 |
| Monthly: | Max. | 1,400 | Oct. 1958      | Min. | 6.66 | March 1957    |
| Yearly:  | Max. | 259   | 1958           | Min. | 49.6 | 1970          |

**Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary**

| Day        | Jan.   | Feb.     | Mar.   | April   | May    | June    | July   | Aug.    | Sept.  | Oct.    | Nov.   | Dec.    |
|------------|--------|----------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| 1          | 51.0   | 343      | 16.5   | 88.6    | 166 *  | 402 *   | 125    | 62.3    | 79.9   | 46.4    | 49.0   | 22.8    |
| 2          | * 49.8 | 334      | 14.6   | * 92.6  | 167    | 394     | 123    | 84.7    | 86.1   | 49.8    | * 39.1 | 37.9    |
| 3          | 50.4   | 323      | 11.8   | 77.6    | 175    | 374     | 108    | 96.9    | 91.2   | 64.9    | 32.6   | * 46.7  |
| 4          | 51.3   | 314      | 26.3   | 80.7    | 180    | 357     | 93.2   | 85.0    | 71.6   | 70.0    | 43.9   | 46.7    |
| 5          | 52.1   | 303 *    | 18.8   | 103     | 190    | 337     | * 85.0 | 83.5    | * 34.3 | 101     | 47.6   | 44.7    |
| 6          | 54.9   | 303      | 11.4   | 98.6    | 189    | 334     | 61.2   | 74.5    | 56.9   | 99.1    | 53.5   | 34.0    |
| 7          | 58.3   | 268      | 11.9   | 99.1    | 189    | 312     | 53.2   | 60.3    | 26.6   | 79.9    | 61.2   | 20.5    |
| 8          | 60.6   | 251      | 25.5   | 101     | 140    | 303     | 54.9   | 59.5    | 32.9   | 60.0    | 70.8   | 24.0    |
| 9          | 62.9   | 213      | 24.8   | 108     | 94.6   | 283     | 50.1   | 57.5    | 45.6   | 35.4    | 43.9   | 35.7    |
| 10         | 63.7   | 187      | 49.6   | 104     | 88.6   | 266     | 53.8   | 60.9    | 51.0   | 38.5    | 28.3   | 39.6    |
| 11         | 66.3   | 176      | 51.8   | 99.7    | 49.8   | 253     | 52.4   | 29.5    | 48.7   | 48.1    | 13.8   | 49.6    |
| 12         | 69.1   | 182      | 51.3   | 88.1    | 38.2   | 174     | 52.7   | 49.6    | 43.6   | 51.0    | 12.0   | 65.1    |
| 13         | 71.4   | 155      | 45.3   | 74.5    | 38.8   | 167     | 40.8   | 48.1    | 40.2   | 54.9    | 15.0   | 58.9    |
| 14         | 82.7   | 135      | 39.9   | 77.3    | * 38.2 | 159     | 19.9   | 48.7    | 34.8   | 67.1    | 17.6   | 59.8    |
| 15         | 100    | 127      | 32.9   | 87.8    | 40.8   | 150 *   | 36.2   | 47.0    | 31.7   | 75.3    | 16.1   | 68.3    |
| 16         | 112    | 96.0     | 33.1   | 90.6    | 65.4   | 163     | 37.4   | * 46.2  | 31.7   | 76.5    | 14.9   | 75.9    |
| 17         | 125 *  | 107      | 43.0   | * 88.1  | 123    | 145     | 49.3   | * 45.0  | 32.9   | 77.3    | 21.6   | * 77.0  |
| 18         | 153    | 96.0     | 60.3   | 88.4    | 172    | 135     | * 53.8 | 49.6    | 38.5   | 73.1    | 32.9   | 69.7    |
| 19         | 177    | 105      | * 60.3 | 101     | 255    | 124     | 68.5   | 61.7    | 43.6   | 70.8    | * 40.5 | 73.3    |
| 20         | 198    | * 75.9   | 64.9   | 101     | 312    | 119     | 71.9   | 66.3    | 50.7   | 73.1    | 41.9   | 78.2    |
| 21         | 215    | 139      | 55.8   | 118     | 326    | 121     | 63.7   | 69.7    | * 44.2 | 71.6    | 34.6   | 86.1    |
| 22         | 231    | 62.6     | 54.1   | 151     | 323    | 131     | 64.6   | 68.0    | 36.8   | 66.8    | 40.8   | 71.9    |
| 23         | 246    | 23.2     | 58.6   | 161     | 323    | 130     | 66.0   | 66.6    | 36.8   | 59.5    | 43.0   | 79.9    |
| 24         | 261    | 12.8     | 63.2   | 185     | 343    | 148     | 70.2   | 64.9    | 79.6   | 65.4    | 39.9   | 83.3    |
| 25         | 282    | 8.33     | 70.0   | 195     | 385    | 154     | 69.1   | 70.0    | 42.8   | 61.7    | 49.0   | 102     |
| 26         | 297    | 7.16     | 70.0   | 209     | 391    | 145     | 62.9   | 75.6    | 46.7   | * 56.4  | 53.0   | 101     |
| 27         | 314    | 9.57     | 69.4   | 209     | 379    | 145     | 59.2   | 73.3    | 43.9   | 54.9    | 57.5   | 105     |
| 28         | 326    | 16.2     | 73.1   | 195     | 379    | 138     | 80.4   | 85.0    | 44.5   | 63.2    | 50.1   | 113     |
| 29         | 334    | 75.3     | 167    | 382     | 130    | 90.6    | 107    | 44.5    | 64.3   | 41.3    | 118    |         |
| 30         | 340    | 55.8     | 165    | 408     | 137    | 91.5    | 113    | 45.3    | 61.2   | 23.3    | 123    |         |
| 31         | 343    | 73.6     | 422    | 84.1    | 90.9   |         |        |         |        | 55.5    |        | 129     |
| <b>Sum</b> |        | 4,372.76 |        | 3,605.3 |        | 6,330   |        | 2,100.8 |        | 1,992.7 |        | 2,140.6 |
|            |        | 4,898.5  |        | 1,412.9 |        | 6,773.4 |        | 2,092.6 |        | 1,437.6 |        | 1,128.7 |

**Current Year 1990**

**Period 1954-1990**

| Month         | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |            |          | Average     | Volume—Thousands of Cubic Metres |                  |                  |                  |        |
|---------------|---------------------|------|---------------------------------|------------|----------|-------------|----------------------------------|------------------|------------------|------------------|--------|
|               | High                | Low  | Day                             | High       | Day      |             | Total                            | Average          | Maximum          | Minimum          |        |
| Jan.          | 9.96                | 8.13 | 29                              | 360        | 2        | 49.6        | 423,230                          | 274,442          | 563,348          | 20,625           |        |
| Feb.          | 9.83                | 7.65 | 1                               | 343        | 27       | 6.74        | 377,806                          | 209,387          | 464,530          | 31,488           |        |
| Mar.          | 8.40                | 7.65 | 29                              | 83.3       | 7        | 7.31        | 122,075                          | 167,121          | 466,756          | 17,787           |        |
| Apr.          | 9.22                | 8.24 | 28                              | 225        | 13       | 61.2        | 120                              | 311,498          | 353,461          | 709,848          | 92,665 |
| May           | 10.44               | 7.96 | 31                              | 430        | 11       | 29.7        | 585,222                          | 468,629          | 850,281          | 45,271           |        |
| June          | 10.22               | 8.32 | 1                               | 408        | 20       | 71.1        | 546,912                          | 357,698          | 811,943          | 97,028           |        |
| July          | 8.99                | 7.80 | 2                               | 172        | 14       | 12.7        | 180,801                          | 225,736          | 707,768          | 27,479           |        |
| Aug.          | 8.72                | 7.88 | 30                              | 129        | 11       | 19.0        | 181,509                          | 289,749          | 1,853,522        | 30,778           |        |
| Sept.         | 8.60                | 7.89 | 24                              | 112        | 7        | 22.1        | 142,209                          | 392,898          | 3,346,077        | 52,387           |        |
| Oct.          | 8.73                | 7.97 | 5                               | 132        | 9        | 30.6        | 64.3                             | 172,169          | 407,388          | 3,758,177        | 37,009 |
| Nov.          | 8.48                | 7.80 | 8                               | 81.3       | 12       | 10.9        | 37.6                             | 97,520           | 181,426          | 1,778,975        | 36,109 |
| Dec.          | 9.02                | 7.79 | 31                              | 176        | 1        | 14.2        | 69.1                             | 184,348          | 151,414          | 665,515          | 39,434 |
| <b>Yearly</b> | 10.44               | 7.65 | <b>—</b>                        | <b>430</b> | <b>—</b> | <b>6.74</b> | <b>3,307,899</b>                 | <b>3,479,349</b> | <b>8,165,042</b> | <b>1,565,582</b> |        |

\* Discharge measurement made on this day

\*\* Mean daily

\*\* Period 1955-1990

## 36-483.00 CONTRIBUTIONS TO THE RIO GRANDE FROM

## THE LOWER RIO SAN JUAN IRRIGATION DISTRICT

## RIO GRANDE CITY TO ANZALDUS DAM

**DESCRIPTION:** The Lower Rio San Juan Irrigation District in Mexico lies along the Rio Grande between Cd. Miguel Aleman and Rio Bravo, Tamaulipas and is irrigated with water impounded by Marte R. Gomez Dam situated on the Rio San Juan 20.0 river kilometres upstream from the confluence with the Rio Grande. The Rio San Juan enters the Rio Grande at river kilometre 384. Drain water from this irrigation district enters the Rio Grande between Falcon Dam and the Rio Grande City Gaging Station through the Rio San Juan channel, Rancherias Drain, and Los Fresnos Drain; and between the Rio Grande City Station and Anzalduas Dam through Puertecitos, Los Indios, Huizache, and Morillo Drains. Only the portion of drain water from this irrigation district reaching the Rio Grande via drains located downstream from Rio Grande City Gaging Station is shown below.

**RECORDS:** Drain water reaching the Rio Grande through Morillo Drain was determined by hourly staff gage readings and the weir discharge table, and through Puertecitos and Los Indios Drains by prorating between frequent current meter measurements. All storm water measured at these drains was deducted and is not included in the tabulation below. In 1990, 64% of the drain water from this irrigation district reaching the Rio Grande between the Rio Grande City Gaging Station and Anzalduas Dam was contributed by Morillo Drain. Records available: 1953 through 1990.

**REMARKS:** Since July 9, 1969, some water has been diverted from Morillo Drain directly to the gulf via the Morillo Drain Diversion Canal to reduce the salinity of Rio Grande waters. In 1990, 10,359,000 m<sup>3</sup> were diverted.

Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.  | Feb.         | Mar. | April        | May  | June          | July | Aug.         | Sept. | Oct.        | Nov. | Dec.         |
|------------|-------|--------------|------|--------------|------|---------------|------|--------------|-------|-------------|------|--------------|
| 1          | 0.38  | 4.01         | 1.14 | 1.12         | 6.07 | 10.5          | 2.63 | 1.19         | 0.22  | 0.15        | 0.13 | 0.61         |
| 2          | .40   | 1.61         | 1.14 | 4.76         | 6.17 | 9.02          | 2.55 | 1.19         | .48   | .14         | .13  | .61          |
| 3          | .41   | .91          | 1.14 | 2.07         | 6.46 | 7.13          | 2.41 | .86          | .43   | .14         | .13  | .63          |
| 4          | .42   | .74          | 1.14 | 1.13         | 6.25 | 7.66          | 2.35 | .60          | .22   | .13         | .14  | .60          |
| 5          | .43   | .52          | 1.14 | 1.13         | 6.86 | 6.94          | 2.29 | 1.18         | .22   | .13         | .14  | .60          |
| 6          | .44   | .57          | 1.25 | 1.14         | 6.91 | 6.12          | 2.18 | .63          | .23   | .13         | .14  | .60          |
| 7          | .46   | .67          | 1.37 | 1.14         | 7.55 | 5.37          | 2.15 | .25          | .23   | .13         | .14  | .59          |
| 8          | .47   | .71          | 1.13 | 1.15         | 7.50 | 4.83          | 1.96 | .25          | .24   | .12         | .16  | .59          |
| 9          | .48   | 1.22         | 1.13 | 1.15         | 7.14 | 4.17          | 1.83 | .27          | .24   | .12         | .71  | .59          |
| 10         | .50   | .81          | 1.13 | 1.16         | 8.42 | 3.81          | 1.77 | .24          | .24   | .12         | .82  | .59          |
| 11         | .51   | .87          | 1.13 | 1.17         | 7.13 | 3.81          | 1.72 | .23          | .25   | .12         | .82  | .59          |
| 12         | .54   | .93          | 1.13 | 1.18         | 6.24 | 3.80          | 1.66 | .23          | .25   | .11         | .76  | .58          |
| 13         | .56   | .98          | 1.12 | 1.26         | 5.78 | 3.49          | 1.60 | .23          | .25   | .11         | .79  | .68          |
| 14         | .58   | 1.04         | 1.12 | 2.56         | 5.77 | 3.17          | 1.34 | .22          | .26   | .11         | .77  | .69          |
| 15         | .59   | 1.10         | 1.12 | 3.00         | 5.49 | 4.27          | 1.26 | .22          | .26   | .11         | .77  | .69          |
| 16         | .61   | 1.16         | 1.12 | 3.00         | 5.35 | 2.16          | 1.28 | .22          | .26   | .10         | .70  | .68          |
| 17         | .64   | 1.16         | 1.12 | 3.01         | 5.34 | 2.25          | 1.22 | .21          | .27   | .10         | .78  | .69          |
| 18         | .65   | 1.16         | 1.12 | 3.01         | 5.48 | 2.54          | 1.14 | .21          | .27   | .10         | .81  | .33          |
| 19         | .67   | 1.16         | 1.12 | 3.02         | 5.79 | 2.84          | 1.15 | .20          | .30   | .30         | .64  | .41          |
| 20         | .65   | 1.15         | 1.12 | 3.15         | 6.07 | 2.84          | 1.15 | .20          | .28   | .29         | .58  | .58          |
| 21         | .62   | 1.15         | 1.12 | 3.38         | 6.54 | 2.76          | 1.15 | .20          | .27   | .11         | .58  | .58          |
| 22         | .60   | 1.15         | 1.12 | 3.85         | 6.85 | 2.62          | 1.16 | .20          | .26   | .11         | .69  | .68          |
| 23         | .58   | 1.15         | 1.12 | 4.16         | 7.01 | 2.62          | 1.16 | .20          | .25   | .11         | .70  | .79          |
| 24         | .56   | 1.15         | 1.12 | 4.42         | 7.27 | 2.62          | 1.16 | .21          | .23   | .11         | .70  | .81          |
| 25         | .54   | 1.15         | 1.12 | 4.61         | 7.48 | 2.62          | 1.16 | .21          | .22   | .12         | .70  | .81          |
| 26         | .90   | 1.15         | 1.12 | 4.99         | 8.27 | 2.62          | 1.17 | .21          | .21   | .12         | .60  | 1.00         |
| 27         | .58   | 1.14         | 1.14 | 5.36         | 9.88 | 2.63          | 1.17 | .21          | .20   | .12         | .60  | 1.03         |
| 28         | .46   | 1.14         | 1.18 | 5.42         | 9.40 | 2.63          | 1.17 | .21          | .19   | .12         | .60  | 1.02         |
| 29         | .43   | 1.14         | 1.14 | 5.74         | 8.73 | 2.63          | 1.18 | .21          | .18   | .12         | .61  | 1.16         |
| 30         | .44   | 1.12         | 1.12 | 5.75         | 8.43 | 2.63          | 1.18 | .21          | .16   | .13         | .61  | 1.43         |
| 31         | 2.83  | 1.12         | 1.12 | 9.55         |      | 1.18          | .21  |              |       | .13         |      | 1.54         |
| <b>Sum</b> |       | <b>31.66</b> |      | <b>87.99</b> |      | <b>123.10</b> |      | <b>11.11</b> |       | <b>4.06</b> |      | <b>22.78</b> |
|            | 18.93 | 35.35        |      | 217.40       |      | 48.48         |      | 7.57         |       | 16.45       |      |              |

Current Year 1990

Period 1954-1990

| Month         | Extreme Gage Metres |      | Extreme-Cubic Metres per Second |      |      | Average | Volume - Thousands of Cubic Metres |         |         |         |  |
|---------------|---------------------|------|---------------------------------|------|------|---------|------------------------------------|---------|---------|---------|--|
|               | High                | Low  | High                            |      | Low  |         | Total                              | Average | Maximum | Minimum |  |
|               |                     |      | Day                             | Day  |      |         |                                    |         |         |         |  |
| Jan.          | 31                  | 2.83 | 1                               | 0.38 | 0.61 | 1,636   | 3,023                              | 9,405   | 575     |         |  |
| Feb.          | 1                   | 4.01 | 5                               | .52  | 1.13 | 2,735   | 3,833                              | 8,707   | 574     |         |  |
| Mar.          | 7                   | 1.37 | 113                             | 1.12 | 1.14 | 3,054   | 2,598                              | 6,526   | 643     |         |  |
| Apr.          | 31                  | 5.75 | 1                               | 1.12 | 2.93 | 7,602   | 4,998                              | 7,602   | 1,109   |         |  |
| May           | 27                  | 9.88 | 17                              | 5.34 | 7.01 | 18,783  | 9,913                              | 37,225  | 1,921   |         |  |
| June          | 1                   | 10.5 | 16                              | 2.16 | 4.10 | 10,636  | 10,513                             | 106,020 | 2,500   |         |  |
| July          | 1                   | 2.63 | 18                              | 1.14 | 1.56 | 4,189   | 5,471                              | 60,172  | 1,109   |         |  |
| Aug.          | 1                   | 1.19 | 119                             | .20  | .36  | 960     | 2,797                              | 16,395  | 815     |         |  |
| Sept.         | 2                   | .48  | 30                              | .16  | .25  | 654     | 2,750                              | 13,905  | 654     |         |  |
| Oct.          | 19                  | .30  | 116                             | .10  | .13  | 351     | 3,350                              | 12,126  | 351     |         |  |
| Nov.          | 110                 | .82  | 1                               | .13  | .55  | 1,421   | 2,360                              | 12,903  | 530     |         |  |
| Dec.          | 31                  | 1.54 | 18                              | .33  | .73  | 1,968   | 2,840                              | 41,991  | 575     |         |  |
| <b>Yearly</b> |                     | =    | 10.5                            | =    | 0.10 | 53,989  | 53,546                             | 221,387 | 16,605  |         |  |

\* Mean daily

! And other days

08-4684.00 DIVERSIONS FROM THE RIO GRANDE  
UNITED STATES SIDE, RIO GRANDE CITY TO ANZALDUAS DAM

Beginning June 1971, the Texas Water Rights Commission, now the Texas Water Commission, assumed control of the United States portion of the water in Falcon Reservoir and in the Rio Grande below Falcon Dam, the disposition of such waters being made by its Rio Grande Watermaster. Previous to that, since June 1956, such waters had been under the jurisdiction of the 93rd District Court of Texas administered by its Special Water Master.

During 1990, 74,611 irrigable hectares, and several towns and rural homes were allotted Rio Grande water in the river between the gaging station at Rio Grande City and Anzalduas Dam. Such irrigable area was 25.6% of the total Irrigable area below Falcon Dam allotted Rio Grande water.

The total diversion during 1990 in this river reach was 293,889,000 m<sup>3</sup>, or 18.5% of the total water diverted from the Rio Grande below Falcon Dam. Records of diversions in this river reach were determined by means of flowmeters and by a deflection meter developed by the International Boundary and Water Commission. More than one crop per year is often grown on parts of this land.

## EXTREME FLOWS FROM RECORDS:

|          |      | Average Flow in Cubic Metres per Second |               |  |           |  |  |  |  |  |              |
|----------|------|---|---------------|--|-----------|--|--|--|--|--|--------------|
| Daily:   | Max. | 34.6                                    | June 21, 1960 |  | Min. 0    |  |  |  |  |  | Occasionally |
| Monthly: | Max. | 28.6                                    | June 1960     |  | Min. 0.29 |  |  |  |  |  | March 1957   |
| Yearly:  | Max. | 13.5                                    | 1989          |  | Min. 5.32 |  |  |  |  |  | 1966         |

**Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary**

| Day        | Jan. | Feb.          | Mar. | April         | May  | June         | July | Aug.          | Sept. | Oct.          | Nov. | Dec.          |
|------------|------|---------------|------|---------------|------|--------------|------|---------------|-------|---------------|------|---------------|
| 1          | 4.02 | 13.2          | 6.00 | 6.15          | 13.3 | 27.2         | 9.94 | 16.8          | 10.9  | 10.4          | 12.9 | 7.33          |
| 2          | 8.16 | 12.9          | 8.42 | 6.32          | 13.7 | 18.7         | 12.0 | 15.8          | 7.65  | 9.01          | 11.0 | 7.70          |
| 3          | 6.77 | 11.9          | 3.51 | 5.58          | 10.7 | 16.4         | 9.46 | 12.7          | 5.95  | 9.74          | 7.19 | 8.61          |
| 4          | 5.58 | 12.8          | 2.97 | 6.94          | 10.2 | 20.1         | 9.29 | 8.58          | 5.81  | 10.0          | 7.11 | 9.57          |
| 5          | 4.84 | 15.8          | 4.11 | 6.17          | 5.10 | 21.3         | 9.97 | 9.12          | 6.94  | 9.35          | 12.2 | 9.97          |
| 6          | 3.57 | 14.9          | 4.73 | 5.58          | 4.39 | 23.4         | 9.60 | 13.6          | 4.47  | 8.27          | 13.3 | 10.1          |
| 7          | 3.14 | 14.2          | 5.81 | 4.87          | 4.70 | 23.1         | 6.26 | 14.4          | 4.79  | 7.33          | 9.71 | 9.18          |
| 8          | 5.21 | 11.9          | 7.16 | 5.61          | .73  | 20.3         | 7.33 | 12.0          | 3.26  | 8.81          | 6.29 | 7.31          |
| 9          | 5.64 | 11.8          | 7.33 | 8.18          | 1.95 | 17.2         | 7.62 | 10.7          | 3.17  | 10.2          | 3.82 | 6.51          |
| 10         | 7.22 | 10.1          | 7.02 | 8.33          | 1.54 | 17.0         | 9.91 | 9.12          | 5.27  | 7.53          | 2.73 | 10.7          |
| 11         | 7.39 | 9.12          | 6.15 | 7.73          | 2.24 | 21.2         | 9.91 | 6.17          | 4.11  | 9.60          | 3.37 | 9.74          |
| 12         | 5.47 | 14.2          | 9.43 | 6.97          | 1.84 | 23.1         | 9.86 | 7.53          | 4.70  | 10.5          | 3.68 | 10.0          |
| 13         | 2.82 | 13.0          | 10.1 | 4.70          | 1.02 | 23.3         | 7.50 | 9.43          | 5.01  | 6.85          | 4.79 | 11.1          |
| 14         | 3.06 | 14.7          | 11.2 | 3.82          | 3.88 | 20.7         | 5.64 | 10.6          | 5.61  | 8.47          | 5.32 | 10.5          |
| 15         | 7.16 | 14.1          | 11.8 | 3.51          | 3.09 | 21.7         | 6.12 | 10.5          | 4.13  | 11.4          | 7.28 | 9.06          |
| 16         | 8.67 | 15.1          | 11.7 | 6.91          | 2.62 | 16.1         | 7.70 | 10.4          | 3.65  | 14.9          | 7.65 | 8.72          |
| 17         | 7.48 | 8.89          | 9.43 | 8.01          | 6.23 | 15.4         | 8.95 | 8.41          | 5.21  | 14.7          | 5.92 | 12.8          |
| 18         | 8.01 | 6.49          | 9.57 | 10.4          | 4.11 | 19.7         | 10.6 | 6.51          | 5.49  | 13.7          | 5.69 | 12.5          |
| 19         | 7.93 | 8.47          | 11.7 | 11.8          | 3.26 | 19.8         | 10.3 | 7.19          | 6.74  | 12.7          | 8.67 | 13.0          |
| 20         | 4.81 | 8.33          | 11.5 | 10.6          | 3.79 | 21.1         | 9.26 | 11.5          | 3.26  | 8.50          | 9.03 | 12.5          |
| 21         | 4.47 | 4.33          | 12.0 | 6.40          | 8.47 | 21.0         | 5.78 | 11.6          | 5.86  | 8.24          | 7.65 | 10.8          |
| 22         | 8.38 | 2.45          | 12.5 | 7.36          | 10.3 | 18.8         | 6.03 | 11.1          | 5.01  | 10.5          | 6.71 | 9.23          |
| 23         | 9.01 | 2.55          | 13.2 | 12.0          | 10.2 | 15.0         | 9.71 | 9.52          | 4.84  | 10.3          | 7.39 | 6.63          |
| 24         | 10.9 | 2.14          | 11.0 | 11.4          | 10.0 | 14.5         | 11.5 | 10.2          | 7.96  | 12.1          | 6.85 | 3.82          |
| 25         | 11.8 | 1.55          | 10.7 | 11.2          | 10.2 | 21.1         | 12.6 | 8.33          | 7.70  | 12.1          | 5.98 | 4.11          |
| 26         | 10.8 | 2.51          | 14.0 | 7.87          | 9.18 | 22.5         | 11.9 | 8.52          | 10.0  | 11.7          | 7.59 | 9.80          |
| 27         | 9.43 | 2.74          | 13.2 | 7.14          | 7.00 | 22.9         | 10.0 | 11.4          | 8.10  | 6.74          | 8.16 |               |
| 28         | 6.06 | 5.61          | 12.5 | 6.26          | 11.8 | 21.4         | 6.74 | 12.8          | 9.77  | 6.94          | 5.26 | 9.03          |
| 29         | 7.36 | 11.6          | 4.36 | 16.4          | 17.9 | 8.01         | 12.1 | 6.94          | 8.72  | 6.03          | 8.61 |               |
| 30         | 8.13 | 8.35          | 7.08 | 16.7          | 11.2 | 11.8         | 12.8 | 5.83          | 9.32  | 6.20          | 7.67 |               |
| 31         | 9.37 | 6.97          |      | 15.7          |      | 14.3         | 12.0 | 9.74          |       |               |      | 7.31          |
| <b>Sum</b> |      | <b>265.78</b> |      | <b>219.25</b> |      | <b>593.1</b> |      | <b>331.43</b> |       | <b>309.72</b> |      | <b>282.07</b> |
|            |      | 212.66        |      | 281.66        |      | 223.94       |      | 285.59        |       | 181.43        |      | 215.05        |

| Month         | Current Year 1990                 |            |                                 |             | Period 1960-1990                 |             |             |                |                |                |                |
|---------------|-----------------------------------|------------|---------------------------------|-------------|----------------------------------|-------------|-------------|----------------|----------------|----------------|----------------|
|               | Average Rainfall**<br>Millimetres |            | Extreme-Cubic Metres per Second |             | Volume-Thousands of Cubic Metres |             |             |                |                |                |                |
|               | 1990                              | 1957-1990  | Day                             | High        | Day                              | Low         | Average     | Total          | Average        | Maximum        | Minimum        |
| Jan.          | 7                                 | 30         | 25                              | 11.8        | 13                               | 2.82        | 6.86        | 18,374         | 16,464         | 35,458         | 2,479          |
| Feb.          | 39                                | 29         | 5                               | 15.8        | 25                               | 1.55        | 9.49        | 22,963         | 17,536         | 47,610         | 4,040          |
| Mar.          | 17                                | 16         | 26                              | 14.0        | 4                                | 2.97        | 9.09        | 24,335         | 28,547         | 51,495         | 8,288          |
| Apr.          | 48                                | 35         | 23                              | 12.0        | 15                               | 3.51        | 7.31        | 18,943         | 33,911         | 53,085         | 9,608          |
| May           | 59                                | 67         | 30                              | 16.7        | 8                                | .73         | 7.22        | 19,348         | 28,284         | 55,738         | 3,919          |
| June          | 4                                 | 67         | 1                               | 27.2        | 30                               | 11.2        | 19.8        | 51,244         | 28,245         | 73,847         | 6,181          |
| July          | 26                                | 40         | 31                              | 14.3        | 14                               | 5.64        | 9.21        | 24,675         | 27,322         | 57,262         | 8,330          |
| Aug.          | 30                                | 57         | 1                               | 16.8        | 11                               | 6.17        | 10.7        | 28,636         | 28,043         | 44,751         | 8,469          |
| Sept.         | 118                               | 98         | 27                              | 11.4        | 9                                | 3.17        | 6.05        | 15,676         | 18,912         | 42,873         | 5,102          |
| Oct.          | 21                                | 57         | 16                              | 14.9        | 13                               | 6.85        | 9.99        | 26,760         | 22,643         | 46,570         | 3,458          |
| Nov.          | 23                                | 22         | 6                               | 13.3        | 10                               | 2.73        | 7.17        | 18,580         | 19,346         | 33,940         | 3,614          |
| Dec.          | 11                                | 25         | 19                              | 13.0        | 24                               | 3.82        | 9.10        | 24,371         | 15,902         | 30,837         | 3,091          |
| <b>Yearly</b> | <b>403</b>                        | <b>543</b> | <b>—</b>                        | <b>27.2</b> | <b>—</b>                         | <b>0.73</b> | <b>9.32</b> | <b>293,905</b> | <b>285,155</b> | <b>424,806</b> | <b>168,318</b> |

## 08-4636.00 DIVERSIONS FROM THE RIO GRANDE

## ANZALDUAS CANAL NEAR REYNOSA, TAMAULIPAS

**DESCRIPTION:** Cableway, gravity well, and water-stage recorder located on the left bank at latitude 26°07'50", longitude 98°20'10", 0.8 canal kilometre from the canal intake, and about 8.0 kilometres northwest of Reynosa, Tamaulipas. The canal intake is immediately upstream from Anzalduas Dam at river kilometre 274, 165 river kilometres downstream from Falcon Dam. The zero of the gage is 26.31 metres above mean sea level, J. S. C. & G. S. datum.

**RECORDS:** Based on 254 discharge measurements during the year, 239 by the Mexican Section and 15 by the United States Section of the Commission, and a continuous record of gage heights. Computations by shifting control methods. Records available: 1952 through 1990.

**REMARKS:** Diversions by this canal are for irrigation and domestic use in Mexico and for conveying water for storage in Culebron, Villa Cardenas, and Palito Blanco Reservoirs about 37.0 canal kilometres downstream from this station. For areas irrigated during 1990 see the tabulation under the heading of "Drainage Basin and Irrigated Areas" in this Bulletin. Flow at this canal station is affected by backwater from the operation of canal gates 7.2 kilometres, 18.2 kilometres, and 36.2 kilometres below this station.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 310 m<sup>3</sup>/sec on June 2, 1957 with a gage height of 4.88 metres. Min. no flow occurs frequently.

|          |      | Average Flow in Cubic Metres per Second |  |                |  |  |  |  |  |  |  |
|----------|------|---|--|----------------|--|--|--|--|--|--|--|
| Daily:   | Max. | 265                                     |  | April 23, 1983 |  |  |  |  |  |  |  |
| Monthly: | Max. | 198                                     |  | May 1988       |  |  |  |  |  |  |  |
| Yearly:  | Max. | 60.4                                    |  | 1989           |  |  |  |  |  |  |  |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.   | Feb.     | Mar.   | April   | May    | June    | July   | Aug.   | Sept.  | Oct.   | Nov.   | Dec.   |
|------------|--------|----------|--------|---------|--------|---------|--------|--------|--------|--------|--------|--------|
| 1          | 6.00   | 243 *    | 0      | 49.0    | 127    | 249 *   | 31.0   | * 8.20 | 11.6   | * 8.20 | 9.10   | 9.30   |
| 2          | 8.70   | 236 *    | 0      | * 51.5  | 122 *  | 244     | * 26.5 | * 6.20 | 12.1   | * 4.50 | * 8.90 | 9.30   |
| 3          | 11.9   | 223 *    | 0      | * 54.6  | 119 *  | 219     | * 22.4 | * 12.2 | * 13.2 | * 4.50 | 8.70   | 10.4   |
| 4          | * 12.0 | 210      | 0      | * 53.0  | 124 *  | 198 *   | * 22.7 | 19.2   | * 17.6 | * 5.10 | 8.80   | * 9.60 |
| 5          | * 13.9 | 199 *    | 3.60   | * 55.7  | 136    | 178 *   | * 16.8 | 7.70   | * 16.0 | * 5.80 | * 9.10 | * 9.10 |
| 6          | 13.9   | 189 *    | * 6.30 | * 61.5  | 141    | 169 *   | * 11.3 | * 6.60 | * 10.1 | 5.80   | * 9.10 | * 4.50 |
| 7          | 14.0   | 189 *    | 5.00   | * 66.1  | 167 *  | 162 *   | * 11.3 | * 5.50 | * 9.70 | 6.40   | * 8.70 | 0      |
| 8          | * 13.5 | 168 *    | * 6.70 | * 63.7  | 175 *  | 145 *   | * 14.2 | * 5.00 | * 9.90 | * 6.30 | * 8.70 | 0      |
| 9          | * 10.7 | 184 *    | * 6.70 | * 59.8  | 108 *  | 138     | * 14.0 | * 5.20 | 10.4   | * 6.30 | * 8.70 | 3.40   |
| 10         | 10.2   | 168 *    | 6.70   | * 61.9  | 101 *  | 133     | * 9.06 | * 5.70 | * 10.4 | * 9.70 | 8.50   | * 6.50 |
| 11         | * 16.1 | 135      | 6.70   | * 67.0  | * 95.7 | 122 *   | * 7.20 | 6.50   | * 9.80 | * 11.0 | 8.20   | * 6.00 |
| 12         | * 21.6 | 119 *    | 6.70   | 73.7    | 45.2   | 108 *   | * 8.80 | * 9.10 | 8.70   | * 7.90 | * 5.30 |        |
| 13         | 21.1   | 111 *    | 6.70   | * 65.1  | 36.6   | * 80.6  | * 10.0 | 7.30   | * 8.90 | 8.70   | * 6.70 | * 5.80 |
| 14         | 30.5   | * 93.5   | 6.70   | 55.2    | * 34.3 | * 62.3  | * 9.40 | * 9.50 | * 8.80 | 8.70   | * 8.50 | * 6.80 |
| 15         | * 56.1 | * 76.2   | 6.70   | 54.8    | * 33.7 | * 48.3  | * 9.40 | * 10.8 | 8.80   | * 9.30 | * 7.40 | 6.88   |
| 16         | * 57.0 | * 66.7   | 6.80   | * 54.9  | * 29.5 | 37.2    | * 9.91 | * 10.6 | 10.8   | * 11.0 | * 7.90 | 5.30   |
| 17         | * 66.6 | 57.0     | 6.50   | * 55.8  | 37.0   | * 10.4  | * 10.6 | * 8.70 | * 10.0 | 7.90   | * 5.20 |        |
| 18         | 85.1   | 55.5     | 6.20   | * 53.2  | * 87.6 | * 28.3  | * 10.8 | * 10.9 | * 4.10 | * 10.0 | 7.90   | * 5.12 |
| 19         | * 99.4 | * 53.0   | * 5.60 | * 63.7  | 137    | * 24.9  | * 12.4 | * 11.2 | * 5.40 | * 10.0 | * 7.90 | * 5.10 |
| 20         | 120    | * 53.5   | * 4.90 | * 66.2  | 203    | * 25.2  | * 14.3 | * 10.6 | * 4.50 | 10.0   | 8.30   | * 7.50 |
| 21         | 141    | * 49.0   | 4.90   | 66.5    | 201 *  | * 27.2  | 14.9   | * 9.20 | * 5.50 | 10.0   | * 8.90 | * 12.7 |
| 22         | 152 *  | * 36.5   | * 5.00 | 75.4    | 196 *  | * 25.6  | 14.9   | * 11.1 | 7.60   | * 10.0 | * 9.70 | 19.8   |
| 23         | 160 *  | * 31.4   | 5.00   | * 91.8  | 186 *  | * 25.5  | 16.6   | * 12.2 | 7.60   | * 9.20 | * 10.3 | 32.0   |
| 24         | 158 *  | 28.9     | 5.00   | 101 *   | 191 *  | * 25.5  | * 18.6 | * 10.6 | * 7.60 | * 8.90 | 11.0   | * 40.8 |
| 25         | 164 *  | 2.70     | 5.00   | 138 *   | 213 *  | * 29.5  | * 18.2 | 10.4   | * 19.0 | * 9.00 | 11.9   | 46.2   |
| 26         | 187 *  | 0        | 6.80   | 159 *   | 238 *  | * 35.0  | * 18.4 | 10.2   | * 16.4 | * 9.30 | 11.9   | * 49.8 |
| 27         | 215 *  | 0        | * 8.70 | 165 *   | 236 *  | * 34.5  | * 18.4 | * 9.40 | * 9.90 | * 13.0 | * 52.5 |        |
| 28         | 229 *  | 0        | 9.10   | 158 *   | 241 *  | * 34.6  | 18.4   | * 8.90 | * 8.80 | 9.30   | * 12.1 | * 59.9 |
| 29         | 224 *  |          | * 15.0 | 137     | 238 *  | * 35.0  | * 17.7 | * 10.4 | * 9.60 | * 9.30 | 10.8   | 67.2   |
| 30         | 227 *  |          | * 29.8 | 129 *   | 239 *  | * 31.0  | * 13.9 | * 11.3 | * 10.8 | * 9.30 | * 9.30 | 76.0   |
| 31         | 245 *  |          | 39.0   | 246 *   |        | 9.55    | * 11.1 |        |        | * 9.30 |        | * 85.0 |
| <b>Sum</b> |        | 2,976.90 |        | 2,407.1 |        | 2,713.2 |        | 291.40 |        | 262.90 |        | 663.00 |
|            |        | 2,790.30 |        | 231.80  |        | 4,496.0 |        | 461.42 |        | 302.70 |        | 273.80 |

## Current Year 1990

## Period 1954-1990

| Month         | Extreme Gage Metres |     | Extreme-Cubic Metres per Second |      | Average | Volume-Thousands of Cubic Metres |         |           |           |
|---------------|---------------------|-----|---------------------------------|------|---------|----------------------------------|---------|-----------|-----------|
|               | High                | Low | Day                             | Day  |         | Total                            | Average | Maximum   | Minimum   |
| Jan.          |                     |     | 31                              | 245  | 1       | 6.00                             | 90.0    | 241,082   | 135,142   |
| Feb.          |                     |     | 1                               | 243  | 126     | 0                                | 106     | 257,204   | 116,212   |
| Mar.          |                     |     | 31                              | 39.0 | 1       | 0                                | 7.48    | 20,028    | 44,975    |
| Apr.          |                     |     | 27                              | 165  | 1       | 49.0                             | 80.2    | 207,973   | 182,432   |
| May           |                     |     | 31                              | 246  | 16      | 29.5                             | 145     | 388,454   | 457,270   |
| June          |                     |     | 1                               | 249  | 19      | 24.9                             | 90.4    | 234,420   | 129,090   |
| July          |                     |     | 1                               | 31.0 | 11      | 7.20                             | 14.9    | 39,867    | 54,654    |
| Aug.          |                     |     | 4                               | 19.2 | 8       | 5.00                             | 9.40    | 25,177    | 200,317   |
| Sept.         |                     |     | 25                              | 19.0 | 18      | 4.10                             | 10.1    | 26,153    | 103,761   |
| Oct.          |                     |     | 111                             | 11.0 | 12      | 4.50                             | 8.48    | 22,715    | 333,640   |
| Nov.          |                     |     | 27                              | 13.0 | 14      | 6.50                             | 9.13    | 23,656    | 68,346    |
| Dec.          |                     |     | 31                              | 85.0 | 7       | 0                                | 21.4    | 57,283    | 204,511   |
| <b>Yearly</b> |                     |     |                                 | 249  |         | 0                                | 49.0    | 1,544,012 | 1,217,230 |
|               |                     |     |                                 |      |         |                                  |         | 1,903,255 | 680,814   |

\* Discharge measurement made on this day

θ Mean daily

! And other days

08-4632.00 RIO GRANDE BELOW ANZALDUAS DAM NEAR REYNOSA, TAMAULIPAS  
AND MISSION, TEXAS

**DESCRIPTION:** Cableway, gravity well, water-stage recorder, and selsyn-type transmitter, located on the right bank at latitude 26°07'50", longitude 98°19'55", and river kilometre 273; 0.8 river kilometre downstream from Anzalduas Dam, about 7.0 kilometres northwest of Reynosa, Tamaulipas, and 16.6 river Kilometres upstream from the international highway bridge between Hidalgo, Texas and Reynosa, Tamaulipas. The zero of the gage is at mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 78 discharge measurements during the year, 68 by the Mexican Section and 10 by the United States Section of the Commission, and a continuous record of gage heights. Records available: 1952 through 1990.

**REMARKS:** Except during local storms, flow at this station is controlled largely by releases from Falcon Reservoir and by diversions into Anzalduas Canal. Excessive upstream flood flows are partly diverted into the United States floodway system inlet at Anzalduas Dam before reaching this station. Prior to January 1, 1968 the zero of the gage was 25.18 metres above mean sea level, U. S. C. & G. S. datum. The transmitter relays gage height data to the Anzalduas Dam control room.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 3,700 m<sup>3</sup>/sec on September 24, 1967 with a gage height of 9.30 metres. Min. periods of no flow have occurred on several occasions in 1953, 1954, 1956, and 1957.

Average Flow in Cubic Metres per Second

|          |      |       |                |      |      |              |
|----------|------|-------|----------------|------|------|--------------|
| Daily:   | Max. | 3,440 | Sept. 25, 1967 | Min. | 0    | Occasionally |
| Monthly: | Max. | 1,070 | Oct. 1958      | Min. | 0.16 | March 1957   |
| Yearly:  | Max. | 182   | 1958           | Min. | 4.49 | 1957         |

**Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary**

| Day        | Jan. | Feb.     | Mar.   | April  | May    | June     | July   | Aug.    | Sept.  | Oct.    | Nov.   | Dec.     |
|------------|------|----------|--------|--------|--------|----------|--------|---------|--------|---------|--------|----------|
| 1          | 25.8 | 69.8     | 10.8   | 22.9   | 48.5   | 143      | 89.9   | 43.9    | 51.6   | 24.0    | 25.5   | 14.3     |
| 2          | 21.8 | 69.0     | 5.40   | 45.9   | 51.3   | 138      | * 92.3 | 48.5    | 57.1   | * 25.6  | 20.3   | 17.3     |
| 3          | 20.7 | 61.8     | 11.6   | 31.6   | 52.2   | 140      | 94.6   | 56.0    | 61.3   | 28.9    | 18.9   | 20.8     |
| 4          | 20.9 | 71.0     | 12.1   | 24.2   | * 51.3 | 145 *    | 75.6   | 46.8    | * 54.6 | 28.1    | 26.7   | * 22.3   |
| 5          | 21.3 | 75.8     | 18.5   | 19.4   | * 56.8 | 144      | 66.6   | 51.4    | 31.9   | 36.9    | 30.7   | * 21.3   |
| 6          | 21.5 | 73.1     | * 13.9 | 18.5   | 47.3   | 132      | 61.0   | 51.2    | 20.4   | 33.7    | * 32.0 | 17.6     |
| 7          | 27.5 | 73.9     | * 13.4 | 25.9   | * 37.4 | 129      | 46.2   | 43.8    | * 24.3 | 54.0    | 25.7   | 13.7     |
| 8          | 36.0 | 70.9     | * 14.4 | 33.0   | * 62.9 | 131 *    | 43.0   | * 41.6  | 16.9   | 48.5    | 19.6   | 9.04     |
| 9          | 39.0 | 59.6     | 15.5   | 31.6   | 49.4   | 129      | * 42.8 | 41.0    | 19.9   | 32.4    | 44.2   | 13.8     |
| 10         | 35.4 | 50.3     | 15.7   | * 29.6 | 13.0   | 129      | 41.9   | * 41.0  | * 23.9 | 24.9    | 32.7   | 19.3     |
| 11         | 37.5 | 54.3     | 25.5   | 21.6   | * 3.83 | 118 *    | 35.5   | 41.0    | 17.2   | 19.4    | 20.0   | 26.6     |
| 12         | 27.1 | 55.5     | * 25.5 | 17.2   | 8.79   | 111      | 30.0   | 28.2    | 16.5   | 17.2    | 13.0   | 27.1     |
| 13         | 25.6 | 55.9     | 25.6   | 11.9   | 5.91   | * 84.5   | * 28.4 | 29.3    | 11.3   | 21.4    | * 13.2 | 26.6     |
| 14         | 41.7 | 50.2     | 25.7   | 14.6   | 8.67   | 86.0     | 19.6   | * 29.7  | * 12.6 | 36.1    | 12.2   | * 44.2   |
| 15         | 41.8 | 44.8     | 25.4   | 18.8   | 13.5   | * 97.4   | 21.0   | 28.6    | 12.6   | 43.4    | * 9.43 | 49.4     |
| 16         | 43.3 | 40.8     | * 21.1 | 24.9   | * 18.2 | 111      | * 28.0 | 29.4    | 12.5   | * 39.2  | * 6.23 | 58.0     |
| 17         | 45.6 | 34.0     | 19.6   | * 28.3 | * 24.2 | 124      | 27.7   | * 28.7  | 15.2   | 36.2    | 11.1   | 61.6     |
| 18         | 45.2 | 42.7     | 29.1   | 25.1   | 29.0   | 108 *    | 29.1   | 28.6    | * 15.2 | 40.4    | 21.3   | 55.9     |
| 19         | 48.8 | 45.1     | * 32.2 | 22.8   | 37.2   | 99.6     | 32.6   | 35.2    | 14.0   | 42.2    | 25.8   | * 56.2   |
| 20         | 43.4 | 33.2     | 32.2   | * 22.7 | 74.7   | 90.2     | * 43.3 | 37.8    | 11.8   | 35.6    | 20.2   | 57.3     |
| 21         | 48.1 | 35.3     | 30.1   | 24.9   | * 88.2 | 91.0     | 39.5   | * 39.1  | * 17.9 | 37.8    | 14.8   | 53.7     |
| 22         | 53.3 | 105      | 31.6   | 34.7   | 76.4   | 89.2     | 33.8   | 38.0    | 17.0   | 39.2    | 17.5   | 47.2     |
| 23         | 54.8 | 33.6     | * 33.2 | 38.5   | 81.6   | 86.8     | * 31.5 | 35.8    | 20.7   | 39.0    | * 23.7 | 31.8     |
| 24         | 58.9 | 7.10     | 35.3   | 39.0   | 105 *  | 96.7     | 31.5   | * 39.5  | 20.8   | 35.4    | 19.0   | 35.2     |
| 25         | 60.1 | 10.5     | 41.0   | 39.3   | 107    | 103 *    | 31.4   | 36.2    | 17.0   | 32.0    | 31.8   | 48.5     |
| 26         | 62.4 | 13.3     | * 44.5 | 40.2   | 114    | 102      | 29.9   | 45.4    | * 19.9 | 20.3    | 37.0   | 48.1     |
| 27         | 66.6 | 13.9     | * 41.2 | * 48.4 | 132    | 98.9     | * 28.2 | 46.2    | 17.8   | 18.9    | * 35.1 | 45.8     |
| 28         | 67.6 | 13.7     | * 33.4 | 35.6   | 128 *  | 96.6     | 24.8   | * 52.1  | * 15.7 | 29.9    | 28.8   | 44.8     |
| 29         | 70.9 | 25.9     | 40.9   | 119    | 103    | 43.3     | * 55.9 | 18.6    | 33.8   | 26.6    | 38.6   |          |
| 30         | 70.2 | 20.4     | 43.0   | 117 *  | 99.9   | * 46.3   | 57.4   | 21.6    | 32.0   | 18.8    | 37.4   |          |
| 31         | 68.4 | 17.0     |        | 130 *  |        | 44.3     | * 56.1 |         | 26.7   |         |        | 26.7     |
| <b>Sum</b> |      | 1,364.10 |        | 875.0  |        | 3,356.8  |        | 1,283.4 |        | 1,013.1 |        | 1,092.14 |
|            |      | 1,351.2  |        | 746.80 |        | 1,892.30 |        | 1,334.6 |        | 687.8   |        | 682.36   |

**Current Year 1990**

**Period 1954-1990**

| Month         | Extreme Gage Metres |              |          | Extreme-Cubic Metres per Second |          |             | Average     | Volume—Thousands of Cubic Metres |                  |                  |                |
|---------------|---------------------|--------------|----------|---------------------------------|----------|-------------|-------------|----------------------------------|------------------|------------------|----------------|
|               | High                | Low          | Day      | High                            | Day      | Low         |             | Total                            | Average          | Maximum          | Minimum        |
| Jan.          | 25.24               | 24.21        | 29       | 71.4                            | 3        | 19.4        | 43.6        | 116,744                          | 118,752          | 401,559          | 1,344          |
| Feb.          | 26.23               | 23.74        | 22       | 140                             | 23       | 5.20        | 48.7        | 117,858                          | 89,011           | 341,105          | 1,024          |
| Mar.          | 24.81               | 23.69        | 26       | 46.1                            | 2        | 3.80        | 24.1        | 64,524                           | 95,858           | 300,324          | 418            |
| Apr.          | 24.91               | 23.91        | 2        | 51.6                            | 13       | 10.4        | 29.2        | 75,600                           | 139,003          | 394,060          | 3,898          |
| May           | 26.86               | 23.68        | 28       | 184                             | 11       | 3.20        | 61.0        | 163,495                          | 185,219          | 591,517          | 43,616         |
| June          | 26.10               | 25.16        | 1 3      | 150                             | 14       | 77.0        | 112         | 290,028                          | 225,439          | 838,792          | 9,683          |
| July          | 25.55               | 24.15        | 12       | 103                             | 14       | 19.3        | 43.1        | 115,309                          | 161,887          | 687,076          | 2,467          |
| Aug.          | 24.89               | 24.24        | 3        | 58.9                            | 14       | 23.3        | 41.4        | 110,886                          | 160,920          | 1,489,874        | 1,163          |
| Sept.         | 25.02               | 23.87        | 4        | 67.3                            | 13       | 8.95        | 22.9        | 59,426                           | 277,333          | 2,297,796        | 4,835          |
| Oct.          | 25.02               | 24.08        | 7        | 67.3                            | 12       | 16.2        | 32.7        | 87,532                           | 319,503          | 2,869,074        | 2,134          |
| Nov.          | 24.85               | 23.77        | 9        | 56.3                            | 16       | 5.75        | 22.7        | 58,956                           | 157,166          | 1,773,744        | 1,764          |
| Dec.          | 24.97               | 23.84        | 17       | 64.1                            | 8        | 7.90        | 35.2        | 94,361                           | 115,028          | 666,203          | 1,850          |
| <b>Yearly</b> | <b>26.86</b>        | <b>23.66</b> | <b>—</b> | <b>184</b>                      | <b>—</b> | <b>3.20</b> | <b>43.0</b> | <b>1,354,719</b>                 | <b>2,045,119</b> | <b>5,724,541</b> | <b>141,541</b> |

\* Discharge measurement made on this day

! And other days

RIO GRANDE FLOODWAY DISCHARGES  
LOWER RIO GRANDE VALLEY

## ON THE UNITED STATES SIDE

Part of the excess water from floods entering the Lower Rio Grande Valley is diverted from the river through the United States floodway system with the inlet located at Anzalduas Dam near Mission, Texas.

Floodwater entering the system is measured first at the Bunker Floodway Station at Anzalduas Dam near Mission and again 40.6 kilometres downstream at the Main Floodway Station on Farm Road No. 88 bridge south of Weslaco. At a point 4.8 kilometres southwest of Mercedes the floodway divides, one channel going northeastward through the Arroyo Colorado Floodway to the Gulf of Mexico, and the other going to the Gulf via the North Floodway, traveling first northward and then eastward to the gulf. At the point of diversion, a divisor dike, which runs longitudinally in the Main Floodway, divides and controls the flows into the Arroyo Colorado Floodway and the North Floodway. The flow of the Arroyo Colorado is measured at El Fuste Siphon south of Mercedes and farther downstream at the bridge on U. S. Highway No. 83 south of Harlingen. The North Floodway flow is measured at the bridge on old U. S. Highway No. 83 west of Mercedes and farther downstream at the bridge on U. S. Highway No. 77 near Sebastian.

In 1990, no flood flow was diverted through this floodway system.

## ON THE MEXICAN SIDE

Part of the excess water from floods entering the Lower Rio Grande Valley is diverted from the river through the Mexican floodway system, with the inlet located 59.7 kilometres downstream from Anzalduas Dam and, when necessary, through Anzalduas Canal located at Anzalduas Dam.

Floodwater entering the system through the Retamal Inlet flows into Culebron and Villa Cardenas Lakes through the Retamal Floodway, while flood flows entering the canal at Anzalduas Dam reach these lakes via the Culebron and Retamal Canals from where it flows in a southeastwardly direction via Floodway No. 1 into the Gulf of Mexico.

The Retamal Floodway replaces the previously used floodway system, which consisted of Retamal Canal, San Rafael Floodway, and Floodway No. 2.

In 1990, no flood flow was diverted through Retamal Floodway or Anzalduas Canal.

08-4732.00 DIVERSIONS FROM THE RIO GRANDE  
UNITED STATES SIDE, ANZALDUS DAM TO PROGRESO

Beginning June 1971, the Texas Water Rights Commission, now the Texas Water Commission, assumed control of the United States portion of the water in Falcon Reservoir and in the Rio Grande below Falcon Dam, the disposition of such waters being made by its Rio Grande Watermaster. Previous to that, since June 1956, such waters had been under the jurisdiction of the 93rd District Court of Texas administered by its Special Water Master.

During 1990, 48,298 hectares and several towns and rural homes were allotted Rio Grande water in the river reach between Anzalduas Dam and the Progreso International Bridge. Such irrigable area was 16.6% of the total irrigable area below Falcon Dam allotted Rio Grande water.

The total diversion during 1990 in this river reach was 333,158,000 m<sup>3</sup>, or 21.0% of the total water diverted from the Rio Grande below Falcon Dam. Records of diversions in this river reach were determined by means of flowmeters and by deflection meters which were developed by the International Boundary and Water Commission. More than one crop per year is often grown on parts of this land.

## EXTREME FLOWS FROM RECORDS:

|          |      |      | Average Flow in Cubic Metres per Second |      |      |              |  |  |
|----------|------|------|---|------|------|--------------|--|--|
| Daily:   | Max. | 33.4 | June 1, 1990                            | Min. | 0    | Occasionally |  |  |
| Monthly: | Max. | 23.1 | June 1990                               | Min. | 0.38 | May 1972     |  |  |
| Yearly:  | Max. | 12.6 | 1989                                    | Min. | 4.73 | 1970         |  |  |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.   | Feb.   | Mar.   | April  | May    | June  | July   | Aug.   | Sept.  | Oct.   | Nov.   | Dec.   |
|------------|--------|--------|--------|--------|--------|-------|--------|--------|--------|--------|--------|--------|
| 1          | 2.97   | 15.3   | 3.82   | 4.53   | 16.5   | 33.4  | 19.3   | 17.2   | 6.94   | 14.2   | 12.2   | 5.21   |
| 2          | 7.56   | 14.3   | 2.10   | 14.8   | 18.0   | 29.2  | 21.9   | 17.3   | 9.06   | 14.8   | 9.01   | 4.98   |
| 3          | 8.04   | 7.02   | .91    | 15.9   | 17.7   | 28.1  | 22.5   | 16.5   | 7.62   | 13.7   | 5.04   | 7.79   |
| 4          | 6.97   | 9.40   | 3.17   | 12.5   | 14.1   | 30.3  | 19.0   | 9.54   | 4.45   | 12.9   | 7.16   | 8.58   |
| 5          | 4.79   | 16.0   | 6.63   | 10.4   | 11.3   | 29.5  | 17.7   | 10.9   | 3.17   | 8.86   | 11.1   | 8.78   |
| 6          | 1.90   | 16.9   | 7.93   | 10.2   | 8.75   | 25.7  | 13.9   | 12.9   | 2.42   | 5.55   | 10.8   | 10.2   |
| 7          | 1.03   | 16.0   | 9.83   | 9.18   | 11.2   | 23.4  | 6.43   | 11.7   | 1.30   | 4.45   | 11.1   | 9.37   |
| 8          | 2.02   | 15.9   | 12.0   | 9.18   | 5.24   | 24.1  | 9.20   | 11.5   | 1.53   | 10.4   | 9.20   | 2.97   |
| 9          | 4.81   | 15.4   | 12.7   | 8.13   | 3.62   | 24.8  | 16.1   | 7.87   | 1.84   | 7.36   | 5.98   | 2.89   |
| 10         | 8.58   | 7.70   | 3.09   | 7.39   | 2.48   | 26.4  | 14.2   | 6.00   | 4.62   | 7.25   | 3.94   | 9.83   |
| 11         | 8.61   | 10.8   | 6.97   | 8.44   | 1.39   | 26.6  | 13.1   | 3.99   | 5.13   | 6.77   | 3.46   | 10.4   |
| 12         | 5.89   | 16.7   | 12.3   | 8.75   | .44    | 26.1  | 13.3   | 3.57   | 4.56   | 4.64   | 4.98   | 10.3   |
| 13         | 3.12   | 16.0   | 11.8   | 6.54   | .20    | 27.2  | 12.0   | 4.62   | 4.33   | 1.65   | 4.73   | 10.5   |
| 14         | 5.04   | 16.4   | 9.37   | 2.89   | 5.04   | 24.8  | 4.73   | 9.20   | 4.22   | 4.56   | 4.13   | 10.5   |
| 15         | 8.10   | 15.3   | 11.7   | 5.86   | 5.89   | 15.5  | 3.68   | 8.84   | 1.67   | 9.43   | 4.81   | 4.02   |
| 16         | 8.41   | 15.6   | 7.56   | 9.54   | 6.77   | 11.4  | 10.4   | 9.63   | 2.57   | 10.2   | 5.78   | 6.80   |
| 17         | 8.41   | 5.24   | 4.05   | 10.9   | 7.33   | 12.9  | 11.6   | 10.2   | 3.91   | 9.46   | 2.36   | 11.8   |
| 18         | 8.47   | 8.84   | 8.35   | 11.0   | 5.83   | 19.8  | 14.6   | 9.32   | 2.42   | 9.57   | 4.53   | 13.9   |
| 19         | 9.09   | 12.0   | 14.3   | 12.0   | 2.95   | 20.3  | 16.9   | 10.1   | 4.13   | 10.2   | 6.77   | 12.4   |
| 20         | 6.32   | 6.94   | 16.1   | 6.57   | 20.8   | 16.3  | 12.7   | 4.05   | 3.23   | 8.58   | 11.7   |        |
| 21         | 6.97   | 6.09   | 16.2   | 10.8   | 14.8   | 21.2  | 7.99   | 14.2   | 2.74   | 6.03   | 5.92   | 11.9   |
| 22         | 10.6   | 6.43   | 15.8   | 11.5   | 16.7   | 21.6  | 5.49   | 14.1   | 1.66   | 9.26   | .79    | 10.4   |
| 23         | 11.3   | 1.40   | 13.4   | 18.0   | 17.5   | 19.4  | 13.2   | 16.2   | 2.86   | 10.3   | 7.19   | 5.44   |
| 24         | 13.8   | .48    | 9.88   | 21.2   | 20.6   | 18.5  | 13.5   | 15.5   | 4.36   | 9.49   | 3.71   | 1.77   |
| 25         | 13.0   | .33    | 12.6   | 19.6   | 18.2   | 21.4  | 13.9   | 5.30   | 4.64   | 9.01   | 4.02   | .53    |
| 26         | 13.8   | 2.86   | 15.8   | 18.6   | 17.6   | 24.0  | 13.5   | 10.4   | 7.14   | 5.75   | 8.01   | 7.62   |
| 27         | 11.6   | 3.26   | 15.9   | 17.8   | 22.8   | 21.9  | 13.5   | 12.9   | 9.29   | 3.06   | 5.52   | 9.91   |
| 28         | 11.4   | 3.29   | 14.8   | 14.3   | 21.3   | 22.6  | 5.58   | 13.5   | 10.8   | 6.34   | 7.79   | 10.3   |
| 29         | 10.7   |        | 12.2   | 14.1   | 25.0   | 22.0  | 6.77   | 13.7   | 13.6   | 10.0   | 8.30   | 8.89   |
| 30         | 15.0   |        |        | 8.10   | 22.5   | 20.4  | 13.9   | 14.4   | 8.75   | 10.5   | 6.12   | 7.19   |
| 31         | 13.2   |        |        | 4.98   | 25.9   | 15.3  | 15.3   | 15.5   | 10.4   |        |        | 4.39   |
| <b>Sum</b> |        | 281.88 |        | 354.93 |        | 693.3 |        | 347.28 |        | 259.32 |        | 251.26 |
|            | 251.50 |        | 304.34 |        | 374.20 |       | 399.47 |        | 145.78 |        | 193.03 |        |

## Current Year 1990

## Period 1957-1990

| Month         | Average Rainfall**<br>Millimetres |           | Extreme-Cubic Metres per Second |      |              | Average | Volume-Thousands of Cubic Metres |         |         |         |         |
|---------------|-----------------------------------|-----------|---------------------------------|------|--------------|---------|----------------------------------|---------|---------|---------|---------|
|               | 1990                              | 1957-1990 | Day                             | High | Day          |         | Total                            | Average | Maximum | Minimum |         |
| Jan.          | 11                                | 35        | 30                              | 15.0 | 7            | 1.03    | 8.11                             | 21,730  | 16,563  | 43,121  |         |
| Feb.          | 37                                | 33        | 6                               | 16.9 | 25           | .33     | 10.1                             | 24,354  | 13,743  | 35,196  |         |
| Mar.          | 13                                | 21        | 16.2                            | 3    | .91          | 9.82    | 26,295                           | 22,920  | 44,562  | 7,923   |         |
| Apr.          | 41                                | 35        | 24                              | 21.2 | 14           | 2.89    | 11.8                             | 30,666  | 27,062  | 48,447  | 10,422  |
| May           | 82                                | 74        | 31                              | 25.9 | 13           | .20     | 12.1                             | 32,331  | 27,523  | 53,225  | 1,008   |
| June          | 20                                | 66        | 1                               | 33.4 | 16           | 11.4    | 23.1                             | 59,901  | 33,226  | 59,901  | 5,184   |
| July          | 21                                | 45        | 3                               | 22.5 | 15           | 3.68    | 12.9                             | 34,514  | 28,727  | 49,928  | 8,137   |
| Aug.          | 52                                | 64        | 2                               | 17.3 | 12           | 3.57    | 11.2                             | 30,005  | 21,072  | 33,973  | 9,192   |
| Sept.         | 136                               | 110       | 29                              | 13.6 | 7            | 1.30    | 4.86                             | 12,595  | 15,352  | 34,885  | 3,964   |
| Oct.          | 20                                | 58        | 2                               | 14.8 | 13           | 1.65    | 8.37                             | 22,405  | 18,765  | 38,509  | 2,540   |
| Nov.          | 50                                | 28        | 1                               | 12.2 | 22           | .79     | 6.43                             | 16,678  | 14,998  | 28,146  | 1,252   |
| Dec.          | 17                                | 29        | 18                              | 13.9 | 25           | .53     | 8.11                             | 21,709  | 12,874  | 24,623  | 2,284   |
| <b>Yearly</b> | 500                               | 592       | <b>=====</b>                    | 33.4 | <b>=====</b> | 0.20    | 10.6                             | 333,183 | 252,825 | 398,520 | 149,260 |

\* Mean daily

\*\* United States side - average of several stations in the reach

## 08-4736.0C DIVERSIONS FROM THE RIO GRANDE

## UNITED STATES SIDE, PROGRESO TO SAN BENITO

Beginning June 1971, the Texas Water Rights Commission, now the Texas Water Commission, assumed control of the United States portion of the water in Falcon Reservoir and in the Rio Grande below Falcon Dam, the disposition of such waters being made by its Rio Grande Watermaster. Previous to that, since June 1956, such waters had been under the jurisdiction of the 93rd District Court of Texas administered by its Special Water Master.

During 1990, 128,627 hectares and several towns and rural homes were allotted Rio Grande water in the river reach between Progreso and the gaging station at San Benito. Such irrigable area was 44.1% of the total irrigable area below Falcon Dam allotted Rio Grande water.

The total diversion during 1990 in this river reach was 776,899,000 m<sup>3</sup>, or 48.9% of the total water diverted from the Rio Grande below Falcon Dam. Records of diversions in this river reach were determined by means of flowmeters, by open channel rating stations, and by deflection meters which were developed by the International Boundary and Water Commission. More than one crop per year is often grown on parts of this land.

## EXTREME FLOWS FROM RECORDS:

|          |      |      |              | Average Flow in Cubic Metres per Second |      |  |              |  |  |  |  |
|----------|------|------|--------------|---|------|--|--------------|--|--|--|--|
| Daily:   | Max. | 82.4 | June 5, 1990 | Mn.                                     | 0    |  | Occasionally |  |  |  |  |
| Monthly: | Max. | 62.6 | June 1990    | Min.                                    | 1.52 |  | March 1957   |  |  |  |  |
| Yearly:  | Max. | 27.6 | 1989         | Min.                                    | 10.4 |  | 1968         |  |  |  |  |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.   | Feb.   | Mar.   | April  | May     | June  | July  | Aug.  | Sept.  | Oct.   | Nov.   | Dec. |
|------------|--------|--------|--------|--------|---------|-------|-------|-------|--------|--------|--------|------|
| 1          | 8.45   | 49.8   | 5.49   | 7.73   | 22.1    | 81.3  | 53.5  | 25.1  | 29.2   | 11.4   | 15.1   | 9.69 |
| 2          | 8.01   | 51.3   | 4.02   | 9.49   | 24.8    | 78.4  | 50.7  | 25.6  | 33.4   | 12.1   | 15.2   | 6.26 |
| 3          | 14.2   | 51.5   | 2.97   | 22.3   | 27.0    | 74.2  | 49.8  | 30.6  | 36.2   | 11.8   | 14.9   | 10.3 |
| 4          | 12.9   | 50.7   | 2.23   | 17.8   | 24.0    | 78.4  | 48.7  | 31.7  | 33.4   | 13.5   | 14.1   | 14.1 |
| 5          | 12.2   | 49.3   | 11.5   | 20.5   | 82.4    | 42.8  | 27.0  | 31.2  | 18.4   | 11.6   | 14.0   |      |
| 6          | 2.23   | 52.4   | 4.79   | 11.2   | 21.3    | 82.1  | 40.5  | 27.4  | 27.6   | 17.2   | 10.8   | 14.1 |
| 7          | 3.17   | 49.8   | 6.37   | 8.21   | 17.4    | 73.1  | 33.7  | 26.1  | 17.5   | 17.9   | 11.1   | 13.7 |
| 8          | 18.6   | 47.0   | 6.29   | 15.7   | 10.4    | 75.3  | 20.2  | 27.2  | 17.1   | 33.4   | 10.8   | 7.56 |
| 9          | 23.7   | 43.6   | 6.49   | 19.3   | 10.1    | 75.0  | 16.4  | 29.2  | 15.0   | 34.3   | 15.7   | 5.61 |
| 10         | 24.3   | 35.1   | 4.64   | 19.9   | 13.0    | 69.1  | 17.1  | 28.3  | 14.8   | 24.4   | 19.5   | 10.8 |
| 11         | 28.6   | 34.0   | 4.64   | 19.1   | 4.47    | 61.7  | 18.4  | 25.7  | 16.5   | 15.6   | 13.6   | 11.7 |
| 12         | 28.0   | 33.1   | 12.0   | 15.6   | 2.53    | 57.2  | 18.4  | 14.5  | 16.8   | 13.0   | 6.97   | 17.3 |
| 13         | 26.0   | 33.7   | 12.5   | 12.9   | .14     | 54.1  | 17.5  | 12.0  | 17.2   | 11.9   | 9.97   | 20.9 |
| 14         | 22.9   | 34.8   | 9.49   | 8.92   | 1.89    | 51.8  | 13.9  | 11.0  | 15.8   | 11.7   | 7.76   | 22.8 |
| 15         | 28.2   | 35.1   | 8.10   | 14.4   | 6.00    | 49.8  | 12.8  | 11.0  | 11.3   | 21.1   | 7.99   | 21.0 |
| 16         | 29.7   | 31.7   | 9.01   | 14.5   | 5.64    | 43.6  | 14.1  | 13.8  | 11.2   | 25.0   | 7.70   | 27.9 |
| 17         | 30.6   | 26.5   | 9.29   | 12.8   | 10.3    | 43.9  | 17.5  | 21.6  | 14.3   | 25.5   | 3.43   | 32.3 |
| 18         | 29.2   | 24.5   | 8.67   | 15.9   | 12.9    | 55.2  | 18.4  | 18.4  | 12.6   | 24.4   | 5.30   | 31.4 |
| 19         | 29.7   | 22.1   | 13.8   | 20.5   | 17.5    | 54.7  | 15.9  | 16.3  | 12.3   | 26.7   | 13.3   | 37.7 |
| 20         | 28.3   | 25.2   | 14.9   | 15.0   | 24.7    | 58.3  | 15.0  | 23.0  | 12.2   | 28.9   | 15.7   | 38.2 |
| 21         | 28.3   | 19.4   | 16.8   | 10.9   | 42.5    | 56.9  | 19.1  | 25.5  | 8.10   | 30.6   | 15.6   | 37.7 |
| 22         | 34.6   | 12.5   | 16.7   | 11.1   | 51.0    | 56.9  | 22.6  | 25.3  | 8.58   | 30.0   | 10.9   | 36.0 |
| 23         | 38.8   | 17.5   | 16.1   | 20.8   | 54.9    | 54.7  | 15.6  | 25.7  | 5.89   | 26.1   | 10.3   | 30.6 |
| 24         | 38.8   | 14.9   | 16.4   | 16.5   | 58.1    | 53.0  | 13.6  | 20.0  | 8.81   | 26.5   | 16.3   | 13.6 |
| 25         | 42.2   | 7.67   | 16.7   | 20.6   | 72.2    | 56.4  | 15.5  | 17.0  | 13.6   | 23.4   | 16.9   | 7.79 |
| 26         | 45.6   | 5.18   | 18.2   | 24.3   | 94.5    | 60.3  | 15.1  | 14.2  | 15.2   | 18.8   | 19.6   | 25.5 |
| 27         | 46.2   | 6.20   | 18.3   | 22.4   | 71.4    | 61.2  | 18.4  | 18.7  | 13.3   | 17.4   | 19.8   | 29.7 |
| 28         | 43.9   | 6.15   | 15.9   | 17.8   | 72.2    | 61.2  | 14.9  | 20.1  | 10.9   | 14.5   | 19.4   | 27.6 |
| 29         | 48.1   | 14.8   | 8.38   | 75.9   | 60.3    | 13.6  | 23.7  | 7.52  | 16.1   | 21.2   | 26.6   |      |
| 30         | 52.1   | 11.9   | 16.2   | 74.8   | 56.6    | 21.3  | 25.5  | 8.27  | 15.1   | 20.6   | 20.9   |      |
| 31         | 52.7   | 8.16   | 75.0   |        |         | 25.2  | 26.9  |       | 14.9   |        | 16.4   |      |
| <b>Sum</b> | 870.70 | 318.08 | 461.73 | 999.17 | 1,877.1 | 730.2 | 688.1 | 682.6 | 495.87 | 401.42 | 645.71 |      |

## Current Year 1990

| Month         | Average Rainfall**<br>Millimetres |           | Extreme-Cubic Metres per Second |        | Average | Period 1957-1990 |        |         |         |         |
|---------------|-----------------------------------|-----------|---------------------------------|--------|---------|------------------|--------|---------|---------|---------|
|               | 1990                              | 1957-1990 | Day                             | % High |         | Day              | % Low  | Total   | Average |         |
| Jan.          | 40                                | 31        | 52.7                            | 6      | 2.23    | 28.3             | 75,709 | 49,007  | 119,807 |         |
| Feb.          | 40                                | 6         | 52.4                            | 26     | 5.18    | 31.1             | 75,228 | 27,632  | 5,929   |         |
| Mar.          | 48                                | 27        | 18.3                            | 4      | 2.23    | 10.3             | 27,482 | 34,142  | 84,858  |         |
| Apr.          | 55                                | 41        | 26                              | 24.3   | 1       | 7.73             | 15.4   | 39,893  | 60,433  | 125,384 |
| May           | 37                                | 75        | 29                              | 75.9   | 13      | .14              | 32.2   | 86,328  | 62,375  | 136,226 |
| June          | 28                                | 74        | 5                               | 82.4   | 16      | 43.6             | 62.6   | 162,181 | 83,516  | 162,181 |
| July          | 36                                | 55        | 1                               | 53.5   | 15      | 12.8             | 23.6   | 63,089  | 56,719  | 13,724  |
| Aug.          | 32                                | 74        | 4                               | 31.7   | 14      | 11.0             | 22.2   | 59,452  | 42,091  | 13,947  |
| Sept.         | 68                                | 131       | 3                               | 36.2   | 23      | 5.89             | 16.5   | 42,843  | 30,738  | 79,218  |
| Oct.          | 22                                | 67        | 9                               | 34.3   | 1       | 11.4             | 20.3   | 54,311  | 31,740  | 73,269  |
| Nov.          | 9                                 | 36        | 29                              | 21.2   | 17      | 3.43             | 13.4   | 34,683  | 25,327  | 5,314   |
| Dec.          | 14                                | 34        | 20                              | 38.2   | 9       | 5.61             | 20.8   | 55,789  | 25,818  | 5,986   |
| <b>Yearly</b> | 402                               | 687       | ==                              | 82.4   | ==      | 0.14             | 24.6   | 776,988 | 536,538 | 868,544 |

08-1737.00 RIO GRANDE NEAR SAN BENITO, TEXAS  
AND RAMIREZ, TAMAULIPAS

**DESCRIPTION:** Cableway, concrete control weir, bubbler gage, water-stage recorders (graphic and digital), and digital transmitter, located on the left bank at latitude 26° 01' 50", longitude 97° 43' 40", and river kilometre 156, 6.3 river kilometres downstream from San Benito pumping plant and about 15.3 kilometres southwest of San Benito, Texas. The zero of the gage is at mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 23 discharge measurements during the year and a continuous record of gage heights. Computations for high flows by shifting control methods. Low and medium flow computations based on a stable control weir rating curve defined by meter measurements. Records available: November 26, 1952 through August 25, 1953, and December 1953 through 1990.

**REMARKS:** Except for diversions, tributary inflows, and drainage returns below Falcon Dam, flow at this station after August 25, 1953 was controlled largely by releases from Falcon Reservoir, 286 river kilometres upstream. Excessive upstream flood flows are partly diverted through the United States and Mexican floodway systems before reaching this station. The transmitter relays gage height data via radio to the Mercedes office of the Commission, and to the Anzalduas Dam Control Room, where it is recorded automatically. The concrete control weir was constructed in December 1965, and the gage was moved to its present location just above the weir on January 4, 1967.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 708 m<sup>3</sup>/sec on September 29, 1967 with a gage height of 18.61 metres. Min. no flow occurs occasionally.

## Average Flow in Cubic Metres per Second\*\*

|          |      |     |                |      |      |               |
|----------|------|-----|----------------|------|------|---------------|
| Daily:   | Max. | 702 | Sept. 29, 1967 | Min. | 0    | Occasionally  |
| Monthly: | Max. | 405 | Oct. 1971      | Min. | 1.12 | December 1956 |
| Yearly:  | Max. | 107 | 1976           | Min. | 5.66 | 1956          |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.   | Feb.   | Mar.   | April  | May    | June   | July   | Aug.   | Sept.  | Oct.   | Nov.   | Dec.   |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1          | 23.2   | 3.06   | 6.12   | 8.13   | * 11.3 | * 11.8 | 23.5   | 4.33   | 9.97   | 2.14   | 6.51   | 1.75   |
| 2          | 23.0   | 5.44   | * 7.62 | 8.01   | 6.20   | 24.6   | 20.3   | * 3.54 | 11.6   | 1.51   | * 3.54 | 4.19   |
| 3          | 11.2   | 7.05   | 8.13   | 11.7   | 4.53   | 23.7   | 17.2   | 1.84   | 15.9   | 1.26   | 2.36   | * 5.35 |
| 4          | * 6.49 | 5.04   | 7.25   | 6.54   | 7.14   | 22.5   | 19.6   | 1.09   | 15.3   | * 1.00 | 1.50   | 2.89   |
| 5          | 6.74   | * 11.3 | 9.01   | 6.37   | 9.26   | 24.2   | 12.3   | 6.26   | * 11.1 | 1.29   | 1.65   | 1.78   |
| 6          | 9.74   | 12.0   | 9.49   | 5.10   | 15.7   | 20.7   | 11.8   | 12.2   | 7.16   | 1.78   | 7.36   | 1.85   |
| 7          | 19.6   | 9.09   | 7.22   | 3.94   | 17.4   | 18.0   | 10.9   | 13.6   | 5.21   | 9.40   | 10.3   | 1.89   |
| 8          | 14.2   | 12.8   | 4.50   | 4.59   | 21.1   | 20.8   | 14.3   | 10.4   | 8.81   | 16.6   | 11.3   | 1.91   |
| 9          | 10.1   | 15.5   | 1.95   | * 5.10 | 39.6   | 23.2   | 19.3   | 6.34   | 8.01   | 6.88   | 7.79   | 3.17   |
| 10         | 13.9   | 10.4   | 1.18   | 7.28   | 48.4   | 26.5   | * 13.2 | 4.36   | 7.05   | 4.02   | 7.62   | 2.64   |
| 11         | 11.0   | 8.55   | 1.90   | 8.18   | 22.8   | 29.7   | 12.1   | 6.09   | 6.15   | 3.17   | 12.7   | 2.11   |
| 12         | 7.31   | 10.9   | 8.44   | 6.68   | 14.2   | 35.7   | 12.1   | 16.6   | 4.79   | 4.11   | 14.8   | 2.19   |
| 13         | 5.86   | 8.75   | 9.20   | 3.12   | 12.0   | 29.2   | 6.80   | 17.4   | 3.26   | 4.73   | 8.18   | 1.23   |
| 14         | 5.35   | 6.06   | 9.40   | 2.25   | 10.3   | 13.5   | 7.70   | 12.9   | 2.19   | 5.24   | 6.51   | .56    |
| 15         | 6.29   | 4.70   | 11.6   | 1.97   | 4.56   | 15.7   | 6.77   | 12.2   | 2.38   | 11.5   | 5.04   | .39    |
| 16         | 9.60   | 2.57   | * 12.6 | 1.57   | 3.34   | 36.8   | 6.26   | * 8.95 | 3.06   | 9.49   | * 4.81 | 3.99   |
| 17         | 8.92   | 2.01   | 11.2   | 1.21   | 2.53   | 49.8   | 4.25   | 4.90   | 2.02   | 8.01   | 5.35   | 11.9   |
| 18         | 9.71   | 1.75   | 9.54   | * 1.46 | 3.06   | 59.2   | * 1.84 | 4.22   | * 1.38 | 4.39   | 3.60   | * 9.37 |
| 19         | * 9.86 | 4.50   | 9.40   | 1.86   | 2.46   | 37.9   | 1.18   | 3.34   | 1.34   | 3.99   | 2.15   | 4.76   |
| 20         | 8.21   | 9.20   | 8.89   | 1.76   | 2.31   | 23.1   | .95    | 2.45   | 1.99   | 4.81   | 1.97   | 2.89   |
| 21         | 8.81   | 5.86   | 6.23   | 1.38   | 17.0   | 15.2   | 3.57   | 1.34   | 2.92   | 3.20   | 2.16   | 5.81   |
| 22         | 8.10   | 14.1   | 5.38   | 1.40   | 15.1   | 12.7   | 7.39   | .66    | 4.62   | 5.24   | 2.25   | 4.08   |
| 23         | 9.12   | * 6.02 | 4.70   | 2.95   | 4.30   | 13.2   | 9.29   | .35    | 6.54   | 5.55   | 3.82   | 3.00   |
| 24         | 7.96   | 43.0   | 5.61   | 4.22   | * 1.60 | 12.8   | 11.3   | .24    | 8.67   | 5.32   | 3.79   | 5.86   |
| 25         | 8.41   | 7.67   | 8.04   | 3.03   | 5.07   | 18.5   | 6.85   | .62    | 10.0   | 5.18   | 2.10   | 20.1   |
| 26         | 5.72   | 5.86   | 12.8   | 1.85   | 2.15   | * 20.0 | 4.81   | 8.72   | 6.06   | 7.53   | 1.70   | 25.6   |
| 27         | 4.87   | 5.21   | 14.0   | 3.17   | 6.37   | 18.2   | 2.95   | 14.0   | 5.10   | 5.81   | 7.50   | 12.8   |
| 28         | 8.92   | 5.64   | 17.0   | 11.1   | 18.7   | 16.2   | 1.84   | 10.3   | 4.33   | 3.96   | 9.63   | 8.78   |
| 29         | 11.6   | 12.4   | 14.6   | 19.6   | 17.0   | 13.3   | 4.08   | 11.9   | 4.19   | 5.52   | 5.10   | 8.72   |
| 30         | 5.64   | 9.97   | 16.7   | 7.45   | 9.74   | 20.4   | 11.5   | 11.7   | 3.03   | 8.89   | 2.29   | 9.03   |
| 31         | 5.04   | 7.99   |        |        |        |        |        | 7.48   | 11.9   | 9.32   |        | 13.2   |
| <b>Sum</b> |        | 306.01 |        | 157.22 |        | 707.1  |        | 224.74 |        | 170.84 |        | 183.79 |
|            | 304.47 |        | 258.76 |        | 362.67 |        | 293.41 |        | 184.13 |        | 165.38 |        |

## Current Year 1990

## Period 1954-1990

| Month         | Extreme Gage Metres |       | Extreme-Cubic Metres per Second |      |           | Average | Volume—Thousands of Cubic Metres |         |           |           |         |
|---------------|---------------------|-------|---------------------------------|------|-----------|---------|----------------------------------|---------|-----------|-----------|---------|
|               | High                | Low   | Day                             | High | Day       |         | Total                            | Average | Maximum   | Minimum   |         |
| Jan.          | 10.93               | 10.52 | 2                               | 25.8 | 31        | 3.31    | 9.82                             | 26,306  | 58,763    | 393,481   | 3,601   |
| Feb.          | 12.30               | 10.50 | 23                              | 76.5 | 18        | 1.13    | 10.9                             | 26,439  | 54,582    | 447,576   | 4,168   |
| Mar.          | 10.84               | 10.45 | 28                              | 18.3 | 10        | 1.03    | 8.35                             | 22,357  | 45,441    | 444,640   | 3,168   |
| Apr.          | 10.85               | 10.44 | 30                              | 19.2 | 17        | .68     | 5.24                             | 13,581  | 51,447    | 310,737   | 9,689   |
| May           | 11.51               | 10.45 | 10                              | 60.3 | 24        | 1.13    | 11.7                             | 31,335  | 84,140    | 472,420   | 20,813  |
| June          | 11.69               | 10.65 | 18                              | 62.6 | 1         | 7.56    | 23.6                             | 61,093  | 94,669    | 647,984   | 19,815  |
| July          | 10.97               | 10.46 | 1                               | 28.6 | 20        | .84     | 9.46                             | 25,351  | 88,003    | 552,457   | 5,790   |
| Aug.          | 10.87               | 10.38 | 12                              | 21.3 | 24        | .16     | 7.25                             | 19,418  | 91,577    | 1,020,220 | 3,827   |
| Sept.         | 10.80               | 10.43 | 4                               | 17.2 | 18        | .76     | 6.14                             | 15,309  | 162,460   | 787,894   | 9,513   |
| Oct.          | 10.88               | 10.43 | 8                               | 22.5 | 4         | .93     | 5.51                             | 14,761  | 203,183   | 1,086,522 | 4,737   |
| Nov.          | 10.84               | 10.46 | 12                              | 17.9 | 1         | 1.24    | 5.51                             | 14,899  | 97,656    | 816,565   | 6,954   |
| Dec.          | 11.00               | 10.42 | 26                              | 31.4 | 15        | .33     | 5.93                             | 15,879  | 79,515    | 591,008   | 2,992   |
| <b>Yearly</b> | 12.30               | 10.38 | <b>==</b>                       | 76.5 | <b>==</b> | 0.16    | 9.09                             | 286,721 | 1,111,436 | 3,383,956 | 179,397 |

\* Discharge measurement made on this day

! And other days

\*\* Period 1954-1990

08-4749.00 DIVERSIONS FROM THE RIO GRANDE  
UNITED STATES SIDE, SAN BENITO TO BROWNSVILLE

Beginning June 1971, the Texas Water Rights Commission, now the Texas Water Commission, assumed control of the United States portion of the water in Falcon Reservoir and in the Rio Grande below Falcon Dam, the disposition of such waters being made by its Rio Grande Watermaster. Previous to that, since June 1956, such waters had been under the jurisdiction of the 93rd District Court of Texas administered by its Special Water Master.

During 1990, 36,088 hectares and several towns and rural homes were allotted Rio Grande water in the river reach between gaging stations near San Benito and Brownsville. Such irrigable area was 12.4% of the total irrigable area below Falcon Dam allotted Rio Grande water.

The total diversion during 1990 in this river reach was 165,064,000 m<sup>3</sup>, or 10.4% of the total water diverted from the Rio Grande below Falcon Dam. Records of diversion in this river reach were determined by means of flowmeters, and by deflection meters which were developed by the International Boundary and Water Commission. More than one crop per year is often grown on parts of this land.

## EXTREME FLOWS FROM RECORDS:

|          |      | Average Flow in Cubic Metres per Second |               |      |      |               |
|----------|------|---|---------------|------|------|---------------|
| Daily:   | Max. | 22.1                                    | June 14, 1963 | Min. | 0    | Occasionally  |
| Monthly: | Max. | 15.3                                    | June 1965     | Min. | 0.52 | February 1966 |
| Yearly:  | Max. | 6.32                                    | 1965          | Min. | 2.79 | 1981          |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day | Jan. | Feb. | Mar. | April | May  | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|-----|------|------|------|-------|------|------|------|------|-------|------|------|------|
| 1   | 0.83 | 5.66 | 0.90 | 1.08  | 11.0 | 14.4 | 13.1 | 9.88 | 10.7  | 1.42 | 10.4 | 1.16 |
| 2   | .82  | 5.21 | .92  | .99   | 10.6 | 13.4 | 13.1 | 4.76 | 8.50  | 1.10 | 7.16 | .93  |
| 3   | 5.82 | 4.76 | .82  | 2.08  | 8.55 | 12.5 | 12.0 | 4.56 | 7.19  | 1.57 | 1.38 | 1.74 |
| 4   | 8.95 | 7.42 | .82  | 2.20  | 2.68 | 13.3 | 9.80 | 3.82 | 4.45  | 1.63 | 1.07 | 1.90 |
| 5   | 4.70 | 8.01 | 4.47 | 2.29  | 2.55 | 16.9 | 10.1 | 2.82 | 6.09  | 1.62 | 1.39 | 1.25 |
| 6   | .84  | 9.71 | 8.44 | 2.05  | 2.46 | 16.0 | 9.37 | 6.88 | 3.79  | .99  | .90  | 3.26 |
| 7   | .83  | 10.6 | 4.62 | 2.09  | 2.42 | 15.9 | 8.35 | 11.0 | 1.63  | 1.17 | 6.37 | 2.08 |
| 8   | .87  | 11.1 | 1.44 | 1.92  | 8.07 | 15.9 | 7.73 | 11.4 | 1.16  | 6.51 | 10.0 | 1.90 |
| 9   | 1.29 | 9.71 | 1.43 | 1.90  | 8.13 | 15.0 | 9.03 | 9.58 | 1.42  | 11.8 | 7.73 | 1.84 |
| 10  | 6.46 | 6.15 | 1.56 | 1.93  | 2.51 | 14.6 | 9.74 | 5.41 | 1.36  | 11.3 | 1.15 | 1.56 |
| 11  | 5.38 | 5.18 | 1.48 | 1.25  | 2.55 | 14.2 | 11.1 | 3.88 | .80   | 5.24 | .73  | 2.55 |
| 12  | 2.61 | 5.30 | 1.77 | .67   | 2.68 | 12.3 | 11.4 | 3.48 | 1.13  | 2.53 | 1.57 | 2.21 |
| 13  | 3.03 | 5.78 | 1.45 | .71   | .82  | 14.4 | 5.24 | 4.05 | .93   | 1.57 | 1.23 | 6.77 |
| 14  | 3.12 | 9.18 | .96  | .69   | .82  | 16.7 | 2.66 | 9.40 | 1.54  | 1.19 | 3.77 | 5.04 |
| 15  | 3.68 | 5.41 | 2.68 | .81   | .79  | 17.2 | 2.08 | 11.2 | 1.57  | 4.28 | 3.29 | 3.43 |
| 16  | 6.68 | 5.10 | 8.24 | .80   | 1.31 | 17.0 | 2.40 | 7.96 | 1.59  | 11.2 | .97  | 2.12 |
| 17  | 9.60 | 3.37 | 7.62 | .92   | 1.41 | 17.0 | 4.02 | 4.33 | 1.61  | 11.9 | .88  | 5.89 |
| 18  | 9.77 | 3.12 | 1.49 | .87   | 1.14 | 17.1 | 3.91 | 3.99 | 1.58  | 11.1 | 1.05 | 11.0 |
| 19  | 6.97 | 3.51 | 1.74 | .80   | 1.09 | 16.7 | 4.19 | 3.79 | 1.48  | 5.15 | 1.48 | 10.9 |
| 20  | 6.83 | 5.55 | 1.80 | .88   | 1.18 | 16.9 | 3.71 | 2.72 | 1.52  | 2.04 | 1.76 | 7.08 |
| 21  | 6.51 | 6.29 | 1.93 | .81   | 5.64 | 17.7 | 3.43 | 2.74 | 1.35  | 1.35 | 1.57 | 3.54 |
| 22  | 4.19 | 6.09 | 2.49 | 1.12  | 10.7 | 12.5 | 3.60 | 2.11 | 1.31  | 2.50 | 2.15 | 3.60 |
| 23  | 3.60 | 4.81 | 2.17 | 1.01  | 11.9 | 9.97 | 7.39 | 2.38 | 1.47  | 3.29 | 2.20 | 1.61 |
| 24  | 6.26 | 1.95 | 1.90 | 1.01  | 13.0 | 12.3 | 10.8 | 2.42 | 6.15  | 3.57 | 1.16 | 3.03 |
| 25  | 7.90 | 1.89 | 1.77 | 1.02  | 7.19 | 13.7 | 11.0 | 2.44 | 9.01  | 3.51 | .92  | 1.63 |
| 26  | 7.79 | 1.35 | 5.64 | 1.05  | 6.49 | 14.4 | 7.14 | 1.95 | 9.26  | 3.03 | .94  | 5.95 |
| 27  | 6.26 | 2.72 | 9.66 | .79   | 5.27 | 15.1 | 2.60 | 6.88 | 5.44  | 2.70 | .82  | 8.67 |
| 28  | 4.84 | 2.46 | 9.43 | 1.10  | 7.76 | 14.8 | 3.37 | 10.7 | 1.55  | .90  | 6.37 | 10.4 |
| 29  | 4.98 | 7.02 | 1.03 | 9.83  | 15.1 | 3.12 | 11.1 | 1.66 | .90   | 7.53 | 4.81 |      |
| 30  | 5.92 | 1.99 | 5.95 | 10.0  | 14.0 | 3.26 | 11.1 | .99  | 5.27  | 2.25 | 1.49 |      |
| 31  | 5.49 | 2.12 |      |       | 10.1 |      | 6.60 | 10.6 | 9.29  |      |      | .95  |

|     |        |        |        |        |        |        |
|-----|--------|--------|--------|--------|--------|--------|
| Sum | 153.39 | 41.82  | 406.97 | 189.29 | 131.62 | 119.89 |
|     | 152.52 | 100.77 | 170.64 | 215.34 | 98.23  | 90.19  |

## Current Year 1990

## Period 1960-1990

| Month  | Average Rainfall**<br>Millimetres | Extreme-Cubic Metres per Second |        |         | Average | Volume—Thousands of Cubic Metres |         |         |         |
|--------|-----------------------------------|---------------------------------|--------|---------|---------|----------------------------------|---------|---------|---------|
|        |                                   | Day                             | Ø High | Ø Low   |         | Total                            | Average | Maximum | Minimum |
| 1990   | 1957-1990                         | Day                             | Day    | Average |         |                                  |         |         |         |
| Jan.   | 12                                | 45                              | 18     | 9.77    | 2       | 0.82                             | 4.92    | 13,178  | 13,448  |
| Feb.   | 30                                | 35                              | 8      | 11.1    | 26      | 1.35                             | 5.48    | 13,253  | 9,054   |
| Mar.   | 49                                | 18                              | 27     | 9.66    | 4       | .82                              | 3.25    | 8,707   | 9,179   |
| Apr.   | 64                                | 45                              | 30     | 5.95    | 12      | .67                              | 1.39    | 3,613   | 14,758  |
| May    | 49                                | 75                              | 24     | 13.0    | 15      | .79                              | 5.50    | 14,743  | 18,062  |
| June   | 10                                | 72                              | 21     | 17.7    | 23      | 9.97                             | 14.9    | 38,618  | 21,073  |
| July   | 22                                | 53                              | 1      | 13.1    | 15      | 2.08                             | 6.95    | 18,605  | 15,477  |
| Aug.   | 29                                | 80                              | 8      | 11.4    | 26      | 1.95                             | 6.11    | 16,355  | 10,931  |
| Sept.  | 80                                | 147                             | 1      | 10.7    | 11      | .80                              | 3.27    | 8,487   | 7,383   |
| Oct.   | 27                                | 68                              | 17     | 11.9    | 128     | .90                              | 4.25    | 11,372  | 7,310   |
| Nov.   | 12                                | 37                              | 1      | 10.4    | 11      | .73                              | 3.01    | 7,792   | 5,793   |
| Dec.   | 5                                 | 39                              | 18     | 11.0    | 2       | .93                              | 3.87    | 10,358  | 6,289   |
| Yearly | 389                               | 714                             | ==     | 17.7    | ==      | 0.67                             | 5.23    | 165,081 | 138,757 |
|        |                                   |                                 |        |         |         |                                  |         | 199,208 | 87,788  |

Ø Mean daily

\*\* United States side - average of several stations in the reach

08-4750.00 RIO GRANDE NEAR BROWNSVILLE, TEXAS  
AND MATALEOS, TAMAULIPAS

**DESCRIPTION:** Cableway, bubbler gage, water-stagg recorders (graphic and digital), and digital transmitter located on the left bank at latitude 25°52'35", longitude 97°27'20", and river kilometre 78.3, 0.3 river kilometre downstream from El Jardín pumping plant, and 7.2 river kilometres downstream from the international highway bridge (Gateway) between Brownsville, Texas, and Matamoros, Tamaulipas. The zero of the gage is at mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on 23 discharge measurements during the year and a continuous record of gage heights. Computations by shifting control methods. Records available: 1938 through 1990.

**HEMERS:** Except for diversions, tributary inflows, and drainage returns below Falcon Dam, flow at this station after August 25, 1953 was controlled largely by releases from Falcon Reservoir, 364 river kilometres upstream. Excessive upstream flood flows are partly diverted into the United States and Mexican floodway systems before reaching this station. The transmitter relays gage height data via radio to the Mercedes office of the Commission, and to the Anzaldúa Dam Control Room, where it is recorded automatically.

**EXTREME FLOWS FROM RECORDS:** Momentary: Max. 998 m<sup>3</sup>/sec on October 8, 1945 with a gage height of 9.60 metres. Min. no flow occurs frequently.

Average Flow in Cubic Metres per Second\*\*

|          |          |                    |           |             |
|----------|----------|--------------------|-----------|-------------|
| Daily:   | Max. 459 | Oct. 19 & 20, 1971 | Min. 0    | Frequently  |
| Monthly: | Max. 408 | Oct. 1971          | Min. 0.10 | August 1957 |
| Yearly:  | Max. 103 | 1976               | Min. 1.19 | 1956        |

**Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary**

| Day | Jan.   | Feb.   | Mar.   | April  | May    | June   | July   | Aug.   | Sept.  | Oct.   | Nov.   | Dec.   |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1   | 12.5   | 0.73   | 8.64   | 10.0   | 7.16   | * 0.09 | 5.75   | 1.91   | 3.17   | 2.77   | 1.09   | 2.46   |
| 2   | * 18.7 | .17    | * 7.82 | 9.09   | * 3.71 | .10    | 9.66   | * .35  | 6.20   | 2.16   | .88    | 2.49   |
| 3   | 19.1   | .37    | 7.50   | 8.38   | .76    | .90    | 8.35   | .28    | 6.54   | 1.71   | .79    | * 2.82 |
| 4   | 8.58   | 1.75   | 7.62   | * 9.77 | .10    | 5.92   | 8.24   | .26    | * 11.2 | * 1.16 | 1.67   | 3.85   |
| 5   | 3.43   | * 1.12 | 7.39   | 9.44   | 2.29   | 5.13   | 9.54   | .59    | 13.1   | 1.26   | 1.91   | 2.63   |
| 6   | 4.70   | .94    | 4.96   | 6.66   | 6.46   | 5.38   | * 6.15 | 1.07   | 10.7   | .95    | 1.70   | 1.36   |
| 7   | 8.35   | 2.86   | 4.19   | 5.64   | 10.9   | 3.77   | 5.49   | 1.05   | 8.58   | .37    | 2.69   | 1.30   |
| 8   | 14.2   | 2.61   | 6.46   | 4.79   | 13.1   | 2.29   | 6.15   | 2.74   | 5.95   | 2.31   | 3.03   | .85    |
| 9   | 13.1   | 2.82   | 6.12   | 4.56   | 11.0   | 3.68   | 7.48   | 1.64   | 7.14   | 3.88   | 2.55   | .76    |
| 10  | 9.12   | 7.31   | 4.45   | 5.21   | 30.9   | 7.33   | 9.66   | 1.28   | 7.70   | 1.50   | 3.00   | 1.04   |
| 11  | 5.61   | 7.90   | 3.34   | 8.24   | 34.8   | 11.5   | 6.20   | 1.42   | 7.14   | .17    | 4.90   | 1.37   |
| 12  | 7.11   | 6.74   | 2.86   | 8.16   | 23.0   | 14.9   | 2.92   | 1.98   | 6.80   | 0      | 8.89   | 1.32   |
| 13  | 6.17   | 6.83   | 5.18   | 7.59   | 15.9   | 17.1   | 4.79   | 8.75   | 5.35   | .10    | 12.4   | .95    |
| 14  | 4.42   | 7.45   | 7.93   | 5.72   | 13.3   | * 11.4 | 5.52   | 11.5   | 3.65   | 2.34   | 8.64   | * .40  |
| 15  | 3.62   | 6.46   | 8.18   | 3.88   | 11.6   | 2.46   | 5.30   | * 3.37 | 2.70   | 2.67   | 3.57   | .02    |
| 16  | * 3.20 | 4.96   | * 9.20 | 3.12   | 7.73   | .73    | * 4.93 | 2.68   | 2.10   | 2.26   | * 2.92 | .01    |
| 17  | * 3.12 | 3.17   | 5.10   | 2.53   | 4.79   | 13.7   | * 3.46 | 3.74   | * 1.95 | 1.14   | 3.88   | .02    |
| 18  | 1.68   | 3.03   | 8.67   | 2.15   | 3.34   | 28.0   | 2.51   | 2.83   | 1.90   | .12    | 4.36   | .08    |
| 19  | 1.00   | 3.77   | 9.57   | * 1.78 | 3.20   | 30.9   | 1.40   | 2.42   | 1.91   | .05    | 4.02   | .15    |
| 20  | 3.09   | 5.21   | 8.78   | 1.83   | 3.31   | 18.1   | .46    | 2.06   | 1.54   | .16    | 2.52   | .06    |
| 21  | 3.09   | * 8.13 | 8.01   | 1.94   | 2.61   | 8.69   | .09    | 1.70   | 1.48   | 1.62   | 1.48   | .05    |
| 22  | 2.81   | * 9.12 | 6.68   | 1.83   | * 3.71 | 3.94   | .09    | 1.37   | 1.92   | 3.23   | .54    | .02    |
| 23  | 4.25   | 19.0   | 5.49   | 1.48   | 5.52   | 4.05   | 2.54   | 1.03   | 2.33   | 2.18   | 1.00   | 1.42   |
| 24  | 5.98   | 51.8   | 4.30   | 1.54   | 1.53   | 4.96   | 1.70   | .66    | 5.92   | 2.39   | 2.24   | 1.94   |
| 25  | 3.12   | 35.7   | 5.35   | 2.67   | .13    | 3.31   | 1.21   | .43    | 4.08   | 2.59   | 3.00   | 3.96   |
| 26  | 1.65   | 16.0   | 7.19   | 3.00   | .01    | 4.79   | .80    | .48    | 1.01   | 2.29   | 2.65   | 12.9   |
| 27  | .89    | 9.94   | 5.66   | 2.77   | 0      | 6.40   | .39    | .84    | .23    | 4.08   | 2.09   | 13.7   |
| 28  | .39    | 8.33   | 6.63   | 2.49   | .13    | 5.47   | .48    | 2.34   | .91    | 5.07   | 3.12   | 6.37   |
| 29  | 1.00   |        | 8.38   | 5.83   | .09    | 4.16   | .27    | 1.98   | 2.57   | 3.54   | 3.77   | 2.18   |
| 30  | 3.57   |        | 10.6   | 9.54   | .94    | 2.36   | .26    | 1.48   | 3.00   | 2.07   | 2.53   | 5.13   |
| 31  | 1.86   |        | 10.4   | .89    |        |        | 3.79   | 1.62   |        | 2.07   |        | 7.28   |

|        |        |        |        |        |       |       |
|--------|--------|--------|--------|--------|-------|-------|
| Sum    | 234.22 | 150.63 | 231.51 | 65.85  | 59.23 | 78.89 |
| 179.41 | 212.65 | 222.91 | 125.58 | 138.77 | 97.83 |       |

Current Year 1990

Period 1954-1990

| Month  | Extreme Gage Metres |      |     | Extreme-Cubic Metres per Second |     |      | Average | Volume - Thousands of Cubic Metres |         |           |         |
|--------|---------------------|------|-----|---------------------------------|-----|------|---------|------------------------------------|---------|-----------|---------|
|        | High                | Low  | Day | High                            | Day | Low  |         | Total                              | Average | Maximum   | Minimum |
| Jan.   | 1.89                | 0.60 | 2   | 21.0                            | 28  | 0.30 | 5.79    | 15,501                             | 47,271  | 407,379   | 349     |
| Feb.   | 3.37                | .53  | 24  | 54.4                            | 2   | .05  | 8.37    | 20,237                             | 47,489  | 446,279   | 1,303   |
| Mar.   | 1.39                | .76  | 30  | 11.1                            | 12  | 2.81 | 6.86    | 18,373                             | 38,611  | 445,080   | 2,532   |
| Apr.   | 1.42                | .72  | 4   | 10.7                            | 24  | 1.27 | 5.02    | 13,014                             | 35,789  | 270,866   | 1,079   |
| May    | 2.83                | .40  | 110 | 41.1                            | 27  | 0    | 7.19    | 19,259                             | 64,877  | 438,873   | 5,104   |
| June   | 2.56                | .51  | 19  | 33.7                            | 16  | .03  | 7.72    | 20,002                             | 72,679  | 600,151   | 2,996   |
| July   | 1.30                | .45  | 10  | 10.5                            | 22  | .01  | 4.05    | 10,850                             | 75,820  | 539,704   | 1,383   |
| Aug.   | 1.51                | .52  | 14  | 13.3                            | 2   | .24  | 2.12    | 5,689                              | 79,053  | 1,001,626 | 269     |
| Sept.  | 1.44                | .53  | 5   | 13.8                            | 27  | .20  | 4.63    | 11,990                             | 146,047 | 784,150   | 1,171   |
| Oct.   | 1.00                | .41  | 28  | 5.24                            | 112 | 0    | 1.91    | 5,117                              | 189,529 | 1,094,351 | 933     |
| Nov.   | 1.51                | .56  | 13  | 13.0                            | 3   | .31  | 3.26    | 8,453                              | 91,366  | 650,763   | 1,587   |
| Dec.   | 1.66                | .40  | 27  | 15.9                            | 16  | .01  | 2.54    | 6,816                              | 76,518  | 591,508   | 646     |
| Yearly | 3.37                | 0.40 | ==  | 54.4                            | ==  | 0    | 4.92    | 155,301                            | 965,049 | 3,263,087 | 37,722  |

\* Discharge measurement made on this day

! And other days

\*\* Period 1954-1990

## 08-4753.00 DIVERSIONS FROM THE RIO GRANDE

## UNITED STATES SIDE, BROWNSVILLE TO THE GULF OF MEXICO

Beginning June 1971, the Texas Water Rights Commission, now the Texas Water Commission, assumed control of the United States portion of the water in Falcon Reservoir and in the Rio Grande below Falcon Dam, the disposition of such waters being made by its Rio Grande Watermaster. Previous to that, since June 1956, such waters had been under the jurisdiction of the 93rd District Court of Texas administered by its Special Water Master.

During 1990, 2,294 hectares were allotted Rio Grande water in the river reach between the gaging station near Brownsville and the mouth of the Rio Grande. Such irrigable area was 0.8% of the total irrigable area below Falcon Dam allotted Rio Grande water.

The total diversion during 1990 in this river reach was 2,744,000 m<sup>3</sup>, or 0.2% of the total water diverted from the Rio Grande below Falcon Dam. Records of diversions in this river reach were determined by means of flow meters. More than one crop per year is often grown on parts of this land.

## EXTREME FLOWS FROM RECORDS:

|          |      | Average Flow in Cubic Metres per Second |             |      |      |              |      |
|----------|------|---|-------------|------|------|--------------|------|
| Daily:   | Max. | 1.92                                    | May 1, 1984 | Min. | 0    | Frequently   |      |
| Monthly: | Max. | 0.66                                    | June 1965   | Min. | 0    | Occasionally |      |
| Yearly:  | Max. | 0.20                                    | 1965        | Min. | 0.02 |              | 1976 |

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day | Jan. | Feb. | Mar. | April | May  | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|-----|------|------|------|-------|------|------|------|------|-------|------|------|------|
| 1   | 0    | .06  | 0.52 | 0     | 0.49 | 0.99 | 0.35 | 0    | 0     | 0    | 0.15 | 0    |
| 2   | 0    | .06  | .40  | 0     | .42  | 1.03 | .34  | 0    | 0     | 0    | .15  | 0    |
| 3   | 0    | .06  | .23  | 0     | .42  | .78  | .19  | 0    | 0     | 0    | 0    | 0    |
| 4   | 0    | .06  | 0    | 0     | .42  | .91  | .23  | 0    | 0     | 0    | 0    | 0    |
| 5   | 0    | .06  | 0    | 0     | .11  | .84  | .20  | 0    | 0     | 0    | 0    | 0    |
| 6   | 0    | .14  | 0    | 0     | 0    | .61  | .14  | 0    | 0     | 0    | 0    | 0    |
| 7   | 0    | .11  | 0    | 0     | 0    | .64  | .01  | 0    | 0     | 0    | 0    | 0    |
| 8   | 0    | .06  | 0    | 0     | 0    | .76  | .03  | 0    | 0     | 0    | .02  | 0    |
| 9   | 0    | .06  | 0    | .09   | 0    | .76  | .03  | 0    | 0     | 0    | 0    | 0    |
| 10  | 0    | .06  | 0    | .09   | 0    | .62  | .03  | 0    | 0     | 0    | 0    | 0    |
| 11  | 0    | .06  | 0    | 0     | .13  | .73  | .04  | 0    | .13   | 0    | 0    | 0    |
| 12  | 0    | .06  | 0    | 0     | .13  | .56  | .01  | 0    | .13   | .03  | 0    | 0    |
| 13  | 0    | .08  | 0    | 0     | .13  | .40  | .01  | .07  | .13   | .03  | 0    | 0    |
| 14  | 0    | .06  | 0    | 0     | .13  | .16  | .01  | .07  | 0     | 0    | 0    | 0    |
| 15  | 0    | .06  | 0    | 0     | .13  | .47  | 0    | .17  | 0     | 0    | 0    | 0    |
| 16  | 0    | .10  | 0    | 0     | 0    | .47  | 0    | .10  | 0     | 0    | 0    | 0    |
| 17  | .04  | .10  | 0    | 0     | 0    | .27  | 0    | .10  | 0     | 0    | 0    | 0    |
| 18  | .04  | .10  | 0    | 0     | 0    | .60  | 0    | 0    | 0     | 0    | 0    | 0    |
| 19  | .04  | .12  | .04  | 0     | 0    | .53  | 0    | 0    | 0     | 0    | 0    | .10  |
| 20  | .04  | .18  | .04  | 0     | 0    | .51  | 0    | 0    | 0     | 0    | 0    | .10  |
| 21  | .04  | .18  | .10  | 0     | 0    | .63  | .07  | 0    | 0     | 0    | 0    | .10  |
| 22  | .04  | .43  | .07  | 0     | 0    | .78  | .07  | 0    | 0     | 0    | 0    | 0    |
| 23  | 0    | .40  | .07  | 0     | 0    | .69  | .07  | 0    | 0     | 0    | 0    | 0    |
| 24  | 0    | .31  | .05  | 0     | 0    | .67  | .07  | 0    | 0     | .14  | 0    | .15  |
| 25  | 0    | 0    | 0    | 0     | 0    | .63  | .07  | 0    | 0     | .14  | 0    | .12  |
| 26  | 0    | 0    | .03  | 0     | .16  | .60  | .07  | 0    | 0     | .14  | 0    | .20  |
| 27  | 0    | 0    | 0    | .07   | .16  | .61  | 0    | 0    | 0     | .16  | 0    | .08  |
| 28  | 0    | 0    | 0    | .07   | 0    | .64  | 0    | 0    | 0     | 0    | 0    | .13  |
| 29  | 0    | 0    | 0    | 0     | 0    | .55  | 0    | 0    | 0     | 0    | 0    | .13  |
| 30  | 0    | 0    | 0    | 0     | 0    | .41  | 0    | 0    | 0     | 0    | 0    | 0    |
| 31  | 0    | 0    | 0    | 0     | 0    | 0    | 0    | 0    | 0     | 0    | 0    | 0    |
| Sum |      | 2.97 | 0.32 | 18.85 | 0.51 | 0.64 |      |      |       |      | 1.11 |      |
|     | 0.24 | 1.55 | 2.83 | 2.04  | 0.39 | 0.32 |      |      |       |      |      |      |

## Current Year 1990

## Period 1960-1990

| Month  | Average Rainfall**<br>Millimetres | Extreme-Cubic Metres per Second |      |      | Average | Volume—Thousands of Cubic Metres |         |         |         |
|--------|-----------------------------------|---------------------------------|------|------|---------|----------------------------------|---------|---------|---------|
|        |                                   | Day                             | High | Day  |         | Total                            | Average | Maximum | Minimum |
| Jan.   | 19                                | 47                              | 117  | 0.04 | 1.1     | 0                                | 0.01    | 20.7    | 446     |
| Feb.   | 36                                | 34                              | 22   | .43  | 125     | 0                                | .11     | 257     | 286     |
| Mar.   | 34                                | 15                              | 1    | .52  | 1.4     | 0                                | .05     | 134     | 167     |
| Apr.   | 57                                | 47                              | 1.9  | .09  | 1.1     | 0                                | .01     | 27.6    | 331     |
| May    | 62                                | 71                              | 1    | .49  | 1.6     | 0                                | .09     | 245     | 490     |
| June   | 11                                | 68                              | 2    | 1.03 | 14      | .16                              | .63     | 1,629   | 589     |
| July   | 27                                | 53                              | 1    | .35  | 15      | 0                                | .07     | 176     | 242     |
| Aug.   | 39                                | 76                              | 15   | .17  | 1.1     | 0                                | .02     | 44.1    | 125     |
| Sept.  | 80                                | 151                             | 111  | .13  | 1.1     | 0                                | .01     | 33.7    | 53.2    |
| Oct.   | 45                                | 71                              | 27   | .16  | 1.1     | 0                                | .02     | 55.3    | 68.3    |
| Nov.   | 20                                | 41                              | 1    | .15  | 1.3     | 0                                | .01     | 27.6    | 69.7    |
| Dec.   | 1                                 | 40                              | 26   | .20  | 1.1     | 0                                | .04     | 95.9    | 103     |
| Yearly | 431                               | 714                             | ==   | 1.03 | ==      | 0                                | 0.09    | 2,746   | 2,970   |
|        |                                   |                                 |      |      |         |                                  |         | 6,212   | 670     |

0 Mean daily

1 And other days

\*\* United States side - average of several stations in the reach

08-4754.00 DIVERSIONS FROM THE RIO GRANDE  
UNITED STATES SIDE, FALCON DAM TO THE GULF OF MEXICO

Beginning June 1971 the Texas Water Rights Commission, now the Texas Water Commission, assumed control of the United States portion of the water in Falcon Reservoir and in the Rio Grande below Falcon Dam, the disposition of such waters being made by its Rio Grande Watermaster. Previous to that, since June 1956, such waters had been under the jurisdiction of the 93rd District Court of Texas administered by its Special Water Master.

In 1990, 291,717 hectares, several towns and many rural homes were allotted Rio Grande water between Falcon Dam and the Gulf of Mexico. The total diversion from the river was 1,589,554,000 m<sup>3</sup>. Records of diversion from the Rio Grande were determined by means of flowmeters, by open channel rating stations and by deflection meters developed by the International Boundary and Water Commission. Drainage from more than 90% of this area does not return to the Rio Grande, but some of it is reused within the area. More than one crop per year is often grown on parts of this land.

Diversion data pertaining to "Diversions from the Rio Grande-United States Side below Rio Grande City" for the period 1922 through 1957 may be found in previous issues of these Water Bulletins. The area irrigated below Rio Grande City is about 99% of the total acreage irrigated on the United States side below Falcon Dam.

A breakdown by river reaches of the total diversion below Falcon Dam shown in the tabulation below may be found in appropriate downstream order in preceding pages of this Water Bulletin. Because the mean daily discharges are rounded, the total volumes shown in the summary below may not equal the sum of the volumes of the individual reaches.

## EXTREME FLOWS FROM RECORDS:

Average Flow in Cubic Metres per Second

|          |      |      |              |      |      |               |  |
|----------|------|------|--------------|------|------|---------------|--|
| Daily:   | Max. | 159  | June 1, 1960 | Min. | 0.08 | Aug. 10, 1980 |  |
| Monthly: | Max. | 123  | June 1960    | Min. | 2.89 | March 1957    |  |
| Yearly:  | Max. | 59.8 | 1989         | Min. | 24.9 | 1970          |  |

Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day        | Jan.            | Feb. | Mar.            | April | May             | June | July           | Aug. | Sept.          | Oct. | Nov.           | Dec. |
|------------|-----------------|------|-----------------|-------|-----------------|------|----------------|------|----------------|------|----------------|------|
| 1          | 12.7            | 84.8 | 17.0            | 19.8  | 64.3            | 159  | 96.7           | 69.5 | 59.0           | 38.0 | 52.0           | 25.1 |
| 2          | 25.1            | 84.8 | 12.2            | 32.1  | 68.5            | 142  | 98.5           | 61.0 | 58.9           | 37.5 | 43.7           | 20.3 |
| 3          | 35.0            | 76.2 | 8.67            | 46.5  | 65.3            | 133  | 94.3           | 64.9 | 57.2           | 37.4 | 30.0           | 29.0 |
| 4          | 34.8            | 81.2 | 9.39            | 40.1  | 52.4            | 144  | 87.3           | 54.2 | 48.4           | 38.6 | 30.3           | 34.8 |
| 5          | 27.0            | 90.2 | 18.1            | 31.0  | 40.1            | 152  | 81.1           | 50.1 | 47.8           | 38.7 | 36.9           | 34.6 |
| 6          | 9.06            | 95.1 | 26.4            | 29.8  | 37.3            | 148  | 73.9           | 61.3 | 38.6           | 32.3 | 36.3           | 38.3 |
| 7          | 8.59            | 91.7 | 27.3            | 25.1  | 36.1            | 137  | 55.1           | 61.7 | 25.6           | 31.1 | 38.7           | 34.9 |
| 8          | 27.1            | 87.0 | 27.5            | 32.7  | 24.7            | 137  | 44.8           | 62.5 | 23.4           | 59.6 | 36.7           | 20.2 |
| 9          | 35.9            | 81.5 | 28.7            | 38.1  | 24.1            | 133  | 49.7           | 57.8 | 21.8           | 64.1 | 33.6           | 16.8 |
| 10         | 47.3            | 60.2 | 17.3            | 38.3  | 19.8            | 128  | 51.5           | 49.3 | 26.3           | 50.7 | 27.6           | 33.5 |
| 11         | 50.7            | 60.1 | 20.0            | 37.4  | 11.2            | 125  | 53.1           | 40.0 | 26.9           | 37.6 | 21.4           | 35.0 |
| 12         | 42.8            | 70.6 | 36.4            | 32.8  | 8.18            | 120  | 53.3           | 29.3 | 27.7           | 31.2 | 17.4           | 40.5 |
| 13         | 35.9            | 69.7 | 36.8            | 25.6  | 2.89            | 120  | 42.7           | 30.5 | 28.0           | 22.6 | 21.0           | 49.9 |
| 14         | 34.7            | 72.3 | 31.8            | 16.8  | 12.1            | 115  | 27.4           | 40.6 | 27.6           | 26.4 | 21.4           | 49.6 |
| 15         | 47.9            | 71.4 | 35.1            | 28.8  | 16.5            | 105  | 24.9           | 42.3 | 19.1           | 46.8 | 23.9           | 38.2 |
| 16         | 54.2            | 68.7 | 37.7            | 32.1  | 17.0            | 89.2 | 34.9           | 42.5 | 19.3           | 62.0 | 22.7           | 46.1 |
| 17         | 56.9            | 45.0 | 31.4            | 33.6  | 26.1            | 90.0 | 42.4           | 45.2 | 25.4           | 62.1 | 13.1           | 63.4 |
| 18         | 56.3            | 43.6 | 28.9            | 39.2  | 24.8            | 113  | 47.9           | 38.6 | 22.4           | 59.4 | 16.9           | 57.4 |
| 19         | 54.6            | 46.7 | 42.7            | 46.2  | 25.6            | 113  | 47.6           | 37.8 | 25.0           | 55.3 | 30.8           | 74.9 |
| 20         | 47.2            | 46.7 | 45.4            | 41.1  | 37.1            | 118  | 44.6           | 50.4 | 21.4           | 43.3 | 35.6           | 70.2 |
| 21         | 46.8            | 36.6 | 48.1            | 29.7  | 72.4            | 118  | 36.7           | 54.5 | 18.4           | 46.8 | 31.2           | 64.7 |
| 22         | 58.5            | 28.2 | 48.5            | 31.7  | 89.7            | 112  | 38.1           | 53.2 | 16.8           | 52.9 | 20.8           | 59.7 |
| 23         | 63.5            | 26.9 | 46.2            | 52.6  | 95.4            | 101  | 46.6           | 54.4 | 15.3           | 50.8 | 27.5           | 44.7 |
| 24         | 70.6            | 20.1 | 40.3            | 51.0  | 103             | 99.6 | 50.0           | 48.7 | 27.6           | 52.6 | 28.5           | 22.7 |
| 25         | 75.9            | 11.6 | 42.6            | 53.2  | 109             | 114  | 53.7           | 33.5 | 35.2           | 46.0 | 27.9           | 14.5 |
| 26         | 78.8            | 12.0 | 54.4            | 52.4  | 109             | 123  | 48.3           | 35.1 | 42.0           | 40.4 | 36.2           | 49.4 |
| 27         | 74.1            | 15.1 | 57.7            | 48.8  | 107             | 123  | 45.1           | 49.9 | 39.9           | 32.3 | 32.9           | 57.0 |
| 28         | 66.4            | 17.6 | 53.6            | 40.1  | 113             | 122  | 31.3           | 57.1 | 33.7           | 28.7 | 39.9           | 58.0 |
| 29         | 71.2            | —    | 47.1            | 27.9  | 127             | 117  | 31.5           | 60.6 | 30.4           | 35.8 | 43.1           | 49.6 |
| 30         | 81.2            | —    | 31.8            | 46.8  | 124             | 103  | 50.3           | 63.8 | 23.8           | 40.2 | 35.2           | 37.3 |
| 31         | 80.8            | —    | 23.6            | —     | 127             | —    | 61.4           | 63.0 | 44.3           | —    | —              | 29.1 |
| <b>Sum</b> | <b>1,595.6</b>  |      | <b>1,097.3</b>  |       | <b>3,653.8</b>  |      | <b>1,568.3</b> |      | <b>1,345.5</b> |      | <b>1,317.4</b> |      |
|            | <b>1,511.55</b> |      | <b>1,032.66</b> |       | <b>1,790.57</b> |      | <b>1,644.7</b> |      | <b>932.9</b>   |      | <b>913.2</b>   |      |

Current Year 1990

Period 1958-1990

| Month         | Average Rainfall**<br>Millimetres |            | Extreme-Cubic Metres per Second |            |          | Average     | Volume-Thousands of Cubic Metres |                  |                  |                  |                |
|---------------|-----------------------------------|------------|---------------------------------|------------|----------|-------------|----------------------------------|------------------|------------------|------------------|----------------|
|               | 1990                              | 1957-1990  | Day                             | Ø          | High     |             | Day                              | Ø                | Low              | Total            | Average        |
| Jan.          | 9                                 | 39         | 30                              | 81.0       | 7        | 8.61        | 48.8                             | 130,598          | 93,861           | 224,987          | 11,984         |
| Feb.          | 35                                | 37         | 6                               | 95.2       | 25       | 11.6        | 57.0                             | 137,860          | 66,832           | 155,700          | 14,537         |
| Mar.          | 27                                | 16         | 27                              | 57.8       | 3        | 8.57        | 33.3                             | 89,222           | 93,639           | 193,098          | 19,538         |
| Apr.          | 47                                | 37         | 25                              | 53.2       | 14       | 16.8        | 36.6                             | 94,807           | 139,146          | 258,994          | 52,375         |
| May           | 45                                | 68         | 29                              | 127        | 13       | 2.89        | 57.8                             | 154,705          | 147,036          | 282,261          | 19,823         |
| June          | 12                                | 69         | 1                               | 159        | 16       | 89.2        | 122                              | 315,688          | 171,281          | 319,179          | 32,671         |
| July          | 27                                | 46         | 2                               | 98.6       | 15       | 24.9        | 53.1                             | 142,102          | 131,378          | 242,015          | 38,857         |
| Aug.          | 33                                | 62         | 1                               | 69.7       | 12       | 29.5        | 50.6                             | 135,501          | 103,909          | 176,740          | 44,662         |
| Sept.         | 84                                | 113        | 1                               | 58.9       | 23       | 15.3        | 31.1                             | 80,603           | 74,408           | 168,349          | 15,676         |
| Oct.          | 21                                | 67         | 9                               | 64.0       | 13       | 22.5        | 43.4                             | 115,251          | 80,307           | 162,305          | 16,023         |
| Nov.          | 23                                | 30         | 1                               | 52.1       | 17       | 13.1        | 30.4                             | 78,900           | 65,090           | 120,842          | 15,633         |
| Dec.          | 9                                 | 30         | 18                              | 75.3       | 25       | 14.5        | 42.5                             | 113,823          | 62,350           | 113,823          | 17,311         |
| <b>Yearly</b> | <b>372</b>                        | <b>614</b> | <b>—</b>                        | <b>159</b> | <b>—</b> | <b>2.89</b> | <b>50.4</b>                      | <b>1,590,060</b> | <b>1,229,237</b> | <b>1,879,991</b> | <b>785,513</b> |

Ø Mean daily

! And other days

\*\* United States side - average of several stations in the reach

## OUTFALLS FROM SEWERS INTO THE RIO GRANDE

IN THOUSANDS OF CUBIC METRES

## EL PASO SEWAGE OUTFALL

Treated sewage effluent enters the Rio Grande through the outfall of the Haskell Street Wastewater Treatment Plant located 11.4 river kilometres downstream from the American Dam. The outfall from this plant consists of flows measured by a Sparling propeller meter and estimates of amounts which bypass the meter. The records are furnished by the City of El Paso, Texas.

| Month   | Jan.  | Feb.  | Mar.  | April | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  | Yearly |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| 1990    | 2,426 | 2,537 | 2,682 | 2,643 | 2,904 | 2,989 | 3,024 | 3,183 | 3,094 | 2,792 | 2,714 | 2,620 | 33,608 |
| Average | 2,437 | 2,294 | 2,457 | 2,382 | 2,484 | 2,513 | 2,665 | 2,772 | 2,656 | 2,543 | 2,462 | 2,442 | 30,107 |

Period average 1981-1990

## EAGLE PASS SEWAGE OUTFALL

Treated sewage effluent enters the Rio Grande at river kilometre 798 and about 183 metres upstream from the Eagle Pass-Piedras Negras International Railroad Bridge. The records are based on weekly current meter measurements and estimates by personnel of the International Boundary and Water Commission.

| Month   | Jan. | Feb. | Mar. | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Yearly |
|---------|------|------|------|-------|-----|------|------|------|-------|------|------|------|--------|
| 1990    | 204  | 188  | 227  | 265   | 235 | 178  | 191  | 220  | 230   | 224  | 218  | 241  | 2,621  |
| Average | 215  | 187  | 201  | 212   | 219 | 212  | 209  | 210  | 211   | 228  | 211  | 221  | 2,536  |

Period average 1981-1990

## LAREDO SEWAGE OUTFALL

Treated sewage effluent enters the Rio Grande from two sewage treatment plants, Zacate Creek Sewage Treatment Plant and Southside Sewage Treatment Plant. These sewage outfalls enter the Rio Grande at river kilometres 579 and 573, 1.4 and 7.9 river kilometres respectively downstream from the old international highway bridge Laredo, Texas and Nuevo Laredo, Tamaulipas. The records are furnished by the Laredo Water Treatment Plant in Laredo, Texas.

| Month   | Jan.  | Feb.  | Mar.  | April | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  | Yearly |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| 1990    | 1,212 | 1,112 | 1,295 | 1,291 | 1,377 | 1,323 | 1,423 | 1,398 | 1,325 | 1,297 | 1,260 | 1,182 | 15,495 |
| Average | 1,113 | 997   | 1,106 | 1,079 | 1,195 | 1,164 | 1,198 | 1,200 | 1,203 | 1,204 | 1,132 | 1,097 | 13,688 |

Period average 1981-1990

## BROWNSVILLE SEWAGE OUTFALL

Treated sewage effluent enters the Rio Grande at river kilometre 75.3, 14.3 river kilometres downstream from the Gateway Bridge between Brownsville, Texas and Matamoros, Tamaulipas and 3.1 river kilometres downstream from the Brownsville Gaging station. Records are furnished by the City of Brownsville.

| Month   | Jan. | Feb. | Mar. | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Yearly |
|---------|------|------|------|-------|-----|------|------|------|-------|------|------|------|--------|
| 1990    | 685  | 624  | 675  | 670   | 693 | 631  | 656  | 668  | 684   | 693  | 629  | 625  | 7,933  |
| Average | 737  | 667  | 717  | 688   | 750 | 721  | 752  | 740  | 761   | 746  | 696  | 700  | 8,675  |

Period average 1981-1990

## MUNICIPAL AND INDUSTRIAL WATER USES

## IN THOUSANDS OF CUBIC METRES

Tabulated below are monthly and yearly amounts of water pumped from the Rio Grande directly into municipal distribution systems of cities along the border, except for the city of Del Rio, whose main supply is derived from San Felipe Springs; and the city of El Paso, whose supply is derived mainly from deep wells. The amount shown below for the city of El Paso is Rio Grande water pumped from the Franklin Canal at the El Paso Water Plant for municipal use. Ciudad Acuna, Coahuila, whose municipal diversion from the Rio Grande started in 1971, may at times use an alternate source from Arroyo Las Vacas, which was its previous source of supply. Such use would be reflected in the tabulations below.

All Rio Grande water used by U. S. municipalities below Falcon Dam is also included in the figures shown under "Diversions from the Rio Grande - United States Side..." (by river reaches and total below Falcon Dam) on prior pages of this bulletin. Population data was provided by the Chamber of Commerce for each city in the United States, except El Paso, which was provided by the City Planning Office; Falcon Village, estimated by the International Boundary and Water Commission; Del Rio, by the Middle Rio Grande Development Counsel; Laughlin Air Force Base, by the U.S. Air Force; Laredo, by the Laredo Development Foundation; and Rio Bravo and San Ygnacio, which are based on utilities connections.

## IN THE UNITED STATES

| Month  | EL PASO<br>(Pop. 515,342) |                       |         | DEL RIO<br>(Pop. 35,000) |                       |         |
|--------|---------------------------|-----------------------|---------|--------------------------|-----------------------|---------|
|        | 1990                      | Period<br>1981 - 1990 |         | 1990                     | Period<br>1981 - 1990 |         |
|        |                           | Average               | Maximum |                          | Average               | Maximum |
| Jan.   | 0                         | 51.9                  | 416     | 0                        | 667                   | 756     |
| Feb.   | 136                       | 161                   | 588     | 0                        | 665                   | 722     |
| Mar.   | 3,601                     | 989                   | 3,601   | 136                      | 697                   | 999     |
| April  | 5,068                     | 2,621                 | 5,068   | 1,004                    | 791                   | 1,117   |
| May    | 5,811                     | 4,640                 | 5,811   | 3,862                    | 1,037                 | 1,198   |
| June   | 5,463                     | 4,861                 | 5,463   | 4,161                    | 1,707                 | 1,231   |
| July   | 5,464                     | 5,165                 | 5,524   | 4,433                    | 1,437                 | 1,509   |
| Aug.   | 5,378                     | 4,852                 | 5,378   | 3,915                    | 1,457                 | 1,656   |
| Sept.  | 4,840                     | 4,422                 | 5,244   | 2,521                    | 1,109                 | 1,220   |
| Oct.   | 1,013                     | 848                   | 2,213   | 0                        | 929                   | 948     |
| Nov.   | 0                         | 45.1                  | 265     | 0                        | 929                   | 809     |
| Dec.   | 0                         | 0                     | 0       | 0                        | 902                   | 767     |
| Yearly | 36,774                    | 28,656                | 36,774  | 23,341                   | 12,327                | 12,932  |
|        |                           |                       |         |                          | 15,254                | 10,150  |

| Month  | EAGLE PASS<br>(Pop. 36,378) |                       |         | LAREDO<br>(Pop. 133,239) |                       |         |
|--------|-----------------------------|-----------------------|---------|--------------------------|-----------------------|---------|
|        | 1990                        | Period<br>1981 - 1990 |         | 1990                     | Period<br>1981 - 1990 |         |
|        |                             | Average               | Maximum |                          | Average               | Maximum |
| Jan.   | 368                         | 318                   | 368     | 236                      | 2,158                 | 1,768   |
| Feb.   | 343                         | 303                   | 362     | 241                      | 2,300                 | 1,715   |
| Mar.   | 353                         | 365                   | 428     | 310                      | 2,402                 | 2,126   |
| April  | 359                         | 396                   | 495     | 331                      | 2,465                 | 2,351   |
| May    | 426                         | 409                   | 481     | 306                      | 3,461                 | 2,553   |
| June   | 596                         | 456                   | 596     | 302                      | 3,903                 | 2,676   |
| July   | 513                         | 526                   | 684     | 402                      | 3,362                 | 2,961   |
| Aug.   | 515                         | 544                   | 650     | 419                      | 3,275                 | 3,065   |
| Sept.  | 392                         | 470                   | 596     | 338                      | 2,454                 | 2,529   |
| Oct.   | 446                         | 397                   | 518     | 268                      | 2,615                 | 2,280   |
| Nov.   | 394                         | 340                   | 407     | 242                      | 2,420                 | 2,074   |
| Dec.   | 412                         | 333                   | 412     | 233                      | 2,357                 | 2,000   |
| Yearly | 5,117                       | 4,857                 | 5,605   | 3,911                    | 33,172                | 28,098  |
|        |                             |                       |         |                          | 33,448                | 25,061  |

| Month  | LAREDO POWER STATION |                       |         | RIO BRAVO<br>(Pop. 7,000) |                       |         |
|--------|----------------------|-----------------------|---------|---------------------------|-----------------------|---------|
|        | 1990                 | Period<br>1981 - 1990 |         | 1990                      | Period<br>1983 - 1990 |         |
|        |                      | Average               | Maximum |                           | Average               | Maximum |
| Jan.   | 56.6                 | 77.1                  | 139     | 37.0                      | 14.9                  | 18.0    |
| Feb.   | 68.7                 | 81.6                  | 124     | 49.0                      | 32.7                  | 17.4    |
| Mar.   | 96.2                 | 106                   | 158     | 55.3                      | 41.8                  | 23.3    |
| April  | 87.3                 | 118                   | 164     | 67.1                      | 33.2                  | 23.7    |
| May    | 135                  | 135                   | 169     | 90.5                      | 47.7                  | 27.9    |
| June   | 229                  | 178                   | 245     | 99.2                      | 83.3                  | 34.0    |
| July   | 169                  | 174                   | 217     | 125                       | 70.9                  | 28.3    |
| Aug.   | 210                  | 188                   | 217     | 148                       | 80.1                  | 40.3    |
| Sept.  | 159                  | 158                   | 207     | 97.4                      | 37.6                  | 30.9    |
| Oct.   | 145                  | 115                   | 145     | 75.7                      | 43.1                  | 27.9    |
| Nov.   | 53.1                 | 79.4                  | 125     | 37.4                      | 44.0                  | 26.4    |
| Dec.   | 109                  | 82.6                  | 138     | 8.1                       | 42.4                  | 18.1    |
| Yearly | 1,518                | 1,493                 | 1,766   | 957                       | 572                   | 572     |
|        |                      |                       |         |                           |                       | 3.7     |

## MUNICIPAL AND INDUSTRIAL WATER USES

IN THOUSANDS OF CUBIC METRES

## IN THE UNITED STATES

| Month  | SAN YGNACIO<br>(Pop. 744) |                       |         | NEW ZAPATA<br>(Pop. 9,500) |                       |         |
|--------|---------------------------|-----------------------|---------|----------------------------|-----------------------|---------|
|        | 1990                      | Period<br>1981 - 1990 |         | 1990                       | Period<br>1981 - 1990 |         |
|        |                           | Average               | Maximum |                            | Average               | Maximum |
| Jan.   | 13.0                      | 13.2                  | 26.5    | 4.9                        | 129                   | 101     |
| Feb.   | 12.6                      | 13.6                  | 23.1    | 5.1                        | 123                   | 130     |
| Mar.   | 13.1                      | 17.0                  | 30.5    | 6.0                        | 150                   | 134     |
| April  | 15.1                      | 18.6                  | 32.8    | 5.9                        | 113                   | 126     |
| May    | 17.5                      | 19.1                  | 32.3    | 5.8                        | 145                   | 154     |
| June   | 23.8                      | 19.1                  | 28.9    | 9.6                        | 231                   | 148     |
| July   | 19.5                      | 20.1                  | 34.3    | 10.2                       | 146                   | 161     |
| Aug.   | 16.6                      | 21.1                  | 38.4    | 11.1                       | 144                   | 169     |
| Sept.  | 15.0                      | 18.9                  | 25.2    | 12.6                       | 161                   | 144     |
| Oct.   | 15.4                      | 16.1                  | 24.9    | 9.6                        | 116                   | 134     |
| Nov.   | 13.9                      | 14.5                  | 22.2    | 10.2                       | 105                   | 111     |
| Dec.   | 13.4                      | 13.6                  | 21.1    | 9.4                        | 152                   | 139     |
| Yearly | 189                       | 205                   | 302     | 101                        | 1,715                 | 1,593   |
|        |                           |                       |         |                            | 1,876                 | 1,127   |

| Month  | FALCON VILLAGE<br>(Pop. 85) |                       |         | ROMA<br>(Pop. 8,059) |                       |         |
|--------|-----------------------------|-----------------------|---------|----------------------|-----------------------|---------|
|        | 1990                        | Period<br>1981 - 1990 |         | 1990                 | Period<br>1981 - 1990 |         |
|        |                             | Average               | Maximum |                      | Average               | Maximum |
| Jan.   | 9.6                         | 10.3                  | 13.1    | 6.9                  | 176                   | 111     |
| Feb.   | 8.9                         | 9.6                   | 12.1    | 6.5                  | 143                   | 176     |
| Mar.   | 9.5                         | 11.2                  | 13.8    | 6.5                  | 176                   | 103     |
| April  | 9.1                         | 12.0                  | 15.2    | 9.1                  | 185                   | 131     |
| May    | 11.5                        | 12.6                  | 15.4    | 9.1                  | 240                   | 139     |
| June   | 14.0                        | 13.3                  | 16.4    | 9.3                  | 276                   | 154     |
| July   | 14.1                        | 14.1                  | 18.1    | 11.0                 | 259                   | 276     |
| Aug.   | 11.9                        | 14.7                  | 19.2    | 10.9                 | 245                   | 173     |
| Sept.  | 9.8                         | 12.3                  | 14.3    | 9.1                  | 195                   | 152     |
| Oct.   | 9.9                         | 12.1                  | 13.8    | 9.9                  | 199                   | 152     |
| Nov.   | 9.0                         | 11.0                  | 13.3    | 8.5                  | 190                   | 143     |
| Dec.   | 8.9                         | 10.6                  | 13.2    | 8.3                  | 195                   | 133     |
| Yearly | 126                         | 144                   | 167     | 113                  | 2,479                 | 1,695   |
|        |                             |                       |         |                      | 2,479                 | 1,119   |

| Month  | RIO GRANDE CITY<br>(Pop. 40,518) |                       |         | BROWNSVILLE<br>(Pop. 115,000) |                       |         |
|--------|----------------------------------|-----------------------|---------|-------------------------------|-----------------------|---------|
|        | 1990                             | Period<br>1981 - 1990 |         | 1990                          | Period<br>1981 - 1990 |         |
|        |                                  | Average               | Maximum |                               | Average               | Maximum |
| Jan.   | 182                              | 171                   | 204     | 132                           | 1,804                 | 1,703   |
| Feb.   | 160                              | 168                   | 235     | 125                           | 1,480                 | 1,528   |
| Mar.   | 177                              | 209                   | 252     | 177                           | 1,879                 | 1,745   |
| April  | 172                              | 212                   | 278     | 134                           | 1,800                 | 1,851   |
| May    | 210                              | 243                   | 437     | 121                           | 2,140                 | 2,279   |
| June   | 258                              | 237                   | 343     | 176                           | 2,383                 | 1,990   |
| July   | 254                              | 253                   | 304     | 222                           | 2,401                 | 2,185   |
| Aug.   | 239                              | 258                   | 331     | 195                           | 2,650                 | 2,185   |
| Sept.  | 211                              | 242                   | 366     | 150                           | 2,039                 | 2,310   |
| Oct.   | 162                              | 231                   | 356     | 162                           | 2,103                 | 1,965   |
| Nov.   | 153                              | 189                   | 233     | 153                           | 1,846                 | 2,164   |
| Dec.   | 170                              | 180                   | 209     | 135                           | 1,901                 | 1,747   |
| Yearly | 2,348                            | 2,593                 | 3,075   | 2,041                         | 24,426                | 22,877  |
|        |                                  |                       |         |                               | 24,602                | 20,831  |

## MUNICIPAL AND INDUSTRIAL WATER USES

IN THOUSANDS OF CUBIC METRES

## IN MEXICO

| Month  | CD. ACUNA, COAHUILA |                    |         | PIEDRAS NEGRAS, COAHUILA |                    |         |
|--------|---------------------|--------------------|---------|--------------------------|--------------------|---------|
|        | 1990                | Period 1981 - 1990 |         | 1990                     | Period 1981 - 1990 |         |
|        |                     | Average            | Maximum |                          | Average            | Maximum |
| Jan.   | 305                 | 288                | 310     | 244                      | 795                | 692     |
| Feb.   | 276                 | 240                | 295     | 245                      | 842                | 562     |
| Mar.   | 306                 | 262                | 310     | 273                      | 862                | 636     |
| April  | 296                 | 255                | 301     | 264                      | 850                | 625     |
| May    | 308                 | 263                | 311     | 274                      | 942                | 666     |
| June   | 298                 | 258                | 302     | 265                      | 364                | 774     |
| July   | 301                 | 267                | 319     | 273                      | 352                | 845     |
| Aug.   | 301                 | 266                | 316     | 274                      | 429                | 848     |
| Sept.  | 296                 | 260                | 305     | 265                      | 396                | 805     |
| Oct.   | 304                 | 265                | 310     | 274                      | 458                | 835     |
| Nov.   | 294                 | 257                | 306     | 265                      | 435                | 735     |
| Dec.   | 304                 | 267                | 316     | 273                      | 445                | 744     |
| Yearly | 3,589               | 3,148              | 3,651   | 3,192                    | 8,238              | 9,023   |
|        |                     |                    |         |                          | 10,663             | 5,416   |

| Month  | NUEVO LAREDO, TAMANLIPAS |                    |         | NUEVA CD. GUERRERO, TAMAMULIPAS |                    |         |
|--------|--------------------------|--------------------|---------|---------------------------------|--------------------|---------|
|        | 1990                     | Period 1981 - 1990 |         | 1990                            | Period 1981 - 1990 |         |
|        |                          | Average            | Maximum |                                 | Average            | Maximum |
| Jan.   | 1,919                    | 2,577              | 3,346   | 1,919                           | 54.7               | 54.3    |
| Feb.   | 1,820                    | 2,209              | 3,184   | 1,820                           | 49.0               | 43.0    |
| Mar.   | 1,855                    | 2,475              | 3,593   | 1,855                           | 44.5               | 66.4    |
| April  | 2,792                    | 2,621              | 3,533   | 2,345                           | 39.0               | 73.5    |
| May    | 1,873                    | 2,602              | 3,593   | 1,813                           | 49.0               | 74.0    |
| June   | 2,097                    | 2,682              | 3,618   | 2,006                           | 42.6               | 62.5    |
| July   | 2,278                    | 2,846              | 3,629   | 2,251                           | 43.9               | 65.5    |
| Aug.   | 2,316                    | 2,878              | 3,639   | 2,299                           | 44.2               | 54.2    |
| Sept.  | 2,368                    | 2,765              | 3,546   | 2,368                           | 41.3               | 48.0    |
| Oct.   | 2,224                    | 2,739              | 3,644   | 2,224                           | 41.2               | 65.5    |
| Nov.   | 1,642                    | 2,645              | 3,515   | 1,642                           | 40.5               | 55.7    |
| Dec.   | 2,233                    | 2,596              | 3,454   | 2,233                           | 39.0               | 46.4    |
| Yearly | 25,417                   | 31,635             | 41,571  | 25,417                          | 566                | 677     |
|        |                          |                    |         |                                 | 583                | 591     |
|        |                          |                    |         |                                 | 566                | 791     |

| Month  | CD. MIER, TAMAULIPAS |                    |         | CD. MIGUEL ALEMAN, TAMAULIPAS |                    |         |
|--------|----------------------|--------------------|---------|-------------------------------|--------------------|---------|
|        | 1990                 | Period 1981 - 1990 |         | 1990                          | Period 1981 - 1990 |         |
|        |                      | Average            | Maximum |                               | Average            | Maximum |
| Jan.   | 45.6                 | 49.9               | 68.5    | 38.0                          | 109                | 174     |
| Feb.   | 40.7                 | 39.3               | 70.4    | 31.5                          | 96.1               | 43.5    |
| Mar.   | 47.6                 | 46.6               | 74.5    | 35.4                          | 157                | 178     |
| April  | 44.1                 | 50.7               | 75.2    | 42.2                          | 112                | 188     |
| May    | 47.6                 | 51.7               | 73.6    | 40.7                          | 112                | 51.2    |
| June   | 69.8                 | 47.1               | 73.1    | 42.1                          | 189                | 119     |
| July   | 64.9                 | 46.2               | 79.6    | 36.8                          | 193                | 189     |
| Aug.   | 56.5                 | 54.4               | 78.0    | 41.0                          | 120                | 51.8    |
| Sept.  | 50.0                 | 50.1               | 72.2    | 40.7                          | 201                | 125     |
| Oct.   | 48.5                 | 49.6               | 74.3    | 35.3                          | 124                | 201     |
| Nov.   | 56.3                 | 48.4               | 74.5    | 37.4                          | 115                | 58.2    |
| Dec.   | 43.1                 | 45.2               | 70.6    | 43.1                          | 187                | 204     |
| Yearly | 615                  | 579                | 868     | 509                           | 672                | 2,216   |
|        |                      |                    |         |                               | 1,369              | 2,216   |
|        |                      |                    |         |                               | 672                | 105     |

**STORED WATER IN LARGE RESERVOIRS OF THE RIO GRANDE BASIN**  
**IN MILLIONS OF CUBIC METRES**

Data are presented below for all storage reservoirs in the Rio Grande basin in the United States and Mexico that exceed 18.5 million cubic metres in capacity. The monthly figures represent the water in storage on the last day of each month, in millions of cubic metres. The capacities indicated are at spillway level. Storage figures greater than the capacity indicate that the water surface was above spillway level.

The reservoirs and the agencies providing the data are: Rio Grande, Continental, Santa Maria, Terrace, Mountain Home, and Sanchez from the State of Colorado, Division of Water Resources; Platboro, Heron, El Vado, Elephant Butte, and Caballo from the United States Bureau of Reclamation; Costilla from the New Mexico Interstate Commission; Abiquiu, Cochiti, and Santa Rosa from the United States Corps of Engineers; Bluewater, Lake Summer, and Brantley from the United States Geological Survey; Storrie from the State Engineer Office of New Mexico; Red Bluff from the Red Bluff Water Power Control District; Lake Casa Blanca from Webb County Office; Delta Lake from the Delta Lake Irrigation District; La Boquilla, La Colina, and Rosetillo from the Federal Power Commission of Mexico; Francisco I. Madero, Chihuahua, Luis L. Leon, Centenario, San Miguel, Venustiano Carranza, Laguna de Salinillas, Rodrigo Gomez (La Boca), Marte R. Gomez, Culebron, Villa Cardenas, and Palito Blanco from the Ministry of Agriculture and Hydraulic Resources of Mexico; Amistad Reservoir (International) and Falcon Reservoir (International) from the International Boundary and Water Commission.

**IN THE UNITED STATES**

| Month | RIO GRANDE<br>(Capacity 63.0) |                      | CONTINENTAL<br>(Capacity 28.0) |                      | SANTA MARIA<br>(Capacity 55.6) |                      | TERRACE<br>(Capacity 21.2) |                      | MOUNTAIN HOME<br>(Capacity 22.9) |                      |
|-------|-------------------------------|----------------------|--------------------------------|----------------------|--------------------------------|----------------------|----------------------------|----------------------|----------------------------------|----------------------|
|       | 1990                          | Average<br>1927-1990 | 1990                           | Average<br>1928-1990 | 1990                           | Average<br>1928-1990 | 1990                       | Average<br>1925-1990 | 1990                             | Average<br>1924-1990 |
| Jan.  | 2.5                           | 17.4                 | 2.7                            | 6.1                  | 11.8                           | 9.6                  | 4.2                        | 5.2                  | 2.1                              | 4.5                  |
| Feb.  | 5.2                           | 18.7                 | 3.3                            | 6.6                  | 12.0                           | 10.1                 | 4.8                        | 5.6                  | 2.2                              | 4.9                  |
| Mar.  | 7.3                           | 20.5                 | 3.9                            | 7.2                  | 12.2                           | 10.6                 | 5.9                        | 6.3                  | 2.6                              | 5.3                  |
| Apr.  | 7.4                           | 21.8                 | 4.1                            | 7.9                  | 12.2                           | 11.8                 | 5.9                        | 6.8                  | 3.1                              | 6.0                  |
| May   | 15.7                          | 24.9                 | 3.3                            | 9.5                  | 12.7                           | 15.2                 | 5.8                        | 7.9                  | 3.6                              | 7.9                  |
| June  | 9.6                           | 28.3                 | 0                              | 10.0                 | 13.2                           | 18.0                 | 4.4                        | 9.7                  | 3.3                              | 8.3                  |
| July  | 0.1                           | 19.6                 | 0                              | 7.4                  | 10.2                           | 14.8                 | 1.2                        | 7.9                  | 2.0                              | 6.1                  |
| Aug.  | 0                             | 11.8                 | 0                              | 4.9                  | 8.0                            | 9.7                  | 1.2                        | 5.3                  | 1.0                              | 3.8                  |
| Sep.  | 0                             | 10.2                 | 0                              | 4.5                  | 7.9                            | 7.9                  | 1.2                        | 4.2                  | 1.1                              | 3.3                  |
| Oct.  | 0                             | 10.8                 | 0.4                            | 4.6                  | 7.6                            | 8.0                  | 1.2                        | 4.2                  | 1.6                              | 3.4                  |
| Nov.  | 6.0                           | 13.1                 | 1.0                            | 4.8                  | 8.0                            | 8.6                  | 4.3                        | 4.5                  | 2.0                              | 3.8                  |
| Dec.  | 9.6                           | 15.8                 | 1.7                            | 5.4                  | 8.5                            | 9.2                  | 5.9                        | 4.8                  | 2.2                              | 4.1                  |
| Avg.  | 5.3                           | 17.7                 | 1.7                            | 6.6                  | 10.4                           | 11.1                 | 3.8                        | 6.0                  | 2.2                              | 5.1                  |
| Max.  | 15.7                          | 67.6                 | 4.1                            | 32.9                 | 13.2                           | 51.9                 | 5.9                        | 21.8                 | 3.6                              | 20.2                 |
| Min.  | 0                             | 0                    | 0                              | 0                    | 7.6                            | 0                    | 1.2                        | 0                    | 1.0                              | 0                    |

| Month | SANCHEZ<br>(Capacity 127.3) |                      | PLATORO<br>(Capacity 73.5) |                      | COSTILLA<br>(Capacity 19.4) |                      | HERON<br>(Capacity 495.0) |                      | EL VADO<br>(Capacity 229.8) |                      |
|-------|-----------------------------|----------------------|----------------------------|----------------------|-----------------------------|----------------------|---------------------------|----------------------|-----------------------------|----------------------|
|       | 1990                        | Average<br>1927-1990 | 1990                       | Average<br>1952-1990 | 1990                        | Average<br>1922-1990 | 1990                      | Average<br>1971-1990 | 1990                        | Average<br>1935-1990 |
| Jan.  | 19.0                        | 17.2                 | 22.3                       | 16.8                 | 8.0                         | 5.7                  | 456.4                     | 293.1                | 108.1                       | 68.1                 |
| Feb.  | 19.0                        | 17.4                 | 22.6                       | 16.6                 | 8.5                         | 6.2                  | 448.2                     | 289.0                | 109.2                       | 66.0                 |
| Mar.  | 21.5                        | 17.9                 | 22.9                       | 16.8                 | 9.5                         | 6.9                  | 411.4                     | 283.0                | 143.1                       | 68.2                 |
| Apr.  | 21.7                        | 19.1                 | 23.1                       | 16.9                 | 12.5                        | 8.2                  | 401.6                     | 286.3                | 185.5                       | 106.1                |
| May   | 21.5                        | 22.5                 | 23.1                       | 19.2                 | 16.2                        | 10.4                 | 429.0                     | 322.0                | 220.7                       | 148.7                |
| June  | 19.7                        | 24.1                 | 25.4                       | 26.2                 | 16.5                        | 9.8                  | 455.9                     | 355.2                | 201.8                       | 140.1                |
| July  | 17.3                        | 19.7                 | 18.5                       | 24.7                 | 12.5                        | 6.6                  | 459.6                     | 359.2                | 176.9                       | 120.3                |
| Aug.  | 14.7                        | 15.9                 | 12.7                       | 22.8                 | 9.3                         | 4.4                  | 462.3                     | 358.0                | 159.1                       | 98.3                 |
| Sep.  | 14.1                        | 15.3                 | 11.0                       | 22.9                 | 7.9                         | 3.8                  | 465.9                     | 354.3                | 137.5                       | 84.6                 |
| Oct.  | 16.0                        | 16.2                 | 8.5                        | 22.5                 | 9.3                         | 4.3                  | 471.1                     | 354.2                | 136.7                       | 79.7                 |
| Nov.  | 17.4                        | 16.7                 | 10.4                       | 18.3                 | 10.4                        | 4.8                  | 471.1                     | 351.5                | 137.3                       | 70.2                 |
| Dec.  | 17.9                        | 17.1                 | 11.3                       | 18.2                 | 10.7                        | 5.2                  | 469.5                     | 321.0                | 128.9                       | 69.6                 |
| Avg.  | 18.3                        | 18.3                 | 17.7                       | 20.2                 | 10.9                        | 6.4                  | 450.2                     | 327.2                | 153.7                       | 93.3                 |
| Max.  | 21.7                        | 77.0                 | 25.4                       | 68.2                 | 16.5                        | 18.6                 | 471.1                     | 495.0                | 220.7                       | 251.0                |
| Min.  | 14.1                        | 0                    | 8.5                        | 0                    | 7.9                         | 0                    | 401.6                     | 0.7                  | 108.1                       | 0                    |

## STORED WATER IN LARGE RESERVOIRS OF THE RIO GRANDE BASIN

IN MILLIONS OF CUBIC METRES

## IN THE UNITED STATES

| Month | ABIQUEU<br>(Capacity 1,481.4) |                      | COCHITI<br>(Capacity 619.6) |                      | BLUEWATER<br>(Capacity 47.5) |                      | ELEPHANT BUTTE<br>(Capacity 2,547.1) |                      | CABALLO<br>(Capacity 408.9) |                      |
|-------|-------------------------------|----------------------|-----------------------------|----------------------|------------------------------|----------------------|--------------------------------------|----------------------|-----------------------------|----------------------|
|       | 1990                          | Average<br>1965-1990 | 1990                        | Average<br>1973-1990 | 1990                         | Average<br>1927-1990 | 1990                                 | Average<br>1915-1990 | 1990                        | Average<br>1938-1990 |
| Jan.  | 206.2                         | 82.7                 | 62.8                        | 75.7                 | 4.1                          | 10.8                 | 2,108.5                              | 1,052.1              | 89.3                        | 122.8                |
| Feb.  | 212.9                         | 79.5                 | 63.0                        | 68.0                 | 4.1                          | 11.6                 | 2,144.5                              | 1,057.3              | 77.0                        | 155.1                |
| Mar.  | 214.9                         | 76.1                 | 62.3                        | 66.6                 | 3.9                          | 16.1                 | 2,039.2                              | 1,021.1              | 70.2                        | 129.4                |
| Apr.  | 213.9                         | 85.8                 | 62.3                        | 78.3                 | 3.8                          | 20.4                 | 1,964.3                              | 1,012.6              | 80.5                        | 128.9                |
| May   | 213.8                         | 136.6                | 61.4                        | 109.3                | 3.7                          | 18.3                 | 1,893.1                              | 1,113.6              | 78.0                        | 135.0                |
| June  | 212.5                         | 131.5                | 60.6                        | 123.4                | 3.3                          | 15.4                 | 1,762.5                              | 1,145.5              | 53.8                        | 117.6                |
| July  | 217.0                         | 117.0                | 61.8                        | 90.2                 | 3.2                          | 13.5                 | 1,656.2                              | 1,080.3              | 43.9                        | 94.7                 |
| Aug.  | 209.2                         | 112.1                | 61.6                        | 78.5                 | 3.2                          | 12.2                 | 1,607.8                              | 1,014.4              | 27.8                        | 65.2                 |
| Sep.  | 193.3                         | 108.3                | 63.2                        | 77.6                 | 3.1                          | 11.5                 | 1,547.3                              | 987.0                | 52.7                        | 50.7                 |
| Oct.  | 191.4                         | 105.1                | 60.9                        | 82.1                 | 2.8                          | 11.1                 | 1,572.6                              | 989.3                | 54.9                        | 64.2                 |
| Nov.  | 190.2                         | 95.0                 | 60.8                        | 81.8                 | 2.8                          | 10.8                 | 1,637.1                              | 1,011.8              | 59.6                        | 79.4                 |
| Dec.  | 195.3                         | 92.8                 | 61.9                        | 80.4                 | 2.7                          | 10.6                 | 1,689.4                              | 1,040.3              | 63.5                        | 99.6                 |
| Avg.  | 205.9                         | 101.9                | 61.9                        | 84.3                 | 3.4                          | 13.5                 | 1,801.9                              | 1,043.8              | 62.6                        | 103.5                |
| Max.  | 217.0                         | 493.8                | 63.2                        | 471.2                | 4.1                          | 58.1                 | 2,144.5                              | 2,840.5              | 89.3                        | 427.5                |
| Min.  | 190.2                         | 0                    | 60.6                        | 4.4                  | 2.7                          | 0                    | 1,547.3                              | 4.1                  | 27.8                        | 0                    |

| Month | STORRIE<br>(Capacity 28.7) |                      | SANTA ROSA<br>(Capacity 542.6) |                      | LAKE SUMNER<br>(Capacity 116.8) |                      | BRANTLEY<br>(Capacity 69.4) |                      | RED BLUFF<br>(Capacity 357.3) |                      |
|-------|----------------------------|----------------------|--------------------------------|----------------------|---------------------------------|----------------------|-----------------------------|----------------------|-------------------------------|----------------------|
|       | 1990                       | Average<br>1939-1990 | 1990                           | Average<br>1980-1990 | 1990                            | Average<br>1937-1990 | 1990                        | Average<br>1988-1990 | 1990                          | Average<br>1936-1990 |
| Jan.  | 15.0                       | 10.1                 | 33.2                           | 61.2                 | 34.0                            | 74.0                 | 10.7                        | 17.5                 | 124.0                         | 121.8                |
| Feb.  | 14.9                       | 10.1                 | 34.2                           | 61.9                 | 37.3                            | 78.7                 | 12.1                        | 17.9                 | 125.2                         | 124.1                |
| Mar.  | 15.0                       | 11.0                 | 34.9                           | 63.9                 | 38.2                            | 67.3                 | 12.7                        | 20.1                 | 117.6                         | 120.8                |
| Apr.  | 15.2                       | 11.6                 | 38.5                           | 65.9                 | 37.5                            | 58.7                 | 6.8                         | 18.9                 | 108.4                         | 106.7                |
| May   | 16.3                       | 12.3                 | 18.1                           | 65.3                 | 32.1                            | 58.4                 | 5.4                         | 28.8                 | 99.2                          | 107.7                |
| June  | 15.7                       | 10.8                 | 9.0                            | 68.4                 | 12.0                            | 52.0                 | 10.1                        | 27.9                 | 79.7                          | 109.2                |
| July  | 14.3                       | 10.7                 | 27.4                           | 59.7                 | 9.5                             | 49.7                 | 4.9                         | 16.8                 | 73.8                          | 98.7                 |
| Aug.  | 14.4                       | 11.4                 | 18.6                           | 62.0                 | 11.3                            | 53.6                 | 14.7                        | 11.0                 | 74.5                          | 94.5                 |
| Sep.  | 16.7                       | 11.0                 | 27.5                           | 59.4                 | 9.3                             | 55.7                 | 10.1                        | 12.8                 | 79.3                          | 98.7                 |
| Oct.  | 18.0                       | 10.6                 | 27.8                           | 61.7                 | 9.4                             | 58.8                 | 9.4                         | 13.2                 | 81.5                          | 108.1                |
| Nov.  | 17.0                       | 10.6                 | 29.4                           | 62.4                 | 14.8                            | 62.7                 | 12.1                        | 14.6                 | 86.1                          | 111.9                |
| Dec.  | 16.9                       | 10.0                 | 30.3                           | 63.3                 | 19.9                            | 68.3                 | 13.7                        | 15.5                 | 88.7                          | 117.1                |
| Avg.  | 15.8                       | 10.8                 | 27.4                           | 62.9                 | 22.1                            | 61.5                 | 10.2                        | 17.9                 | 94.8                          | 109.9                |
| Max.  | 18.0                       | 32.3                 | 38.5                           | 143.5                | 38.2                            | 192.8                | 14.7                        | 52.2                 | 125.2                         | 404.0                |
| Min.  | 14.3                       | 0                    | 9.0                            | 0                    | 9.3                             | 0.5                  | 4.9                         | 1.1                  | 73.8                          | 12.3                 |

| Month | LAKE CASA BLANCA<br>(Capacity 22.9) |                      | DELTA LAKE<br>(Capacity 30.8) |                      |  |  |  |  | TOTAL IN<br>U.S. RESERVOIRS<br>(Capacity 7,408.7) |                        |
|-------|-------------------------------------|----------------------|-------------------------------|----------------------|--|--|--|--|---|------------------------|
|       | 1990                                | Average<br>1962-1990 | 1990                          | Average<br>1939-1990 |  |  |  |  | 1990  | Estimated<br>! Average |
| Jan.  | 16.7                                | 16.2                 | 21.5                          | 19.2                 |  |  |  |  | 3,363.1   | 2,107.8                |
| Feb.  | 16.3                                | 15.9                 | 25.4                          | 18.6                 |  |  |  |  | 3,401.9   | 2,139.8                |
| Mar.  | 15.5                                | 15.7                 | 20.8                          | 17.7                 |  |  |  |  | 3,285.5   | 2,068.5                |
| Apr.  | 14.7                                | 16.0                 | 21.8                          | 17.8                 |  |  |  |  | 3,244.8   | 2,112.5                |
| May   | 13.7                                | 16.8                 | 17.1                          | 18.5                 |  |  |  |  | 3,203.5   | 2,408.8                |
| June  | 13.1                                | 17.0                 | 19.0                          | 18.6                 |  |  |  |  | 3,001.1   | 2,467.0                |
| July  | 12.3                                | 16.4                 | 17.1                          | 18.4                 |  |  |  |  | 2,839.7   | 2,252.4                |
| Aug.  | 11.7                                | 16.3                 | 16.8                          | 17.4                 |  |  |  |  | 2,739.9   | 2,083.5                |
| Sep.  | 18.0                                | 17.7                 | 19.9                          | 19.0                 |  |  |  |  | 2,687.0   | 2,020.4                |
| Oct.  | 18.7                                | 17.6                 | 22.6                          | 18.7                 |  |  |  |  | 2,722.4   | 2,048.4                |
| Nov.  | 17.8                                | 17.2                 | 20.4                          | 18.8                 |  |  |  |  | 2,816.0   | 2,073.3                |
| Dec.  | 16.3                                | 16.8                 | 22.3                          | 18.4                 |  |  |  |  | 2,887.1   | 2,103.5                |
| Avg.  | 15.4                                | 16.6                 | 20.4                          | 18.4                 |  |  |  |  | 3,016.0   | 2,157.2                |
| Max.  | 18.7                                | 34.8                 | 25.4                          | 27.9                 |  |  |  |  | 3,401.9   |                        |
| Min.  | 11.7                                | 4.3                  | 16.8                          | 0                    |  |  |  |  | 2,687.0   |                        |

! Total of period averages in all reservoirs

## STORED WATER IN LARGE RESERVOIRS OF THE RIO GRANDE BASIN

IN MILLIONS OF CUBIC METRES

## IN MEXICO

| Month | LA BOQUILLA<br>(Capacity 2,903.4) |                      | LA COLINA<br>(Capacity 24.1) |                      | ROSETILLA<br>(Capacity 19.0) |                      | FRANCISCO I.<br>MADERO<br>(Capacity 348.0) |                      | CHIHUAHUA<br>(Capacity 31.9) |                      |
|-------|-----------------------------------|----------------------|------------------------------|----------------------|------------------------------|----------------------|--|----------------------|------------------------------|----------------------|
|       | 1990                              | Average<br>1914-1990 | 1990                         | Average<br>1940-1990 | 1990                         | Average<br>1940-1990 | 1990                                       | Average<br>1948-1990 | 1990                         | Average<br>1961-1990 |
| Jan.  | 1,502.4                           | 1,837.8              | 25.3                         | 22.6                 | 17.1                         | 15.8                 | 177.2                                      | 268.1                | 6.2                          | 9.2                  |
| Feb.  | 1,376.7                           | 1,788.9              | 25.1                         | 23.1                 | 17.1                         | 15.7                 | 177.9                                      | 263.0                | 6.2                          | 8.9                  |
| Mar.  | 1,204.8                           | 1,714.9              | 25.3                         | 23.2                 | 17.1                         | 15.0                 | 175.7                                      | 245.3                | 6.2                          | 8.3                  |
| Apr.  | 1,012.6                           | 1,618.4              | 25.2                         | 23.7                 | 17.1                         | 14.8                 | 142.4                                      | 204.8                | 5.7                          | 7.9                  |
| May   | 818.5                             | 1,524.9              | 25.2                         | 23.3                 | 17.1                         | 14.9                 | 115.5                                      | 169.4                | 4.9                          | 7.1                  |
| June  | 645.0                             | 1,443.8              | 25.2                         | 23.5                 | 17.1                         | 15.2                 | 59.7                                       | 148.7                | 4.2                          | 6.6                  |
| July  | 751.9                             | 1,488.6              | 24.4                         | 23.4                 | 17.1                         | 15.1                 | 137.1                                      | 166.6                | 8.1                          | 6.9                  |
| Aug.  | 1,563.2                           | 1,713.2              | 24.6                         | 23.1                 | 17.1                         | 16.1                 | 345.1                                      | 215.3                | 21.6                         | 9.0                  |
| Sep.  | 1,822.1                           | 1,929.7              | 24.5                         | 22.9                 | 17.1                         | 16.4                 | 350.6                                      | 261.4                | 25.7                         | 11.5                 |
| Oct.  | 2,080.8                           | 1,941.7              | 24.5                         | 22.6                 | 17.1                         | 16.3                 | 349.0                                      | 269.7                | 25.7                         | 11.3                 |
| Nov.  | 2,078.2                           | 1,903.6              | 24.4                         | 20.9                 | 17.1                         | 15.6                 | 347.1                                      | 270.6                | 24.8                         | 10.8                 |
| Dec.  | 2,120.2                           | 1,889.6              | 24.4                         | 22.8                 | 17.1                         | 16.1                 | 347.0                                      | 269.5                | 24.1                         | 10.3                 |
| Avg.  | 1,414.7                           | 1,732.9              | 24.8                         | 22.9                 | 17.1                         | 15.6                 | 227.0                                      | 229.5                | 13.6                         | 9.0                  |
| Max.  | 2,120.2                           | 3,402.1              | 25.3                         | 27.8                 | 17.1                         | 23.9                 | 350.6                                      | 452.2                | 25.7                         | 32.7                 |
| Min.  | 645.0                             | 20.8                 | 24.4                         | 14.3                 | 17.1                         | 0                    | 59.7                                       | 1.7                  | 4.2                          | 0.2                  |

| Month | LUIS L. LEON<br>(Capacity 850.0) |                      | CENTENARIO and<br>SAN MIGUEL<br>(Capacity 24.5) |                      | VENUSTIANO<br>CARRANZA<br>(Capacity 1,385.0) |                      | LAGUNA DE<br>SALINILLAS<br>(Capacity 19.0) |                      | RODRIGO GOMEZ<br>(Capacity 41.0) |                      |
|-------|----------------------------------|----------------------|---|----------------------|--|----------------------|--|----------------------|----------------------------------|----------------------|
|       | 1990                             | Average<br>1968-1990 | 1990  | Average<br>1934-1990 | 1990   | Average<br>1930-1990 | 1990                                       | Average<br>1931-1990 | 1990                             | Average<br>1963-1990 |
| Jan.  | 406.0                            | 472.8                | 15.1  | 17.1                 | 767.7  | 619.2                | 12.8                                       | 9.4                  | 25.5                             | 33.1                 |
| Feb.  | 381.3                            | 467.7                | 14.5  | 17.0                 | 729.2  | 594.6                | 13.0                                       | 11.3                 | 21.3                             | 32.7                 |
| Mar.  | 354.0                            | 440.7                | 15.3  | 13.7                 | 685.5  | 561.5                | 12.6                                       | 9.4                  | 18.1                             | 31.3                 |
| Apr.  | 349.0                            | 409.2                | 16.6  | 11.8                 | 647.2  | 544.4                | 11.9                                       | 11.0                 | 16.6                             | 30.3                 |
| May   | 346.7                            | 382.4                | 21.3  | 12.6                 | 558.2  | 520.7                | 12.6                                       | 11.0                 | 14.2                             | 29.8                 |
| June  | 343.8                            | 378.3                | 16.7  | 10.8                 | 458.9  | 497.3                | 15.0                                       | 10.1                 | 13.5                             | 29.5                 |
| July  | 405.5                            | 393.9                | 15.1  | 10.2                 | 497.8  | 510.6                | 14.0                                       | 9.6                  | 14.3                             | 29.1                 |
| Aug.  | 356.9                            | 394.5                | 19.5  | 10.9                 | 549.4  | 518.2                | 11.8                                       | 9.6                  | 13.5                             | 29.3                 |
| Sep.  | 474.6                            | 453.8                | 20.8  | 13.2                 | 629.4  | 583.5                | 14.7                                       | 10.4                 | 17.2                             | 33.4                 |
| Oct.  | 480.9                            | 479.4                | 23.6  | 15.6                 | 696.1  | 626.3                | 11.9                                       | 9.7                  | 28.0                             | 34.9                 |
| Nov.  | 418.4                            | 483.9                | 26.1  | 16.1                 | 709.7  | 636.7                | 16.1                                       | 9.4                  | 30.1                             | 34.5                 |
| Dec.  | 475.6                            | 495.8                | 25.6  | 16.5                 | 690.8  | 633.5                | 14.7                                       | 9.2                  | 30.7                             | 34.0                 |
| Avg.  | 399.4                            | 437.7                | 19.2  | 13.8                 | 635.0  | 570.5                | 13.4                                       | 10.0                 | 20.3                             | 31.8                 |
| Max.  | 480.9                            | 898.0                | 26.1  | 26.1                 | 767.7  | 1,435.0              | 16.1                                       | 19.5                 | 30.7                             | 45.4                 |
| Min.  | 343.8                            | 17.9                 | 14.5  | 0                    | 458.9  | 1.2                  | 11.8                                       | 0                    | 13.5                             | 0                    |

| Month | MARTE R. GOMEZ<br>(Capacity 1,096.9) |                      |  |  |  |  |  |  | TOTAL IN MEXICAN<br>RESERVOIRS<br>(Capacity 6,742.8) |                      |
|-------|--------------------------------------|----------------------|--|--|--|--|--|--|--|----------------------|
|       | 1990                                 | Average<br>1943-1990 |  |  |  |  |  |  | 1990   | Estimated<br>Average |
| Jan.  | 406.0                                | 765.3                |  |  |  |  |  |  | 3,361.3  | 4,070.4              |
| Feb.  | 386.3                                | 718.4                |  |  |  |  |  |  | 3,148.6  | 3,941.3              |
| Mar.  | 352.0                                | 687.0                |  |  |  |  |  |  | 2,866.6  | 3,750.3              |
| Apr.  | 315.0                                | 630.8                |  |  |  |  |  |  | 2,559.3  | 3,507.1              |
| May   | 139.1                                | 576.4                |  |  |  |  |  |  | 2,073.3  | 3,272.5              |
| June  | 109.4                                | 582.9                |  |  |  |  |  |  | 1,708.5  | 3,146.7              |
| July  | 101.8                                | 571.2                |  |  |  |  |  |  | 1,987.1  | 3,227.2              |
| Aug.  | 107.4                                | 613.4                |  |  |  |  |  |  | 3,030.1  | 3,552.6              |
| Sep.  | 273.1                                | 768.8                |  |  |  |  |  |  | 3,669.8  | 4,105.0              |
| Oct.  | 357.5                                | 814.6                |  |  |  |  |  |  | 4,095.1  | 4,242.1              |
| Nov.  | 378.4                                | 817.2                |  |  |  |  |  |  | 4,070.4  | 4,219.3              |
| Dec.  | 359.0                                | 813.6                |  |  |  |  |  |  | 4,129.2  | 4,210.9              |
| Avg.  | 273.8                                | 696.6                |  |  |  |  |  |  | 3,058.3  | 3,770.5              |
| Max.  | 406.0                                | 1,308.0              |  |  |  |  |  |  | 4,129.2  |                      |
| Min.  | 101.8                                | 22.0                 |  |  |  |  |  |  | 1,708.5  |                      |

! Total of period averages in all reservoirs

## STORED WATER IN LARGE RESERVOIRS OF THE RIO GRANDE BASIN

## INTERNATIONAL AMISTAD RESERVOIR

Amistad Dam is the second of the major international storage dams constructed on the Rio Grande as authorized by the Water Treaty of 1944 between the United States and Mexico. It is located at river Kilometre 924, 20.8 river kilometres upstream from Del Rio, Texas and Cd. Acuna, Coahuila.

Maximum storage for period of record: 5,994.6 millions of cubic metres on September 22, 1974 with an elevation of 346.150 metres above mean sea level, U. S. C. & G. S. datum. The elevation-area-capacity table, based on the 1980 survey, became effective November 1, 1981.

## STORAGE CAPACITIES

(1980 SURVEY)

| Elevation Metres | Description                             | At Indicated Elevation                       |                         | Between Indicated Elevations             |                     |
|------------------|---|--|-------------------------|--|---------------------|
|                  |   | Reservoir Capacity Thousands of Cubic Metres | Reservoir Area Hectares | Storage Volume Thousands of Cubic Metres | Type of Storage     |
| 273.710          | Original River Bed at Dam Axis          | 0  | 0                       | 0  |                     |
| 283.465          | Lowest Outlet (United States Penstocks) | 0  | 0                       | 4,174,047                                | Silt & Conservation |
| 340.462          | Top of Conservation Storage *           | 4,174,047                                    | 26,247                  | 2,151,570                                | Ordinary Flood      |
| 347.595          | Top of Spillway Gates                   | 6,325,617                                    | 34,140                  | 500,931                                  | Surcharge           |
| 349.025          | Maximum Water Surface                   | 6,826,548                                    | 36,007                  |  |                     |

## STORAGE IN MILLIONS OF CUBIC METRES AT 24:00 HOURS 1990 - ANNUAL AND PERIOD SUMMARY

| Day | Jan.    | Feb.    | Mar.    | Apr.    | May     | June    | July    | Aug.    | Sept.   | Oct.    | Nov.    | Dec.    |
|-----|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1   | 3,524.5 | 3,378.3 | 3,134.6 | 3,079.7 | 2,810.0 | 2,540.1 | 2,411.9 | 2,709.2 | 3,526.9 | 3,975.7 | 4,109.5 | 4,157.8 |
| 2   | 3,519.8 | 3,363.4 | 3,132.7 | 3,076.5 | 2,808.0 | 2,534.5 | 2,408.3 | 2,744.5 | 3,537.5 | 4,002.5 | 4,110.8 | 4,157.8 |
| 3   | 3,518.7 | 3,347.5 | 3,128.3 | 3,069.0 | 2,784.1 | 2,530.8 | 2,404.7 | 2,774.1 | 3,549.3 | 4,028.1 | 4,114.7 | 4,155.2 |
| 4   | 3,514.6 | 3,329.3 | 3,125.1 | 3,060.4 | 2,768.2 | 2,525.2 | 2,401.1 | 2,794.0 | 3,552.9 | 4,064.2 | 4,114.7 | 4,152.6 |
| 5   | 3,510.5 | 3,313.5 | 3,122.9 | 3,054.0 | 2,750.4 | 2,519.7 | 2,399.3 | 2,810.0 | 3,561.2 | 4,126.5 | 4,114.7 | 4,147.3 |
| 6   | 3,509.3 | 3,297.7 | 3,122.9 | 3,044.4 | 2,730.8 | 2,513.2 | 2,396.6 | 2,843.2 | 3,564.7 | 4,199.9 | 4,116.0 | 4,147.3 |
| 7   | 3,504.6 | 3,279.7 | 3,120.7 | 3,033.8 | 2,712.2 | 2,503.9 | 2,393.9 | 2,877.7 | 3,570.7 | 4,211.7 | 4,123.9 | 4,143.4 |
| 8   | 3,501.1 | 3,261.8 | 3,117.5 | 3,024.2 | 2,692.8 | 2,503.0 | 2,392.2 | 2,915.6 | 3,573.1 | 4,230.3 | 4,123.9 | 4,142.1 |
| 9   | 3,499.9 | 3,246.1 | 3,115.3 | 3,017.9 | 2,674.4 | 2,498.4 | 2,392.2 | 2,951.8 | 3,575.5 | 4,236.9 | 4,122.5 | 4,139.5 |
| 10  | 3,497.5 | 3,231.6 | 3,116.4 | 3,012.6 | 2,663.8 | 2,492.0 | 2,390.4 | 2,980.0 | 3,581.7 | 4,242.2 | 4,123.9 | 4,135.6 |
| 11  | 3,495.2 | 3,214.9 | 3,120.7 | 3,002.1 | 2,657.1 | 2,484.6 | 2,390.4 | 3,002.1 | 3,585.0 | 4,243.5 | 4,129.0 | 4,135.6 |
| 12  | 3,491.7 | 3,199.5 | 3,120.7 | 2,991.5 | 2,650.4 | 2,478.2 | 2,389.5 | 3,014.7 | 3,588.5 | 4,242.2 | 4,134.2 | 4,134.2 |
| 13  | 3,489.3 | 3,192.9 | 3,125.1 | 2,984.2 | 2,640.8 | 2,471.8 | 2,392.2 | 3,020.0 | 3,592.1 | 4,235.6 | 4,140.8 | 4,134.2 |
| 14  | 3,485.8 | 3,187.3 | 3,120.7 | 2,976.9 | 2,631.3 | 2,468.1 | 2,392.2 | 3,021.1 | 3,594.5 | 4,230.3 | 4,146.0 | 4,133.0 |
| 15  | 3,484.7 | 3,181.8 | 3,121.8 | 2,967.5 | 2,624.7 | 2,466.3 | 2,392.2 | 3,033.8 | 3,600.5 | 4,223.6 | 4,151.3 | 4,133.0 |
| 16  | 3,478.8 | 3,173.1 | 3,121.8 | 2,963.3 | 2,618.0 | 2,462.7 | 2,411.9 | 3,056.1 | 3,607.6 | 4,215.7 | 4,155.6 | 4,131.7 |
| 17  | 3,481.2 | 3,167.6 | 3,120.7 | 2,954.9 | 2,611.4 | 2,460.8 | 2,415.5 | 3,059.9 | 3,612.4 | 4,193.3 | 4,156.5 | 4,131.7 |
| 18  | 3,477.7 | 3,165.4 | 3,119.6 | 2,945.6 | 2,606.7 | 2,459.9 | 2,430.0 | 3,131.6 | 3,638.8 | 4,192.0 | 4,159.1 | 4,126.5 |
| 19  | 3,475.3 | 3,161.0 | 3,118.5 | 2,938.4 | 2,607.6 | 2,457.2 | 2,516.0 | 3,173.1 | 3,652.1 | 4,174.8 | 4,160.4 | 4,125.2 |
| 20  | 3,471.8 | 3,159.9 | 3,118.5 | 2,931.1 | 2,615.2 | 2,452.6 | 2,521.5 | 3,205.0 | 3,672.6 | 4,163.0 | 4,160.4 | 4,123.9 |
| 21  | 3,469.5 | 3,157.7 | 3,114.2 | 2,917.7 | 2,611.4 | 2,449.9 | 2,524.3 | 3,236.1 | 3,673.8 | 4,148.7 | 4,163.0 | 4,125.2 |
| 22  | 3,462.5 | 3,154.4 | 3,111.0 | 2,902.3 | 2,612.4 | 2,447.2 | 2,528.0 | 3,267.4 | 3,706.6 | 4,131.7 | 4,164.4 | 4,118.6 |
| 23  | 3,455.5 | 3,151.2 | 3,108.8 | 2,891.0 | 2,606.7 | 2,443.5 | 2,560.6 | 3,297.7 | 3,827.1 | 4,117.3 | 4,164.4 | 4,113.0 |
| 24  | 3,452.0 | 3,147.9 | 3,107.7 | 2,875.7 | 2,600.1 | 2,439.9 | 2,577.5 | 3,327.1 | 3,878.3 | 4,103.0 | 4,164.4 | 4,108.2 |
| 25  | 3,441.6 | 3,144.6 | 3,101.3 | 2,882.8 | 2,596.0 | 2,435.4 | 2,585.9 | 3,358.9 | 3,899.7 | 4,088.8 | 4,165.7 | 4,105.6 |
| 26  | 3,433.5 | 3,140.3 | 3,102.3 | 2,875.7 | 2,584.1 | 2,431.8 | 2,590.6 | 3,388.6 | 3,918.6 | 4,091.3 | 4,163.0 | 4,105.6 |
| 27  | 3,427.7 | 3,140.3 | 3,091.6 | 2,861.4 | 2,577.5 | 2,428.1 | 2,609.5 | 3,420.6 | 3,926.2 | 4,095.2 | 4,163.0 | 4,103.0 |
| 28  | 3,418.5 | 3,139.2 | 3,088.3 | 2,848.3 | 2,567.1 | 2,424.5 | 2,632.4 | 3,453.2 | 3,933.8 | 4,099.1 | 4,161.7 | 4,103.0 |
| 29  | 3,409.3 |         | 3,088.3 | 2,835.1 | 2,558.7 | 2,420.0 | 2,647.5 | 3,478.8 | 3,943.9 | 4,101.7 | 4,159.1 | 4,103.0 |
| 30  | 3,402.4 |         | 3,086.2 | 2,820.0 | 2,553.1 | 2,416.4 | 2,657.1 | 3,498.7 | 3,961.7 | 4,105.6 | 4,157.8 | 4,103.0 |
| 31  | 3,393.1 |         | 3,081.9 | 2,944.7 |         |         |         | 3,514.0 |         | 4,108.2 |         | 4,099.1 |

| Month  | 1990              |         |     |                   |         |     | Period 1969-1990     |         |         |         |
|--------|-------------------|---------|-----|-------------------|---------|-----|----------------------|---------|---------|---------|
|        | MOMENTARY MAXIMUM |         |     | MOMENTARY MINIMUM |         |     | Mean Monthly Storage |         |         |         |
|        | Elevation         | Storage | Day | Elevation         | Storage | Day | Average Storage      | Average | Maximum | Minimum |
| Jan.   | 337.870           | 3,528.1 | 1   | 337.290           | 3,393.1 | 31  | 3,474.1              | 3,728.7 | 8,445.5 | 4,365.4 |
| Feb.   | 337.290           | 3,393.1 | 1   | 336.155           | 3,139.2 | 28  | 3,215.3              | 3,696.6 | 8,167.4 | 4,186.9 |
| Mar.   | 336.155           | 3,139.2 | 1   | 335.890           | 3,081.9 | 31  | 3,113.7              | 3,649.9 | 8,067.8 | 4,176.6 |
| Apr.   | 335.890           | 3,081.9 | 1   | 334.630           | 2,820.0 | 30  | 2,961.3              | 3,605.0 | 7,871.7 | 4,148.9 |
| May    | 334.630           | 2,820.0 | 1   | 333.205           | 2,544.7 | 31  | 2,647.2              | 3,523.9 | 7,370.8 | 3,928.3 |
| June   | 333.205           | 2,544.7 | 1   | 332.505           | 2,416.4 | 30  | 2,472.0              | 3,465.7 | 7,168.8 | 3,599.9 |
| July   | 333.905           | 2,677.3 | 31  | 332.355           | 2,389.5 | 12  | 2,478.5              | 3,447.6 | 7,224.1 | 3,649.8 |
| Aug.   | 337.810           | 3,514.0 | 31  | 333.905           | 2,677.3 | 1   | 3,109.5              | 3,546.4 | 7,970.9 | 4,298.5 |
| Sept.  | 339.640           | 3,961.7 | 30  | 337.810           | 3,514.0 | 1   | 3,680.2              | 3,633.6 | 8,758.7 | 4,955.6 |
| Oct.   | 340.725           | 4,243.5 | 11  | 339.640           | 3,961.7 | 1   | 4,149.1              | 3,818.6 | 9,664.2 | 5,638.3 |
| Nov.   | 340.430           | 4,165.7 | 25  | 340.210           | 4,108.2 | 1   | 4,143.2              | 3,856.1 | 9,374.9 | 5,701.3 |
| Dec.   | 340.400           | 4,157.8 | 1   | 340.175           | 4,099.1 | 31  | 4,128.2              | 3,864.7 | 9,098.9 | 5,720.0 |
| Yearly | 340.725           | 4,243.5 |     | 340.210           | 2,389.5 |     | 3,297.7              | 3,653.1 | 4,873.4 | 1,290.5 |

\* When necessary, the Commission may set temporary conservation levels

! And other days

## STORED WATER IN LARGE RESERVOIRS OF THE RÍO GRANDE BASIN

## INTERNATIONAL FALCON RESERVOIR

Falcon Dam is the lowermost of the major international storage dams authorized for construction on the Rio Grande by the Water Treaty of 1944 between the United States and Mexico and was the first dam constructed. It is located 139 river Kilometres downstream from the old international highway bridge between Laredo, Texas and Nuevo Laredo, Tamaulipas and 442 river kilometres upstream from the Gulf of Mexico.

Maximum storage for period of record: 4,305.6 millions of cubic metres on October 19, 1958 with an elevation of 93.910 metres above mean sea level, U. S. C. & G. S. datum.

## STORAGE CAPACITIES

(1971 - 1972 SURVEY)

| Elevation Metres | Description                      | At Indicated Elevation                       |                         | Between Indicated Elevations             |                     |
|------------------|----------------------------------|--|-------------------------|--|---------------------|
|                  |                                  | Reservoir Capacity Thousands of Cubic Metres | Reservoir Area Hectares | Storage Volume Thousands of Cubic Metres | Type of Storage     |
| 53.340           | Original River Bed at Dam Axis   | 0  | 0                       | 83                                       | Dead                |
| 61.965           | Lowest Outlet (Mexican Penstock) | 83   | 36                      | 3,290,072                                | Silt & Conservation |
| 91.805           | Top of Conservation Storage *    | 3,290,155                                    | 35,142                  | 627,872                                  | Ordinary Flood      |
| 93.480           | Top of Spillway Gates            | 3,918,027                                    | 39,860                  | 990,137                                  | Surcharge           |
| 95.770           | Maximum Water Surface            | 4,908,164                                    | 46,710                  |  |                     |

## STORAGE IN MILLIONS OF CUBIC METRES AT 24:00 HOURS 1990 - ANNUAL AND PERIOD SUMMARY

| Day | Jan.    | Feb.    | Mar.    | Apr.    | May     | June    | July    | Aug.    | Sept.   | Oct.    | Nov.    | Dec.    |
|-----|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1   | 1,652.8 | 1,392.2 | 1,491.7 | 1,554.6 | 1,713.0 | 1,533.9 | 1,161.4 | 1,312.4 | 1,352.8 | 1,678.0 | 2,379.9 | 2,573.6 |
| 2   | 1,653.5 | 1,381.7 | 1,497.9 | 1,559.0 | 1,717.1 | 1,503.4 | 1,152.1 | 1,319.7 | 1,349.9 | 1,698.2 | 2,387.6 | 2,577.2 |
| 3   | 1,656.1 | 1,369.5 | 1,505.3 | 1,560.3 | 1,723.2 | 1,491.7 | 1,146.9 | 1,331.6 | 1,354.5 | 1,723.2 | 2,397.1 | 2,582.6 |
| 4   | 1,658.1 | 1,358.5 | 1,512.7 | 1,560.3 | 1,723.9 | 1,472.2 | 1,141.8 | 1,340.2 | 1,361.4 | 1,747.2 | 2,404.0 | 2,582.6 |
| 5   | 1,658.8 | 1,348.2 | 1,515.8 | 1,560.3 | 1,725.9 | 1,448.6 | 1,137.1 | 1,345.9 | 1,371.2 | 1,770.7 | 2,404.8 | 2,582.6 |
| 6   | 1,660.1 | 1,344.2 | 1,524.5 | 1,566.6 | 1,731.4 | 1,428.8 | 1,136.1 | 1,348.7 | 1,377.0 | 1,794.4 | 2,408.3 | 2,588.0 |
| 7   | 1,660.7 | 1,341.9 | 1,530.7 | 1,567.9 | 1,738.2 | 1,409.9 | 1,135.1 | 1,354.5 | 1,380.5 | 1,820.5 | 2,436.9 | 2,592.5 |
| 8   | 1,662.1 | 1,336.7 | 1,535.4 | 1,567.9 | 1,747.8 | 1,392.2 | 1,135.1 | 1,356.8 | 1,382.9 | 1,848.9 | 2,457.8 | 2,593.4 |
| 9   | 1,662.1 | 1,336.7 | 1,537.0 | 1,569.2 | 1,763.0 | 1,376.5 | 1,133.5 | 1,359.7 | 1,384.0 | 1,888.1 | 2,465.6 | 2,593.4 |
| 10  | 1,662.1 | 1,337.9 | 1,540.1 | 1,573.6 | 1,771.3 | 1,360.2 | 1,129.4 | 1,362.0 | 1,384.6 | 1,917.9 | 2,473.5 | 2,594.3 |
| 11  | 1,662.1 | 1,341.3 | 1,548.3 | 1,574.9 | 1,793.0 | 1,345.3 | 1,125.9 | 1,362.6 | 1,390.5 | 1,946.1 | 2,484.0 | 2,596.1 |
| 12  | 1,662.7 | 1,344.2 | 1,550.8 | 1,578.1 | 1,808.4 | 1,335.0 | 1,125.9 | 1,363.1 | 1,399.8 | 1,973.1 | 2,495.5 | 2,597.0 |
| 13  | 1,664.1 | 1,351.0 | 1,554.0 | 1,582.6 | 1,816.9 | 1,324.8 | 1,125.3 | 1,363.1 | 1,406.3 | 1,997.3 | 2,502.5 | 2,597.9 |
| 14  | 1,658.8 | 1,359.7 | 1,558.4 | 1,584.5 | 1,825.4 | 1,318.0 | 1,125.3 | 1,363.1 | 1,412.2 | 2,022.5 | 2,510.5 | 2,599.7 |
| 15  | 1,652.1 | 1,363.7 | 1,562.2 | 1,585.8 | 1,827.5 | 1,307.9 | 1,126.9 | 1,362.0 | 1,415.2 | 2,044.1 | 2,514.9 | 2,599.7 |
| 16  | 1,646.2 | 1,368.3 | 1,561.6 | 1,589.1 | 1,829.7 | 1,299.5 | 1,130.5 | 1,362.6 | 1,418.7 | 2,069.8 | 2,522.8 | 2,600.6 |
| 17  | 1,638.3 | 1,374.1 | 1,559.0 | 1,596.1 | 1,826.8 | 1,292.8 | 1,142.8 | 1,365.4 | 1,421.1 | 2,098.9 | 2,525.5 | 2,602.4 |
| 18  | 1,627.8 | 1,375.3 | 1,557.1 | 1,598.6 | 1,816.2 | 1,286.6 | 1,157.3 | 1,370.1 | 1,430.0 | 2,118.7 | 2,529.9 | 2,605.1 |
| 19  | 1,622.6 | 1,376.5 | 1,556.5 | 1,603.8 | 1,800.7 | 1,278.9 | 1,168.7 | 1,371.2 | 1,439.6 | 2,140.2 | 2,531.7 | 2,606.0 |
| 20  | 1,607.0 | 1,385.8 | 1,553.3 | 1,608.3 | 1,783.9 | 1,269.0 | 1,175.5 | 1,371.8 | 1,448.0 | 2,165.2 | 2,537.0 | 2,606.0 |
| 21  | 1,592.2 | 1,405.7 | 1,549.6 | 1,609.0 | 1,771.3 | 1,261.3 | 1,197.1 | 1,371.8 | 1,454.0 | 2,196.9 | 2,539.7 | 2,609.6 |
| 22  | 1,578.7 | 1,424.1 | 1,546.4 | 1,609.0 | 1,756.8 | 1,252.5 | 1,235.7 | 1,371.8 | 1,467.9 | 2,217.5 | 2,545.0 | 2,612.3 |
| 23  | 1,562.8 | 1,441.4 | 1,546.4 | 1,620.0 | 1,740.3 | 1,242.7 | 1,253.1 | 1,371.8 | 1,482.6 | 2,239.0 | 2,548.6 | 2,600.6 |
| 24  | 1,544.5 | 1,449.2 | 1,544.5 | 1,622.0 | 1,722.5 | 1,231.9 | 1,256.3 | 1,374.7 | 1,491.1 | 2,263.9 | 2,552.2 | 2,593.4 |
| 25  | 1,523.9 | 1,458.3 | 1,546.4 | 1,616.8 | 1,706.9 | 1,221.1 | 1,269.5 | 1,374.7 | 1,512.7 | 2,284.9 | 2,553.1 | 2,591.6 |
| 26  | 1,502.8 | 1,465.5 | 1,547.7 | 1,616.8 | 1,679.4 | 1,208.3 | 1,297.2 | 1,374.1 | 1,537.0 | 2,312.6 | 2,557.5 | 2,590.7 |
| 27  | 1,486.2 | 1,473.4 | 1,548.3 | 1,631.8 | 1,660.1 | 1,197.1 | 1,304.5 | 1,372.4 | 1,566.6 | 2,338.1 | 2,564.7 | 2,588.0 |
| 28  | 1,469.2 | 1,484.4 | 1,548.3 | 1,674.7 | 1,634.4 | 1,189.7 | 1,307.9 | 1,369.5 | 1,595.4 | 2,355.1 | 2,570.0 | 2,584.4 |
| 29  | 1,449.8 | 1,494.2 | 1,549.6 | 1,698.8 | 1,610.3 | 1,181.3 | 1,308.4 | 1,364.3 | 1,621.3 | 2,358.5 | 2,570.0 | 2,579.9 |
| 30  | 1,427.7 | 1,507.7 | 1,552.7 | 1,710.3 | 1,584.5 | 1,170.8 | 1,308.4 | 1,358.5 | 1,647.5 | 2,365.3 | 2,570.9 | 2,578.1 |
| 31  | 1,409.9 | 1,553.3 |         |         | 1,559.0 | 1,130.8 | 1,308.4 | 1,355.6 | 1,693.5 | 2,373.0 | 2,570.9 | 2,570.9 |

| Month  | 1990              |         |     |                   |         |     | Period 1954-1990 |                      |         |
|--------|-------------------|---------|-----|-------------------|---------|-----|------------------|----------------------|---------|
|        | MOMENTARY MAXIMUM |         |     | MOMENTARY MINIMUM |         |     | Average Storage  | Mean Monthly Storage |         |
|        | Elevation         | Storage | Day | Elevation         | Storage | Day |                  | Average              | Maximum |
| Jan.   | 86,030            | 1,662.7 | 12  | 85,980            | 1,409.9 | 31  | 1,599.1          | 2,600.1              | 3,787.8 |
| Feb.   | 85,175            | 1,484.4 | 28  | 84,415            | 1,336.7 | 8   | 1,385.3          | 2,487.4              | 3,712.2 |
| Mar.   | 85,555            | 1,562.2 | 15  | 85,175            | 1,484.4 | 1   | 1,541.4          | 2,483.9              | 3,689.1 |
| Apr.   | 86,245            | 1,710.3 | 30  | 85,515            | 1,553.3 | 1   | 1,598.4          | 2,381.2              | 3,644.4 |
| May    | 86,770            | 1,829.7 | 16  | 85,540            | 1,559.0 | 31  | 1,739.0          | 2,209.4              | 3,540.0 |
| June   | 85,540            | 1,559.0 | 1   | 83,500            | 1,170.8 | 30  | 1,321.0          | 2,112.9              | 3,440.3 |
| July   | 84,260            | 1,308.4 | 29  | 83,220            | 1,125.3 | 13  | 1,189.0          | 2,193.5              | 3,321.4 |
| Aug.   | 84,615            | 1,374.7 | 24  | 83,490            | 1,308.4 | 1   | 1,359.5          | 2,171.7              | 3,418.5 |
| Sept.  | 85,960            | 1,647.5 | 30  | 84,485            | 1,349.9 | 2   | 1,441.9          | 2,281.5              | 3,541.4 |
| Oct.   | 88,875            | 2,373.0 | 31  | 85,960            | 1,647.5 | 1   | 2,057.0          | 2,566.4              | 4,009.2 |
| Nov.   | 89,565            | 2,570.9 | 30  | 88,960            | 2,373.0 | 1   | 2,498.1          | 2,637.9              | 3,854.0 |
| Dec.   | 89,705            | 2,612.3 | 22  | 89,565            | 2,570.9 | 1   | 2,592.6          | 2,678.6              | 3,860.4 |
| Yearly | 89,705            | 2,612.3 |     | 83,220            | 1,125.3 |     | 1,693.5          | 2,398.7              | 3,410.6 |

\* When necessary, the Commission may set temporary conservation levels

† And other days

## QUALITY OF WATER - 1990

## 08-3640.00 RIO GRANDE AT EL PASO, TEXAS

LOCATION: At gaging station on Courchesne Bridge at river kilometre 2,021, 2.7 river kilometres upstream from American Dam, and 8.9 kilometres upstream from Paso del Norte Bridge between El Paso, Texas and Cd. Juarez, Chihuahua.

RECORDS: Chemical analyses, February 1930 through current year (prior to July 1986 sampling at American Dam); biochemical analyses, September 1943 through 1972 and February 1976 through current year (prior to 1976 samples taken from Franklin Canal at El Paso, Texas); specific conductance, 1930 through 1932 and 1937 through current year (prior to July 1986 samples taken at American Dam); suspended silt, 1947 through 1976 (samples taken at American Dam).

REMARKS: Sampling by International Boundary and Water Commission; chemical analyses by U. S. Geological Survey, biochemical analyses by Haskell R. Street Wastewater Treatment Plant laboratory in El Paso; specific conductance determinations by International Boundary and Water Commission. Additional water quality parameters, including heavy metals, nutrients, pesticides, and biological indices, determined and published by U. S. Geological Survey.

| 1990<br>Date | Time<br>Standard | Streamflow<br>Momentary<br>m <sup>3</sup> /sec | Specific<br>Conductance<br>Micromhos | pH<br>Units | Water<br>Temper-<br>ature<br>Deg C | Hardness,<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Hardness,<br>Noncarbonate<br>(as CaCO <sub>3</sub> )<br>mg/L | Calcium<br>ion (Ca),<br>Dissolved<br>mg/L | Magnesium<br>ion (Mg),<br>Dissolved<br>mg/L |
|--------------|------------------|--|--------------------------------------|-------------|------------------------------------|---|--|---|---|
| Jan. 18      | 0735             | 3.26   | 2,160                                | 8.3         | 9.0                                | 420   | 161  | 120                                       | 30  |
| Feb. 22      | 0728             | 3.54   | 2,350                                | 8.1         | 5.5                                | 430   | 168  | 120                                       | 31  |
| Mar. 22      | 0730             | 23.9   | 972                                  | 7.9         | 14.5                               | 230   | 66   | 66  | 15  |
| Apr. 19      | 0700             | 16.1   | 1,170                                | 8.0         | 12.0                               | 260   | 66   | 75  | 17  |
| May 24       | 0640             | 16.8   | 1,130                                | 8.1         | 20.0                               | 250   | 63   | 74  | 17  |
| June 21      | 0735             | 28.0   | 1,040                                | 7.9         | 23.5                               | 240   | 66   | 69  | 16  |
| July 19      | 0810             | 25.4   | 1,040                                | 7.9         | 23.5                               | 250   | 73   | 72  | 16  |
| Aug. 17      | 0740             | 14.2   | 1,030                                | 7.8         | 24.5                               | 240   | 74   | 70  | 16  |
| Sept. 20     | 0730             | 14.1   | 1,440                                | 8.1         | 20.0                               | 320   | 99   | 92  | 21  |
| Oct. 19      | 0820             | 7.22   | 1,940                                | 8.1         | 14.5                               | 410   | 149  | 120                                       | 27  |
| Nov. 16      | 0715             | 4.90   | 2,020                                | 8.1         | 11.0                               | 420   | 158  | 120                                       | 28  |
| Dec. 11      | 0715             | 3.82   | 2,060                                | 8.0         |                                    | 420   | 156  | 120                                       | 29  |

| 1990<br>Date | Sodium<br>ion (Na),<br>Dissolved<br>mg/L | Sodium<br>Adsorption<br>Ratio(SAR) | Potassium<br>ion (K)<br>Dissolved<br>mg/L | Alkalinity<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Sulfate<br>ion (SO <sub>4</sub> )<br>Dissolved<br>mg/L | Chloride<br>ion (Cl),<br>Dissolved<br>mg/L | Silica<br>(SiO <sub>2</sub> )<br>Dissolved<br>mg/L | Solids<br>Dissolved<br>(Calculated)<br>mg/L |
|--------------|--|------------------------------------|---|--|--|--|--|---|
| Jan. 18      | 300                                      | 6                                  | 11.0                                      | 259  | 490  | 240  | 26   | 1,370                                       |
| Feb. 22      | 340                                      | 7                                  | 10.0                                      | 262  | 500  | 290  | 21   | 1,470                                       |
| Mar. 22      | 110                                      | 3                                  | 6.8                                       | 164  | 170  | 98   | 11   | 575   |
| Apr. 19      | 140                                      | 4                                  | 6.6                                       | 194  | 250  | 74   | 14   | 693   |
| May 24       | 140                                      | 4                                  | 7.5                                       | 187  | 220  | 100  | 12   | 683   |
| June 21      | 130                                      | 4                                  | 7.2                                       | 174  | 210  | 90   | 9.4  | 636   |
| July 19      | 130                                      | 4                                  | 6.6                                       | 177  | 200  | 100  | 15   | 646   |
| Aug. 17      | 130                                      | 4                                  | 6.8                                       | 166  | 220  | 89   | 18   | 649   |
| Sept. 20     | 190                                      | 5                                  | 8.6                                       | 221  | 310  | 140  | 21   | 916   |
| Oct. 19      | 270                                      | 6                                  | 11.0                                      | 261  | 440  | 210  | 25   | 1,260                                       |
| Nov. 16      | 280                                      | 6                                  | 9.1                                       | 262  | 430  | 220  | 24   | 1,270                                       |
| Dec. 11      | 290                                      | 6                                  | 11.0                                      | 264  | 440  | 230  | 24   | 1,300                                       |

QUALITY OF WATER - 1990

08-3640.00 RIO GRANDE AT EL PASO, TEXAS

| 1990 | Water Temperature | Oxygen Dissolved (DO) | pH   | Coliform, Fecal Colonies /100 mL | Oxygen Demand Bio-Chemical (BOD) 5 Day mg/L | 1990 | Water Temperature | Oxygen Dissolved (DO) | pH   | Coliform, Fecal Colonies /100 mL | Oxygen Demand Bio-Chemical (BOD) 5 Day mg/L |       |     |
|------|-------------------|-----------------------|------|----------------------------------|---|------|-------------------|-----------------------|------|----------------------------------|---|-------|-----|
|      | Date              | Deg C                 | mg/L | Units                            | /100 mL                                     |      | Date              | Deg C                 | mg/L | Units                            | /100 mL                                     | mg/L  |     |
| Jan. | 4                 | 4.0                   | 11.4 | 8.2                              | 100   | 5    | June              | 7                     | 23.0 | 7.4                              | 8.4   | 170   | 4   |
|      | 11                | 7.0                   | 10.4 | 8.2                              | 180   | 4    |                   | 14                    | 22.0 | 7.8                              | 8.4   | 86    | 4   |
|      | 18                | 7.0                   | 10.8 | 8.2                              | 90  | 5    |                   | 21                    | 23.0 | 7.2                              | 7.2   | 220   | 4   |
|      | 25                | 4.0                   | 11.7 | 8.2                              | 250   | 3    |                   | 28                    | 23.0 | 7.2                              | 8.4   | 140   | 5   |
| Feb. | 1                 | 7.0                   | 10.5 | 8.2                              | 670   | 5    | July              | 12                    | 22.0 | 7.3                              | 8.2   | 160   | 7   |
|      | 8                 | 11.0                  | 10.3 | 8.2                              | 160   | 5    |                   | 19                    | 23.0 | 7.2                              | 8.2   | 150   | 3   |
|      | 15                | 2.0                   | 11.1 | 8.3                              | 210   | 5    |                   | 26                    | 22.0 | 7.3                              | 8.2   | 200   | 2   |
|      | 22                | 6.0                   | 11.1 | 8.4                              | 10  | 3    | Aug.              | 2                     | 23.0 | 7.3                              | 8.2   | 210   | 3   |
| Mar. | 1                 | 0.0                   | 10.5 | 8.3                              | 300   | 6    |                   | 9                     | 22.0 | 7.4                              | 8.3   | 350   | 3   |
|      | 8                 | 9.0                   | 10.0 | 8.3                              | 150   | 2    |                   | 23                    | 21.0 | 7.6                              | 8.3   | 680   | 3   |
|      | 15                | 7.0                   | 10.8 | 8.3                              | 30  | 3    |                   | 30                    | 22.0 | 7.3                              | 8.4   | 880   | 5   |
|      | 22                | 14.0                  | 9.2  | 8.3                              | 70  | 3    | Sept.             | 13                    | 21.0 | 7.6                              | 8.4   | 360   | > 8 |
|      | 29                | 12.0                  | 9.2  | 8.3                              | 60  | 6    |                   | 28                    | 19.0 | 7.9                              | 8.2   | 1,500 | 2   |
| Apr. | 5                 | 14.0                  | 8.6  | 8.3                              | 180   | 3    | Oct.              | 11                    | 13.0 | 8.8                              | 8.4   | 360   | 4   |
|      | 12                | 14.0                  | 9.0  | 8.4                              | 154   | 3    |                   | 19                    | 14.0 | 8.8                              | 8.4   | 320   | 3   |
|      | 19                | 12.0                  | 9.0  | 7.1                              | 130   | 3    |                   | 26                    | 13.0 | 8.8                              | 8.3   | 410   | 3   |
|      | 26                | 12.0                  | 9.2  | 8.4                              | 90  | 2    | Nov.              | 8                     | 2.0  | 10.0                             | 8.3   | 700   | 4   |
| May  | 3                 | 12.0                  | 9.4  | 8.4                              | 96  | 2    |                   | 15                    | 11.0 | 9.2                              | 8.4   | 380   | 4   |
|      | 10                | 17.0                  | 8.2  | 8.3                              | 82  | 3    | Dec.              | 6                     | 3.0  | 10.5                             | 8.2   | 100   | 3   |
|      | 17                | 19.0                  | 8.2  | 8.4                              | 68  | 3    |                   | 13                    | 10.0 | 10.8                             | 8.4   | 150   | 4   |
|      | 24                | 20.0                  | 7.7  | 8.4                              | 148   | 4    |                   | 20                    | 4.0  | 11.1                             | 8.3   | 180   | 3   |
|      | 31                | 18.0                  | 7.9  | 8.3                              | 96  | 3    |                   | 28                    | 3.0  | 11.1                             | 8.3   | 150   | 3   |

> Actual value is known to be greater than the value shown

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct. | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|
| 1   |       | 1,970 |       |       | 1,200 |       |       |       |       |      | 1,810 |       |
| 2   |       |       |       |       | 1,190 |       |       |       |       |      | 1,820 |       |
| 3   |       |       |       | 980   | 1,190 |       |       |       |       |      |       | 1,180 |
| 4   |       |       |       |       | 1,110 | 1,060 |       |       |       |      |       | 1,250 |
| 5   |       | 2,040 |       | 960   | 1,110 | 1,060 |       |       |       |      | 1,850 | 1,150 |
| 6   |       | 2,240 |       |       |       | 1,060 |       |       |       |      | 1,920 | 2,110 |
| 7   |       | 2,260 |       |       |       | 1,120 | 1,040 |       |       |      | 1,820 |       |
| 8   | 2,020 |       |       |       |       | 1,120 |       |       |       |      | 1,910 |       |
| 9   | 2,030 |       |       |       |       |       |       |       |       |      |       |       |
| 10  | 2,070 |       |       |       |       |       |       |       |       |      |       | 2,120 |
| 11  | 2,100 |       |       |       |       | 1,030 |       |       |       |      |       |       |
| 12  |       |       |       |       |       |       |       |       |       |      |       | 2,110 |
| 13  |       |       |       |       |       |       |       |       |       |      |       | 2,090 |
| 14  |       |       |       |       | 1,160 |       |       |       |       |      |       |       |
| 15  |       |       |       |       | 1,150 |       |       |       |       |      |       |       |
| 16  | 2,100 |       |       |       |       | 1,150 |       |       |       |      |       |       |
| 17  | 2,170 |       |       | 1,120 |       | 1,130 |       |       |       |      |       |       |
| 18  | 2,100 |       |       |       | 1,110 |       | 935   |       |       |      |       |       |
| 19  |       |       |       |       | 1,180 |       | 941   |       |       |      |       |       |
| 20  |       |       | 950   |       |       |       | 1,040 |       |       |      |       |       |
| 21  |       |       | 970   |       |       | 1,150 |       |       |       |      |       |       |
| 22  | 2,920 |       | 900   |       |       | 1,130 | 1,040 |       |       |      |       |       |
| 23  |       |       |       | 1,090 |       |       |       |       |       |      |       |       |
| 24  |       |       |       | 1,110 |       |       |       |       |       |      |       |       |
| 25  |       |       |       | 1,090 |       |       |       |       | 1,060 |      |       |       |
| 26  |       |       | 1,100 |       |       |       |       |       |       |      |       |       |
| 27  |       |       |       |       |       |       | 1,090 |       |       |      |       |       |
| 28  |       |       |       |       |       |       | 1,060 |       |       |      | 1,190 |       |
| 29  |       |       |       |       | 1,050 |       |       | 1,060 |       |      | 1,110 |       |
| 30  |       |       |       |       | 1,050 |       |       | 1,050 |       |      | 1,110 |       |
| 31  |       |       |       |       | 1,060 |       |       | 1,050 |       |      |       |       |

## QUALITY OF WATER - 1980

## RIO GRANDE AT RIVERSIDE CANAL HEADING NEAR EL PASO, TEXAS AND CO. JUAREZ, CHIHUAHUA

**LOCATION:** At river kilometre 1,991, 15.3 kilometres downstream from the Haskell R. Street Wastewater Treatment Plant and 26.8 river kilometres downstream from the American Dam at El Paso, Texas.

**RECORDS:** Biochemical analyses, February 1976 through current year. Samples also collected quarterly and analyses made by the Texas Water Commission at a location one mile upstream at Yaletta-Zaragoza Bridge, 1937 through 1972 and May 1975 through current year.

**REMARKS:** Sampling by International Boundary and Water Commission. Analyses by the Haskell R. Street Wastewater Treatment Plant laboratory in El Paso.

| 1990 | Water Temperature | Oxygen Dissolved (DO) | pH    | Coli-form, Fecal Colonies /100 mL | Oxygen Demand Bio-Chemical (BOD) 5 Day mg/L | 1990 | Water Temperature | Oxygen Dissolved (DO) | pH    | Coli-form, Fecal Colonies /100 mL | Oxygen Demand Bio-Chemical (BOD) 5 Day mg/L |      |
|------|-------------------|-----------------------|-------|-----------------------------------|---|------|-------------------|-----------------------|-------|-----------------------------------|---|------|
| Date | Deg C             | mg/L                  | Units | /100 mL                           |   | Date | Deg C             | mg/L                  | Units | /100 mL                           |   |      |
| Jan. | 4                 | 7                     | 10.8  | 7.6                               | 24  | 18   | July 12           | 23                    | 7.2   | 7.9                               | 170   |      |
|      | 11                | 7                     | 9.9   | 7.6                               | 88  | 10   | 19                | 7.0                   | 7.8   | 50                                | 7   |      |
|      | 18                | 10                    | 10.3  | 7.4                               | 10  | 17   | 26                | 7.3                   | 7.9   | 110                               | 7   |      |
|      | 25                | 4                     | 11.4  | 7.5                               | 178   | 13   | Aug. 2            | 24                    | 7.3   | 7.8                               | 450   | 8    |
| Feb. | 1                 | 9                     | 10.3  | 7.6                               | 416   | 20   | 9                 | 22                    | 7.4   | 7.9                               | 970   | 7    |
|      | 8                 | 10                    | 9.8   | 7.4                               | 100   | 28   | 23                | 22                    | 7.4   | 7.9                               | INTC  | 10   |
|      | 15                | 4                     | 10.8  | 7.6                               | 120   | 27   | 30                | 26                    | 7.0   | 7.9                               | 1,940                                       | 12   |
|      | 22                | 9                     | 10.3  | 7.6                               | 70  | 16   | Sep. 12           | 23                    | 7.3   | 7.9                               | 400   | 12   |
| Mar. | 1                 | 8                     | 10.3  | 7.9                               | 48  | 14   | 28                | 21                    | 7.6   | 7.9                               | 90  | 8    |
|      | 8                 | 10                    | 9.8   | 8.0                               | 190   | 5    | Oct. 11           | 17                    | 8.2   | 7.8                               | 160   | > 92 |
|      | 15                | 8                     | 10.3  | 8.0                               | 10  | 7    | 19                | 16                    | 8.2   | 7.9                               | 110   | 9    |
|      | 22                | 14                    | 9.0   | 8.0                               | 160   | 9    | 26                | 16                    | 8.4   | 7.8                               | 40  | 11   |
|      | 29                | 13                    | 9.2   | 7.9                               | 20  | 12   | Nov. 8            | 3                     | 10.3  | 7.9                               | TNTC  | 14   |
| Apr. | 5                 | 18                    | 8.4   | 7.8                               | 60  | 11   | 16                | 14                    | 8.6   | 7.8                               | 10  | 12   |
|      | 12                | 16                    | 8.6   | 7.7                               | 58  | 11   | Dec. 6            | 7                     | 9.8   | 7.7                               | 10  | 8    |
|      | 19                | 16                    | 8.8   | 7.2                               | 0   | 10   | 13                | 13                    | 10.5  | 7.8                               | 30  | 7    |
|      | 26                | 14                    | 9.0   | 7.7                               | 30  | 9    | 20                | 8                     | 10.9  | 7.6                               | 30  | 16   |
| May  | 3                 | 13                    | 9.2   | 7.6                               | 200   | 13   | 28                | 6                     | 11.3  | 7.9                               | 10  | 8    |
|      | 10                | 18                    | 8.1   | 7.6                               | 990   | 11   |                   |                       |       |                                   |   |      |
|      | 17                | 21                    | 7.9   | 7.6                               | 200   | 13   |                   |                       |       |                                   |   |      |
|      | 24                | 22                    | 7.6   | 7.7                               | 90  | 14   |                   |                       |       |                                   |   |      |
|      | 31                | 20                    | 7.7   | 7.8                               | 140   | 10   |                   |                       |       |                                   |   |      |
| June | 7                 | 28                    | 7.4   | 7.9                               | 130   | 11   |                   |                       |       |                                   |   |      |
|      | 14                | 23                    | 7.2   | 8.1                               | 970   | 7    |                   |                       |       |                                   |   |      |
|      | 21                | 26                    | 7.0   | 7.8                               | 140   | 10   |                   |                       |       |                                   |   |      |
|      | 28                | 26                    | 7.0   | 7.8                               | 560   | 12   |                   |                       |       |                                   |   |      |

TNTC Too numerous to count

&gt; Actual value is known to be greater than the value shown

## QB-3705.00 RIO GRANDE AT FORT QUITMAN, TEXAS NEAR COLONIA LUIS LEON, CHIHUAHUA

**LOCATION:** Gaging station at river kilometre 1,888, 2.4 river kilometres downstream from old Fort Quitman.

**RECORDS:** Chemical analyses, February 1938 through current year; biochemical analyses, October 1974 through current year; specific conductance (dS/m), October 1974 through 1977.

**REMARKS:** Sampling and analyses by U. S. Geological Survey. Additional water quality parameters, including heavy metals, nutrients, pesticides, and biological indices, determined and published by the U. S. Geological Survey. Sampling prior to 1977 by the International Boundary and Water Commission.

| 1990    | Stream flow, Momentary | Specific Conductance | pH    | Water Temperature | Hardness, Total (as CaCO <sub>3</sub> ) mg/L | Hardness, Noncarbonate (as CaCO <sub>3</sub> ) mg/L | Calcium ion (Ca), Dissolved (as CaCO <sub>3</sub> ) mg/L | Magnesium ion (Mg), Dissolved mg/L | Sodium ion (Na), Dissolved mg/L | Sodium Adsorption Ratio (SAR) | Potassium ion (K) Dissolved mg/l |
|---------|------------------------|----------------------|-------|-------------------|--|---|--|------------------------------------|---------------------------------|-------------------------------|----------------------------------|
| Date    | Time Std.              | micromhos            | Units | Deg C             |  |   |  |                                    |                                 |                               |                                  |
| Jan. 24 | 1215                   | 2.55                 | 4,400 | 9.0               | 11.5   | 750   | 450  | 200                                | 60                              | 620                           | 10                               |
| Mar. 21 | 1230                   | 2.86                 | 6,200 | 8.4               | 21.0   | 850   | 580  | 210                                | 78                              | 980                           | 15                               |
| May 25  | 1145                   | 3.09                 | 3,700 | 9.6               | 26.0   | 650   | 410  | 180                                | 48                              | 560                           | 10                               |
| Jul. 11 | 1215                   | 1.25                 | 5,000 | 8.6               | 30.5   | 850   | 600  | 210                                | 77                              | 870                           | 13                               |
| Sep. 19 | 1100                   | 7.36                 | 3,150 | 8.4               | 23.5   | 570   | 350  | 160                                | 41                              | 420                           | 8                                |
| Nov. 15 | 1100                   | 9.01                 | 3,400 | 7.7               | 14.0   | 570   | 290  | 160                                | 41                              | 450                           | 11                               |

| 1990    | Alkalinity Total (as CaCO <sub>3</sub> ) mg/L | Sulfate ion (SO <sub>4</sub> ) Dis-solved mg/L | Chloride ion (Cl), Dis-solved mg/L | Silica (SiO <sub>2</sub> ), Dis-solved mg/L | Oxygen, Dis-solved (DO) mg/L | Coli-form, Fecal Colonies /100 mL | Turbidity NTU | Solids Dis-solved (Calculated) mg/L | Solids Dis-solved (Residue @ 180 Deg C) mg/L | Solids Dis-solved (Sediment) mg/L | Sus-pended Sediment mg/L |
|---------|---|--|------------------------------------|---|------------------------------|-----------------------------------|---------------|-------------------------------------|--|-----------------------------------|--------------------------|
| Date    |   |  |                                    |   |                              |                                   |               |                                     |  |                                   |                          |
| Jan. 24 | 300   | 710  | 890                                | 27  | 11.2                         | K 32                              | 31            | 2,710                               | 2,800  | 351                               |                          |
| Mar. 21 | 260   | 960  | 1,300                              | 19  | 17.4                         | K 11                              | 4.5           | 3,710                               | 4,060  | 427                               |                          |
| May 25  | 240   | 620  | 700                                | 16  | 16.1                         | 100                               | 55            | 2,290                               | 2,330  | 362                               |                          |
| Jul. 11 | 246   | 940  | 1,300                              | 21  | 13.8                         | K 160                             | 63            | 3,590                               | 3,550  | 192                               |                          |
| Sep. 19 | 224   | 480  | 530                                | 23  | 7.8                          | K 230                             | 120           | 1,810                               | 1,920  | 602                               |                          |
| Nov. 15 | 280   | 500  | 570                                | 29  | 6.2                          | 2,300                             | 27            | 1,970                               | 2,020  |                                   |                          |

K Results based on colony count outside the acceptance range (non-ideal colony count)

QUALITY OF WATER - 1990

08-3715.00 RIO GRANDE ABOVE RIO CONCHOS NEAR PRESIDIO, TEXAS AND OJINAGA, CHIHUAHUA

LOCATION: Gaging station at river kilometre 1,555; 10.5 river kilometres upstream from the Rio Conchos.  
RECORDS: Chemical analyses, February 1933 through 1981; specific conductance, 1931 and 1935 through current year.

REMARKS: Sampling by the International Boundary and Water Commission; chemical analyses by the U.S. Geological Survey; determinations for specific conductance by International Boundary and Water Commission. Results of biochemical analyses by the International Boundary and Water Commission and the Texas Water Commission, November 1977 through current year, available upon request.

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| 1990 CONSUMPTION OF WILSON BARS IN MICRONOMES/CH 25 DEG C = 1990 |      |       |       |       |       |       |       |       |       |      |      |      |
|--|------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|
| Day  | Jan. | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct. | Nov. | Dec. |
| 1  |      |       | 4,030 | 3,970 |       |       |       |       |       |      |      |      |
| 2  |      |       |       |       |       |       |       |       |       |      |      |      |
| 3  |      |       | 3,400 |       | 4,590 | 3,520 |       | 946   |       |      |      |      |
| 4  |      |       |       |       | 5,160 |       | 3,620 |       |       |      |      |      |
| 5  |      |       |       |       |       | 4,400 |       |       |       | 871  |      |      |
| 6  |      |       |       |       |       | 4,400 |       |       |       |      |      |      |
| 7  |      |       |       |       |       |       |       |       |       |      |      |      |
| 8  |      |       | 3,870 | 3,770 |       |       |       |       |       |      |      |      |
| 9  |      |       |       |       |       |       |       |       |       |      |      |      |
| 10   |      |       |       |       | 3,590 |       |       |       |       |      |      |      |
| 11   |      | 3,470 |       |       |       |       | 5,010 |       |       |      |      |      |
| 12   |      |       |       |       |       | 4,260 |       |       |       |      |      |      |
| 13   |      |       |       |       |       | 4,780 |       | 2,050 |       |      |      |      |
| 14   |      |       |       |       |       |       |       |       |       |      |      |      |
| 15   |      |       | 3,830 | 4,290 |       | 4,290 |       |       |       |      |      |      |
| 16   |      |       |       |       |       |       |       |       |       |      |      |      |
| 17   |      |       |       |       |       |       |       |       |       |      |      |      |
| 18   |      | 3,680 |       |       | 2,880 |       | 5,560 | 1,130 |       |      |      |      |
| 19   |      |       |       |       |       |       | 2,120 |       |       |      |      |      |
| 20   |      |       |       | 4,860 |       |       |       |       |       |      |      |      |
| 21   |      |       | 3,910 |       |       |       | 5,290 |       |       |      |      |      |
| 22   |      |       | 4,060 |       | 4,340 |       |       |       |       |      |      |      |
| 23   |      |       |       |       |       |       |       |       |       |      |      |      |
| 24   |      |       |       |       |       |       |       |       |       |      |      |      |
| 25   |      | 3,310 |       |       |       |       |       |       |       |      |      |      |
| 26   |      |       |       |       |       |       |       |       |       |      |      |      |
| 27   |      |       |       |       |       |       |       |       |       |      |      |      |
| 28   |      |       |       |       |       |       |       |       |       |      |      |      |
| 29   |      |       |       |       |       |       |       |       |       |      |      |      |
| 30   |      |       |       |       |       |       |       |       |       |      |      |      |
| 31   |      |       |       |       | 4,780 | 2,900 | 3,660 |       |       |      |      |      |
|  |      |       |       |       |       |       |       | 1,550 |       |      |      |      |

## QUALITY OF WATER - 1990

## 08-3730.00 RIO CONCHOS NEAR OJINAGA, CHIHUAHUA

LOCATION: At gaging station, 2.5 river kilometres from the confluence with the Rio Grande, which is located at river kilometre 1,547.

RECORDS: Chemical analyses, February 1935 through 1981; suspended silt, 1956 through 1979, specific conductance, 1935 through current year.

REMARKS: Sampling and determinations for suspended silt and specific conductance by the International Boundary and Water Commission; chemical analyses by the U. S. Geological Survey.

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct. | Nov. | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|-------|
| 1   |       |       |       |       |       | 1,710 |       |       |       |      |      |       |
| 2   |       |       |       |       |       |       |       | 1,050 |       |      |      |       |
| 3   | 1,520 | 1,670 | 1,260 | 1,320 |       |       |       | 1,120 |       | 624  |      |       |
| 4   |       |       |       |       | 1,340 |       | 1,640 |       |       | 651  |      |       |
| 5   |       | 1,240 |       |       |       |       |       |       |       | 750  |      |       |
| 6   |       |       |       |       |       |       |       |       |       |      |      |       |
| 7   |       |       |       |       |       |       |       |       |       |      |      |       |
| 8   | 1,580 | 1,210 | 1,290 | 1,620 | 1,580 | 1,710 | 1,470 | 882   |       |      |      |       |
| 9   |       | 1,240 | 1,270 |       | 1,700 | 1,630 |       | 939   |       |      |      |       |
| 10  | 1,670 |       |       |       |       |       | 1,910 | 824   |       |      |      |       |
| 11  |       |       |       |       |       |       |       | 944   |       |      |      |       |
| 12  | 1,690 | 1,260 | 1,310 | 1,900 | 1,730 | 1,740 | 1,860 | 1,030 | 1,210 | 701  |      |       |
| 13  |       |       |       |       |       |       |       |       |       |      |      |       |
| 14  |       |       |       |       |       |       |       |       |       |      |      |       |
| 15  | 1,760 |       |       |       |       | 1,710 |       |       |       |      |      |       |
| 16  |       |       |       |       |       |       |       |       |       |      |      |       |
| 17  | 1,750 |       |       |       |       |       |       |       |       |      |      |       |
| 18  |       |       |       |       |       |       |       |       |       |      |      |       |
| 19  | 1,840 |       |       |       |       |       |       |       |       |      |      |       |
| 20  |       |       |       |       |       |       |       |       |       |      |      |       |
| 21  |       |       |       |       |       |       |       |       |       |      |      |       |
| 22  | 1,780 | 1,270 | 1,360 |       | 1,650 |       |       |       |       |      |      |       |
| 23  |       |       |       |       |       |       |       |       |       |      |      |       |
| 24  | 1,740 | 1,320 | 1,370 |       | 1,690 |       |       |       |       |      |      |       |
| 25  |       |       |       |       |       | 1,620 |       |       |       |      |      |       |
| 26  | 1,750 | 1,280 | 1,360 |       |       |       |       |       |       |      |      |       |
| 27  |       |       |       |       |       |       |       |       |       |      |      |       |
| 28  |       |       |       |       |       |       |       |       |       |      |      |       |
| 29  | 1,710 | 1,290 | 1,360 |       | 1,600 |       | 890   |       |       | 769  |      |       |
| 30  |       |       |       |       |       |       | 844   |       |       | 744  |      |       |
| 31  |       |       |       |       |       | 2,180 |       |       |       | 703  |      |       |
|     |       |       |       |       |       |       | 610   |       |       |      |      | 1,520 |
|     |       |       |       |       |       |       | 778   |       |       |      |      | 1,490 |

## WATER BULLETIN NUMBER 60 -- INTERNATIONAL BOUNDARY AND WATER COMMISSION

## QUALITY OF WATER - 1990

08-3/42.00 RIO GRANDE BELOW RIO CONCHOS NEAR PRESIDIO, TEXAS AND OTINAGA, CHIHUAHUA

LOCATION: Gaging station at river kilometre 1,259; 0.6 river kilometre downstream from Alamito Creek and 18.7 river kilometres downstream from the Rio Conchos.

RECORDS: Specific conductance, 1956 through current year.

REMARKS: Sampling and determinations for specific conductance by the International Boundary and Water Commission. Results of biochemical analyses by the International Boundary and Water Commission and the Texas Water Commission, November 1977 through current year, available upon request.

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| January  |       | March |       | May  |       | July   |       | September |       | November |       |
|----------|-------|-------|-------|------|-------|--------|-------|-----------|-------|----------|-------|
| 3        | 2,370 | 1     | 1,690 | 2    | 2,600 | 3      | 2,000 | 4         | 1,630 | 6        | 987   |
| 18       | 2,500 | 20    | 1,680 | 15   | 2,090 | 17     | 1,420 | 19        | 1,080 | 19       | 2,530 |
| February |       | April |       | June |       | August |       | October   |       | December |       |
| 1        | 2,160 | 3     | 1,660 | 5    | 1,800 | 2      | 990   | 1         | 371   | 4        | 2,980 |
| 13       | 1,670 | 18    | 2,410 | 18   | 2,080 | 8      | 774   | 18        | 917   | 17       | 3,160 |
| 21       | 1,570 |       |       |      |       | 13     | 1,190 |           |       | 16       | 763   |

08-3772.00 RIO GRANDE AT FOSTER RANCH NEAR LANGTRY, TEXAS AND RANCHO SANTA ROSA, COAHUILA

LOCATION: Gaging station at river kilometre 1,058, about 20.8 kilometres west of Langtry, Texas.

RECORDS: Chemical analyses, March 1969 through 1970 and October 1974 through current year; biochemical, October 1974 through current year; suspended silt, 1969 through current year; specific conductance, 1969 through 1981, 1983, 1985 through current year.

REMARKS: Sampling and analyses by U. S. Geological Survey; sampling and determinations for suspended silt and specific conductance by the International Boundary and Water Commission. Additional water quality parameters, including heavy metals, nutrients, pesticides, and biological indices, determined and published by the U. S. Geological Survey.

| 1990    | Time | Stream flow, Momen-tary | Specific Conduct-ance | pH    | Water Temper-ature | Hard-ness, Total (as CaCO <sub>3</sub> ) | Hard-ness, Noncar-bonate (as CaCO <sub>3</sub> ) | Calcium ion (Ca), Dis-solved | Magne-sium ion (Mg), Dis-solved | Sodium ion (Na), Dis-solved | Sodium Adsorp-tion Ratio (SAR) | Potassium ion (K) Dissolved |
|---------|------|-------------------------|-----------------------|-------|--------------------|--|--|------------------------------|---------------------------------|-----------------------------|--------------------------------|-----------------------------|
| Date    | Std. | m <sup>3</sup> /sec     | Micromhos             | Units | Deg C              | mg/L                                     | mg/L   | mg/L                         | mg/L                            | mg/L                        |                                | mg/L                        |
| Jan. 31 | 1105 | 18.0                    | 1,660                 | 8.2   | 13.5               | 360                                      | 180  | 99                           | 27                              | 210                         | 5                              | 6.8                         |
| May 23  | 1605 | 22.2                    | 1,110                 | 7.9   | 27.0               | 300                                      | 190  | 100                          | 11                              | 110                         | 3                              | 5.9                         |
| Aug. 28 | 1410 | 368                     | 848                   | 8.2   | 28.5               | 210                                      | 69   | 68                           | 8.9                             | 100                         | 3                              | 6.2                         |
| Nov. 7  | 1100 | 192                     | 1,040                 | 8.4   | 17.5               | 270                                      | 110  | 86                           | 13                              | 120                         | 3                              | 5.4                         |

| 1990    | Alka-linity Total (as CaCO <sub>3</sub> ) | Sulfate ion (SO <sub>4</sub> ) Dis-solved | Chlo-ride ion (Cl), Dis-solved | Silica (SiO <sub>2</sub> ), Dis-solved | Oxygen, Dis-solved (DO) | Coli-form, Fecal | Oxygen Demand, Bio-Chemical (BOD) | Tur-bidity | Solids Dis-solved (Calcu-lated) | Solids Dis-solved (Residue @ 180 Deg C) | Sus-pended Sediment |
|---------|---|---|--------------------------------|--|-------------------------|------------------|-----------------------------------|------------|---------------------------------|---|---------------------|
| Date    | mg/L                                      | mg/L                                      | mg/L                           | mg/L                                   | mg/L                    | Cols./100 mL     | mg/L                              | NTU        | mg/L                            | mg/L                                    | mg/L                |
| Jan. 31 | 176                                       | 390                                       | 180                            | 18                                     | 9.6                     | 28               | 2.3                               | 6.0        | 1,040                           | 1,080                                   | 64                  |
| May 23  | 109                                       | 370                                       | 35                             | 15                                     | 7.5                     | K 360            | 3.7                               | 530        | 720                             | 760                                     | 1,250               |
| Aug. 28 | 138                                       | 200                                       | 50                             | 23                                     | 6.6                     | K 200            | 2.2                               | 2.6        | 546                             | 572                                     | 4,910               |
| Nov. 7  | 157                                       | 230                                       | 89                             | 25                                     | 8.8                     | 520              | 1.9                               | 140        | 668                             | 654                                     | 654                 |

K Results based on colony count outside the acceptance range (non-ideal colony count)

## SUSPENDED SILT - 1990

| 1990   | Time | Stream-flow, Momen-tary | Gravimetric Percent | 1990   | Time | Stream-flow, Momen-tary | Gravimetric Percent | 1990   | Time | Stream-flow, Momen-tary | Gravimetric Percent |
|--------|------|-------------------------|---------------------|--------|------|-------------------------|---------------------|--------|------|-------------------------|---------------------|
| Date   | Std. | m <sup>3</sup> /sec     |                     | Date   | Std. | m <sup>3</sup> /sec     |                     | Date   | Std. | m <sup>3</sup> /sec     |                     |
| Jan. 2 | 1200 | 22.2                    | 0.0041              | May 7  | 0930 | 15.0                    | 0.0287              | Sep. 4 | 1200 | 134                     | 0.2010              |
| 16     | 1300 | 19.7                    | 0.0073              | 21     | 0955 | 40.2                    | 1.8380              | 17     | 1100 | 180                     | 0.4941              |
| Feb. 5 | 1030 | 17.8                    | 0.0095              | June 4 | 0900 | 17.8                    | 0.0139              | Oct. 1 | 1130 | 464                     | 0.4624              |
| 20     | 1200 | 28.6                    | 0.0055              | 18     | 0945 | 23.7                    | 0.0239              | 15     | 1130 | 286                     | 0.2631              |
| Mar. 5 | 1030 | 28.6                    | 0.0117              | July 2 | 1200 | 8.90                    | 0.0156              | Nov. 5 | 1010 | 11.9                    | 0.0795              |
| 19     | 1425 | 25.2                    | 0.0147              | 16     | 1220 | 12.4                    | 0.0473              | 19     | 1200 | 59.7                    | 0.0362              |
| Apr. 2 | 1045 | 24.4                    | 0.0152              | Aug. 6 | 1100 | 306                     | 0.8517              | Dec. 3 | 1015 | 35.9                    | 0.0058              |
| 16     | 1200 | 16.8                    | 0.0104              | 7      | 1100 | 484                     | 0.6733              |        |      |                         |                     |

## QUALITY OF WATER - 1990

08-5772.00 RIO GRANDE AT FOSTER RANCH NEAR LANGTRY, TEXAS AND RANCHO SANTA ROSA, COAHUILA

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| January  | March    | May      | July     | September | November |
|----------|----------|----------|----------|-----------|----------|
| 2 1,620  | 5 1,460  | 6 1,450  | 2 1,200  | 4 1,060   | 5 1,020  |
| 16 1,640 | 19 1,380 | 21 1,300 | 16 1,220 | 17 1,230  | 17 1,200 |
| February | April    | June     | August   | October   | December |
| 5 1,610  | 2 1,400  | 4 1,400  | 6 681    | 1 739     | 3 2,000  |
| 20 1,330 | 16 1,340 | 18 1,410 | 7 965    | 15 937    |          |

## 03-4474.10 PECOS RIVER NEAR LANGTRY, TEXAS

LOCATION: At gaging station, 24.1 river kilometres from the confluence with the Rio Grande, which is located at river Kilometre 991.4.

RECORDS: Chemical analyses, 1967 through current year; biochemical analyses, October 1974 through current year; suspended silt, November 1954 through 1976; specific conductance daily, 1969 through September 1985 and biweekly through current year.

REMARKS: Sampling and analyses by U.S. Geological Survey; sampling and determinations for specific conductance by the International Boundary and Water Commission. Additional water quality parameters, including heavy metals, nutrients, pesticides, and biological indices, determined and published by the U.S. Geological Survey.

| 1990    | Time | Stream flow, Momen-tary | Specific Conductance | pH    | Water Temperature | Hard-ness, Total (as CaCO <sub>3</sub> ) | Hard-ness, Noncar-bonate (as CaCO <sub>3</sub> ) | Calcium ion (Ca), Dis-solved | Magne-sium ion Dis-solved (Mg) | Sodium ion (Na), Dis-solved | Sodium Adsorp-tion Ratio (SAR) | Potassium ion (K) Dissolved |
|---------|------|-------------------------|----------------------|-------|-------------------|--|--|------------------------------|--------------------------------|-----------------------------|--------------------------------|-----------------------------|
| Date    | Std. | m <sup>3</sup> /sec     | Micromhos            | Units | Deg C             | mg/L                                     | mg/L   | mg/L                         | mg/L                           | mg/L                        |                                | mg/L                        |
| Jan. 31 | 1605 | 4.10                    | 4,890                | 8.1   | 12.5              | 900                                      | 750  | 200                          | 96                             | 660                         | 10                             | .9.0                        |
| Mar. 21 | 1245 | 3.60                    | 5,220                | 8.2   | 18.0              | 950                                      | 820  | 200                          | 110                            | 740                         | 10                             | 11                          |
| May 23  | 1050 | 10.7                    | 2,770                | 8.2   | 28.0              | 520                                      | 400  | 120                          | 53                             | 380                         | 7                              | 8.1                         |
| July 11 | 1235 | 2.50                    | 3,420                | 8.2   | 28.0              | 620                                      | 520  | 130                          | 72                             | 470                         | 8                              | 8.0                         |
| Aug. 29 | 0900 | 4.80                    | 3,520                | 8.3   | 29.5              | 660                                      | 520  | 140                          | 74                             | 470                         | 8                              | 8.5                         |
| Nov. 7  | 1615 | 7.50                    | 3,160                | 8.3   | 15.0              | 650                                      | 490  | 150                          | 67                             | 410                         | 7                              | 7.9                         |

| 1990    | Alka-linity Total (as CaCO <sub>3</sub> ) | Sulfate ion (SO <sub>4</sub> ) Dis-solved | Chlo-ride ion (Cl), Dis-solved | Silica (SiO <sub>2</sub> ), Dis-solved | Oxygen, Dis-solved (DO) | Coli-form, Fecal | Oxygen Demand, Bio-Chemical (BOD) | Tur-bidity | Solids Dis-solved (Calcu-lated) | Solids Dis-solved (Residue @ 180 Deg C) | Sus-pended Sed-i-ment |
|---------|---|---|--------------------------------|--|-------------------------|------------------|-----------------------------------|------------|---------------------------------|---|-----------------------|
| Date    | mg/L                                      | mg/L                                      | mg/L                           | mg/L                                   | mg/L                    | Cols./100 mL     | 5 Day mg/L                        | NTU        | mg/L                            | mg/L                                    | mg/L                  |
| Jan. 31 | 150                                       | 700                                       | 1,100                          | 12                                     | 9.9                     | K 1              | 2.0                               | 1.3        | 2,870                           | 3,080                                   | 7                     |
| Mar. 21 | 129                                       | 700                                       | 1,200                          | 11                                     | 10.1                    | K 2              | 2.1                               | 2.2        | 3,050                           | 3,380                                   | 33                    |
| May 23  | 124                                       | 380                                       | 610                            | 14                                     | 7.3                     | 440              | 0.5                               | 41         | 1,650                           | 1,720                                   | 67                    |
| July 11 | 100                                       | 480                                       | 780                            | 9.4                                    | 8.3                     | K 8              | 0.7                               | 5.5        | 2,010                           | 2,030                                   | 14                    |
| Aug. 29 | 134                                       | 470                                       | 760                            | 14                                     | 6.7                     | 29               | 0.3                               | 3.5        | 2,020                           | 2,160                                   | 20                    |
| Nov. 7  | 161                                       | 410                                       | 650                            | 15                                     | 9.0                     | K 13             | 1.4                               | 0.4        | 1,810                           | 1,860                                   | 10                    |

K Results based on colony count outside the acceptance range (non-ideal colony count)

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| January  | March    | May      | July     | September | November |
|----------|----------|----------|----------|-----------|----------|
| 16 4,330 | 1 4,780  | 7 4,630  | 2 3,520  | 4 3,830   | 5 3,430  |
|          | 19 4,800 | 21 1,740 | 16 3,100 | 15 3,560  | 19 4,390 |
| February | April    | June     | August   | October   | December |
| 5 4,560  | 2 4,990  | 4 3,470  | 6 1,120  | 1 2,350   | 1 4,160  |
| 19 4,660 | 16 5,210 | 18 3,510 | 20 2,430 | 18 3,020  | 18 3,680 |

## 08-4494.00 DEVILS RIVER AT PAFFORD CROSSING NEAR COMSTOCK, TEXAS

LOCATION: At gaging station 41.0 river kilometres from the confluence with the Rio Grande, which is located at river kilometre 925.

RECORDS: Daily specific conductance, 1968 through September 1985; biweekly specific conductance through current year.

REMARKS: Sampling and determinations for specific conductance by the U.S. Geological Survey through September 1985. Sampling prior to 1978 and since October 1985 by the International Boundary and Water Commission. Chemical and biochemical analyses, 1978 through current year, available from U.S. Geological Survey.

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| January  | March  | May    | July   | September | November |
|----------|--------|--------|--------|-----------|----------|
| 2 410    | 9 340  | 7 354  | 2 258  | 4 383     | 19 367   |
| 16 400   |        | 21 360 | 16 216 | 17 352    |          |
| February | April  | June   | August | October   | December |
| 5 400    | 2 320  | 4 354  | 6 344  | 1 388     | 3 398    |
| 20 420   | 16 382 | 15 380 | 7 365  | 15 377    | 17 397   |

QUALITY OF WATER - 1990

08-4509.00 RIO GRANDE BELOW AMISTAD DAM NEAR CD. ACUNA, COAHUILA AND DEL RIO, TEXAS

LOCATION: Gaging station at river kilometre 920.3, 3.4 river kilometres downstream from Amistad Dam.  
RECORDS: Chemical analyses, July 1968 through current year; suspended silt, 1969 through 1976; specific conductance 1968 through current year.

**REMARKS:** Sampling for chemical analyses by the International Boundary and Water Commission, analyses by the U. S. Geological Survey. Sampling and determinations for specific conductance by the International Boundary and Water Commission.

| 1990    | Time     | Streamflow | Specific    | pH    | Water       | Hardness,                        | Hardness,                               | Calcium                | Magnesium              |
|---------|----------|------------|-------------|-------|-------------|----------------------------------|---|------------------------|------------------------|
|         |          | Momentary  | Conductance |       | Temperature | Total<br>(as CaCO <sub>3</sub> ) | Noncarbonate<br>(as CaCO <sub>3</sub> ) | ion (Ca),<br>Dissolved | ion (Mg),<br>Dissolved |
| Date    | Standard | m3/sec     | Micromhos   | Units | Deg C       | mg/L                             | mg/L                                    | mg/L                   | mg/L                   |
| Jan. 17 | 0800     | 38.8       | 1,420       | 8.2   | 16.0        | 300                              | 170                                     | 82                     | 24                     |
| Feb. 21 | 0800     | 86.7       | 1,370       | 8.0   |             | 300                              | 165                                     | 79                     | 24                     |
| Mar. 21 | 0800     | 95.4       | 1,390       | 8.0   | 13.0        | 300                              | 169                                     | 80                     | 24                     |
| Apr. 26 | 1205     | 185        | 1,390       | 8.0   | 17.0        | 300                              | 166                                     | 81                     | 24                     |
| May 16  | 0750     | 128        | 1,410       | 8.0   | 18.5        | 300                              | 167                                     | 81                     | 24                     |
| June 21 | 0645     | 14.3       | 1,350       | 7.9   | 20.0        | 300                              | 167                                     | 81                     | 24                     |
| July 18 | 0700     | 9.91       | 1,350       | 7.8   | 22.0        | 300                              | 162                                     | 82                     | 23                     |
| Aug. 15 | 0650     | 135        | 1,280       | 7.9   | 23.0        | 290                              | 159                                     | 80                     | 23                     |
| Sep. 19 | 0705     | 8.01       | 1,250       | 7.9   | 23.0        | 290                              | 156                                     | 80                     | 21                     |
| Oct. 30 | 0955     | 118        | 1,040       | 8.0   | 20.0        | 250                              | 125                                     | 74                     | 15                     |
| Nov. 21 | 0755     | 42.5       | 1,060       | 8.0   | 19.0        | 250                              | 119                                     | 75                     | 16                     |
| Dec. 20 | 0750     | 42.5       | 1,050       | 7.9   | 13.0        | 250                              | 125                                     | 73                     | 16                     |

|         | Sodium ion (Na), Dissolved | Sodium Adsorption Ratio(SAR) | Potassium ion (K) Dissolved | Alkalinity Total (as CaCO <sub>3</sub> ) | Sulfate ion (SO <sub>4</sub> ) Dissolved | Chloride ion (Cl <sup>-</sup> ), Dissolved | Silica (SiO <sub>2</sub> ) Dissolved | Solids Dissolved (Calculated) |
|---------|----------------------------|------------------------------|-----------------------------|--|--|--|--------------------------------------|-------------------------------|
| Date    | mg/L                       |                              | mg/L                        | mg/L                                     | mg/L                                     | mg/L                                       | mg/L                                 | mg/L                          |
| Jan. 17 | 170                        | 4                            | 6.2                         | 130                                      | 300                                      | 190  | 16                                   | 866                           |
| Feb. 21 | 170                        | 4                            | 5.7                         | 135                                      | 290                                      | 170  | 16                                   | 836                           |
| Mar. 21 | 170                        | 4                            | 5.9                         | 131                                      | 310                                      | 180  | 16                                   | 864                           |
| Apr. 26 | 170                        | 4                            | 5.8                         | 134                                      | 310                                      | 170  | 16                                   | 857                           |
| May 16  | 170                        | 4                            | 5.8                         | 133                                      | 280                                      | 170  | 16                                   | 827                           |
| June 21 | 170                        | 4                            | 5.7                         | 133                                      | 280                                      | 170  | 16                                   | 826                           |
| July 18 | 160                        | 4                            | 5.1                         | 138                                      | 270                                      | 170  | 16                                   | 809                           |
| Aug. 15 | 160                        | 4                            | 5.7                         | 131                                      | 280                                      | 150  | 17                                   | 794                           |
| Sep. 19 | 150                        | 4                            | 5.6                         | 134                                      | 250                                      | 160  | 17                                   | 765                           |
| Oct. 30 | 110                        | 3                            | 5.5                         | 125                                      | 230                                      | 100  | 17                                   | 627                           |
| Nov. 21 | 120                        | 3                            | 4.7                         | 131                                      | 220                                      | 100  | 17                                   | 632                           |
| Dec. 20 | 120                        | 3                            | 5.6                         | 125                                      | 220                                      | 120  | 16                                   | 646                           |

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   |       |       |       |       |       | 1,350 |       | 1,340 |       | 922   |       |       |
| 2   |       |       | 1,360 | 1,310 | 1,330 | 1,380 | 1,360 | 1,360 |       | 1,030 | 1,040 |       |
| 3   |       |       |       |       | 1,370 | 1,370 | 1,370 | 1,340 |       |       | 1,050 |       |
| 4   | 1,350 |       |       |       | 1,370 |       |       |       |       |       |       | 1,070 |
| 5   |       | 1,350 | 1,340 | 1,370 |       |       | 1,360 | .     | 1,300 | 1,000 | 1,050 |       |
| 6   |       |       |       |       |       | 1,360 | 1,360 | 1,360 |       |       |       |       |
| 7   |       | 1,350 | 1,330 | 1,370 | 1,360 | 1,360 | 1,360 | 1,240 |       |       | 1,050 |       |
| 8   | 1,340 |       |       |       |       | 1,390 | 1,390 | 1,360 |       | 1,040 |       |       |
| 9   |       | 1,360 | 1,330 | 1,380 | 1,390 |       | 1,390 |       |       | 1,090 |       |       |
| 10  | 1,330 |       |       |       |       |       | 1,320 | 1,260 |       |       |       | 1,070 |
| 11  |       |       |       | 1,380 | 1,400 | 1,370 |       |       |       |       |       |       |
| 12  | 1,350 | 1,340 | 1,340 |       |       |       |       |       | 1,270 |       |       |       |
| 13  |       |       |       |       | 1,390 | 1,380 | 1,380 | 1,300 |       |       |       | 1,070 |
| 14  |       | 1,350 |       |       | 1,380 | 1,390 |       |       | 1,270 |       |       |       |
| 15  |       |       |       |       |       | 1,320 |       |       |       | 1,080 | 1,070 |       |
| 16  |       | 1,350 | 1,340 | 1,380 | 1,400 |       | 1,350 |       |       |       | 1,070 |       |
| 17  |       |       |       |       | 1,360 | 1,380 | 1,370 | 1,310 | 1,210 | 1,080 |       |       |
| 18  |       |       |       |       |       | 1,370 |       |       |       |       |       | 1,060 |
| 19  | 1,360 |       |       |       | 1,340 |       | 1,330 | 1,300 | 1,260 | 1,080 | 1,070 |       |
| 20  |       |       |       |       | 1,360 |       |       |       |       |       |       | 1,060 |
| 21  |       | 1,360 |       |       |       | 1,380 | 1,350 |       | 1,230 |       |       |       |
| 22  | 1,410 |       |       |       |       | 1,370 |       | 1,310 |       | 1,080 |       |       |
| 23  | 1,340 | 1,350 |       | 1,420 | 1,350 |       | 1,340 |       |       |       |       |       |
| 24  | 1,420 |       |       |       |       |       | 1,350 | 1,300 | 1,220 | 1,060 |       |       |
| 25  |       |       |       |       | 1,380 | 1,390 | 1,360 |       |       |       |       | 1,060 |
| 26  | 1,400 | 1,340 | 1,350 |       | 1,370 |       | 1,380 | 1,360 | 1,300 | 873   | 1,060 | 1,080 |
| 27  |       |       |       |       |       |       | 1,370 |       |       |       |       |       |
| 28  |       | 1,340 | 1,340 |       |       |       |       |       |       | 930   |       |       |
| 29  | 1,380 |       |       |       |       | 1,370 | 1,370 | 1,300 |       | 1,040 | 1,090 |       |
| 30  |       |       |       |       |       | 1,380 | 1,380 | 1,360 |       |       | 1,090 |       |
| 31  | 1,380 |       |       |       |       |       |       |       |       |       | 1,030 | 1,080 |

## QUALITY OF WATER - 1990

## 08-4557.00 RIO GRANDE NEAR JIMENEZ, COAHUILA AND QUEMADO, TEXAS

LOCATION: Near gaging station at Maverick Canal Headgates. The canal intake is at river kilometre 875, 21.5 river kilometres above the gaging station.

RECORDS: Specific conductance, 1954 through current year.

REMARKS: Sampling and determinations by the International Boundary and Water Commission.

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   | 1,290 | 1,270 | 1,280 | 1,310 | 1,360 | 1,340 | 1,360 | 1,250 | 1,280 | 1,010 | 1,050 | 1,080 |
| 2   | 1,310 | 1,300 | 1,320 | 1,340 | 1,360 | 1,350 | 1,360 | 1,290 | 1,190 | 999   | 1,060 | 1,100 |
| 3   | 1,300 | 1,280 | 1,330 | 1,340 | 1,330 | 1,370 | 1,330 | 1,220 | 1,210 | 1,020 | 1,050 | 1,050 |
| 4   | 1,310 | 1,290 | 1,320 | 1,350 | 1,350 | 1,380 | 1,340 | 1,180 | 1,200 | 1,060 | 1,060 | 1,050 |
| 5   | 1,280 | 1,280 | 1,340 | 1,340 | 1,370 | 1,360 | 1,320 | 1,250 | 1,220 | 1,050 | 1,060 | 1,050 |
| 6   | 1,280 | 1,290 | 1,320 | 1,350 | 1,370 | 1,340 | 1,330 | 1,260 | 1,220 | 1,060 | 1,050 | 1,050 |
| 7   | 1,300 | 1,290 | 1,310 | 1,360 | 1,350 | 1,340 | 1,260 | 1,230 | 1,050 | 739   | 1,050 | 1,050 |
| 8   | 1,290 | 1,290 | 1,310 | 1,390 | 1,350 | 1,350 | 1,310 | 1,260 | 1,220 | 1,080 | 1,060 | 1,060 |
| 9   | 1,310 | 1,290 | 1,310 | 1,370 | 1,340 | 1,340 | 1,340 | 1,980 | 1,230 | 1,080 | 1,050 | 1,060 |
| 10  | 1,310 | 1,290 | 1,320 | 1,360 | 1,380 | 1,370 | 1,340 | 2,130 | 1,210 | 1,090 | 1,050 | 1,060 |
| 11  | 1,330 | 1,300 | 1,310 | 1,390 | 1,370 | 1,350 | 1,310 | 2,070 | 1,190 | 1,080 | 1,050 | 1,050 |
| 12  | 1,350 | 1,300 | 1,240 | 1,410 | 1,380 | 1,360 | 1,260 | 1,300 | 1,200 | 1,090 | 1,050 | 1,060 |
| 13  | 1,360 | 1,290 | 1,310 | 1,390 | 1,360 | 1,340 | 1,260 | 1,250 | 1,200 | 1,100 | 1,050 | 1,060 |
| 14  | 1,350 | 1,300 | 1,320 | 1,400 | 1,360 | 1,370 | 1,260 | 1,290 | 1,180 | 1,090 | 1,060 | 1,060 |
| 15  | 1,360 | 1,300 | 1,330 | 1,380 | 1,370 | 1,350 | 1,260 | 1,270 | 1,170 | 1,090 | 1,050 | 1,050 |
| 16  | 1,360 | 1,310 | 1,320 | 1,380 | 1,360 | 1,360 | 1,300 | 1,260 | 1,170 | 1,060 | 1,050 | 1,050 |
| 17  | 1,360 | 1,290 | 1,320 | 1,370 | 1,360 | 1,320 | 130   | 1,270 | 1,160 | 1,060 | 1,060 | 1,060 |
| 18  | 1,350 | 1,290 | 1,310 | 1,360 | 1,370 | 1,340 | 1,290 | 1,270 | 1,200 | 1,060 | 1,060 | 1,060 |
| 19  | 1,360 | 1,290 | 1,330 | 1,370 | 1,350 | 1,350 | 1,290 | 1,260 | 1,220 | 1,070 | 1,070 | 1,050 |
| 20  | 1,350 | 1,290 | 1,320 | 1,360 | 1,380 | 1,350 | 1,190 | 1,270 | 1,200 | 1,060 | 1,060 | 1,060 |
| 21  | 1,360 | 1,280 | 1,330 | 1,370 | 1,360 | 1,360 | 1,090 | 1,270 | 1,200 | 1,070 | 2,380 | 1,080 |
| 22  | 1,370 | 1,270 | 1,330 | 1,360 | 1,340 | 1,350 | 1,250 | 1,270 | 1,200 | 1,070 | 2,390 | 1,030 |
| 23  | 1,380 | 1,260 | 1,340 | 1,640 | 1,320 | 1,340 | 1,250 | 1,270 | 1,210 | 1,070 | 2,390 | 1,080 |
| 24  | 1,370 | 1,270 | 1,360 | 1,650 | 1,340 | 1,350 | 1,260 | 1,270 | 1,200 | 1,070 | 2,390 | 1,080 |
| 25  | 1,350 | 1,400 | 1,280 | 1,640 | 1,340 | 1,350 | 1,340 | 1,260 | 1,200 | 1,060 | 1,070 | 1,080 |
| 26  | 1,350 | 1,290 | 1,330 | 831   | 1,340 | 1,360 | 1,260 | 1,300 | 1,000 | 1,050 | 1,060 | 1,040 |
| 27  | 1,380 | 1,290 | 1,330 | 1,320 | 1,330 | 1,360 | 1,290 | 1,260 | 994   | 1,070 | 1,060 | 1,080 |
| 28  | 1,360 | 1,250 | 1,330 | 1,360 | 1,340 | 1,340 | 1,290 | 1,270 | 994   | 1,050 | 1,060 | 1,060 |
| 29  | 1,360 |       | 1,320 | 1,370 | 1,370 | 1,370 | 1,290 | 1,260 | 1,010 | 1,040 | 1,080 | 1,060 |
| 30  | 1,350 |       | 1,280 | 1,370 | 1,350 | 1,360 | 1,300 | 1,260 | 988   | 1,020 | 1,070 | 1,050 |
| 31  | 1,350 |       | 1,290 |       | 1,370 |       | 1,300 | 1,270 |       | 1,060 |       | 1,040 |

## 08-4587.00 RIO GRANDE NEAR EL INDIO, TEXAS AND VILLA GUERRERO, COAHUILA

LOCATION: Gaging station at river kilometre 741, 57.8 river kilometres downstream from the international highway bridge between Eagle Pass, Texas and Piedras Negras, Coahuila.

RECORDS: Specific conductance 1954 through current year.

REMARKS: Sampling and determinations by the International Boundary and Water Commission.

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| January  | March    | May      | July     | September | November |
|----------|----------|----------|----------|-----------|----------|
| 3 1,310  | 6 1,320  | 3 1,360  | 5 1,390  | 5 1,040   | 6 1,000  |
| 17 1,340 | 22 1,350 | 17 1,370 | 17 1,170 | 20 1,030  | 20 1,010 |
| February | April    | June     | August   | October   | December |
| 7 1,340  | 3 1,370  | 6 1,360  | 3 762    | 3 972     | 5 1,030  |
| 22 1,050 | 18 1,390 | 26 1,370 | 15 1,080 | 17 1,060  | 17 1,100 |

## QUALITY OF WATER - 1990

08-4530.00 RIO GRANDE AT LAREDO WATER PLANT, LAREDO, TEXAS AND NUEVO LAREDO, TAMAULIPAS

LOCATION: Samples for biochemical analyses, specific conductance, and suspended silt collected at the Laredo Water Plant, river kilometre 586.

RECORDS: Chemical analyses, 1955 through 1976; chemical and biochemical analyses, 1973 through September 1986; biochemical analyses, September 1968 through current year; suspended silt, 1953 through current year; specific conductance, 1948-1949 and 1955 through current year.

REMARKS: Field parameter samples for biochemical analyses, suspended silt and specific conductance collected and analyzed by the International Boundary and Water Commission and the Texas Water Commission. Additional water quality parameters, including heavy metals, nutrients, pesticides, and biological indices, available from U. S. Geological Survey through September 1986.

| 1990<br>Date | Time<br>Standard | Streamflow<br>Momentary<br>m³/sec | Specific<br>Conductance<br>Micromhos | pH<br>Units | Water<br>Temper-<br>ature<br>Deg C | Hardness,<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Hardness,<br>Noncarbonate<br>(as CaCO <sub>3</sub> )<br>mg/L | Calcium<br>ion (Ca),<br>Dissolved<br>mg/L | Magnesium<br>ion (Mg),<br>Dissolved<br>mg/L |
|--------------|------------------|-----------------------------------|--------------------------------------|-------------|------------------------------------|---|--|---|---|
| Jan. 17      | 1215             | 93.5                              | 1,360                                | 8.0         | 20.0                               | 300   | 169  | 82  | 24  |
| Feb. 21      | 1145             | 110                               | 1,400                                | 7.9         | 14.5                               | 300   | 170  | 80  | 25  |
| Mar. 20      | 0915             | 42.5                              | 1,330                                | 7.9         | 18.5                               | 310   | 179  | 83  | 24  |
| Apr. 17      | 1100             | 136                               | 1,350                                | 7.9         | 21.0                               | 300   | 162  | 82  | 23  |
| May 15       | 1225             | 122                               | 1,400                                | 8.1         | 26.0                               | 310   | 174  | 85  | 24  |
| June 19      | 1025             | 42.5                              | 1,370                                | 8.0         | 27.0                               | 300   | 174  | 81  | 24  |
| July 19      | 0920             | 156                               | 490                                  | 7.6         | 25.0                               | 140   | 45   | 45  | 6.9   |
| Aug. 21      | 1045             | 73.6                              | 1,220                                | 8.0         | 27.0                               | 300   | 159  | 84  | 22  |
| Sep. 18      | 1055             | 133                               | 930                                  | 7.9         | 28.0                               | 230   | 105  | 67  | 16  |
| Oct. 24      | 1230             | 382                               | 1,030                                | 8.0         | 20.0                               | 260   | 130  | 77  | 16  |
| Nov. 21      | 1000             | 96.3                              | 1,010                                | 8.0         | 21.0                               | 270   | 126  | 81  | 16  |
| Dec. 18      | 1110             | 127                               | 1,010                                | 7.9         | 16.0                               | 270   | 131  | 80  | 16  |

| 1990<br>Date | Sodium<br>ion (Na),<br>Dissolved<br>mg/L | Sodium<br>Adsorption<br>Ratio(SAR) | Potassium<br>ion (K)<br>Dissolved<br>mg/L | Alkalinity<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Sulfate<br>ion (SO <sub>4</sub> )<br>Dissolved<br>mg/L | Chloride<br>ion (Cl),<br>Dissolved<br>mg/L | Silica<br>(SiO <sub>2</sub> )<br>Dissolved<br>mg/L | Solids<br>Dissolved<br>(Calculated)<br>mg/L |
|--------------|--|------------------------------------|---|--|--|--|--|---|
| Jan. 17      | 160                                      | 4                                  | 5.8                                       | 131  | 290  | 170  | 11   | 821   |
| Feb. 21      | 170                                      | 4                                  | 6.4                                       | 130  | 300  | 180  | 15   | 854   |
| Mar. 20      | 150                                      | 4                                  | 5.4                                       | 131  | 270  | 170  | 12   | 793   |
| Apr. 17      | 160                                      | 4                                  | 5.3                                       | 138  | 300  | 130  | 15   | 798   |
| May 15       | 170                                      | 4                                  | 5.4                                       | 136  | 290  | 180  | 15   | 851   |
| June 19      | 170                                      | 4                                  | 6.0                                       | 126  | 280  | 170  | 15   | 822   |
| July 19      | 40                                       | 1                                  | 5.3                                       | 95   | 77   | 43   | 6.9  | 281   |
| Aug. 21      | 140                                      | 4                                  | 5.3                                       | 141  | 260  | 150  | 17   | 763   |
| Sep. 18      | 95                                       | 3                                  | 4.8                                       | 125  | 170  | 94   | 13   | 535   |
| Oct. 24      | 110                                      | 3                                  | 5.2                                       | 130  | 220  | 100  | 16   | 623   |
| Nov. 21      | 100                                      | 3                                  | 4.0                                       | 144  | 200  | 100  | 14   | 602   |
| Dec. 18      | 110                                      | 3                                  | 4.8                                       | 139  | 200  | 100  | 14   | 609   |

| 1990<br>Date | Time<br>Std.<br>m³/sec | Stream-<br>flow,<br>Momen-<br>tary<br>Micro-<br>mhos | Specific<br>Conduct-<br>ance<br>pH | Water<br>Tem-<br>perature<br>Deg C | Oxygen,<br>Dis-<br>solved<br>(DO)<br>mg/L | Coli-<br>form,<br>Fecal<br>Cols./<br>100 mL | Oxygen,<br>Demand,<br>Bio-<br>Chemical<br>(BOD)<br>5 Day<br>mg/L | Alka-<br>linity<br>Total<br>(as<br>CaCO <sub>3</sub> )<br>mg/L | Sulfate<br>ion<br>(SO <sub>4</sub> ),<br>Dis-<br>solved<br>mg/L | Chloride<br>ion<br>(Cl),<br>Dis-<br>solved<br>mg/L | Solids<br>Dis-<br>solved<br>(Residue<br>@ 180<br>Deg C)<br>mg/L | Sus-<br>pended<br>Solids<br>mg/L |
|--------------|------------------------|--|------------------------------------|------------------------------------|---|---|--|--|---|--|---|----------------------------------|
| Jan. 9       | 1100                   | 51.0   | 1,163                              | 7.5                                | 13.5                                      | 8.7   | 10   |  |   |  |   |                                  |
| Feb. 6       | 1105                   | 210  | 1,350                              | 7.8                                | 14.1                                      | 7.0   | 40   |  |   |  |   |                                  |
| Mar. 26      | 1725                   | 103  | 1,330                              | 7.8                                | 16.9                                      | 8.8   | 7  |  |   |  |   |                                  |
| Apr. 10      | 1100                   | 136  | 1,280                              | 7.4                                | 20.5                                      | 7.8   | 60   |  |   |  |   |                                  |
| May 8        | 1110                   | 263  | 1,300                              | 7.5                                | 20.8                                      | 6.2   | 20   |  |   |  |   |                                  |
| June 12      | 0830                   | 1,350  | 8.5                                | 27.3                               | 8.0                                       | < 9   |  |  |   |  |   |                                  |
| July 10      | 1100                   | 28.3   | 1,310                              | 7.6                                | 28.6                                      | 6.2   | 60   | 3.0  | 126   | 289  | 177   | 40                               |
| Aug. 14      | 45.3                   | 1,000  | 7.7                                | 29.6                               | 6.8                                       | 85  | 1.0  | 124  | 297   | 184  | 878   | 34                               |
| Oct. 10      | 1045                   | 425  | 930                                | 8.0                                | 22.2                                      | 7.2   | 240  | 3.0  | 125   | 196  | 90  | 590                              |
| Nov. 6       | 1040                   | 142  | 990                                | 7.4                                | 18.4                                      | 7.0   | 40   | 1.0  | 139   | 194  | 94  | 626                              |

&lt; Actual value is known to be less than the value shown

## QUALITY OF WATER - 1990

08-4590.0J RIO GRANDE AT LAREDO WATER PLANT, LAREDO, TEXAS AND NUEVO LAREDO, TAMAULIPAS

## SUSPENDED SILT - 1990

| Month | Monthly Weight<br>Megagrams |         | Number<br>of<br>Samples | Gravimetric Percentages |                   |                   | Period 1968 - 1990                    |         |         |         |
|-------|-----------------------------|---------|-------------------------|-------------------------|-------------------|-------------------|---------------------------------------|---------|---------|---------|
|       |                             |         |                         | Average                 | Maximum<br>Sample | Minimum<br>Sample | Silt Volume - Thousand Cubic Metres * |         |         |         |
|       | Water                       | Silt    |                         |                         |                   |                   | Total                                 | Average | Maximum | Minimum |
| Jan.  | 239,052,000                 | 6,220   | 31                      | 0.00260                 |                   |                   | 5.8                                   | 6.8     | 25.8    | 1.2     |
| Feb.  | 416,197,000                 | 45,370  | 28                      | 0.01090                 |                   |                   | 42.5                                  | 14.9    | 134.0   | 1.1     |
| Mar.  | 210,419,000                 | 8,210   | 31                      | 0.00390                 |                   |                   | 7.7                                   | 13.7    | 77.3    | 2.2     |
| Apr.  | 498,537,000                 | 73,780  | 30                      | 0.01480                 |                   |                   | 69.1                                  | 35.3    | 310.0   | 0.9     |
| May   | 526,349,000                 | 17,370  | 31                      | 0.00330                 |                   |                   | 16.3                                  | 51.1    | 204.0   | 1.4     |
| June  | 198,288,000                 | 4,960   | 30                      | 0.00250                 | 0.01090           | 0.00280           | 4.6                                   | 73.5    | 849.0   | 0.7     |
| July  | 320,285,000                 | 62,780  | 31                      | 0.01960                 | 0.09460           | 0.00320           | 58.8                                  | 65.0    | 516.0   | 1.6     |
| Aug.  | 219,465,000                 | 26,770  | 31                      | 0.01220                 | 0.05830           | 0.00810           | 25.1                                  | 55.6    | 386.0   | 2.8     |
| Sept. | 396,265,000                 | 50,330  | 30                      | 0.01270                 | 0.02670           | 0.00600           | 47.1                                  | 77.2    | 863.0   | 4.1     |
| Oct.  | 999,907,000                 | 218,980 | 31                      | 0.02190                 | 0.26940           | 0.00360           | 205.0                                 | 71.2    | 353.0   | 2.1     |
| Nov.  | 353,946,000                 | 8,490   | 30                      | 0.00240                 | 0.00690           | 0.00230           | 8.0                                   | 10.0    | 33.7    | 1.0     |
| Dec.  | 271,054,000                 | 4,340   | 31                      | 0.00160                 | 0.00270           | 0.00130           | 4.1                                   | 11.7    | 95.5    | 0.8     |
| Year  | 4,649,764,000               | 527,600 | 365                     | 0.00903                 |                   |                   | 2 " 1                                 | 486.0   | 2,007.0 | 117.0   |

\* Volume calculated at 1.068 megagrams per cubic metre

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |       |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   | 1,320 | 1,340 | 1,300 | 1,380 | 1,260 | 1,320 | 1,420 | 970   | 1,110 | 858   | 1,020 | 1,000 |       |
| 2   | 1,320 | 1,370 | 1,320 | 1,380 | 1,360 | 1,280 | 1,430 | 974   | 1,100 | 894   | 1,020 | 1,010 |       |
| 3   | 1,320 | 1,370 | 1,190 | 1,290 | 1,360 | 1,280 | 1,410 | 823   | 1,070 | 921   | 1,020 | 995   |       |
| 4   | 1,320 | 1,370 | 1,110 | 1,020 | 1,380 | 1,360 | 1,440 | 777   | 939   | 920   | 1,020 | 978   |       |
| 5   | 1,320 | 1,380 | 1,210 | 1,200 | 1,370 | 1,360 | 1,410 | 761   | 964   | 943   | 1,050 | 988   |       |
| 6   | 1,310 | 1,370 | 1,270 | 1,330 | 1,360 | 1,340 | 1,400 | 756   | 960   | 985   | 1,020 | 1,010 |       |
| 7   | 1,310 | 1,350 | 1,300 | 1,360 | 1,370 | 1,320 | 1,410 | 828   | 1,000 | 966   | 988   | 978   |       |
| 8   | 1,300 | 1,350 | 1,310 | 1,370 | 1,360 | 1,350 | 1,380 | 925   | 1,020 | 989   | 987   | 1,030 |       |
| 9   | 1,300 | 1,350 | 1,310 | 1,390 | 1,380 | 1,360 | 1,390 | 930   | 1,070 | 960   | 968   | 1,010 |       |
| 10  | 1,310 | 1,350 | 1,310 | 1,380 | 1,380 | 1,370 | 1,420 | 974   | 1,050 | 977   | 990   | 1,010 |       |
| 11  | 1,320 | 1,350 | 1,330 | 1,370 | 1,410 | 1,360 | 1,390 | 1,000 | 1,060 | 986   | 1,010 | 998   |       |
| 12  | 1,310 | 1,360 | 1,320 | 1,370 | 1,400 | 1,360 | 1,390 | 1,030 | 956   | 1,020 | 1,000 | 1,000 |       |
| 13  | 1,310 | 1,360 | 1,340 | 1,380 | 1,400 | 1,360 | 1,420 | 1,060 | 906   | 1,080 | 1,000 | 988   |       |
| 14  | 1,320 | 1,350 | 1,350 | 1,390 | 1,400 | 1,350 | 1,330 | 1,050 | 935   | 1,050 | 1,020 | 977   |       |
| 15  | 1,310 | 1,340 | 1,330 | 1,380 | 1,390 | 1,370 | 1,420 | 806   | 1,020 | 1,040 | 1,010 | 997   |       |
| 16  | 1,300 | 1,360 | 1,360 | 1,360 | 1,390 | 1,350 | 903   | 1,100 | 1,050 | 1,060 | 1,010 | 994   |       |
| 17  | 1,320 | 1,360 | 1,360 | 1,370 | 1,380 | 1,370 | 675   | 1,120 | 1,030 | 1,060 | 981   | 995   |       |
| 18  | 1,330 | 1,350 | 1,330 | 1,370 | 1,380 | 1,380 | 859   | 1,190 | 875   | 1,060 | 979   | 985   |       |
| 19  | 1,330 | 1,360 | 1,220 | 947   | 1,360 | 1,390 | 643   | 1,250 | 987   | 1,060 | 974   | 1,010 |       |
| 20  | 1,340 | 1,360 | 1,290 | 1,170 | 1,380 | 1,400 | 669   | 1,260 | 890   | 1,060 | 965   | 1,000 |       |
| 21  | 1,360 | 1,360 | 1,300 | 1,310 | 1,360 | 1,400 | 896   | 1,280 | 841   | 1,070 | 986   | 988   |       |
| 22  | 1,380 | 1,080 | 1,330 | 1,350 | 1,320 | 1,410 | 496   | 1,190 | 928   | 1,070 | 993   | 991   |       |
| 23  | 1,380 | 850   | 1,340 | 1,340 | 1,250 | 1,410 | 560   | 1,190 | 930   | 1,060 | 986   | 1,020 |       |
| 24  | 1,380 | 990   | 1,330 | 1,350 | 1,200 | 1,410 | 600   | 1,150 | 942   | 1,060 | 980   | 1,020 |       |
| 25  | 1,380 | 1,030 | 1,330 | 1,370 | 976   | 1,390 | 672   | 1,200 | 929   | 1,060 | 969   | 1,010 |       |
| 26  | 1,360 | 1,140 | 1,320 | 1,370 | 1,120 | 1,400 | 533   | 1,220 | 797   | 1,070 | 970   | 1,020 |       |
| 27  | 1,360 | 1,270 | 1,330 | 1,090 | 1,260 | 1,410 | 611   | 1,220 | 817   | 1,040 | 982   | 1,010 |       |
| 28  | 1,380 | 1,330 | 1,350 | 743   | 1,330 | 1,410 | 520   | 1,220 | 847   | 1,050 | 981   | 1,020 |       |
| 29  |       |       |       | 1,350 | 802   | 1,330 | 1,400 | 626   | 1,190 | 833   | 1,060 | 981   | 1,000 |
| 30  | 1,370 |       | 1,350 | 1,170 | 1,330 | 1,400 | 794   | 1,170 | 815   | 1,040 | 983   | 1,010 |       |
| 31  | 1,360 |       | 1,340 |       | 1,330 |       | 914   | 1,100 |       | 1,030 |       | 1,010 |       |

## QUALITY OF WATER - 1990

## 03-4613.00 RIO GRANDE BELOW FALCON DAM NEAR FALCON, TEXAS AND NUEVA CO. GUERRERO, TAMAULIPAS

**LOCATION:** Chemical and specific conductance samples from Falcon Reservoir at Falcon Dam, river kilometre 442.3, and biochemical sampling at the Chapeno gaging station 4.1 river kilometres below Falcon Dam; latitude 26°31'45", longitude 99°09'30".

**RECORDS:** Chemical analyses, July 1955 through current year; biochemical analyses, July 1975 through current year; suspended silt, July 1955 through 1976; specific conductance 1955 through current year.

**REMARKS:** Sampling for chemical analyses by the International Boundary and Water Commission at Falcon Village Water Plant, analyses by the U. S. Geological Survey; sampling and determinations for specific conductance by the International Boundary and Water Commission at Falcon Dam Power Plant tailrace; biochemical analyses, collected and analyzed by the International Boundary and Water Commission and the Texas Water Commission.

| 1990<br>Date | Time<br>Standard | Streamflow<br>Momentary<br>m3/sec | Specific<br>Conductance<br>Micromhos | pH<br>Units | Water<br>Tempera-<br>ture<br>Deg C | Hardness,<br>Total<br>(as CaCO3)<br>mg/L | Hardness,<br>Noncarbonate<br>(as CaCO3)<br>mg/L | Calcium<br>ion (Ca),<br>Dissolved<br>mg/L | Magnesium<br>ion (Mg),<br>Dissolved<br>mg/L |
|--------------|------------------|-----------------------------------|--------------------------------------|-------------|------------------------------------|--|---|---|---|
| Jan. 18      | 0930             | 182                               | 1,360                                | 7.9         | 14.5                               | 300                                      | 188   | 78  | 25  |
| Feb. 20      | 1130             |                                   | 1,390                                | 7.9         | 15.5                               | 300                                      | 182   | 78  | 26  |
| Mar. 21      | 1130             |                                   | 1,400                                | 8.0         | 19.0                               | 300                                      | 179   | 79  | 26  |
| Apr. 18      | 1300             |                                   | 1,390                                | 7.9         | 21.0                               | 310                                      | 192   | 81  | 26  |
| May 21       | 0930             | 377                               | 1,370                                | 7.9         | 24.5                               | 290                                      | 177   | 77  | 24  |
| June 18      | 0930             | 140                               | 1,330                                | 7.7         | 26.5                               | 280                                      | 172   | 74  | 24  |
| July 20      | 1100             | 59.8                              | 1,380                                | 7.6         | 26.5                               | 300                                      | 193   | 77  | 25  |
| Aug. 15      | 1100             | 44.7                              | 1,310                                | 7.6         | 26.5                               | 280                                      | 178   | 72  | 24  |
| Sep. 20      | 0915             | 24.9                              | 1,240                                | 7.7         | 26.5                               | 270                                      | 167   | 72  | 23  |
| Oct. 18      | 1330             | 66.6                              | 1,130                                | 7.8         | 25.0                               | 260                                      | 155   | 69  | 21  |
| Nov. 23      | 1130             | 38.2                              | 1,090                                | 7.9         | 20.0                               | 260                                      | 142   | 74  | 19  |
| Dec. 18      | 1130             | 73.1                              | 1,110                                | 7.8         | 18.0                               | 260                                      | 145   | 71  | 20  |

| 1990<br>Date | Sodium<br>ion (Na),<br>Dissolved<br>mg/L | Sodium<br>Adsorption<br>Ratio(SAR) | Potassium<br>ion (K)<br>Dissolved<br>mg/L | Alkalinity<br>Total<br>(as CaCO3)<br>mg/L | Sulfate<br>ion (SO4)<br>Dissolved<br>mg/L | Chloride<br>ion (Cl),<br>Dissolved<br>mg/L | Silica<br>(SiO2)<br>Dissolved<br>mg/L | Solids<br>Dissolved<br>(Calculated)<br>mg/L |
|--------------|--|------------------------------------|---|---|---|--|---------------------------------------|---|
| Jan. 18      | 160                                      | 4                                  | 6.3                                       | 112                                       | 300                                       | 170  | 12                                    | 818   |
| Feb. 20      | 160                                      | 4                                  | 6.0                                       | 118                                       | 300                                       | 180  | 12                                    | 833   |
| Mar. 21      | 170                                      | 4                                  | 6.0                                       | 121                                       | 300                                       | 190  | 12                                    | 856   |
| Apr. 18      | 170                                      | 4                                  | 5.3                                       | 118                                       | 320                                       | 160  | 12                                    | 845   |
| May 21       | 170                                      | 4                                  | 6.0                                       | 113                                       | 290                                       | 170  | 13                                    | 818   |
| June 18      | 160                                      | 4                                  | 6.1                                       | 108                                       | 290                                       | 170  | 14                                    | 803   |
| July 20      | 170                                      | 4                                  | 5.9                                       | 107                                       | 280                                       | 180  | 14                                    | 816   |
| Aug. 15      | 160                                      | 4                                  | 6.4                                       | 102                                       | 290                                       | 170  | 13                                    | 797   |
| Sep. 20      | 150                                      | 4                                  | 6.3                                       | 103                                       | 270                                       | 160  | 13                                    | 757   |
| Oct. 18      | 140                                      | 4                                  | 5.7                                       | 105                                       | 250                                       | 150  | 13                                    | 712   |
| Nov. 23      | 120                                      | 3                                  | 5.1                                       | 118                                       | 230                                       | 120  | 13                                    | 653   |
| Dec. 18      | 130                                      | 4                                  | 6.0                                       | 115                                       | 230                                       | 130  | 13                                    | 670   |

| 1990<br>Date | Time<br>Std.<br>m3/sec | Stream-<br>flow,<br>Momentary<br>Micro-<br>mhos | Specific<br>Conduct-<br>ance<br>pH<br>Units | Water<br>Tem-<br>perature<br>Deg C | Oxygen,<br>Dis-<br>solved<br>(DO)<br>mg/L | Coli-<br>form,<br>Fecal<br>Coli./<br>100 mL | Oxygen,<br>Demand,<br>Bio-<br>Chemical<br>(BOD)<br>5 Day<br>mg/L | Aalka-<br>linity<br>Total<br>(as<br>CaCO3)<br>mg/L | Sulfate<br>ion<br>(SO4),<br>Dis-<br>solved<br>mg/L | Chloride<br>ion<br>(Cl),<br>Dis-<br>solved<br>mg/L | Solids<br>Dis-<br>solved<br>(Residue<br>@ 180<br>Deg C)<br>mg/L | Sus-<br>pended<br>Solids<br>mg/L |
|--------------|------------------------|---|---|------------------------------------|---|---|--|--|--|--|---|----------------------------------|
| Mar. 26      | 1400                   | 46.7  | 1,390                                       | 7.6                                | 18.5                                      | 8.6   | < 7  |  | 114  | 350  | 174   |                                  |
| June 12      | 1400                   | 234   | 1,340                                       | 8.6                                | 28.9                                      | 8.2   | < 7  |  | 114  | 297  | 172   | 10<br>24                         |

< Actual value is known to be less than the value shown

## QUALITY OF WATER - 1990

08-4615.00 RIO GRANDE BELOW FALCON DAM NEAR FALCON, TEXAS AND NUEVA CO. GUERRERO, TAMAULIPAS

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   | 1,290 |       |       |       |       | 1,330 | 1,370 | 1,390 |       | 1,240 | 1,070 |       |
| 2   | 1,350 |       | 1,380 | 1,370 | 1,400 |       | 1,370 | 1,390 | 1,260 | 1,230 |       | 1,100 |
| 3   | 1,310 |       |       |       | 1,380 | 1,410 | 1,340 | 1,390 |       | 1,240 | 1,060 | 1,120 |
| 4   |       |       |       |       |       |       |       |       |       |       |       |       |
| 5   | 1,310 | 1,350 | 1,380 |       |       |       |       |       |       |       |       |       |
| 6   |       |       |       | 1,370 |       | 1,330 | 1,360 | 1,380 |       |       |       |       |
| 7   |       | 1,350 | 1,380 |       | 1,400 |       | 1,330 | 1,370 | 1,260 |       | 1,120 | 1,120 |
| 8   | 1,310 |       |       |       |       |       |       |       | 1,170 |       |       |       |
| 9   | 1,360 | 1,370 | 1,370 | 1,370 | 1,400 |       | 1,390 | 1,360 | 1,260 | 1,160 | 1,110 | 1,130 |
| 10  | 1,270 |       |       |       |       |       |       |       |       |       |       |       |
| 11  |       |       |       | 1,360 | 1,400 | 1,340 | 1,380 |       |       |       |       |       |
| 12  | 1,320 | 1,370 | 1,370 |       |       |       |       |       | 1,270 | 1,180 | 1,110 | 1,130 |
| 13  |       |       |       | 1,370 |       | 1,340 | 1,390 | 1,330 |       | 1,240 | 1,180 |       |
| 14  |       | 1,380 | 1,370 |       | 1,370 |       |       |       |       | 1,100 |       | 1,130 |
| 15  | 1,320 |       |       |       |       | 1,340 |       | 1,330 |       |       |       |       |
| 16  |       | 1,370 | 1,370 | 1,370 | 1,340 |       | 1,390 |       |       |       |       |       |
| 17  | 1,340 |       |       |       |       |       |       | 1,320 | 1,250 | 1,170 |       | 1,130 |
| 18  |       |       |       | 1,410 | 1,370 | 1,350 | 1,400 |       |       |       |       |       |
| 19  | 1,340 | 1,370 | 1,370 |       |       |       |       |       | 1,240 | 1,140 | 1,110 | 1,130 |
| 20  |       |       |       | 1,420 |       | 1,340 | 1,390 | 1,330 |       |       |       |       |
| 21  |       | 1,370 |       |       |       | 1,360 |       |       | 1,250 |       |       |       |
| 22  | 1,340 |       |       |       |       | 1,360 |       | 1,290 |       | 1,150 | 1,040 | 1,120 |
| 23  |       | 1,370 | 1,370 | 1,420 | 1,360 |       | 1,400 |       | 1,300 | 1,230 | 1,170 |       |
| 24  | 1,340 |       |       |       |       | 1,410 | 1,350 | 1,390 |       |       |       |       |
| 25  |       |       |       |       |       |       |       |       |       |       |       |       |
| 26  | 1,340 | 1,370 | 1,380 |       |       |       |       |       | 1,220 | 1,140 | 1,080 | 1,130 |
| 27  |       |       |       | 1,410 |       | 1,360 | 1,390 | 1,280 |       | 1,230 |       |       |
| 28  |       | 1,370 | 1,370 |       | 1,350 |       | 1,360 |       | 1,270 |       | 1,160 | 1,090 |
| 29  | 1,340 |       |       |       |       | 1,350 |       | 1,380 |       |       | 1,110 | 1,130 |
| 30  |       |       |       | 1,420 | 1,350 |       |       |       | 1,260 |       | 1,150 |       |
| 31  | 1,340 |       |       |       |       |       |       |       |       |       |       | 1,140 |

08-4342.00 RIO SAN JUAN AT CAMARGO, TAMAULIPAS

LOCATION: At gaging station, 5.1 river kilometres from the confluence with the Rio Grande, which is located at river kilometre 384.

RECORDS: Specific conductance, 1960 through current year.

REMARKS: Sampling and determinations by the International Boundary and Water Commission.

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| January  | March    | May      | August    | October  | 30    |
|----------|----------|----------|-----------|----------|-------|
| 9 2,680  | 2 2,800  | 16 3,340 | 20 2,460  | 2 1,650  | 3,060 |
| 19 2,670 | 16 3,180 |          |           | 16 3,480 |       |
| February | April    | June     | September | November |       |
| 2 2,540  | 3 3,320  | 1 3,360  | 4 2,410   | 6 1,900  |       |
| 16 2,750 | 30 3,570 | 19 3,510 | 20 1,430  | 16 7,280 |       |

08-4645.00 RANCHERIAS DRAIN NEAR CAMARGO, TAMAULIPAS

LOCATION: At a point about 600 metres from the confluence with the Rio Grande, which is located at river kilometre 389. This drain carries waste water from the Lower Rio San Juan Irrigation District in Mexico.

RECORDS: Specific conductance, 1948 and 1960 through current year.

REMARKS: Sampling and determinations by the International Boundary and Water Commission.

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| January  | March    | May      | July     | September | November |
|----------|----------|----------|----------|-----------|----------|
| 9 5,000  | 2 5,590  | 16 3,670 | 4 4,980  | 4 2,040   | 6 4,620  |
| 19 3,730 | 16 4,630 |          | 17 4,890 | 20 1,930  | 16 4,480 |
| February | April    | June     | August   | October   | 29 4,690 |
| 2 4,210  | 3 5,640  | 1 5,580  | 2 5,110  | 2 4,410   | December |
| 16 5,060 | 30 3,680 | 19 5,180 | 20 4,940 | 17 4,590  | 14 4,080 |

## QUALITY OF WATER - 1990

## 03-4647.00 RIO GRANDE AT RIO GRANDE CITY, TEXAS NEAR CAMARGO, TAMAULIPAS

LOCATION: Gaging station at river kilometre 378, 6.0 river kilometres downstream from Rio San Juan.  
 RECORDS: Chemical analyses, 1959 through current year; specific conductance, 1958 through current year; suspended silt, 1959 through 1977.

REMARKS: Sampling by the International Boundary and Water Commission; chemical analyses by the U.S. Geological Survey; specific conductance determinations by the International Boundary and Water Commission.

| 1990<br>Date | Time<br>Standard | Streamflow<br>Momentary<br>m <sup>3</sup> /sec | Specific<br>Conductance<br>Micromhos | pH<br>Units | Water<br>Temperature<br>Deg C | Hardness,<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Hardness,<br>Noncarbonate<br>(as CaCO <sub>3</sub> )<br>mg/L | Calcium<br>Ion (Ca),<br>Dissolved<br>mg/L | Magnesium<br>Ion (Mg),<br>Dissolved<br>mg/L |
|--------------|------------------|--|--------------------------------------|-------------|-------------------------------|---|--|---|---|
| Jan. 17      | 1345             | 110  | 1,380                                | 8.0         | 16.0                          | 290   | 182  | 76  | 25  |
| Feb. 20      | 1250             | 75.3   | 1,470                                | 7.9         | 17.0                          | 310   | 194  | 80  | 27  |
| Mar. 19      | 1200             | 65.7   | 1,440                                | 8.0         | 21.0                          | 310   | 190  | 83  | 26  |
| Apr. 17      | 1215             | 50.9   | 1,410                                | 8.0         | 24.0                          | 310   | 190  | 81  | 26  |
| May 18       | 1045             | 141  | 1,390                                | 8.0         | 24.5                          | 300   | 185  | 78  | 25  |
| June 15      | 1100             | 113  | 1,360                                | 7.8         | 29.5                          | 290   | 182  | 75  | 25  |
| July 18      | 1115             | 54.9   | 1,460                                | 7.7         | 28.0                          | 310   | 202  | 80  | 26  |
| Aug. 15      | 1200             | 60.9   | 1,340                                | 7.9         | 30.0                          | 290   | 187  | 73  | 25  |
| Sep. 18      | 0945             | 38.5   | 1,370                                | 7.8         | 29.0                          | 260   | 176  | 65  | 24  |
| Oct. 26      | 0900             | 56.9   | 1,190                                | 7.9         | 22.0                          | 270   | 158  | 72  | 22  |
| Nov. 19      | 1100             | 59.2   | 1,180                                | 7.9         | 22.0                          | 270   | 157  | 72  | 21  |
| Dec. 17      | 1245             | 82.7   | 1,130                                | 7.8         | 23.5                          | 260   | 145  | 71  | 20  |

| 1990<br>Date | Sodium<br>Ion (Na),<br>Dissolved<br>mg/L | Sodium<br>Adsorption<br>Ratio (SAR) | Potassium<br>Ion (K)<br>Dissolved<br>mg/L | Alkalinity<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Sulfate<br>ion (SO <sub>4</sub> )<br>Dissolved<br>mg/L | Chloride<br>ion (Cl),<br>Dissolved<br>mg/L | Silica<br>(SiO <sub>2</sub> )<br>Dissolved<br>mg/L | Solids<br>Dissolved<br>(Calculated)<br>mg/L |
|--------------|--|-------------------------------------|---|--|--|--|--|---|
| Jan. 17      | 160                                      | 4                                   | 6.2                                       | 108  | 300  | 180  | 12   | 824   |
| Feb. 20      | 180                                      | 4                                   | 5.8                                       | 116  | 310  | 190  | 12   | 874   |
| Mar. 19      | 180                                      | 4                                   | 6.1                                       | 120  | 310  | 190  | 11   | 878   |
| Apr. 17      | 170                                      | 4                                   | 5.6                                       | 120  | 320  | 180  | 12   | 867   |
| May 18       | 170                                      | 4                                   | 5.8                                       | 115  | 290  | 180  | 13   | 831   |
| June 15      | 170                                      | 5                                   | 6.1                                       | 108  | 290  | 170  | 14   | 815   |
| July 18      | 190                                      | 5                                   | 5.9                                       | 108  | 310  | 200  | 13   | 890   |
| Aug. 15      | 170                                      | 4                                   | 6.6                                       | 103  | 310  | 170  | 13   | 829   |
| Sep. 18      | 180                                      | 5                                   | 6.4                                       | 84   | 280  | 200  | 13   | 819   |
| Oct. 26      | 140                                      | 4                                   | 5.9                                       | 112  | 250  | 150  | 13   | 721   |
| Nov. 19      | 140                                      | 4                                   | 5.3                                       | 113  | 240  | 150  | 12   | 709   |
| Dec. 17      | 130                                      | 4                                   | 5.8                                       | 115  | 230  | 140  | 13   | 680   |

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   | 1,410 | 1,390 |       |       |       | 1,390 |       | 1,140 |       |       | 1,240 | 1,250 |
| 2   |       |       | 1,730 | 1,430 | 1,510 |       | 1,440 | 1,440 | 1,260 |       |       |       |
| 3   | 1,430 |       |       |       | 1,520 | 1,490 | 1,400 | 1,460 |       | 1,290 | 1,170 | 1,260 |
| 4   |       |       |       | 1,420 | 1,750 |       |       |       |       |       |       |       |
| 5   | 1,450 |       |       |       |       | 1,500 |       |       |       |       |       |       |
| 6   |       |       |       |       |       | 1,480 |       |       |       |       |       |       |
| 7   | 1,460 | 1,440 | 1,980 |       |       | 1,500 | 1,430 | 1,500 | 1,450 |       | 1,180 | 1,370 |
| 8   |       |       |       |       |       |       | 1,370 | 1,430 | 1,400 |       |       |       |
| 9   |       |       |       | 1,410 | 1,640 | 1,430 | 1,500 |       |       |       | 1,200 |       |
| 10  | 1,480 |       |       |       |       |       | 1,510 | 1,340 | 1,350 |       |       | 1,240 |
| 11  |       |       |       |       |       |       |       |       |       |       |       |       |
| 12  | 1,390 | 1,400 | 1,480 | 1,500 | 1,630 | 1,530 | 1,740 |       | 1,490 |       | 1,410 | 1,240 |
| 13  |       |       |       |       |       |       |       |       |       |       |       |       |
| 14  |       |       |       | 1,430 | 1,630 | 1,480 | 1,470 | 1,550 | 1,390 | 1,420 | 1,380 | 1,220 |
| 15  | 1,450 |       |       |       |       |       | 1,620 | 1,460 | 1,390 |       |       |       |
| 16  |       |       |       |       |       |       |       |       |       |       | 1,370 |       |
| 17  | 1,390 |       | 1,500 | 1,550 | 1,580 | 1,450 |       | 1,560 | 1,420 | 1,190 |       | 1,180 |
| 18  |       |       |       |       |       |       |       | 1,450 | 1,520 |       |       |       |
| 19  | 1,380 | 1,500 | 1,450 |       | 1,480 |       | 1,440 | 1,470 | 1,370 |       | 1,240 | 1,190 |
| 20  |       |       |       |       |       |       |       |       |       |       |       |       |
| 21  |       |       |       |       |       |       |       |       |       |       |       |       |
| 22  | 1,380 |       | 1,120 | 1,450 |       | 1,460 | 1,440 |       | 1,370 |       | 1,240 | 1,220 |
| 23  |       |       |       |       |       |       |       |       |       |       |       |       |
| 24  | 1,410 |       | 1,130 | 1,540 | 1,490 | 1,420 |       | 1,490 | 1,330 |       | 1,290 | 1,200 |
| 25  |       |       |       |       |       |       |       |       |       |       |       |       |
| 26  | 1,390 | 1,770 | 1,480 |       | 1,490 |       | 1,450 | 1,560 | 1,340 | 850   | 1,200 | 1,200 |
| 27  |       |       |       |       |       |       |       |       |       |       | 1,190 |       |
| 28  |       |       |       | 1,870 | 1,500 | 1,410 |       | 1,450 | 1,330 |       |       | 1,190 |
| 29  | 1,410 |       |       |       |       | 1,490 | 1,370 | 1,440 | 1,330 |       |       |       |
| 30  |       |       |       |       |       |       |       |       |       |       | 1,330 |       |
| 31  | 1,380 |       |       |       |       | 1,560 | 1,490 | 1,330 |       |       |       | 1,220 |

## QUALITY OF WATER - 1990

## PUERTECITOS DRAIN AND LOS INDIOS DRAIN NEAR CO. DIAZ ORDAZ, TAMAULIPAS

**LOCATION:** For Puertecitos Drain, at a point about 2,600 metres from the confluence with the Rio Grande, which is located at river kilometre 353; and, for Los Indios Drain, at a point about 650 metres from its confluence with Puertecitos Drain. These two drains join at a point about 1,300 metres from the confluence with the Rio Grande. These drains carry waste water from the lower Rio San Juan Irrigation District in Mexico.

**RECORDS:** Specific conductance, 1960 through current year.

**REMARKS:** Sampling and determinations by the International Boundary and Water Commission.

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| Date    | Puerte-citos Drain | Los Indios Drain | Date   | Puerte-citos Drain | Los Indios Drain | Date  | Puerte-citos Drain | Los Indios Drain | Date    | Puerte-citos Drain | Los Indios Drain |
|---------|--------------------|------------------|--------|--------------------|------------------|-------|--------------------|------------------|---------|--------------------|------------------|
| Jan. 9  | 1,660              | 2,060            | 3      | 3,040              | 2,720            | 3,160 | 2,640              | 2,220            | Nov. 6  | 2,560              | 2,090            |
| 19      | 2,360              | 2,120            | 30     | 2,720              | 2,450            | 2,490 | 2,620              | 2,180            | 16      | 2,610              | 2,070            |
| Feb. 2  | 2,410              | 2,160            | May 16 | 2,890              | 2,360            | 2,490 | 2,150              | 2,110            | 30      | 2,690              | 2,080            |
| 16      | 2,540              | 2,120            | June 1 | 2,360              | 2,390            | 2,610 | 2,110              | 2,100            | Dec. 14 | 2,700              | 2,090            |
| Mar. 2  | 3,070              | 2,350            | 19     | 2,940              | 2,300            | 2,500 | 2,090              |                  |         |                    |                  |
| Mar. 16 | 3,080              | 3,160            | July 4 | 2,870              | 2,260            | 2,530 | 2,100              |                  |         |                    |                  |
| Apr. 2  |                    | 2,270            | 17     | 2,720              | 2,240            |       |                    |                  |         |                    |                  |

## 08-4665.00 RIO GRANDE AT LOS EBANOS, TEXAS NEAR CO. DIAZ ORDAZ, TAMAULIPAS

**LOCATION:** Gaging station at river kilometre 329, 54.7 river kilometres upstream from Anzalduas Dam.

**RECORDS:** Chemical analyses, June 1977 through current year; specific conductance, 1956 through current year.

**REMARKS:** Sampling by the International Boundary and Water Commission; chemical analyses by the U. S. Geological Survey; specific conductance determinations by the International Boundary and Water Commission.

| 1990    | Time     | Streamflow<br>Momentary | Specific<br>Conductance | pH    | Water<br>Temper-<br>ature | Hardness,<br>Total<br>(as CaCO <sub>3</sub> ) | Hardness,<br>Noncarbonate<br>(as CaCO <sub>3</sub> ) | Calcium<br>ion (Ca),<br>Dissolved | Magnesium<br>ion (Mg),<br>Dissolved |
|---------|----------|-------------------------|-------------------------|-------|---------------------------|---|--|-----------------------------------|-------------------------------------|
| Date    | Standard | m <sup>3</sup> /sec     | Micromhos               | Units | Deg C                     | mg/L  | mg/L   | mg/L                              | mg/L                                |
| Jan. 18 | 1230     | 153                     | 1,380                   | 7.8   | 17.0                      | 300   | 188  | 78                                | 25                                  |
| Feb. 20 | 1345     | 108                     | 1,500                   | 7.8   | 17.0                      | 320   | 199  | 83                                | 28                                  |
| Mar. 19 | 1345     | 32.9                    | 1,540                   | 8.0   | 21.0                      | 330   | 205  | 87                                | 28                                  |
| Apr. 17 | 1315     | 75.0                    | 1,450                   | 8.0   | 25.0                      | 320   | 199  | 84                                | 27                                  |
| May 18  | 0930     | 117                     | 1,420                   | 7.9   | 27.0                      | 310   | 192  | 81                                | 25                                  |
| June 12 | 0915     | 229                     | 1,360                   | 7.9   | 28.0                      | 300   | 188  | 77                                | 25                                  |
| July 11 | 1045     | 56.4                    | 1,540                   | 7.8   | 29.0                      | 330   | 212  | 85                                | 28                                  |
| Aug. 15 | 1300     | 48.7                    | 1,480                   | 7.8   | 30.0                      | 330   | 215  | 84                                | 28                                  |
| Sep. 21 | 0920     | 50.4                    | 1,420                   | 7.9   | 29.0                      | 290   | 188  | 74                                | 26                                  |
| Oct. 26 | 1400     | 43.9                    | 1,250                   | 8.2   | 24.0                      | 280   | 170  | 74                                | 23                                  |
| Nov. 19 | 1400     | 32.6                    | 1,380                   | 8.0   | 23.0                      | 310   | 187  | 81                                | 25                                  |
| Dec. 17 | 1700     | 51.0                    | 1,150                   | 7.9   | 22.0                      | 260   | 145  | 73                                | 20                                  |

| 1990    | Sodium<br>ion (Na),<br>Dissolved | Sodium<br>Adsorption<br>Ratio(SAR) | Potassium<br>ion (K)<br>Dissolved | Alkalinity<br>Total<br>(as CaCO <sub>3</sub> ) | Sulfate<br>ion (SO <sub>4</sub> )<br>Dissolved | Chloride<br>ion (Cl),<br>Dissolved | Silica<br>(SiO <sub>2</sub> )<br>Dissolved | Solids<br>Dissolved<br>(Calculated) |
|---------|----------------------------------|------------------------------------|-----------------------------------|--|--|------------------------------------|--|-------------------------------------|
| Date    | mg/L                             |                                    | mg/L                              | mg/L   | mg/L   | mg/L                               | mg/L                                       | mg/L                                |
| Jan. 18 | 160                              | 4                                  | 6.3                               | 112  | 300  | 180                                | 12   | 828                                 |
| Feb. 20 | 180                              | 4                                  | 7.0                               | 121  | 340  | 200                                | 13   | 924                                 |
| Mar. 19 | 190                              | 5                                  | 6.0                               | 125  | 330  | 210                                | 9.7  | 936                                 |
| Apr. 17 | 180                              | 4                                  | 10                                | 121  | 340  | 180                                | 13   | 907                                 |
| May 18  | 170                              | 4                                  | 5.9                               | 118  | 290  | 180                                | 13   | 836                                 |
| June 12 | 170                              | 4                                  | 6.1                               | 112  | 280  | 180                                | 14   | 819                                 |
| July 11 | 190                              | 5                                  | 5.9                               | 118  | 320  | 210                                | 14   | 924                                 |
| Aug. 15 | 190                              | 5                                  | 6.5                               | 115  | 350  | 200                                | 14   | 941                                 |
| Sep. 21 | 180                              | 5                                  | 6.2                               | 102  | 300  | 200                                | 13   | 861                                 |
| Oct. 26 | 150                              | 4                                  | 5.8                               | 110  | 270  | 160                                | 13   | 762                                 |
| Nov. 19 | 170                              | 4                                  | 5.7                               | 123  | 310  | 180                                | 12   | 858                                 |
| Dec. 17 | 130                              | 3                                  | 6.1                               | 115  | 240  | 140                                | 13   | 692                                 |

## QUALITY OF WATER - 1990

08-4003.00 RIO GRANDE AT LOS EBAÑOS, TEXAS NEAR CO. DIAZ ORDAZ, TAMAULIPAS

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct. | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|
| 1   | 2,000 | 1,330 | 1,330 | 1,430 | 1,420 | 1,370 | 1,420 | 1,310 | 1,420 |      | 1,310 | 1,500 |
| 2   | 2,000 | 1,310 | 1,330 | 1,420 | 1,410 | 1,380 | 1,390 | 1,300 | 1,420 |      | 1,300 | 1,510 |
| 3   | 1,670 | 1,280 | 1,320 | 1,510 | 1,600 | 1,370 | 1,380 | 1,300 | 1,420 |      | 1,300 | 1,520 |
| 4   | 1,660 | 1,290 | 1,350 | 1,520 | 1,610 | 1,380 | 1,380 | 1,300 | 1,380 |      | 1,310 | 1,510 |
| 5   | 1,660 | 1,290 | 1,400 | 1,510 | 1,610 | 1,370 | 1,570 | 1,380 | 1,380 |      | 1,300 | 1,510 |
| 6   | 1,660 | 1,350 | 1,610 | 1,510 | 1,610 | 1,380 | 1,570 | 1,370 | 1,370 |      | 1,300 | 1,510 |
| 7   | 1,670 | 1,310 | 1,610 | 1,540 | 1,610 | 1,370 | 1,550 | 1,380 | 1,380 |      | 1,160 | 1,500 |
| 8   | 1,660 | 1,360 | 1,610 | 1,520 | 1,610 | 1,380 | 1,410 | 1,380 | 1,390 |      | 1,170 | 1,490 |
| 9   | 1,330 | 1,350 | 1,610 | 1,510 | 1,610 | 1,380 | 1,500 | 1,380 | 1,380 |      | 1,160 | 1,490 |
| 10  | 1,350 | 1,350 | 1,630 | 1,520 | 1,600 | 1,380 | 1,520 | 1,380 | 1,380 |      | 1,160 | 1,490 |
| 11  | 1,350 | 1,350 | 1,620 | 1,520 | 1,610 | 1,380 | 1,520 | 1,380 | 1,320 |      | 1,170 | 1,480 |
| 12  | 1,340 | 1,360 | 1,640 | 1,520 | 1,580 | 1,380 | 1,510 | 1,370 | 1,320 |      | 1,160 | 1,480 |
| 13  | 1,350 | 1,370 | 1,620 | 1,510 | 1,590 | 1,380 | 1,520 | 1,380 | 1,560 |      |       | 1,500 |
| 14  | 1,350 | 1,380 | 1,620 | 1,520 | 1,600 | 1,380 | 1,500 | 1,390 | 1,560 |      |       | 1,180 |
| 15  | 1,310 | 1,380 | 1,610 | 1,430 | 1,380 | 1,390 | 1,500 | 1,390 | 1,580 |      |       | 1,200 |
| 16  | 1,310 | 1,390 | 1,520 | 1,470 | 1,360 | 1,380 | 1,490 | 1,370 | 1,430 |      |       | 1,180 |
| 17  | 1,300 | 1,390 | 1,530 | 1,490 | 1,360 | 1,380 | 1,480 | 1,350 | 1,420 |      |       | 1,180 |
| 18  | 1,310 | 1,390 | 1,540 | 1,480 | 1,380 | 1,380 | 1,460 | 1,360 | 1,410 |      |       | 1,180 |
| 19  | 1,310 | 1,380 | 1,530 | 1,430 | 1,380 | 1,440 | 1,470 | 1,350 | 1,420 |      | 1,500 | 1,190 |
| 20  | 1,310 | 1,380 | 1,530 | 1,420 | 1,370 | 1,350 | 1,460 | 1,360 | 1,420 |      | 1,490 | 1,180 |
| 21  | 1,310 | 1,400 | 1,480 | 1,440 | 1,370 | 1,340 | 1,470 | 1,350 | 1,410 |      | 1,500 | 1,173 |
| 22  | 1,310 | 1,340 | 1,390 | 1,440 | 1,380 | 1,340 | 1,470 | 1,350 | 1,410 |      | 1,500 | 1,180 |
| 23  | 1,310 | 1,320 | 1,420 | 1,430 | 1,380 | 1,340 | 1,480 | 1,450 | 1,410 |      | 1,500 | 1,180 |
| 24  | 1,330 | 1,330 | 1,450 | 1,430 | 1,380 | 1,410 | 1,260 | 1,360 | 1,410 |      | 1,490 | 1,200 |
| 25  | 1,320 | 1,320 | 1,430 | 1,430 | 1,380 | 1,410 | 1,290 | 1,350 | 1,420 |      | 1,470 | 1,190 |
| 26  | 1,320 | 1,340 | 1,430 | 1,430 | 1,340 | 1,410 | 1,290 | 1,350 | 1,470 |      | 1,470 | 1,190 |
| 27  | 1,320 | 1,310 | 1,420 | 1,520 | 1,340 | 1,410 | 1,290 | 1,350 | 1,410 |      | 1,490 | 1,190 |
| 28  | 1,320 | 1,320 | 1,420 | 1,420 | 1,340 | 1,410 | 1,280 | 1,380 | 1,420 |      | 1,480 | 1,190 |
| 29  | 1,330 |       | 1,420 | 1,420 | 1,340 | 1,360 | 1,290 | 1,320 | 1,410 |      | 1,470 | 1,190 |
| 30  | 1,330 |       | 1,410 | 1,410 | 1,370 | 1,420 | 1,290 | 1,350 | 1,410 |      | 1,480 | 1,180 |
| 31  | 1,320 |       | 1,420 | 1,370 | 1,420 | 1,280 | 1,420 |       |       |      |       | 1,170 |

08-4075.00 RIO GRANDE AT PENITAS, TEXAS AND REYNOSA DIAZ, TAMAULIPAS

LOCATION: At the H.C.W.C. &amp; I. District No. 1 (Edinburg) pumping plant, river kilometre 300, 26.2 river kilo-metres upstream from Anzalduas Dam.

RECORDS: Specific conductance, 1963 through current year.

REMARKS: Sampling and determinations by the International Boundary and Water Commission.

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   | 1,510 |       |       |       | 1,430 | 1,350 |       | 1,480 |       | 1,490 | 1,240 |       |
| 2   |       | 1,350 | 1,100 | 1,440 |       |       | 1,420 |       | 1,300 | 1,340 | 1,480 | 1,450 |
| 3   | 1,470 |       |       |       | 1,420 | 1,430 | 1,360 | 1,420 |       | 1,320 | 1,400 | 1,350 |
| 4   |       |       |       |       |       |       |       |       |       |       |       |       |
| 5   | 1,520 | 1,340 | 1,560 |       | 1,460 |       | 1,370 | 1,470 | 1,400 | 1,400 | 1,350 | 1,390 |
| 6   |       |       |       |       |       |       |       |       |       |       |       |       |
| 7   |       |       |       |       |       |       |       |       |       |       |       |       |
| 8   | 1,440 | 1,370 | 1,920 |       | 1,440 |       | 1,380 | 1,490 | 1,370 | 976   | 1,320 | 1,330 |
| 9   |       | 1,380 | 2,120 | 1,490 | 1,410 |       | 1,540 |       | 1,470 | 1,450 | 1,200 |       |
| 10  | 1,400 |       |       |       | 1,430 | 1,570 |       |       |       | 1,170 |       | 1,380 |
| 11  |       |       |       |       |       |       |       |       |       |       |       |       |
| 12  | 1,460 | 1,390 | 1,940 |       | 1,430 | 1,570 |       |       |       |       |       |       |
| 13  |       |       |       |       |       |       |       |       |       |       |       |       |
| 14  |       | 1,380 | 1,530 |       | 1,600 |       |       |       |       |       |       |       |
| 15  | 1,390 |       |       |       |       |       |       |       |       |       | 1,190 | 1,240 |
| 16  |       |       |       |       |       |       |       |       |       |       |       |       |
| 17  | 1,450 | 1,630 | 1,500 | 1,660 |       |       | 1,610 | 1,510 | 1,770 | 1,250 | 1,300 | 1,210 |
| 18  | 1,380 |       |       | 1,470 | 1,680 | 1,380 | 1,830 |       |       |       |       |       |
| 19  | 1,360 | 1,430 | 1,690 | 1,480 |       | 1,370 | 1,600 | 1,540 | 1,560 | 1,260 | 1,640 | 1,180 |
| 20  |       |       |       |       |       |       |       |       |       |       |       |       |
| 21  |       | 1,440 | 1,560 |       | 1,390 |       | 1,410 |       | 1,440 | 1,250 | 1,440 | 1,190 |
| 22  | 1,350 |       | 1,370 | 1,520 | 1,460 | 1,390 |       | 1,540 | 1,440 | 1,250 | 1,300 |       |
| 23  |       |       |       |       |       |       |       |       |       |       |       |       |
| 24  | 1,350 |       |       |       | 4,440 | 1,380 | 1,420 | 1,540 | 1,430 | 1,460 | 1,250 | 1,180 |
| 25  |       |       |       |       |       |       |       |       |       |       |       |       |
| 26  | 1,350 | 780   | 1,510 | 1,300 |       | 1,370 | 1,410 | 1,520 | 1,400 | 1,410 | 1,290 | 1,260 |
| 27  |       |       |       |       |       |       |       |       |       |       |       |       |
| 28  |       |       |       |       |       |       |       |       |       |       |       |       |
| 29  | 1,350 | 930   | 1,510 |       | 1,370 |       | 1,420 |       | 1,380 | 1,300 | 1,250 | 1,180 |
| 30  |       |       |       |       |       |       |       |       |       |       |       |       |
| 31  | 1,350 |       | 1,450 | 1,360 | 1,370 |       | 1,420 | 1,490 | 1,330 | 1,260 | 1,220 | 1,170 |

## QUALITY OF WATER - 1990

## 03-1678.30 Morillo Drain near Anzalduas Dam

**LOCATION:** At the Morillo Drain Project pumping plant located about 0.6 river kilometre from the confluence with the Rio Grande or at the gaging station on the bypass canal 0.6 kilometre from the pumping plant. Morillo Drain enters the Rio Grande at river Kilometre 288, 14.2 river kilometres upstream from Anzalduas Dam. This drain carries waste water from the lower Rio San Juan Irrigation District in Mexico and surface runoff during periods of heavy precipitation.

**RECORDS:** Chemical analyses, 1962 through current year; specific conductance, 1956 through current year.

**REMARKS:** Sampling by the International Boundary and Water Commission and chemical analyses by the U. S. Geological Survey. Determinations for specific conductance by International Boundary and Water Commission.

| 1990<br>Date | Time<br>Standard | Streamflow<br>Momentary<br>m3/sec | Specific<br>Conductance<br>Micromhos | pH<br>Units | Water<br>Temper-<br>ature<br>Deg C | Hardness,<br>Total<br>(as CaCO3)<br>mg/L | Hardness,<br>Noncarbonate<br>(as CaCO3)<br>mg/L | Calcium<br>ion (Ca),<br>Dissolved<br>mg/L | Magnesium<br>ion (Mg),<br>Dissolved<br>mg/L |
|--------------|------------------|-----------------------------------|--------------------------------------|-------------|------------------------------------|--|---|---|---|
| Jan. 17      | 0845             | .57                               | 4,390                                | 8.1         | 21.0                               | 640                                      | 437   | 150                                       | 65  |
| Feb. 21      | 0845             | .85                               | 6,480                                | 8.0         | 19.0                               | 1,000                                    | 731   | 260                                       | 92  |
| Mar. 21      | 0900             | 2.01                              | 7,210                                | 8.0         | 21.0                               | 1,000                                    | 729   | 250                                       | 97  |
| Apr. 16      | 0815             | 1.64                              | 5,930                                | 8.1         | 25.0                               | 830                                      | 615   | 200                                       | 81  |
| May 23       | 0735             | 6.40                              | 4,390                                | 7.9         | 29.0                               | 700                                      | 500   | 180                                       | 61  |
| June 20      | 0730             | 1.81                              | 6,770                                | 8.0         | 26.5                               | 970                                      | 740   | 230                                       | 96  |
| July 18      | 0800             | 1.81                              | 6,870                                | 7.8         | 28.0                               | 1,000                                    | 779   | 250                                       | 95  |
| Aug. 17      | 0930             |                                   | 6,730                                | 7.9         | 30.0                               | 940                                      | 727   | 210                                       | 100   |
| Sep. 19      | 0810             | .07                               | 6,330                                | 7.8         | 26.0                               | 860                                      | 717   | 200                                       | 88  |
| Oct. 19      | 0820             |                                   | 7,160                                | 7.8         | 23.0                               | 1,000                                    | 803   | 220                                       | 110   |
| Nov. 21      | 0830             | .01                               | 7,300                                | 8.0         | 24.0                               | 990                                      | 734   | 230                                       | 100   |
| Dec. 19      | 0825             | .57                               | 7,160                                | 7.9         | 19.0                               | 940                                      | 710   | 210                                       | 100   |

| 1990<br>Date | Sodium<br>ion (Na),<br>Dissolved<br>mg/L | Sodium<br>Adsorption<br>Ratio(SAR) | Potassium<br>ion (K)<br>Dissolved<br>mg/L | Alkalinity<br>Total<br>(as CaCO3)<br>mg/L | Sulfate<br>ion (SO4)<br>Dissolved<br>mg/L | Chloride<br>ion (Cl),<br>Dissolved<br>mg/L | Silica<br>(SiO2)<br>Dissolved<br>mg/L | Solids<br>Dissolved<br>(Calculated)<br>mg/L |
|--------------|--|------------------------------------|---|---|---|--|---------------------------------------|---|
| Jan. 17      | 710                                      | 12                                 | 7.5                                       | 203                                       | 940                                       | 760  | 24                                    | 2,780                                       |
| Feb. 21      | 1,100                                    | 15                                 | 7.0                                       | 269                                       | 1,400                                     | 1,300                                      | 41                                    | 4,360                                       |
| Mar. 21      | 1,300                                    | 18                                 | 7.0                                       | 271                                       | 1,700                                     | 1,400                                      | 41                                    | 4,960                                       |
| Apr. 16      | 1,000                                    | 15                                 | 11  | 215                                       | 1,200                                     | 1,200                                      | 34                                    | 3,850                                       |
| May 23       | 700                                      | 12                                 | 7.6                                       | 200                                       | 920                                       | 740  | 28                                    | 2,760                                       |
| June 20      | 1,200                                    | 17                                 | 8.0                                       | 230                                       | 1,500                                     | 1,300                                      | 41                                    | 4,510                                       |
| July 18      | 1,200                                    | 16                                 | 7.0                                       | 221                                       | 1,400                                     | 1,300                                      | 38                                    | 4,420                                       |
| Aug. 17      | 1,200                                    | 17                                 | 7.0                                       | 213                                       | 1,400                                     | 1,400                                      | 35                                    | 4,480                                       |
| Sep. 19      | 1,100                                    | 16                                 | 7.0                                       | 143                                       | 980                                       | 1,400                                      | 23                                    | 3,880                                       |
| Oct. 19      | 1,300                                    | 18                                 | 8.0                                       | 197                                       | 1,500                                     | 1,400                                      | 34                                    | 4,690                                       |
| Nov. 21      | 1,300                                    | 18                                 | 7.5                                       | 256                                       | 1,500                                     | 1,400                                      | 28                                    | 4,720                                       |
| Dec. 19      | 1,300                                    | 18                                 | 7.5                                       | 230                                       | 1,500                                     | 1,400                                      | 28                                    | 4,690                                       |

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   |       | 4,380 | 5,660 |       |       | 4,630 |       | 7,040 |       | 6,890 |       |       |
| 2   | 6,910 | 4,470 | 6,620 | 2,070 | 4,070 |       | 7,020 | 7,030 | 7,000 |       |       |       |
| 3   | 6,920 |       |       | 4,300 | 4,240 |       | 7,000 | 7,110 | 7,110 |       | 7,350 |       |
| 4   | 6,930 |       |       | 5,880 | 4,310 | 5,120 | 7,050 |       | 7,200 | 7,100 |       |       |
| 5   | 6,930 |       | 6,710 |       | 4,100 | 4,470 | 7,020 |       | 3,970 | 6,650 | 7,430 | 7,380 |
| 6   |       | 4,770 | 6,750 | 6,260 |       | 5,820 | 7,060 | 6,960 | 6,500 |       | 7,410 | 7,440 |
| 7   |       | 4,740 | 5,470 |       | 4,130 | 5,920 |       |       | 6,650 |       | 7,040 | 7,080 |
| 8   | 6,890 | 5,120 | 6,750 |       | 1,780 | 6,070 |       |       |       | 7,190 | 7,500 |       |
| 9   | 6,890 | 5,120 | 6,880 | 6,540 | 2,570 |       | 6,480 | 6,200 | 4,940 | 7,030 |       |       |
| 10  | 6,930 |       |       | 6,600 | 3,850 |       | 6,910 | 6,920 | 7,050 | 4,290 |       | 7,670 |
| 11  | 6,260 |       |       | 6,670 | 4,680 | 6,610 | 6,960 |       |       | 5,970 |       | 7,250 |
| 12  | 6,100 | 5,830 | 6,780 |       |       | 6,480 | 6,930 |       |       |       | 7,100 | 7,060 |
| 13  |       |       | 5,670 | 6,760 |       | 6,490 | 6,780 |       |       | 7,260 |       | 7,250 |
| 14  |       | 5,910 | 7,010 | 7,040 | 6,160 | 6,680 |       |       | 6,840 |       | 7,260 | 7,270 |
| 15  | 4,710 | 5,980 | 6,970 |       |       | 6,100 | 6,790 |       |       | 7,330 | 7,150 |       |
| 16  | 4,710 | 6,030 | 7,250 | 6,190 |       |       | 7,060 | 6,830 |       | 7,230 | 6,690 |       |
| 17  | 4,360 |       | 6,310 | 5,580 |       |       | 6,970 | 6,900 | 6,320 | 7,200 |       | 7,440 |
| 18  | 4,270 |       | 5,690 | 5,630 | 7,060 | 7,060 |       |       | 6,740 | 7,180 |       | 7,640 |
| 19  | 4,380 | 6,180 | 6,970 | 5,920 | 6,820 | 7,040 |       | 5,720 | 7,410 |       | 7,520 | 7,520 |
| 20  |       | 6,170 | 7,010 | 5,780 | 6,940 | 7,020 | 7,110 | 7,180 | 6,810 |       |       |       |
| 21  | 6,260 | 6,260 | 7,290 |       | 4,790 | 6,970 |       | 7,230 | 6,120 |       | 7,480 | 7,520 |
| 22  | 4,160 | 6,080 | 6,960 |       | 4,690 | 7,020 |       | 7,190 |       | 5,460 | 7,110 |       |
| 23  | 4,180 | 6,150 | 6,970 |       | 5,590 | 4,490 | 6,970 |       |       | 6,270 | 7,230 |       |
| 24  | 4,190 |       |       |       | 4,760 | 4,470 | 7,170 | 7,290 | 6,810 |       | 7,290 | 7,520 |
| 25  | 4,290 |       |       |       | 4,370 | 4,240 | 6,980 | 7,090 |       | 6,230 | 6,840 |       |
| 26  | 4,290 | 6,260 | 6,910 | 4,510 |       | 6,960 | 7,020 |       | 7,000 | 6,800 | 7,320 | 5,250 |
| 27  |       | 6,480 | 6,820 | 4,530 |       | 6,860 | 7,070 | 7,140 | 7,180 |       | 7,390 | 5,690 |
| 28  |       | 6,540 | 7,050 |       | 4,390 | 7,010 |       | 7,130 | 7,170 |       | 7,380 | 5,710 |
| 29  | 4,310 |       | 6,740 |       | 4,190 | 7,050 |       | 7,350 |       | 7,070 | 7,390 |       |
| 30  | 4,130 |       | 6,780 | 4,150 | 4,230 |       | 7,060 | 7,280 |       | 7,230 | 7,290 |       |
| 31  | 4,370 |       |       |       | 4,500 |       | 7,090 | 7,280 |       | 7,330 |       | 4,860 |

## QUALITY OF WATER - 1990

## 03-4632.00 RIO GRANDE BELOW ANZALDUAS DAM NEAR REYNOSA, TAMAULIPAS AND MISSION, TEXAS

LOCATION: At Anzalduas Dam, 0.8 river kilometre above the gaging station, located at river kilometre 273.

RECORDS: Chemical analyses, March 1959 through current year; specific conductance 1948 and 1956 through current year; suspended silt, May 1956 through 1977.

REMARKS: Sampling by the International Boundary and Water Commission; chemical analyses by the U. S. Geological Survey; determinations for specific conductance by the International Boundary and Water Commission.

| 1990    | Time     | Streamflow<br>Momentary | Specific<br>Conductance | pH    | Water<br>Tempera-<br>ture | Hardness,<br>Total<br>(as CaCO <sub>3</sub> ) | Hardness,<br>Noncarbonate<br>(as CaCO <sub>3</sub> ) | Calcium<br>Ion (Ca),<br>Dissolved | Magnesium<br>Ion (Mg),<br>Dissolved |
|---------|----------|-------------------------|-------------------------|-------|---------------------------|---|--|-----------------------------------|-------------------------------------|
| Date    | Standard | m <sup>3</sup> /sec     | Micromhos               | Units | Deg C                     | mg/L  | mg/L   | mg/L                              | mg/L                                |
| Jan. 17 | 0930     | 45.6                    | 1,480                   | 8.1   | 19.0                      | 300   | 188  | 78                                | 26                                  |
| Feb. 21 | 0915     | 21.2                    | 1,600                   | 7.8   | 17.0                      | 330   | 204  | 86                                | 29                                  |
| Mar. 21 | 0915     | 29.2                    | 1,810                   | 8.0   | 21.0                      | 380   | 232  | 100                               | 32                                  |
| Apr. 16 | 1400     | 26.1                    | 1,640                   | 8.0   | 21.0                      | 340   | 212  | 90                                | 29                                  |
| May 23  | 0840     | 77.0                    | 1,470                   | 7.9   | 27.0                      | 310   | 195  | 80                                | 26                                  |
| June 20 | 0820     | 90.6                    | 1,470                   | 7.9   | 25.0                      | 300   | 190  | 77                                | 26                                  |
| July 18 | 0840     | 28.3                    | 1,880                   | 7.9   | 29.0                      | 360   | 235  | 93                                | 32                                  |
| Aug. 17 | 0845     | 29.5                    | 1,520                   | 7.8   | 30.0                      | 320   | 205  | 84                                | 27                                  |
| Sep. 19 | 0840     | 15.6                    | 1,460                   | 7.9   | 29.0                      | 310   | 200  | 79                                | 27                                  |
| Oct. 19 | 0845     | 42.8                    | 1,310                   | 8.0   | 26.0                      | 300   | 188  | 77                                | 25                                  |
| Nov. 21 | 0945     | 17.0                    | 1,870                   | 8.1   | 24.0                      | 410   | 259  | 110                               | 32                                  |
| Dec. 19 | 0810     | 56.4                    | 1,290                   | 8.0   | 20.0                      | 280   | 160  | 75                                | 22                                  |

| 1990    | Sodium<br>Ion (Na),<br>Dissolved | Sodium<br>Adsorption<br>Ratio(SAR) | Potassium<br>ion (K)<br>Dissolved | Alkalinity<br>Total<br>(as CaCO <sub>3</sub> ) | Sulfate<br>ion (SO <sub>4</sub> )<br>Dissolved | Chloride<br>ion (Cl),<br>Dissolved | Silica<br>(SiO <sub>2</sub> )<br>Dissolved | Solids<br>Dissolved<br>(Calculated) |
|---------|----------------------------------|------------------------------------|-----------------------------------|--|--|------------------------------------|--|-------------------------------------|
| Date    | mg/L                             |                                    | mg/L                              | mg/L   | mg/L   | mg/L                               | mg/L                                       | mg/L                                |
| Jan. 17 | 190                              | 5                                  | 6.4                               | 112  | 320  | 200                                | 12   | 900                                 |
| Feb. 21 | 200                              | 5                                  | 6.6                               | 126  | 350  | 220                                | 13   | 980                                 |
| Mar. 21 | 220                              | 5                                  | 6.3                               | 148  | 370  | 250                                | 11   | 1,080                               |
| Apr. 16 | 210                              | 5                                  | 5.0                               | 128  | 350  | 230                                | 13   | 1,000                               |
| May 23  | 180                              | 4                                  | 5.8                               | 115  | 310  | 190                                | 13   | 874                                 |
| June 20 | 180                              | 5                                  | 6.2                               | 110  | 310  | 190                                | 14   | 869                                 |
| July 18 | 250                              | 6                                  | 6.2                               | 125  | 380  | 270                                | 16   | 1,120                               |
| Aug. 17 | 200                              | 5                                  | 6.5                               | 115  | 310  | 210                                | 14   | 920                                 |
| Sep. 19 | 180                              | 4                                  | 6.2                               | 110  | 300  | 210                                | 14   | 883                                 |
| Oct. 19 | 170                              | 4                                  | 6.1                               | 112  | 290  | 180                                | 13   | 829                                 |
| Nov. 21 | 250                              | 5                                  | 5.9                               | 151  | 410  | 290                                | 15   | 1,200                               |
| Dec. 19 | 150                              | 4                                  | 5.7                               | 120  | 260  | 170                                | 13   | 768                                 |

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   | 1,920 | 1,310 | 1,020 | 1,520 | 1,490 | 1,390 | 1,470 | 1,630 | 1,320 | 1,280 | 1,340 | 1,340 |
| 2   | 1,870 | 1,350 | 1,090 | 1,520 | 1,510 | 1,410 | 1,530 | 1,590 | 1,310 | 1,070 | 1,280 | 1,350 |
| 3   | 1,750 | 1,340 | 1,200 | 1,680 | 1,520 | 1,420 | 1,500 | 1,610 | 1,290 | 1,370 | 1,290 | 1,340 |
| 4   | 1,660 | 1,360 | 1,340 | 1,500 | 1,530 | 1,420 | 1,510 | 1,600 | 1,300 | 1,490 | 1,270 | 1,400 |
| 5   | 1,690 | 1,340 | 1,390 | 1,520 | 1,530 | 1,420 | 1,520 | 1,750 | 1,330 | 1,570 | 1,280 | 1,480 |
| 6   | 1,670 | 1,350 | 1,640 | 1,530 | 1,530 | 1,450 | 1,540 | 1,580 | 1,340 | 1,530 | 1,340 | 1,470 |
| 7   | 1,670 | 1,340 | 2,050 | 1,530 | 1,530 | 1,430 | 1,580 | 1,450 | 1,320 | 1,430 | 1,390 | 1,490 |
| 8   | 1,660 | 1,360 | 2,320 | 1,480 | 1,490 | 1,420 | 1,600 | 1,280 | 1,330 | 1,330 | 1,420 | 1,540 |
| 9   | 1,610 | 1,350 | 2,370 | 1,480 | 1,450 | 1,430 | 1,630 | 1,370 | 1,310 | 1,280 | 1,440 | 1,580 |
| 10  | 1,550 | 1,370 | 2,490 | 1,490 | 1,560 | 1,440 | 1,700 | 1,450 | 1,380 | 937   | 1,290 | 1,490 |
| 11  | 1,510 | 1,400 | 2,600 | 1,490 | 1,620 | 1,440 | 1,690 | 1,460 | 1,370 | 910   | 1,270 | 1,470 |
| 12  | 1,520 | 1,400 | 2,420 | 1,480 | 1,720 | 1,420 | 1,770 | 1,510 | 1,570 | 958   | 1,250 | 1,540 |
| 13  | 1,530 | 1,400 | 2,210 | 1,470 | 1,760 | 1,420 | 1,780 | 1,520 | 1,540 | 1,120 | 1,260 | 1,590 |
| 14  | 1,530 | 1,400 | 2,210 | 1,480 | 1,920 | 1,470 | 1,800 | 1,520 | 1,560 | 1,330 | 1,270 | 1,670 |
| 15  | 1,470 | 1,400 | 2,010 | 1,580 | 2,000 | 1,460 | 1,780 | 1,500 | 1,590 | 1,450 | 1,290 | 1,520 |
| 16  | 1,430 | 1,520 | 1,750 | 1,640 | 2,070 | 1,490 | 1,730 | 1,470 | 1,450 | 1,570 | 1,260 | 1,340 |
| 17  | 1,420 | 1,490 | 1,670 | 1,650 | 2,190 | 1,450 | 1,880 | 1,640 | 1,470 | 1,430 | 1,250 | 1,280 |
| 18  | 1,430 | 1,450 | 1,660 | 1,620 | 2,010 | 1,460 | 1,900 | 1,430 | 1,450 | 1,390 | 1,320 | 1,290 |
| 19  | 1,420 | 1,480 | 1,790 | 1,590 | 1,660 | 1,470 | 1,930 | 1,500 | 1,470 | 1,330 | 1,340 | 1,260 |
| 20  | 1,410 | 1,480 | 1,810 | 1,620 | 1,510 | 1,490 | 2,000 | 1,610 | 1,490 | 1,300 | 1,620 | 1,250 |
| 21  | 1,400 | 1,480 | 1,760 | 1,620 | 1,470 | 1,520 | 1,840 | 1,610 | 1,650 | 1,400 | 1,940 | 1,250 |
| 22  | 1,400 | 1,530 | 1,610 | 1,600 | 1,470 | 1,530 | 1,720 | 1,620 | 1,700 | 1,280 | 1,860 | 1,250 |
| 23  | 1,400 | 1,530 | 1,550 | 1,590 | 1,480 | 1,530 | 1,640 | 1,530 | 1,660 | 1,260 | 1,770 | 1,240 |
| 24  | 1,410 | 1,440 | 1,540 | 1,550 | 1,480 | 1,540 | 1,630 | 1,480 | 1,590 | 1,320 | 1,600 | 1,250 |
| 25  | 1,410 | 1,020 | 1,550 | 1,520 | 1,460 | 1,510 | 1,660 | 1,470 | 1,540 | 1,260 | 1,504 | 1,240 |
| 26  | 1,390 | 940   | 1,590 | 1,500 | 1,440 | 1,510 | 1,690 | 1,460 | 1,490 | 1,290 | 1,410 | 1,330 |
| 27  | 1,410 | 890   | 1,570 | 1,430 | 1,410 | 1,490 | 1,680 | 1,450 | 1,420 | 1,300 | 1,420 | 1,230 |
| 28  | 1,400 | 970   | 1,530 | 1,480 | 1,420 | 1,540 | 1,690 | 1,450 | 1,280 | 1,340 | 1,370 | 1,230 |
| 29  | 1,400 |       | 1,500 | 1,490 | 1,430 | 1,480 | 1,680 | 1,440 | 1,450 | 1,360 | 1,380 | 1,230 |
| 30  | 1,390 |       | 1,500 | 1,510 | 1,430 | 1,470 | 1,740 | 1,420 | 1,350 | 1,310 | 1,390 | 1,230 |
| 31  | 1,380 |       | 1,500 | 1,430 |       |       | 1,680 | 1,380 | 1,350 |       |       | 1,210 |

## QUALITY OF WATER - 1990

08-4733.90 RIO GRANDE AT MERCEDES IRRIGATION DISTRICT PUMPS NEAR MERCEDES, TEXAS AND RIO RICO, TAMAULIPAS

LOCATION: At river kilometre 190, 84.6 river kilometres downstream from Anzalduas Dam.

RECORDS: Specific conductance, 1945 through current year.

REMARKS: Sampling and determinations by the International Boundary and Water Commission.

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1990

| Day | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   | 1,920 | 1,370 | 1,600 | 1,640 | 1,540 | 1,430 | 1,480 | 1,710 | 1,420 | 1,560 | 1,380 | 1,450 |
| 2   | 2,120 | 1,370 | 1,380 | 1,650 | 1,540 | 1,430 | 1,510 | 1,700 | 1,380 | 1,500 | 1,390 | 1,460 |
| 3   | 2,020 | 1,390 | 1,300 | 1,630 | 1,530 | 1,430 | 1,510 | 1,680 | 1,310 | 1,500 | 1,450 | 1,500 |
| 4   | 1,960 | 1,410 | 1,280 | 1,550 | 1,590 | 1,420 | 1,520 | 1,600 | 1,320 | 1,570 | 1,460 | 1,510 |
| 5   | 1,980 | 1,420 | 1,360 | 1,640 | 1,570 | 1,440 | 1,510 | 1,630 | 1,330 | 1,230 | 1,440 | 1,470 |
| 6   | 1,890 | 1,400 | 1,500 | 1,700 | 1,560 | 1,430 | 1,540 | 1,630 | 1,310 | 1,490 | 1,400 | 1,450 |
| 7   | 1,750 | 1,410 | 1,440 | 1,610 | 1,550 | 1,440 | 1,540 | 1,800 | 1,410 | 1,560 | 1,370 | 1,470 |
| 8   | 1,790 | 1,420 | 1,550 | 1,620 | 1,560 | 1,440 | 1,560 | 1,560 | 1,390 | 1,610 | 1,370 | 1,560 |
| 9   | 1,720 | 1,400 | 1,540 | 1,680 | 1,530 | 1,430 | 1,600 | 1,530 | 1,410 | 1,460 | 1,410 | 1,590 |
| 10  | 1,670 | 1,440 | 1,580 | 1,550 | 1,530 | 1,450 | 1,620 | 1,340 | 1,400 | 1,390 | 1,450 | 1,650 |
| 11  | 1,640 | 1,440 | 1,700 | 1,500 | 1,600 | 1,430 | 1,660 | 1,360 | 1,430 | 1,370 | 1,480 | 1,710 |
| 12  | 1,600 | 1,450 | 2,250 | 1,540 | 1,690 | 1,440 | 1,710 | 1,460 | 1,420 | 1,340 | 1,380 | 1,710 |
| 13  | 1,570 | 1,480 | 2,530 | 1,580 | 1,710 | 1,450 | 1,690 | 1,500 | 1,430 | 1,190 | 1,360 | 1,640 |
| 14  | 1,610 | 1,470 | 2,620 | 1,580 | 1,920 | 1,450 | 1,770 | 1,500 | 1,450 | 1,140 | 1,370 | 1,490 |
| 15  | 1,590 | 1,480 | 2,490 | 1,640 | 2,070 | 1,500 | 1,790 | 1,540 | 1,480 | 1,440 | 1,430 | 1,650 |
| 16  | 1,560 | 1,480 | 2,280 | 1,640 | 2,030 | 1,570 | 1,800 | 1,570 | 1,700 | 1,340 | 1,450 | 1,710 |
| 17  | 1,510 | 1,500 | 2,280 | 1,620 | 2,050 | 1,510 | 1,800 | 1,560 | 1,700 | 1,500 | 1,460 | 1,480 |
| 18  | 1,480 | 1,590 | 2,060 | 1,730 | 2,140 | 1,510 | 1,830 | 1,540 | 1,720 | 1,570 | 1,510 | 1,320 |
| 19  | 1,460 | 1,520 | 1,810 | 1,740 | 2,100 | 1,510 | 1,800 | 1,530 | 1,650 | 1,470 | 1,540 | 1,320 |
| 20  | 1,470 | 1,520 | 1,760 | 1,720 | 2,220 | 1,520 | 1,880 | 1,580 | 1,550 | 1,310 | 1,450 | 1,310 |
| 21  | 1,440 | 1,520 | 1,890 | 1,720 | 1,770 | 1,510 | 1,930 | 1,560 | 1,520 | 1,280 | 1,410 | 1,290 |
| 22  | 1,440 | 1,560 | 1,860 | 1,720 | 1,510 | 1,510 | 1,990 | 1,590 | 1,480 | 1,320 | 1,450 | 1,270 |
| 23  | 1,430 | 1,580 | 1,810 | 1,720 | 1,480 | 1,540 | 1,880 | 1,580 | 1,630 | 1,400 | 1,620 | 1,280 |
| 24  | 1,430 | 1,500 | 1,630 | 1,680 | 1,490 | 1,540 | 1,770 | 1,620 | 1,650 | 1,350 | 2,010 | 1,290 |
| 25  | 1,440 | 1,530 | 1,580 | 1,640 | 1,470 | 1,510 | 1,650 | 1,600 | 1,760 | 1,330 | 1,890 | 1,300 |
| 26  | 1,430 | 1,570 | 1,570 | 1,640 | 1,470 | 1,510 | 1,700 | 1,540 | 1,730 | 1,310 | 1,810 | 1,280 |
| 27  | 1,430 | 1,690 | 1,620 | 1,600 | 1,460 | 1,510 | 1,690 | 1,500 | 1,720 | 1,300 | 1,660 | 1,260 |
| 28  | 1,410 | 1,830 | 1,610 | 1,530 | 1,450 | 1,490 | 1,720 | 1,490 | 1,660 | 1,360 | 1,500 | 1,290 |
| 29  | 1,430 |       | 1,580 | 1,500 | 1,460 | 1,500 | 1,720 | 1,480 | 1,620 | 1,410 | 1,520 | 1,260 |
| 30  | 1,420 |       |       | 1,600 | 1,550 | 1,460 | 1,520 | 1,720 | 1,450 | 1,630 | 1,380 | 1,490 |
| 31  | 1,420 |       |       |       |       | 1,480 |       | 1,720 | 1,440 |       | 1,430 | 1,260 |

## QUALITY OF WATER - 1990

08-4750.00 RIO GRANDE NEAR BROWNSVILLE, TEXAS AND MATAMOROS, TAMAULIPAS

LOCATION: Gaging station at river kilometre 78.3, 0.3 river kilometre downstream from El Jardin pumping plant and 11.2 river kilometres downstream from the international highway bridge between Brownsville, Texas and Matamoros, Tamaulipas.

RECORDS: Chemical and biochemical analyses, October 1967 through January 1968 and October 1974 through current year; biochemical, December 1976 through current year; specific conductance, 1955 through September 1983; suspended silt, 1955 through 1977.

REMARKS: Sampling and analyses by the U. S. Geological Survey. Additional water quality parameters, including heavy metals, nutrients, pesticides, and biological indices, determined and published by the U. S. Geological Survey. Sampling and determinations for specific conductance prior to 1978 by the International Boundary and Water Commission.

| 1990<br>Date | Time<br>Standard | Streamflow<br>Momentary<br>m <sup>3</sup> /sec | Specific<br>Conductance<br>Micromhos | pd<br>Units | Water<br>Temperature<br>Deg C | Hardness,<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Hardness,<br>Noncarbonate<br>(as CaCO <sub>3</sub> )<br>mg/L | Calcium<br>Ion (Ca),<br>Dissolved<br>mg/L | Magnesium<br>Ion (Mg),<br>Dissolved<br>mg/L |
|--------------|------------------|--|--------------------------------------|-------------|-------------------------------|---|--|---|---|
| Feb. 14      | 1235             | 6.80   | 1,520                                | 8.6         | 22.0                          | 330   | 210  | 86  | 27  |
| Apr. 26      | 0839             | 2.24   | 1,790                                | 8.1         | 26.5                          | 440   | 260  | 120                                       | 35  |
| June 26      | 1658             | 4.98   | 1,520                                | 8.2         | 32.0                          | 330   | 200  | 83  | 29  |
| Aug. 23      | 0758             | .01  | 1,630                                | 7.9         | 29.0                          | 360   | 230  | 91  | 31  |
| Oct. 31      | 0829             |  | 1,470                                | 8.0         | 23.0                          | 340   | 190  | 88  | 28  |

| 1990<br>Date | Sodium<br>Ion (Na),<br>Dissolved<br>mg/L | Sodium<br>Adsorption<br>Ratio(SAR) | Potassium<br>ion (K)<br>Dissolved<br>mg/L | Alkalinity<br>Total<br>(as CaCO <sub>3</sub> )<br>mg/L | Sulfate<br>ion (SO <sub>4</sub> )<br>Dissolved<br>mg/L | Chloride<br>ion (Cl),<br>Dissolved<br>mg/L | Silica<br>(SiO <sub>2</sub> )<br>Dissolved<br>mg/L | Solids<br>Dissolved<br>(Calculated)<br>mg/L | Solids<br>Dissolved<br>(Residue @<br>180 Deg C)<br>mg/L |
|--------------|--|------------------------------------|---|--|--|--|--|---|---|
| Feb. 14      | 180                                      | 4                                  | 6.2                                       | 117  | 330  | 200  | 13   | 915   | 966   |
| Apr. 26      | 210                                      | 4                                  | 7.0                                       | 185  | 320  | 230  | 24   | 1,060                                       | 1,220   |
| June 26      | 200                                      | 5                                  | 6.4                                       | 124  | 340  | 220  | 15   | 970   | 976   |
| Aug. 23      | 210                                      | 5                                  | 6.8                                       | 124  | 370  | 230  | 15   | 1,030                                       | 1,030   |
| Oct. 31      | 180                                      | 4                                  | 6.4                                       | 146  | 310  | 200  | 14   | 916   | 930   |

## RAINFALL ON THE RIO GRANDE WATERSHED

## IN THE UNITED STATES

## IN MILLIMETRES

Tabulated below, in approximate downstream order, are monthly records of United States rainfall stations with averages for their periods of record. With the exception of Las Cruces, New Mexico, all stations are located in Texas. For location, elevation, period of record, type of gage in use, watershed subdivision in which the station is located, and the observer, see alphabetical listing of these stations following rainfall data in this bulletin. These rainfall records have not been published elsewhere. Records of daily rainfall amounts, where available, are on file in the offices of the United States Section of the Commission. Daily records for years prior to 1953 may also be found in corresponding water bulletins.

Detailed listings of the months and years for which records are available through 1970 may be found under "Index to Precipitation Records" in Water Bulletins 10, 14, 26, and Supplement 40A.

| Month  | Las Cruces,<br>New Mexico |         | American<br>Dam |         | Fort Hancock<br>Bridge |         | Guayucco<br>Arroyo |         | Neely<br>Ranch |         |
|--------|---------------------------|---------|-----------------|---------|------------------------|---------|--------------------|---------|----------------|---------|
|        | 1990                      | Average | 1990            | Average | 1990                   | Average | 1990               | Average | 1990           | Average |
| Jan.   | 6                         | 16      | 11              | 10      | 2                      | 10      | 2                  | 8       | 0              | 8       |
| Feb.   | 6                         | 12      | 3               | 9       | 3                      | 8       | 5                  | 6       | 6              | 6       |
| Mar.   | 5                         | 6       | 13              | 8       | 0                      | 7       | 0                  | 6       | 7              | 5       |
| Apr.   | 2                         | 7       | 0               | 5       | 1                      | 7       | 0                  | 5       | 2              | 5       |
| May    | 8                         | 13      | 11              | 7       | 3                      | 12      | 5                  | 11      | 1              | 10      |
| June   | 1                         | 20      | 1               | 15      | 0                      | 22      | 0                  | 15      | 0              | 21      |
| July   | 45                        | 26      | 51              | 38      | 68                     | 34      | 34                 | 34      | 97             | 45      |
| Aug.   | 53                        | 72      | 55              | 39      | 58                     | 42      | 59                 | 42      | 106            | 48      |
| Sep.   | 49                        | 33      | 40              | 28      | 70                     | 36      | 82                 | 31      | 105            | 40      |
| Oct.   | 28                        | 27      | 42              | 21      | 72                     | 26      | 6                  | 23      | 25             | 26      |
| Nov.   | 15                        | 19      | 33              | 8       | 10                     | 9       | 10                 | 7       | 15             | 8       |
| Dec.   | 10                        | 21      | 7               | 12      | 5                      | 12      | 5                  | 9       | 8              | 11      |
| Yearly | 228                       | 272     | 267             | 200     |                        | 225     | 209                | 197     | 372            | 233     |

| Month  | La Macolla<br>Farm |         | Bill Shannon<br>Ranch |         | H. T. Fletcher<br>Ranch |         | Adobes<br>Ranch |         | Shafter |         |
|--------|--------------------|---------|-----------------------|---------|-------------------------|---------|-----------------|---------|---------|---------|
|        | 1990               | Average | 1990                  | Average | 1990                    | Average | 1990            | Average | 1990    | Average |
| Jan.   | 8                  | 0       | 11                    | 4       | 17                      | 0       | 9               | 7       | 5       | 5       |
| Feb.   | 10                 | 10      | 5                     | 9       | 10                      | T       | 6               | 0       | 11      | 11      |
| Mar.   | 3                  | 1       | 7                     | 5       | 8                       | 0       | 4               | 5       | 8       | 8       |
| Apr.   | 17                 | 0       | 7                     | 37      | 13                      | 0       | 4               | 0       | 19      | 19      |
| May    | 24                 | 0       | 19                    | 9       | 27                      | 0       | 16              | 0       | 20      | 20      |
| June   | 55                 | 8       | 43                    | 20      | 47                      | 0       | 35              | 0       | 65      | 65      |
| July   | 51                 | 38      | 51                    | 51      | 206                     | 76      | 112             | 50      | 165     | 82      |
| Aug.   | 110                | 76      | 119                   | 69      | 166                     | 85      | 63              | 48      | 94      | 71      |
| Sep.   | 115                | 67      | 86                    | 66      | 149                     | 66      | 165             | 60      | 146     | 86      |
| Oct.   | 28                 | 31      | 65                    | 35      | 77                      | 38      | 0               | 19      | 63      | 40      |
| Nov.   | 7                  | 0       | 11                    | 3       | 11                      | 0       | 7               | 0       | 9       | 9       |
| Dec.   | 12                 | 1       | 11                    | 22      | 12                      | 0       | 8               | 11      | 12      | 12      |
| Yearly |                    | 348     | 336                   | 339     | 708                     | 410     | 340             | 266     | 491     | 428     |

| Month  | Kerr Mitchell<br>Ranch |         | Presidio<br>(IB&WC Gage) |         | Redford |         | Yarborough<br>Ranch |         | La Mota<br>Ranch |         |
|--------|------------------------|---------|--------------------------|---------|---------|---------|---------------------|---------|------------------|---------|
|        | 1990                   | Average | 1990                     | Average | 1990    | Average | 1990                | Average | 1990             | Average |
| Jan.   | 4                      | 13      | 8                        | 1       | 8       | 6       | 7                   | 0       | 14               |         |
| Feb.   | 10                     | 9       | 6                        | 6       | T       | 6       | 20                  | 12      | 8                | 5       |
| Mar.   | 8                      | 5       | 1                        | 4       | 0       | 4       | 8                   | 9       | 0                | 5       |
| Apr.   | 6                      | 13      | T                        | 7       | T       | 7       | 6                   | 8       | 3                | 17      |
| May    | 23                     | 30      | 6                        | 14      | 43      | 16      | 41                  | 29      | 10               | 23      |
| June   | 44                     | 49      | 1                        | 34      | 0       | 26      | 57                  | 54      | 51               | 43      |
| July   | 141                    | 54      | 63                       | 37      | 196     | 40      | 112                 | 66      | 183              | 43      |
| Aug.   | 144                    | 60      | 75                       | 37      | 86      | 36      | 137                 | 72      | 97               | 52      |
| Sep.   | 110                    | 54      | 123                      | 40      | 216     | 50      | 181                 | 82      | 112              | 57      |
| Oct.   | 81                     | 36      | 53                       | 21      | T       | 22      | 73                  | 44      | 76               | 29      |
| Nov.   | 5                      | 9       | 0                        | 8       | 0       | 9       | 4                   | 13      | 7                | 11      |
| Dec.   | 17                     | 11      |                          | 9       | 0       | 8       | 10                  | 14      | 10               |         |
| Yearly | 593                    | 343     |                          | 225     | 542     | 232     | 655                 | 410     |                  | 309     |

## RAINFALL ON THE RIO GRANDE WATERSHED

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IN MILLIMETRES

| Month  | Study Butte |         | Terlingua Creek Station |         | Johnson Ranch |         | Owens Ranch |         | Lewis James Ranch |         |
|--------|-------------|---------|-------------------------|---------|---------------|---------|-------------|---------|-------------------|---------|
|        | 1990        | Average | 1990                    | Average | 1990          | Average | 1990        | Average | 1990              | Average |
| Jan.   | 0           | 11      | T                       | 7       | 3             | 8       | 5           | 11      | 0                 | 12      |
| Feb.   | 13          | 6       | 10                      | 6       | T             | 5       | 29          | 19      | T                 | 15      |
| Mar.   | 3           | 2       | 0                       | 3       | 0             | 4       | 53          | 24      | 22                | 8       |
| Apr.   | 8           | 13      | 13                      | 9       | 5             | 11      | 50          | 45      | 43                | 29      |
| May    | 34          | 38      | 19                      | 13      | 25            | 190     | 59          | 8       | 8                 | 43      |
| June   | 20          | 35      | 1                       | 28      | 6             | 29      | 6           | 52      | 0                 | 32      |
| July   | 130         | 49      | 140                     | 34      | 61            | 30      | 117         | 34      | 34                | 33      |
| Aug.   | 62          | 49      | 91                      | 34      | 84            | 25      | 13          | 49      | 84                | 48      |
| Sep.   | 89          | 36      | 160                     | 35      | 140           | 36      | 155         | 65      | 130               | 77      |
| Oct.   | 83          | 31      | 10                      | 20      | 0             | 19      | 55          | 59      | 54                | 41      |
| Nov.   | 13          | 8       | 0                       | 6       | 0             | 6       | 38          | 30      | 5                 | 18      |
| Dec.   |             | 7       | 0                       | 6       | 0             | 8       | 10          | 16      | 0                 | 12      |
| Yearly |             | 281     | 463                     | 207     | 312           | 206     | 721         | 463     | 380               | 368     |

| Month  | Rio Grande near Dryden |         | Bricker Ranch |         | Ross Foster Ranch |         | Jones Ranch * |         | Eugene Miller Ranch |         |
|--------|------------------------|---------|---------------|---------|-------------------|---------|---------------|---------|---------------------|---------|
|        | 1990                   | Average | 1990          | Average | 1990              | Average | 1990          | Average | 1990                | Average |
| Jan.   | 2                      | 15      | 0             | 8       |                   |         | 10            | 29      | 23                  | 15      |
| Feb.   | 28                     | 10      | 0             | 17      |                   |         | 14            | 128     | 30                  | 23      |
| Mar.   | 3                      | 3       | 0             | 11      | 13                | 6       | 24            | 21      | 5                   | 20      |
| Apr.   | 3                      | 18      | 3             | 24      |                   |         | 21            | 76      | 46                  | 36      |
| May    | 1                      | 28      | 13            | 37      |                   |         | 31            | 93      | 66                  | 103     |
| June   | 8                      | 32      | 0             | 31      | 0                 | 34      | 0             | 51      | 1                   | 49      |
| July   | 17                     | 22      | 24            | 19      | 28                | 16      | 277           | 60      | 136                 | 64      |
| Aug.   | 58                     | 43      | 36            | 25      | 36                | 31      | 132           | 64      | 71                  | 51      |
| Sep.   | 43                     | 52      | 13            | 53      | 41                | 38      | 198           | 86      | 335                 | 87      |
| Oct.   | 57                     | 29      | 44            | 27      | 63                | 29      | 69            | 62      | 67                  | 68      |
| Nov.   | 8                      | 14      | 0             | 9       | 0                 | 12      | 28            | 24      | 28                  | 22      |
| Dec.   | 3                      | 12      | 0             | 9       | 0                 | 12      | 0             | 16      | 3                   | 15      |
| Yearly | 231                    | 278     | 133           | 270     |                   |         | 254           | 1,054   | 549                 | 809     |
|        |                        |         |               |         |                   |         |               |         |                     | 533     |

| Month  | Prosser Ranch No. 3 |         | Pecos River near Langtry Station |         | Prosser Ranch No. 2 |         | Devils River at Cauthorn Ranch |         | Dead Man's Canyon near Comstock |         |
|--------|---------------------|---------|----------------------------------|---------|---------------------|---------|--------------------------------|---------|---------------------------------|---------|
|        | 1990                | Average | 1990                             | Average | 1990                | Average | 1990                           | Average | 1990                            | Average |
| Jan.   | 0                   | 9       | 3                                | 10      | 0                   | 9       | 6                              | 10      |                                 | 12      |
| Feb.   | 0                   | 21      | 5                                | 19      | 8                   | 24      | 17                             | 19      |                                 | 18      |
| Mar.   | 8                   | 14      | 8                                | 11      | 23                  | 15      | 46                             | 19      | 5                               | 13      |
| Apr.   | 8                   | 31      | 10                               | 24      | 41                  | 32      | 37                             | 23      | 10                              | 29      |
| May    | 0                   | 54      | 33                               | 37      | 18                  | 60      | 47                             | 54      |                                 | 58      |
| June   | 0                   | 40      | 0                                | 51      | 0                   | 45      | 1                              | 50      |                                 | 56      |
| July   | 190                 | 41      | 234                              | 45      | 196                 | 49      | 75                             | 24      |                                 | 65      |
| Aug.   | 23                  | 49      | 4                                | 37      | 0                   | 56      | 24                             | 29      | 0                               | 40      |
| Sep.   | 127                 | 83      | 3                                | 57      | 130                 | 78      | 145                            | 48      | 61                              | 62      |
| Oct.   | 0                   | 50      | 3                                | 41      | 0                   | 44      | 75                             | 67      | 13                              | 51      |
| Nov.   | 69                  | 18      | 0                                | 17      | 20                  | 18      | 10                             | 14      | 0                               | 19      |
| Dec.   | 0                   | 13      | 0                                | 13      | 0                   | 12      | 1                              | 14      | 0                               | 14      |
| Yearly | 425                 | 423     | 303                              | 362     | 436                 | 442     | 484                            | 371     |                                 | 437     |

| Month  | Martin King Ranch |         | Prosser Ranch No. 1 |         | Walker Ranch |         | Brotherton Ranch |         | Harlow Ranch |         |
|--------|-------------------|---------|---------------------|---------|--------------|---------|------------------|---------|--------------|---------|
|        | 1990              | Average | 1990                | Average | 1990         | Average | 1990             | Average | 1990         | Average |
| Jan.   | 7                 | 13      | 0                   | 9       | 0            | 10      | 10               | 16      | 9            | 10      |
| Feb.   | 11                | 18      | 10                  | 20      | 0            | 20      | 11               | 23      | 9            | 17      |
| Mar.   | 28                | 10      | 15                  | 13      | 10           | 12      | 24               | 14      | 7            | 8       |
| Apr.   | 36                | 24      | 53                  | 32      | 63           | 28      | 43               | 24      | 25           | 27      |
| May    | 35                | 43      | 43                  | 61      | 13           | 64      | 37               | 44      | 46           | 51      |
| June   | 0                 | 44      | 0                   | 44      | 0            | 57      | 0                | 46      | 0            | 60      |
| July   | 134               | 39      | 226                 | 54      | 178          | 46      | 134              | 40      | 188          | 40      |
| Aug.   | 10                | 38      | 0                   | 46      | 16           | 30      | 11               | 41      | 0            | 39      |
| Sep.   | 45                | 64      | 183                 | 73      | 170          | 75      | 63               | 65      | 0            | 61      |
| Oct.   | 27                | 52      | 0                   | 46      | 0            | 41      | 43               | 44      | 124          | 51      |
| Nov.   | 14                | 15      | 51                  | 20      | 5            | 19      | 18               | 15      | 0            | 15      |
| Dec.   | 1                 | 13      | 0                   | 12      | 0            | 13      | 3                | 11      | 0            | 12      |
| Yearly | 348               | 373     | 581                 | 430     | 455          | 415     | 397              | 383     | 408          | 391     |

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| Month  | Zuberbueler Ranch |         | Ed Crane Ranch |         | A. A. Baker Ranch |         | Cow Creek near Comstock |         | Comstock |         |
|--------|-------------------|---------|----------------|---------|-------------------|---------|-------------------------|---------|----------|---------|
|        | 1990              | Average | 1990           | Average | 1990              | Average | 1990                    | Average | 1990     | Average |
| Jan.   | 12                | 15      | 10             | 20      | 14                | 11      | 122                     | 14      | 6        | 14      |
| Feb.   | 11                | 26      | 30             | 27      | 13                | 19      |                         | 11      | 8        | 20      |
| Mar.   | 43                | 16      | 37             | 15      | 20                | 15      | 41                      | 11      | 51       | 16      |
| Apr.   | 48                | 28      | 76             | 39      | 60                | 29      | 63                      | 29      | 43       | 33      |
| May    | 66                | 57      | 94             | 67      | 61                | 50      | 124                     | 37      | 96       | 49      |
| June   | 0                 | 55      | 0              | 53      | 0                 | 47      | 0                       | 35      | 0        | 54      |
| July   | 178               | 61      | 266            | 49      | 200               | 45      | 93                      | 45      | 234      | 40      |
| Aug.   | 13                | 23      | 15             | 28      | 17                | 39      | 13                      | 42      | 13       | 41      |
| Sep.   | 68                | 68      | 146            | 73      | 94                | 75      | 5                       | 54      | 61       | 61      |
| Oct.   | 45                | 40      | 41             | 54      | 67                | 46      | 0                       | 44      | 48       | 45      |
| Nov.   | 19                | 20      | 22             | 21      | 17                | 17      | 0                       | 18      | 7        | 16      |
| Dec.   | 4                 | 19      | 6              | 19      | 3                 | 12      | 89                      | 17      | 3        | 16      |
| Yearly | 507               | 428     | 743            | 465     | 566               | 405     |                         | 357     | 570      | 405     |

| Month  | Amistad Reservoir near Comstock |         | Tuffy Whitehead Ranch |         | Gillis Ranch |         | Goldwire Ranch |         | H. K. Fawcett Ranch |         |
|--------|---------------------------------|---------|-----------------------|---------|--------------|---------|----------------|---------|---------------------|---------|
|        | 1990                            | Average | 1990                  | Average | 1990         | Average | 1990           | Average | 1990                | Average |
| Jan.   | 0                               | 9       | 11                    | 10      | 9            | 12      | 10             | 15      | 15                  | 16      |
| Feb.   | 4                               | 16      | 9                     | 19      | 14           | 23      | 9              | 18      | 23                  | 20      |
| Mar.   | 10                              | 10      | 57                    | 18      | 64           | 21      | 13             | 18      | 35                  | 19      |
| Apr.   | 29                              | 63      | 32                    | 58      | 37           | 147     | 43             | 54      | 54                  | 40      |
| May    | 61                              | 36      | 22                    | 45      | 25           | 60      | 30             | 63      | 113                 | 61      |
| June   | 0                               | 40      | 0                     | 47      | 0            | 55      | 0              | 53      | 0                   | 37      |
| July   | 30                              | 203     | 43                    | 283     | 57           | 183     | 60             | 176     | 46                  |         |
| Aug.   | 35                              | 0       | 34                    | 30      | 37           | 8       | 58             | 31      | 54                  |         |
| Sep.   | 5                               | 47      | 75                    | 70      | 77           | 73      | 5              | 57      | 217                 | 73      |
| Oct.   | 0                               | 43      | 55                    | 44      | 30           | 48      | 33             | 56      | 54                  | 60      |
| Nov.   | 11                              | 16      | 20                    | 17      | 22           | 22      | 15             | 27      | 14                  | 20      |
| Dec.   | 4                               | 8       | 3                     | 13      | 0            | 15      | 4              | 15      | 10                  | 14      |
| Yearly |                                 | 319     | 518                   | 392     | 612          | 460     | 457            | 483     | 742                 | 460     |

| Month  | Pafford Crossing |         | Buoy No. 11 |         | H. T. Miers Ranch No. 2 |         | Vinegarone |         | Evans Creek near Comstock |         |
|--------|------------------|---------|-------------|---------|-------------------------|---------|------------|---------|---------------------------|---------|
|        | 1990             | Average | 1990        | Average | 1990                    | Average | 1990       | Average | 1990                      | Average |
| Jan.   | 22               | 14      | 0           | 10      | 12                      | 13      | 30         | 16      | 13                        | 8       |
| Feb.   | 11               | 19      |             | 16      | 20                      | 22      | 32         | 21      | 5                         | 19      |
| Mar.   | 25               | 14      | 76          | 14      | 25                      | 22      | 41         | 17      | 47                        | 14      |
| Apr.   | 156              | 36      |             | 38      | 66                      | 39      | 59         | 37      |                           | 27      |
| May    | 28               | 50      | 59          | 49      | 149                     | 69      | 168        | 71      |                           | 42      |
| June   | 0                | 54      | 0           | 52      | 0                       | 56      | 0          | 54      | 0                         | 45      |
| July   | 137              | 53      | 99          | 40      | 176                     | 47      | 299        | 67      | 290                       | 55      |
| Aug.   | 8                | 50      | 3           | 36      | 4                       | 52      | 28         | 69      | 0                         | 47      |
| Sep.   | 75               | 70      | 30          | 50      | 184                     | 73      | 266        | 67      | 10                        | 64      |
| Oct.   | 33               | 54      | 32          | 43      | 0                       | 55      | 67         | 68      | 95                        | 51      |
| Nov.   | 15               | 22      | 0           | 15      | 0                       | 24      | 20         | 24      | 4                         | 21      |
| Dec.   | 4                | 15      | 0           | 9       | 0                       | 18      | 0          | 16      | 1                         | 12      |
| Yearly | 514              | 451     |             | 372     | 646                     | 490     | 1,010      | 527     |                           | 405     |

| Month  | H. T. Miers Ranch Headquarters |         | J. G. Brite Ranch |         | Big Satan Creek Station |         | Sellers Ranch |         | Lowry Ranch No. 2 |         |
|--------|--------------------------------|---------|-------------------|---------|-------------------------|---------|---------------|---------|-------------------|---------|
|        | 1990                           | Average | 1990              | Average | 1990                    | Average | 1990          | Average | 1990              | Average |
| Jan.   | 10                             | 15      | 14                | 11      | 18                      | 16      | 13            | 10      | 3                 | 12      |
| Feb.   | 8                              | 25      | 12                | 21      | 15                      | 17      | 8             | 18      | 13                | 20      |
| Mar.   | 36                             | 19      | 34                | 17      | 41                      | 22      | 61            | 13      | 49                | 20      |
| Apr.   | 129                            | 44      | 59                | 35      | 154                     | 44      | 0             | 30      | 95                | 40      |
| May    | 81                             | 65      | 67                | 56      | 23                      | 59      | 30            | 47      | 171               | 61      |
| June   | 0                              | 65      | 0                 | 57      | 0                       | 53      | 0             | 62      | 0                 | 58      |
| July   | 127                            | 43      | 125               | 42      | 231                     | 59      | 127           | 38      | 186               | 50      |
| Aug.   | 10                             | 47      | 4                 | 44      | 0                       | 62      | 0             | 37      | 11                | 53      |
| Sep.   | 94                             | 64      | 104               | 77      | 33                      | 56      | 19            | 59      | 162               | 61      |
| Oct.   | 41                             | 68      | 23                | 51      | 0                       | 59      | 97            | 51      | 28                | 51      |
| Nov.   | 10                             | 23      | 22                | 19      | 22                      | 26      | 19            | 19      | 26                | 24      |
| Dec.   | 3                              | 16      | 4                 | 14      | 4                       | 16      | 3             | 13      | 5                 | 16      |
| Yearly | 549                            | 494     | 468               | 444     | 541                     | 489     | 377           | 397     | 749               | 466     |

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| Month  | Devils Lake |         | Rough Canyon near Del Rio |         | Cliff Lowry Ranch No. 1 |         | Amistad Dam |         | Stewart Ranch |         |
|--------|-------------|---------|---------------------------|---------|-------------------------|---------|-------------|---------|---------------|---------|
|        | 1990        | Average | 1990                      | Average | 1990                    | Average | 1990        | Average | 1990          | Average |
| Jan.   | 10          | 16      | 0                         | 9       | 13                      | 13      | 14          | 13      | 12            | 12      |
| Feb.   | 16          | 21      | 15                        | 24      | 19                      | 26      | 13          | 22      | 13            | 22      |
| Mar.   | 68          | 16      | 80                        | 19      | 55                      | 21      | 43          | 19      | 92            | 18      |
| Apr.   | 97          | 40      | 0                         | 31      | 117                     | 42      | 86          | 44      | 73            | 39      |
| May    | 164         | 55      | 173                       | 67      | 157                     | 68      | 135         | 60      | 178           | 52      |
| June   | 0           | 62      | 0                         | 59      | 0                       | 59      | 2           | 56      | 0             | 57      |
| July   | 161         | 38      | 0                         | 52      | 249                     | 50      | 95          | 48      | 263           | 50      |
| Aug.   | 14          | 41      | 30                        | 47      | 11                      | 50      | 15          | 48      | 12            | 39      |
| Sep.   | 151         | 61      | 356                       | 77      | 165                     | 79      | 130         | 87      | 130           | 64      |
| Oct.   | 26          | 50      | 0                         | 59      | 57                      | 57      | 42          | 50      | 38            | 53      |
| Nov.   | 29          | 20      | 53                        | 27      | 15                      | 26      | 23          | 23      | 19            | 22      |
| Dec.   | 7           | 18      | 1                         | 17      | 6                       | 16      | 5           | 16      | 7             | 15      |
| Yearly | 743         | 438     | 708                       | 488     | 865                     | 507     | 603         | 486     | 837           | 443     |

| Month  | North Fork San Pedro |         | Long Ranch |         | Middle Fork San Pedro |         | Hutto Ranch No. 2 |         | Gillis Headquarters Ranch |         |
|--------|----------------------|---------|------------|---------|-----------------------|---------|-------------------|---------|---------------------------|---------|
|        | 1990                 | Average | 1990       | Average | 1990                  | Average | 1990              | Average | 1990                      | Average |
| Jan.   | 5                    | 11      | 8          | 14      | 0                     | 11      | 14                | 14      | 11                        | 17      |
| Feb.   | 18                   | 21      | 23         | 8       | 24                    | 25      | 25                | 18      | 27                        | 27      |
| Mar.   | 88                   | 20      | 58         | 20      | 80                    | 20      | 40                | 18      | 106                       | 24      |
| Apr.   | 0                    | 39      | 140        | 42      | 0                     | 37      | 149               | 49      | 88                        | 47      |
| May    | 135                  | 64      | 91         | 60      | 142                   | 63      | 110               | 52      | 109                       | 76      |
| June   | 0                    | 62      | 0          | 60      | 0                     | 60      | 0                 | 61      | 0                         | 70      |
| July   | 231                  | 67      | 104        | 55      | 0                     | 56      | 207               | 53      | 324                       | 65      |
| Aug.   | 28                   | 46      | 3          | 36      | 8                     | 44      | 7                 | 47      | 22                        | 57      |
| Sep.   | 150                  | 59      | 140        | 58      | 389                   | 63      | 146               | 81      | 195                       | 60      |
| Oct.   | 0                    | 57      | 23         | 50      | 0                     | 64      | 32                | 52      | 43                        | 66      |
| Nov.   | 38                   | 26      | 22         | 22      | 15                    | 23      | 14                | 24      | 21                        | 32      |
| Dec.   | 1                    | 16      | 6          | 16      | 1                     | 15      | 7                 | 14      | 8                         | 20      |
| Yearly | 694                  | 488     | 616        | 456     | 643                   | 480     | 751               | 490     | 945                       | 561     |

| Month  | Hutto Ranch No. 1 |         | Lewis Ranch |         | Laughlin Air Force Base |         | Maverick County Canal Headgate |         | Wardlaw Standart Ranch |         |
|--------|-------------------|---------|-------------|---------|-------------------------|---------|--------------------------------|---------|------------------------|---------|
|        | 1990              | Average | 1990        | Average | 1990                    | Average | 1990                           | Average | 1990                   | Average |
| Jan.   | 11                | 13      | 13          | 15      | 12                      | 14      | 0                              | 14      | 10                     | 19      |
| Feb.   | 30                | 23      | 36          | 29      | 56                      | 24      | 53                             | 25      | 75                     | 31      |
| Mar.   | 66                | 18      | 81          | 23      | 59                      | 16      | 38                             | 15      | 50                     | 28      |
| Apr.   | 107               | 45      | 128         | 52      | 178                     | 52      | 190                            | 44      | 167                    | 45      |
| May    | 140               | 59      | 75          | 61      | 56                      | 56      | 41                             | 55      | 48                     | 70      |
| June   | 0                 | 59      | 0           | 73      | 0                       | 71      | T                              | 57      | 0                      | 81      |
| July   | 268               | 57      | 246         | 43      | 256                     | 63      | 127                            | 45      | 253                    | 40      |
| Aug.   | 22                | 44      | 67          | 52      | 20                      | 45      | 33                             | 39      | 13                     | 27      |
| Sep.   | 148               | 73      | 107         | 68      | 116                     | 65      | 173                            | 67      | 18                     | 53      |
| Oct.   | 25                | 55      | 35          | 69      | 13                      | 65      | 19                             | 57      | 18                     | 55      |
| Nov.   | 3                 | 21      | 29          | 30      | 11                      | 26      | 25                             | 25      | 0                      | 38      |
| Dec.   | 1                 | 14      | 5           | 19      | 7                       | 16      | 0                              | 17      | 36                     | 21      |
| Yearly | 821               | 481     | 822         | 534     | 784                     | 513     | 699                            | 460     | 688                    | 508     |

| Month  | Pinto Creek Station |         | Las Moras Creek |         | Normandy |         | Lateral No. 12 Headgate |         | Coal Mine |         |
|--------|---------------------|---------|-----------------|---------|----------|---------|-------------------------|---------|-----------|---------|
|        | 1990                | Average | 1990            | Average | 1990     | Average | 1990                    | Average | 1990      | Average |
| Jan.   | 0                   | 12      | 0               | 18      | 6        | 20      | 0                       | 15      | 5         | 16      |
| Feb.   | 5                   | 19      | 57              | 25      | 87       | 22      | 60                      | 18      | 88        | 21      |
| Mar.   | 66                  | 15      | 51              | 18      | 59       | 19      | 56                      | 15      | 41        | 17      |
| Apr.   | 262                 | 46      | 152             | 39      | 113      | 49      | 69                      | 45      | 66        | 43      |
| May    | 33                  | 59      | 91              | 55      | 71       | 71      | 71                      | 64      | 71        | 67      |
| June   | 0                   | 59      | T               | 65      | T        | 60      | 0                       | 59      | 0         | 59      |
| July   | 264                 | 41      | 237             | 40      | 241      | 53      | 190                     | 39      | 156       | 51      |
| Aug.   | 76                  | 39      | 55              | 46      | 85       | 50      | 69                      | 41      | 23        | 40      |
| Sep.   | 0                   | 66      | 234             | 83      | 97       | 75      | 138                     | 70      | 169       | 77      |
| Oct.   | 0                   | 49      | 5               | 60      | 27       | 62      | 18                      | 63      | 24        | 63      |
| Nov.   | 5                   | 27      | 18              | 26      | 22       | 27      | 23                      | 23      | 19        | 20      |
| Dec.   | 0                   | 15      | T               | 19      | 0        | 18      | 0                       | 16      | 0         | 15      |
| Yearly | 711                 | 447     | 900             | 494     | 808      | 526     | 694                     | 468     | 662       | 489     |

## RAINFALL ON THE RIO GRANDE WATERSHED

IN THE UNITED STATES

IN MILLIMETRES

| Month  | Eagle Pass |         | Trees Farm |         | Farias Ranch |         | Indio Ranch |         | El Indio |         |
|--------|------------|---------|------------|---------|--------------|---------|-------------|---------|----------|---------|
|        | 1990       | Average | 1990       | Average | 1990         | Average | 1990        | Average | 1990     | Average |
| Jan.   | 10         | 19      | 6          | 15      | 7            | 17      | 12          | 18      | 10       | 19      |
| Feb.   | 89         | 24      | 121        | 22      | 152          | 28      | 123         | 23      | 108      | 26      |
| Mar.   | 39         | 19      | 33         | 12      | 38           | 14      | 22          | 14      | 33       | 14      |
| Apr.   | 77         | 46      | 60         | 46      | 42           | 49      | 62          | 51      | 69       | 47      |
| May    | 104        | 95      | 95         | 78      | 34           | 77      | 81          | 77      | 33       | 83      |
| June   | T          | 78      | T          | 59      | T            | 59      | 0           | 62      | 0        | 59      |
| July   | 127        | 47      | 83         | 38      | 197          | 48      | 147         | 46      | 162      | 34      |
| Aug.   | 68         | 61      | 11         | 43      | 41           | 47      | 22          | 41      | 88       | 49      |
| Sep.   | 167        | 77      | 65         | 64      | 89           | 80      | 66          | 76      | 64       | 72      |
| Oct.   | 15         | 60      | 28         | 69      | 17           | 68      | 15          | 62      | 19       | 59      |
| Nov.   | 26         | 25      | 28         | 21      | 29           | 21      | 26          | 22      | 38       | 20      |
| Dec.   | 3          | 21      | 3          | 18      | 0            | 20      | 0           | 19      | 2        | 18      |
| Yearly | 725        | 572     | 533        | 485     | 646          | 528     | 576         | 511     | 626      | 500     |

| Month  | Van Dalsen Farm |         | Keisling Farm |         | Apache Ranch |         | Laredo Water Plant |         | Corralitos Ranch |         |
|--------|-----------------|---------|---------------|---------|--------------|---------|--------------------|---------|------------------|---------|
|        | 1990            | Average | 1990          | Average | 1990         | Average | 1990               | Average | 1990             | Average |
| Jan.   | 13              | 16      | 13            | 18      | 43           | 16      | 19                 | 13      | 19               |         |
| Feb.   | 132             | 24      | 119           | 25      | 109          | 22      | 49                 | 22      | 102              | 20      |
| Mar.   | 53              | 13      | 39            | 16      | 15           | 9       | 20                 | 14      | 28               | 13      |
| Apr.   | 25              | 53      | 18            | 49      | 97           | 43      | 69                 | 30      | 83               | 30      |
| May    | 66              | 78      | 66            | 73      | 41           | 61      | 15                 | 60      | 19               | 52      |
| June   | 18              | 54      | 18            | 67      | 0            | 51      | 3                  | 54      | 27               | 54      |
| July   | 89              | 36      | 133           | 36      | 152          | 54      | 55                 | 30      | 89               | 36      |
| Aug.   | 74              | 43      | 0             | 41      | 71           | 45      | 66                 | 48      | 63               | 51      |
| Sep.   | 43              | 70      | 48            | 63      | 63           | 78      | 119                | 73      | 76               | 75      |
| Oct.   | 46              | 62      | 15            | 60      | 63           | 65      | 39                 | 46      | 63               | 52      |
| Nov.   | 46              | 21      | 52            | 20      | 76           | 21      | 0                  | 21      | 98               | 22      |
| Dec.   | 0               | 19      | 0             | 21      | 0            | 18      | 98                 | 23      | 6                | 16      |
| Yearly | 605             | 489     | 521           | 489     | 730          | 483     |                    | 440     | 667              | 440     |

| Month  | Huiscache Ranch |         | Zapata Water Plant |         | Falcon Dam |         | Roma (Int'l. Bridge) |         | Garciasville |         |
|--------|-----------------|---------|--------------------|---------|------------|---------|----------------------|---------|--------------|---------|
|        | 1990            | Average | 1990               | Average | 1990       | Average | 1990                 | Average | 1990         | Average |
| Jan.   | 11              | 20      | 8                  | 22      | 4          | 23      | 5                    | 22      | 5            | 23      |
| Feb.   | 94              | 24      | 93                 | 23      | 72         | 26      | 74                   | 27      | 42           | 27      |
| Mar.   | 25              | 15      | 24                 | 14      | 29         | 15      | 28                   | 14      | 10           | 12      |
| Apr.   | 81              | 34      | 79                 | 39      | 75         | 35      | 76                   | 36      | 57           | 30      |
| May    | 14              | 54      | 5                  | 64      | 6          | 63      | 5                    | 49      | 23           | 62      |
| June   | 19              | 62      | 13                 | 59      | 0          | 63      | 0                    | 57      | 18           | 64      |
| July   | 88              | 38      | 86                 | 42      | 63         | 34      | 63                   | 33      | 34           | 34      |
| Aug.   | 76              | 40      | 83                 | 50      | 93         | 62      | 94                   | 49      | 11           | 47      |
| Sep.   | 63              | 93      | 66                 | 104     | 59         | 105     | 57                   | 57      | 50           | 81      |
| Oct.   | 48              | 55      | 24                 | 47      | 24         | 51      | 22                   | 49      | 31           | 44      |
| Nov.   | 89              | 21      | 80                 | 23      | 65         | 28      | 71                   | 21      | 36           | 23      |
| Dec.   | 4               | 20      | 2                  | 23      | 2          | 20      | 3                    | 13      | 0            | 19      |
| Yearly | 612             | 476     | 563                | 510     | 492        | 525     | 498                  | 475     | 317          | 466     |

| Month  | Los Ebanos |         | La Joya |         | Penitas (Edinburg Pumping Plant) |         | HCWCID #6 Goodwin Pump No. 4B |         | HCWCID #6 Goodwin Pump No. 3 |         |
|--------|------------|---------|---------|---------|----------------------------------|---------|-------------------------------|---------|------------------------------|---------|
|        | 1990       | Average | 1990    | Average | 1990                             | Average | 1990                          | Average | 1990                         | Average |
| Jan.   | 14         | 26      | 7       | 27      | 4                                | 33      | 5                             | 32      | 0                            | 35      |
| Feb.   | 15         | 25      | 15      | 26      | 16                               | 28      | 63                            | 27      | 44                           | 32      |
| Mar.   | 39         | 12      | 21      | 12      | 20                               | 16      | 13                            | 14      | 0                            | 16      |
| Apr.   | 54         | 33      | 55      | 24      | 39                               | 32      | 51                            | 30      | 57                           | 38      |
| May    | 11         | 58      | 10      | 57      | 67                               | 61      | 102                           | 58      | 114                          | 65      |
| June   | 0          | 63      | 0       | 67      | 0                                | 71      | 0                             | 63      | 0                            | 65      |
| July   | 33         | 30      | 13      | 27      | 31                               | 39      | 25                            | 34      | 3                            | 42      |
| Aug.   | 0          | 45      | 0       | 36      | 35                               | 57      | 10                            | 39      | 38                           | 46      |
| Sep.   | 129        | 80      | 95      | 78      | 128                              | 90      | 203                           | 87      | 159                          | 81      |
| Oct.   | 7          | 45      | 18      | 44      | 36                               | 65      | 38                            | 64      | 0                            | 70      |
| Nov.   | 0          | 19      | 0       | 19      | 33                               | 22      | 25                            | 23      | 0                            | 23      |
| Dec.   | 46         | 21      | 33      | 23      | 0                                | 26      | 10                            | 26      | 0                            | 27      |
| Yearly | 348        | 457     | 267     | 440     | 409                              | 540     | 545                           | 497     | 415                          | 540     |

## RAINFALL ON THE RIO GRANDE WATERSHED

IN THE UNITED STATES

**IN MILLIMETRES**

| Month  | United Irrigation District |         | Edinburg Filtration Plant |         | La Feria Materials Yard |         | La Feria Pumping Plant |         | CCWCID #19 (Adams Gardens) |         |
|--------|----------------------------|---------|---------------------------|---------|-------------------------|---------|------------------------|---------|----------------------------|---------|
|        | 1990                       | Average | 1990                      | Average | 1990                    | Average | 1990                   | Average | 1990                       | Average |
| Jan.   | 11                         | 31      | 11                        | 38      | 15                      | 45      | 19                     | 46      | 12                         | 34      |
| Feb.   | 33                         | 30      | 39                        | 29      | 46                      | 54      | 43                     | 47      | 38                         | 41      |
| Mar.   | 10                         | 23      | 14                        | 18      | 33                      | 22      | 47                     | 24      | 21                         | 21      |
| Apr.   | 58                         | 33      | 44                        | 38      | 36                      | 40      | 51                     | 51      | 40                         | 38      |
| May    | 93                         | 75      | 84                        | 61      | 48                      | 68      | 29                     | 75      | 41                         | 66      |
| June   | 0                          | 63      | 28                        | 62      | 33                      | 89      | 53                     | 82      | 13                         | 70      |
| July   | 50                         | 42      | 25                        | 42      | 38                      | 65      | 34                     | 60      | 44                         | 48      |
| Aug.   | 72                         | 55      | 21                        | 57      | 10                      | 73      | 15                     | 83      | 13                         | 71      |
| Sep.   | 137                        | 80      | 69                        | 91      | 102                     | 127     | 33                     | 154     | 47                         | 106     |
| Oct.   | 1                          | 58      | 52                        | 54      | 28                      | 77      | 23                     | 96      | 2                          | 66      |
| Nov.   | 29                         | 19      | 35                        | 24      | 5                       | 34      | 5                      | 47      | 11                         | 36      |
| Dec.   | 6                          | 25      | 12                        | 30      | 19                      | 40      | 13                     | 40      | 10                         | 29      |
| Yearly | 500                        | 534     | 434                       | 544     | 413                     | 734     | 365                    | 805     | 292                        | 626     |

| Month  | San Benito Pump |         | GCCCID #11<br>(Bayview Dist. Off. |         |  |  |  |  |  |  |
|--------|-----------------|---------|-----------------------------------|---------|--|--|--|--|--|--|
|        | 1990            | Average | 1990                              | Average |  |  |  |  |  |  |
| Jan.   | 0               | 37      | 21                                | 46      |  |  |  |  |  |  |
| Feb.   | 11              | 27      | 46                                | 41      |  |  |  |  |  |  |
| Mar.   | 45              | 20      | 70                                | 19      |  |  |  |  |  |  |
| Apr.   | 46              | 35      | 56                                | 47      |  |  |  |  |  |  |
| May    | 35              | 68      | 72                                | 65      |  |  |  |  |  |  |
| June   | 10              | 62      | 0                                 | 56      |  |  |  |  |  |  |
| July   | 44              | 43      | 0                                 | 48      |  |  |  |  |  |  |
| Aug.   | 26              | 61      | 44                                | 68      |  |  |  |  |  |  |
| Sep.   | 56              | 109     | 109                               | 142     |  |  |  |  |  |  |
| Oct.   | 29              | 66      | 18                                | 60      |  |  |  |  |  |  |
| Nov.   | 0               | 31      | 19                                | 38      |  |  |  |  |  |  |
| Dec.   | 0               | 34      | 0                                 | 38      |  |  |  |  |  |  |
| Yearly | 302             | 593     | 455                               | 668     |  |  |  |  |  |  |

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## RAINFALL ON THE RIO GRANDE WATERSHED

IN MEXICO

IN MILLIMETRES

Tabulated below, in approximate downstream order, are monthly records of Mexican rainfall stations with averages for their periods of record. For location, elevation, period of record, type of gage in use, watershed subdivision in which the station is located, and the observer, see alphabetical listing of these stations following rainfall data. These rainfall records have not been published elsewhere. Records of daily rainfall amounts, where available, are on file in the offices of the Mexican Section of the Commission.

Detailed listings of the months and years for which records are available through 1970 may be found under "Index to Precipitation Records" in Water Bulletins 10, 14, 22, 26, and Supplement 40A.

| Month  | Cd. Juarez,<br>Chihuahua |         | Samalayuca,<br>Chihuahua |         | Luis L. Leon,<br>Chihuahua |         | La Trasquila,<br>Chihuahua |         | Parrita,<br>Chihuahua |         |
|--------|--------------------------|---------|--------------------------|---------|----------------------------|---------|----------------------------|---------|-----------------------|---------|
|        | 1990                     | Average | 1990                     | Average | 1990                       | Average | 1990                       | Average | 1990                  | Average |
| Jan.   | 12                       | 11      | 4                        | 11      | T                          | 9       | 2                          | 9       |                       | 8       |
| Feb.   | 4                        | 11      | 4                        | 12      | 3                          | 8       | 4                          | 7       |                       | 7       |
| Mar.   | 12                       | 9       | 18                       | 10      |                            | 6       | 3                          | 4       |                       | 7       |
| Apr.   | 10                       | 7       | 2                        | 4       | 2                          | 5       | 1                          | 5       |                       | 10      |
| May    | 3                        | 9       |                          | 6       | 8                          | 12      | 2                          | 8       |                       | 14      |
| June   | 0                        | 16      |                          | 20      | T                          | 29      | 6                          | 30      |                       | 46      |
| July   | 29                       | 39      |                          | 50      | 152                        | 54      | 154                        | 88      |                       | 64      |
| Aug.   | 75                       | 43      |                          | 51      | 140                        | 56      | 146                        | 73      |                       | 87      |
| Sep.   | 22                       | 36      |                          | 50      | 54                         | 48      | 108                        | 80      | 187                   | 86      |
| Oct.   | 11                       | 26      |                          | 23      | 53                         | 28      | 23                         | 25      | 36                    | 27      |
| Nov.   | 0                        | 12      |                          | 12      | 4                          | 11      | 13                         | 9       | 2                     | 8       |
| Dec.   | 6                        | 15      |                          | 11      | 3                          | 10      |                            | 11      | 3                     | 6       |
| Yearly | 184                      | 234     |                          | 260     |                            | 276     |                            | 349     |                       | 370     |

| Month  | Cd. Guerrero,<br>Chihuahua |         | Estacion Rosario,<br>Durango |         | Villa Coronado,<br>Chihuahua |         | Valle Allende,<br>Chihuahua |         | Hidalgo del Parral,<br>Chihuahua |         |
|--------|----------------------------|---------|------------------------------|---------|------------------------------|---------|-----------------------------|---------|----------------------------------|---------|
|        | 1990                       | Average | 1990                         | Average | 1990                         | Average | 1990                        | Average | 1990                             | Average |
| Jan.   | 1                          | 16      | 8                            | 10      |                              | 17      | T                           | 9       | T                                | 5       |
| Feb.   |                            | 10      | 7                            | 6       |                              | 7       | T                           | 4       | T                                | 5       |
| Mar.   | 10                         | 6       | 0                            | 3       |                              | 4       | T                           | 2       | 0                                | 2       |
| Apr.   | 1                          | 5       | 0                            | 8       |                              | 15      | 1                           | 7       | 6                                | 5       |
| May    | 16                         | 9       | 0                            | 16      | 62                           | 21      |                             | 21      | 5                                | 12      |
| June   | 36                         | 40      | 6                            | 56      | 10                           | 79      |                             | 52      | 16                               | 44      |
| July   | 139                        | 125     | 116                          | 118     |                              | 114     |                             | 101     | 292                              | 110     |
| Aug.   | 81                         | 130     | 66                           | 122     | 186                          | 146     | 73                          | 120     | 106                              | 114     |
| Sep.   |                            | 80      |                              | 115     | 115                          | 110     | 170                         | 93      | 189                              | 116     |
| Oct.   | 51                         | 30      |                              | 28      |                              | 37      | 44                          | 22      |                                  | 28      |
| Nov.   | 3                          | 12      |                              | 8       | 9                            | 12      | 12                          | 7       |                                  | 12      |
| Dec.   | 90                         | 19      |                              | 11      | 0                            | 12      |                             | 9       | 1                                | 10      |
| Yearly |                            | 482     |                              | 501     |                              | 574     |                             | 447     |                                  | 463     |

| Month  | Jimenez,<br>Chihuahua |         | Balleza,<br>Chihuahua |         | Ojo Caliente,<br>Chihuahua |         | Camargo,<br>Chihuahua |         | Las Virgenes,<br>Chihuahua |         |
|--------|-----------------------|---------|-----------------------|---------|----------------------------|---------|-----------------------|---------|----------------------------|---------|
|        | 1990                  | Average | 1990                  | Average | 1990                       | Average | 1990                  | Average | 1990                       | Average |
| Jan.   | 2                     | 8       | 3                     | 11      | T                          | 7       | T                     | 10      | T                          | 7       |
| Feb.   | 3                     | 4       | T                     | 8       | 2                          | 5       | 2                     | 6       |                            | 3       |
| Mar.   | 7                     | 3       | 0                     | 4       | 2                          | 4       | 2                     | 5       | 0                          | 2       |
| Apr.   | T                     | 5       | T                     | 6       |                            | 5       | T                     | 6       | T                          | 7       |
| May    | 6                     | 14      |                       | 7       | 3                          | 12      | 5                     | 13      | 3                          | 8       |
| June   | 11                    | 38      |                       | 43      | 25                         | 43      | 18                    | 40      | 1                          | 30      |
| July   | 135                   | 86      | 123                   | 138     | 85                         | 130     | 77                    | 89      | 69                         | 70      |
| Aug.   | 71                    | 67      | 124                   | 100     | 75                         | 119     | 72                    | 179     | 70                         |         |
| Sep.   |                       | 58      |                       | 84      | 88                         | 68      | 119                   | 67      | 140                        | 62      |
| Oct.   | 25                    | 28      |                       | 23      | 51                         | 28      | 33                    | 25      | 74                         | 23      |
| Nov.   |                       | 6       |                       | 12      | T                          | 6       | 5                     | 11      | 3                          | 6       |
| Dec.   | 4                     | 6       |                       | 12      | 3                          | 7       | 5                     | 11      | 5                          | 9       |
| Yearly |                       | 323     |                       | 457     |                            | 345     | 438                   | 343     |                            | 296     |

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RAINFALL ON THE RIO GRANDE WATERSHED  
IN MEXICO  
IN MILLIMETRES

| Month  | Delicias,<br>Chihuahua |         | Presas Chihuahua,<br>Chihuahua |         | Meoqui,<br>Chihuahua |         | Posta Zootecnica,<br>Chihuahua |         | Las Burras,<br>Chihuahua |         |
|--------|------------------------|---------|--------------------------------|---------|----------------------|---------|--------------------------------|---------|--------------------------|---------|
|        | 1990                   | Average | 1990                           | Average | 1990                 | Average | 1990                           | Average | 1990                     | Average |
| Jan.   |                        | 9       | 0                              | 7       | T                    | 9       | T                              | 10      |                          | 8       |
| Feb.   |                        | 4       | 8                              | 5       | 4                    | 4       | 3                              | 5       | 7                        | 5       |
| Mar.   |                        | 3       |                                | 4       | T                    | 3       | 0                              | 4       |                          | 3       |
| Apr.   |                        | 9       | 4                              | 9       | 3                    | 11      |                                | 11      | 0                        | 8       |
| May    |                        | 10      |                                | 22      | 1                    | 13      | 5                              | 19      |                          | 12      |
| June   |                        | 32      | 25                             | 52      | 4                    | 33      | 18                             | 38      |                          | 31      |
| July   | 141                    | 65      | 282                            | 106     | 97                   | 67      | 148                            | 84      | 114                      | 74      |
| Aug.   | 147                    | 66      | 215                            | 123     | 351                  | 79      |                                | 102     | 123                      | 66      |
| Sep.   | 136                    | 61      | 288                            | 92      | 132                  | 61      | 128                            | 82      | 170                      | 62      |
| Oct.   | 80                     | 22      | 45                             | 27      | 70                   | 26      | 43                             | 31      |                          | 21      |
| Nov.   | 4                      | 7       | 2                              | 8       | 2                    | 7       |                                | 8       | 4                        | 6       |
| Dec.   | 1                      | 9       | 6                              | 10      | 2                    | 11      | 3                              | 9       | 1                        | 9       |
| Yearly |                        | 297     |                                | 465     | 666                  | 324     |                                | 403     |                          | 305     |

| Month  | Maclovio Herrera,<br>Chihuahua |         | Coyame,<br>Chihuahua |         | Ojinaga (IB&WC),<br>Chihuahua |         | Escalon,<br>Chihuahua |         | Sierra Mojada,<br>Coahuila |         |
|--------|--------------------------------|---------|----------------------|---------|-------------------------------|---------|-----------------------|---------|----------------------------|---------|
|        | 1990                           | Average | 1990                 | Average | 1990                          | Average | 1990                  | Average | 1990                       | Average |
| Jan.   | 2                              | 8       | 10                   | 7       | 4                             | 8       | 3                     | 11      | 0                          | 16      |
| Feb.   | 5                              | 5       | 9                    | 8       | 9                             | 7       | T                     | 5       | 2                          | 7       |
| Mar.   | 1                              | 3       | T                    | 3       | 1                             | 4       | 3                     | 3       | 0                          | 6       |
| Apr.   | 1                              | 9       |                      | 10      | 0                             | 9       | 2                     | 12      | 0                          | 9       |
| May    | 5                              | 14      | 8                    | 16      | 15                            | 13      | 16                    | 20      | 14                         | 26      |
| June   | T                              | 34      |                      | 46      | 1                             | 36      | 30                    | 46      | 9                          | 56      |
| July   | 129                            | 70      | 158                  | 65      | 61                            | 41      | 125                   | 65      | 81                         | 71      |
| Aug.   | 174                            | 73      | 147                  | 66      | 86                            | 46      | 41                    | 76      | 72                         | 76      |
| Sep.   | 135                            | 79      | 91                   | 71      | 79                            | 44      | 154                   | 74      | 82                         | 76      |
| Oct.   | 65                             | 23      | 39                   | 27      | 23                            | 26      |                       | 32      | 13                         | 34      |
| Nov.   | 2                              | 9       | 3                    | 10      | 0                             | 10      | 7                     | 7       | 0                          | 13      |
| Dec.   | 2                              | 15      | 4                    | 8       |                               | 9       | 1                     | 10      | 2                          | 17      |
| Yearly | 521                            | 342     |                      | 337     |                               | 253     |                       | 361     | 275                        | 407     |

| Month  | La Chuparrrosa,<br>Coahuila |         | Progreso,<br>Coahuila |         | La Amistad,<br>Coahuila |         | Amistad Res. near<br>Tlaloc, Coahuila |         | Represa Amistad,<br>Coahuila |         |
|--------|-----------------------------|---------|-----------------------|---------|-------------------------|---------|---------------------------------------|---------|------------------------------|---------|
|        | 1990                        | Average | 1990                  | Average | 1990                    | Average | 1990                                  | Average | 1990                         | Average |
| Jan.   | 0                           | 7       | 5                     | 13      | 9                       | 16      | 8                                     | 10      | 7                            | 9       |
| Feb.   | 0                           | 13      | 97                    | 18      | 12                      | 23      | 8                                     | 18      | 3                            | 16      |
| Mar.   | 37                          | 11      | 15                    | 9       | 39                      | 20      | 58                                    | 19      | 19                           | 13      |
| Apr.   | 97                          | 31      | 33                    | 31      | 86                      | 40      | 76                                    | 29      | 67                           | 26      |
| May    | 12                          | 34      | 15                    | 53      | 123                     | 62      | 89                                    | 46      | 57                           | 42      |
| June   | 0                           | 36      | 0                     | 55      | 1                       | 62      | 0                                     | 51      | 4                            | 40      |
| July   | 6                           | 38      | 12                    | 29      | 160                     | 47      | 132                                   | 69      | 92                           | 50      |
| Aug.   | 5                           | 46      | 49                    | 11      | 15                      | 15      | 46                                    | 5       | 33                           |         |
| Sep.   | 67                          | 57      | 149                   | 75      | 144                     | 66      | 201                                   | 70      | 117                          | 61      |
| Oct.   | 27                          | 40      | 17                    | 45      | 44                      | 53      | 33                                    | 48      | 29                           | 50      |
| Nov.   | 9                           | 16      | 54                    | 16      | 24                      | 30      | 28                                    | 20      | 8                            | 17      |
| Dec.   | 0                           | 7       | 1                     | 13      | 5                       | 16      | 0                                     | 16      | 1                            | 8       |
| Yearly | 260                         | 336     |                       | 406     | 658                     | 450     | 648                                   | 442     | 409                          | 365     |

| Month  | Cd. Acuna,<br>Coahuila |         | Presas Centenario,<br>Coahuila |         | Palestina,<br>Coahuila |         | Presas Cabeceras,<br>Coahuila |         | Presas San Miguel,<br>Coahuila |         |
|--------|------------------------|---------|--------------------------------|---------|------------------------|---------|-------------------------------|---------|--------------------------------|---------|
|        | 1990                   | Average | 1990                           | Average | 1990                   | Average | 1990                          | Average | 1990                           | Average |
| Jan.   | 11                     | 15      | 0                              | 13      | 9                      | 21      | 0                             | 13      | 8                              | 14      |
| Feb.   | 30                     | 23      | 8                              | 18      | 64                     | 25      | 58                            | 20      | 70                             | 21      |
| Mar.   | 91                     | 20      | 117                            | 19      | 31                     | 19      | 7                             | 15      | 23                             | 16      |
| Apr.   | 126                    | 46      | 145                            | 42      |                        | 46      | 124                           | 45      | 204                            | 42      |
| May    | 38                     | 59      | 63                             | 58      | 66                     | 64      | 99                            | 55      | 43                             | 59      |
| June   | 0                      | 56      | 0                              | 62      | 0                      | 60      | 0                             | 60      | 0                              | 63      |
| July   | 144                    | 45      | 166                            | 39      | 160                    | 51      | 259                           | 73      | 148                            | 48      |
| Aug.   | 14                     | 41      | 87                             | 59      | 62                     | 57      | 86                            | 72      | 51                             | 62      |
| Sep.   | 237                    | 78      | 240                            | 86      | 285                    | 83      | 325                           | 116     | 228                            | 96      |
| Oct.   | 41                     | 63      | 46                             | 64      |                        | 57      |                               | 66      | 42                             | 58      |
| Nov.   | 24                     | 20      | 27                             | 27      |                        | 23      |                               | 29      | 24                             | 31      |
| Dec.   | 4                      | 16      | 0                              | 17      |                        | 19      | 0                             | 15      | 0                              | 18      |
| Yearly | 760                    | 482     | 899                            | 504     |                        | 525     |                               | 589     | 841                            | 528     |

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## RAINFALL ON THE RIO GRANDE WATERSHED

IN MEXICO

IN MILLIMETRES

| Month  | Emiliano Zapata,<br>Coahuila |         | Jimenez,<br>Coahuila |         | Piedras Negras,<br>Coahuila |         | Zaragoza,<br>Coahuila |         | Muzquiz,<br>Coahuila |         |
|--------|------------------------------|---------|----------------------|---------|-----------------------------|---------|-----------------------|---------|----------------------|---------|
|        | 1990                         | Average | 1990                 | Average | 1990                        | Average | 1990                  | Average | 1990                 | Average |
| Dec.   | 0                            | 27      | 3                    | 18      | 93                          | 19      |                       |         | 33                   | 15      |
| Feb.   | 89                           | 31      | 60                   | 23      | 6                           | 22      |                       |         | 20                   | 19      |
| Mar.   | 50                           | 29      | 45                   | 19      | 28                          | 16      |                       |         | 17                   | 39      |
| Apr.   | 55                           | 49      | 180                  | 46      | 140                         | 50      |                       |         | 61                   | 58      |
| May    | 50                           | 96      | 26                   | 62      | 78                          | 91      |                       |         | 47                   | 30      |
| June   | 0                            | 88      | T                    | 62      | 0                           | 68      |                       |         | 75                   | 0       |
| July   | 302                          | 69      | 218                  | 44      | 210                         | 54      |                       |         | 101                  | 168     |
| Aug.   | 77                           | 50      | 44                   | 43      | 17                          | 58      |                       |         | 54                   | 75      |
| Sep.   | 61                           | 145     |                      | 75      | 179                         | 81      |                       |         | 199                  | 147     |
| Oct.   | 43                           | 12      |                      | 62      | 21                          | 69      |                       |         | 18                   | 220     |
| Nov.   | 44                           | 21      |                      | 27      | 23                          | 23      |                       |         | 14                   | 53      |
| Dec.   | 26                           | 4       |                      | 17      | 0                           | 18      |                       |         | 30                   | 29      |
| Yearly |                              | 613     | 758                  | 498     | 795                         | 569     |                       |         | 556                  | 858     |
|        |                              |         |                      |         |                             |         |                       |         |                      | 643     |

| Month  | Sabinas,<br>Coahuila |         | Ocampo,<br>Coahuila |         | Presa Carranza,<br>Coahuila |         | Cuatro Cienegas,<br>Coahuila |         | Ejido lo de Mayo,<br>Coahuila |         |
|--------|----------------------|---------|---------------------|---------|-----------------------------|---------|------------------------------|---------|-------------------------------|---------|
|        | 1990                 | Average | 1990                | Average | 1990                        | Average | 1990                         | Average | 1990                          | Average |
| Dec.   | 0                    | 15      | 9                   | 12      | 33                          | 18      | 31                           | 9       | 31                            | 28      |
| Feb.   | 19                   | 17      | 15                  | 7       | 65                          | 18      | 9                            | 8       | 28                            | 10      |
| Mar.   | 23                   | 10      | 7                   | 4       | 13                          | 12      | 7                            | 4       | 20                            | 6       |
| Apr.   | 15                   | 32      | 6                   | 18      | 7                           | 32      | 0                            | 10      | 0                             | 42      |
| May    | 52                   | 69      | 28                  | 31      | 11                          | 53      | 24                           | 20      | 25                            | 36      |
| June   | 8                    | 55      | 4                   | 42      | 51                          | 46      | 2                            | 19      | 6                             | 38      |
| July   | 210                  | 41      | 20                  | 41      | 58                          | 26      | 76                           | 26      | 38                            | 43      |
| Aug.   | 32                   | 52      | 69                  | 41      | 22                          | 49      | 43                           | 31      | 21                            |         |
| Sep.   | 17                   | 87      | 75                  | 50      | 118                         | 78      | 82                           | 38      | 155                           | 30      |
| Oct.   | 6                    | 47      | 2                   | 27      | 109                         | 44      | 22                           | 20      | 26                            | 35      |
| Nov.   | 7                    | 15      | 0                   | 11      | 0                           | 14      | 0                            | 11      | 0                             | 6       |
| Dec.   | 0                    | 13      | 0                   | 11      | 0                           | 16      | 0                            | 12      |                               | 3       |
| Yearly | 389                  | 453     | 235                 | 295     | 487                         | 406     | 296                          | 208     |                               | 298     |

| Month  | Castanos,<br>Coahuila |         | Villa Hidalgo,<br>Coahuila |         | Colombia (SARH),<br>Nuevo Leon |         | San Nicolas,<br>Nuevo Leon |         | Jarita,<br>Nuevo Leon |         |
|--------|-----------------------|---------|----------------------------|---------|--------------------------------|---------|----------------------------|---------|-----------------------|---------|
|        | 1990                  | Average | 1990                       | Average | 1990                           | Average | 1990                       | Average | 1990                  | Average |
| Dec.   | 19                    | 16      | 31                         | 19      | 25                             | 21      | 27                         | 25      | 28                    | 17      |
| Feb.   | 54                    | 15      | 50                         | 22      | 47                             | 24      | 54                         | 26      | 88                    | 30      |
| Mar.   | 0                     | 5       | 19                         | 17      | 11                             | 16      | 21                         | 19      | 19                    | 13      |
| Apr.   | 0                     | 24      | 42                         | 45      | 24                             | 48      | 15                         | 44      | 16                    | 42      |
| May    | 36                    | 50      | T                          | 68      | 13                             | 58      | 5                          | 73      | 20                    | 81      |
| June   | 50                    | 52      | 0                          | 57      | 0                              | 47      | 0                          | 59      | 0                     | 44      |
| July   | 68                    | 46      | 171                        | 34      | 120                            | 41      | 302                        | 55      | 106                   | 40      |
| Aug.   | 10                    | 57      | 26                         | 53      | 66                             | 21      | 26                         | 50      | 10                    | 51      |
| Sep.   | 57                    | 68      | 52                         | 80      | 14                             | 30      | 130                        | 56      | 96                    | 66      |
| Oct.   | 0                     | 40      | 31                         | 53      | 65                             |         |                            | 63      |                       | 50      |
| Nov.   | 0                     | 8       | 47                         | 23      | 21                             |         |                            | 13      |                       | 29      |
| Dec.   | 18                    | 7       | T                          | 19      | 22                             |         |                            | 21      |                       | 21      |
| Yearly | 312                   | 388     | 469                        | 490     |                                |         | 424                        |         | 504                   | 484     |

| Month  | Anahuac,<br>Nuevo Leon |         | Nv. Laredo (M. S.<br>of Mexico), Tamps. |         | Lampazos,<br>Nuevo Leon |         | Nv. Laredo (IB&WC),<br>Tamaulipas |         | Espinazo,<br>Nuevo Leon |         |
|--------|------------------------|---------|---|---------|-------------------------|---------|-----------------------------------|---------|-------------------------|---------|
|        | 1990                   | Average | 1990                                    | Average | 1990                    | Average | 1990                              | Average | 1990                    | Average |
| Dec.   | 33                     | 19      | 29                                      | 21      | 24                      | 19      | 29                                | 20      | 23                      | 34      |
| Feb.   | 95                     | 19      | 65                                      | 23      | 19                      | 18      | 94                                | 26      | 24                      | 14      |
| Mar.   | 13                     | 13      | 27                                      | 16      | 31                      | 13      | 27                                | 14      | 5                       | 4       |
| Apr.   | 13                     | 32      | 57                                      | 34      | 17                      | 30      | 57                                | 36      | 26                      | 40      |
| May    | 7                      | 65      | 13                                      | 63      | 18                      | 49      | 12                                | 76      | 17                      | 66      |
| June   | 0                      | 52      | 4                                       | 57      | 0                       | 53      | 4                                 | 67      | 1                       | 26      |
| July   | 136                    | 38      | 59                                      | 32      | 55                      | 45      | 59                                | 36      | 48                      | 42      |
| Aug.   | 59                     | 82      | 43                                      | 32      | 35                      | 35      | 59                                | 57      | 27                      | 36      |
| Sep.   | 245                    | 80      | 153                                     | 72      | 66                      | 118     | 133                               | 79      | 47                      | 59      |
| Oct.   | 44                     | 32      | 50                                      | 27      | 54                      | 32      | 60                                | 23      | 23                      | 37      |
| Nov.   | 160                    | 20      | 46                                      | 25      | 27                      | 27      | 95                                | 29      | 3                       | 10      |
| Dec.   | 0                      | 18      | 7                                       | 23      | 18                      |         | 1                                 | 21      | 0                       | 11      |
| Yearly |                        | 459     | 574                                     | 459     |                         | 479     | 602                               | 521     | 244                     | 379     |

## RAINFALL ON THE RIO GRANDE WATERSHED

IN MEXICO

IN MILLIMETRES

| Month  | Villaldama,<br>Nuevo Leon |         | Reata,<br>Coahuila |         | Vallecillo,<br>Nuevo Leon |         | La Popa,<br>Nuevo Leon |         | Sabinas Hidalgo,<br>Nuevo Leon |         |
|--------|---------------------------|---------|--------------------|---------|---------------------------|---------|------------------------|---------|--------------------------------|---------|
|        | 1990                      | Average | 1990               | Average | 1990                      | Average | 1990                   | Average | 1990                           | Average |
| Jan.   | 22                        | 34      | 23                 | 11      | 25                        | 21      | 10                     | 12      | 31                             | 21      |
| Feb.   | 9                         | 13      | 24                 | 7       | 37                        | 21      | 4                      | 14      | 39                             | 20      |
| Mar.   | 13                        | 7       | 4                  | 6       | 14                        | 12      | 0                      | 5       | 18                             | 15      |
| Apr.   | 11                        | 44      | 8                  | 15      | 51                        | 50      | 0                      | 13      | 27                             | 34      |
| May    | 12                        | 49      | 19                 | 23      |                           | 52      | 13                     | 25      | 7                              | 68      |
| June   | 11                        | 69      | 0                  | 30      |                           | 79      | 0                      | 35      |                                | 85      |
| July   | 83                        | 57      | 52                 | 27      |                           | 42      | 0                      | 29      | 60                             | 65      |
| Aug.   | 72                        | 72      | 64                 | 39      |                           | 54      | 25                     | 40      | 84                             | 59      |
| Sep.   | 113                       | 125     | 31                 | 41      |                           | 105     | 0                      | 65      | 164                            | 156     |
| Oct.   | 32                        |         | 140                | 23      |                           |         | 51                     | 18      | 16                             | 62      |
| Nov.   | 16                        |         | 2                  | 12      |                           |         | 21                     | 15      | 7                              | 23      |
| Dec.   |                           | 15      |                    | 10      |                           |         | 17                     | 16      | 0                              | 15      |
| Yearly |                           | 533     |                    | 244     |                           |         | 525                    |         | 287                            |         |
|        |                           |         |                    |         |                           |         |                        |         |                                | 623     |

| Month  | El Alamo,<br>Nuevo Leon |         | Garza Ayala,<br>Nuevo Leon |         | Parras,<br>Coahuila |         | Hipolito,<br>Coahuila |         | Mina,<br>Nuevo Leon |         |
|--------|-------------------------|---------|----------------------------|---------|---------------------|---------|-----------------------|---------|---------------------|---------|
|        | 1990                    | Average | 1990                       | Average | 1990                | Average | 1990                  | Average | 1990                | Average |
| Jan.   | 0                       | 29      | 23                         | 23      | 12                  | 17      | 0                     | 18      | 7                   | 15      |
| Feb.   | 4                       | 14      | 31                         | 18      | 5                   | 8       | 0                     | 9       | 14                  | 10      |
| Mar.   | 12                      | 15      | 24                         | 11      | 3                   | 7       | 0                     | 9       | 5                   | 4       |
| Apr.   | 9                       | 59      | 36                         | 44      | 0                   | 11      | 11                    | 16      | 45                  | 17      |
| May    | 25                      | 78      | 11                         | 50      | 48                  | 32      | 0                     | 14      | 8                   | 21      |
| June   | 0                       | 60      |                            | 55      | 47                  | 46      | 16                    | 9       |                     | 35      |
| July   |                         | 31      |                            | 95      | 152                 | 66      |                       | 13      | 18                  | 30      |
| Aug.   | 34                      | 43      |                            | 66      | 108                 | 71      |                       | 17      |                     | 42      |
| Sep.   | 100                     | 84      |                            | 103     | 137                 | 68      |                       | 26      | 83                  | 80      |
| Oct.   | 36                      |         |                            | 57      | 69                  | 33      |                       | 18      | 99                  | 26      |
| Nov.   | 12                      |         |                            | 38      | 0                   | 16      |                       | 8       | 3                   | 15      |
| Dec.   |                         | 40      |                            | 14      | 0                   | 18      |                       | 5       | 1                   | 13      |
| Yearly |                         | 501     |                            | 574     | 581                 | 393     |                       | 162     |                     | 308     |

| Month  | Icamole,<br>Nuevo Leon |         | General Cepeda,<br>Coahuila |         | Hacienda Mamulique,<br>Nuevo Leon |         | Paras,<br>Nuevo Leon |         | Nueva Cd. Guerrero,<br>Tamaulipas |         |
|--------|------------------------|---------|-----------------------------|---------|-----------------------------------|---------|----------------------|---------|-----------------------------------|---------|
|        | 1990                   | Average | 1990                        | Average | 1990                              | Average | 1990                 | Average | 1990                              | Average |
| Jan.   | 11                     | 11      | 5                           | 13      |                                   | 25      | 0                    | 20      | 1                                 | 24      |
| Feb.   | 7                      | 8       | 8                           | 12      |                                   | 10      | 37                   | 20      | 75                                | 28      |
| Mar.   | 3                      | 4       | 6                           | 7       |                                   | 11      | 10                   | 14      | 19                                | 13      |
| Apr.   | 6                      | 10      | 16                          | 13      | 107                               | 50      | 11                   | 25      | 29                                | 39      |
| May    | 7                      | 19      | 22                          | 23      | 25                                | 43      | 0                    | 51      |                                   | 69      |
| June   | 0                      | 21      | 15                          | 52      | 78                                | 82      |                      | 68      | 0                                 | 63      |
| July   | 12                     | 15      | 106                         | 79      | 60                                | 72      |                      | 41      | 56                                | 37      |
| Aug.   | 35                     | 21      | 81                          | 72      |                                   | 78      |                      | 58      | 76                                | 54      |
| Sep.   | 22                     | 50      | 90                          | 72      |                                   | 109     |                      | 85      | 131                               | 99      |
| Oct.   | 35                     | 24      | 31                          | 30      | 27                                | 42      |                      | 53      | 12                                | 48      |
| Nov.   | 0                      | 15      | 0                           | 13      | 9                                 | 26      |                      | 21      | 47                                | 26      |
| Dec.   | 0                      | 13      | 0                           | 14      | 1                                 | 23      |                      | 16      | 1                                 | 20      |
| Yearly | 138                    | 211     | 380                         | 400     |                                   | 571     |                      | 472     |                                   | 520     |

| Month  | La Escondida,<br>Nuevo Leon |         | Rinconada,<br>Nuevo Leon |         | Ramos Arizpe,<br>Coahuila |         | Gomez Farias,<br>Coahuila |         | Cienega de Flores,<br>Nuevo Leon |         |
|--------|-----------------------------|---------|--------------------------|---------|---------------------------|---------|---------------------------|---------|----------------------------------|---------|
|        | 1990                        | Average | 1990                     | Average | 1990                      | Average | 1990                      | Average | 1990                             | Average |
| Jan.   | 3                           | 38      | 5                        | 11      | 9                         | 13      | 6                         | 38      | 4                                | 30      |
| Feb.   | 32                          | 30      | 17                       | 8       | 17                        | 9       | 38                        | 19      | 8                                | 23      |
| Mar.   | 46                          | 22      | 18                       | 5       | 17                        | 7       | 10                        | 4       | 16                               | 24      |
| Apr.   | 34                          | 75      |                          | 14      | 16                        | 14      | 10                        | 27      | 19                               | 37      |
| May    | 28                          | 49      | 48                       | 17      | 48                        | 24      | 99                        | 46      |                                  | 65      |
| June   | 82                          | 7       | 26                       | 0       | 26                        | 79      | 55                        |         |                                  | 82      |
| July   | 64                          | 53      | 12                       | 15      | 94                        | 37      | 135                       | 57      |                                  | 59      |
| Aug.   | 49                          | 113     | 15                       | 30      | 21                        | 33      | 85                        | 62      |                                  | 108     |
| Sep.   | 136                         | 110     | 35                       | 53      | 40                        | 47      | 132                       | 62      |                                  | 137     |
| Oct.   | 50                          |         |                          | 22      | 13                        | 21      | 48                        | 27      | 55                               | 63      |
| Nov.   | 17                          |         |                          | 9       | 1                         | 12      | 0                         | 12      | 1                                | 27      |
| Dec.   |                             | 45      |                          | 10      | 0                         | 13      | 0                         | 23      | 0                                | 29      |
| Yearly |                             | 684     |                          | 220     | 276                       | 256     | 642                       | 432     |                                  | 684     |

## RAINFALL ON THE RIO GRANDE WATERSHED

In Mexico

In Millimetres

| Month  | Saltillo,<br>Coahuila |         | San Juan de<br>Vaqueria, Coahuila |         | Agualegas,<br>Nuevo Leon |         | Higueras,<br>Nuevo Leon |         | Topo Chico,<br>Nuevo Leon |         |
|--------|-----------------------|---------|-----------------------------------|---------|--------------------------|---------|-------------------------|---------|---------------------------|---------|
|        | 1990                  | Average | 1990                              | Average | 1990                     | Average | 1990                    | Average | 1990                      | Average |
| Jan.   | 9                     | 16      | 3                                 | 27      | 2                        | 41      | 2                       | 19      | 4                         | 14      |
| Feb.   | 34                    | 13      | 16                                | 13      | 31                       | 22      | 10                      | 16      | 14                        | 15      |
| Mar.   | 3                     | 8       | 21                                | 7       | 12                       | 15      | 32                      | 17      | 48                        | 13      |
| Apr.   | 11                    | 17      | 29                                | 28      | 12                       | 49      | 33                      | 32      | 30                        | 30      |
| May    | 52                    | 29      | 63                                | 45      | 12                       | 67      | 38                      | 53      | 37                        | 42      |
| June   | 28                    | 51      | 95                                | 57      |                          | 53      | 31                      | 67      | 0                         | 57      |
| July   | 96                    | 66      | 135                               | 88      |                          | 45      | 77                      | 56      | 86                        | 42      |
| Aug.   | 28                    | 62      | 51                                | 80      |                          | 87      | 67                      | 86      | 56                        | 76      |
| Sep.   | 69                    | 64      | 108                               | 66      |                          | 57      | 174                     | 124     | 81                        | 122     |
| Oct.   | 32                    | 31      | 22                                | 47      |                          | 53      | 27                      | 47      | 66                        | 75      |
| Nov.   | 4                     | 20      | 5                                 | 9       |                          | 19      | 9                       | 20      | 6                         | 18      |
| Dec.   | 0                     | 16      | 0                                 | 8       |                          | 20      | 0                       | 19      | 0                         | 12      |
| Yearly | 366                   | 393     | 548                               | 475     |                          | 528     | 500                     | 556     | 428                       | 516     |

| Month  | San Antonio de las<br>Alazanas, Coahuila |         | Monterrey,<br>Nuevo Leon |         | Ejido Marin,<br>Nuevo Leon |         | Las Comitas,<br>Nuevo Leon |         | La Cruz,<br>Nuevo Leon |         |
|--------|--|---------|--------------------------|---------|----------------------------|---------|----------------------------|---------|------------------------|---------|
|        | 1990                                     | Average | 1990                     | Average | 1990                       | Average | 1990                       | Average | 1990                   | Average |
| Jan.   | 27                                       | 29      | 4                        | 16      | 2                          | 32      | 7                          | 10      |                        | 31      |
| Feb.   | 58                                       | 19      | 9                        | 17      | 4                          | 18      | 20                         | 11      |                        | 17      |
| Mar.   | 60                                       | 12      | 37                       | 19      | 24                         | 13      | 11                         | 6       | 70                     | 11      |
| Apr.   | 10                                       | 27      | 39                       | 30      | 9                          | 34      | 14                         | 20      | 35                     | 34      |
| May    | 48                                       | 24      | 46                       | 33      | 66                         | 28      | 30                         | 50      | 50                     | 52      |
| June   | 65                                       | 19      | 73                       | 0       | 59                         | 11      | 57                         | 20      | 77                     |         |
| July   | 83                                       | 33      | 58                       | 94      | 53                         | 37      | 43                         | 134     | 83                     |         |
| Aug.   | 79                                       | 57      | 81                       | 80      | 66                         | 108     | 79                         | 75      | 106                    |         |
| Sep.   | 66                                       | 178     | 155                      | 244     | 106                        | 104     | 125                        | 119     | 168                    |         |
| Oct.   | 44                                       | 135     | 78                       | 18      | 35                         |         | 42                         | 93      | 57                     |         |
| Nov.   | 24                                       | 7       | 29                       | 10      | 13                         |         | 12                         |         | 22                     |         |
| Dec.   | 26                                       | 0       | 18                       | 0       | 33                         |         | 10                         |         | 15                     |         |
| Yearly |  | 522     | 542                      | 617     | 518                        | 528     |                            | 445     |                        | 673     |

| Month  | Huachichil,<br>Coahuila |         | Cd. Mier,<br>Tamaulipas |         | General Trevino,<br>Nuevo Leon |         | Cerralvo,<br>Nuevo Leon |         | La Arena,<br>Nuevo Leon |         |
|--------|-------------------------|---------|-------------------------|---------|--------------------------------|---------|-------------------------|---------|-------------------------|---------|
|        | 1990                    | Average | 1990                    | Average | 1990                           | Average | 1990                    | Average | 1990                    | Average |
| Jan.   | 54                      | 73      | 5                       | 26      | 0                              | 32      | 1                       | 20      | 2                       | 22      |
| Feb.   | 71                      | 40      | 97                      | 32      | 22                             | 28      | 14                      | 17      | 11                      | 19      |
| Mar.   | 33                      | 13      | 15                      | 15      | 20                             | 17      | 28                      | 17      | 22                      | 15      |
| Apr.   | 23                      | 36      | 33                      | 39      | 9                              | 55      | 38                      | 43      | 24                      | 33      |
| May    | 137                     | 79      | 15                      | 66      | 5                              | 85      | 8                       | 86      | 24                      | 71      |
| June   | 118                     | 74      | 0                       | 64      | 0                              | 58      | 90                      | 3       | 76                      |         |
| July   | 200                     | 111     | 12                      | 33      | 38                             | 31      | 44                      | 51      | 15                      | 72      |
| Aug.   | 141                     | 63      |                         | 65      | 110                            | 71      | 79                      | 92      | 47                      | 81      |
| Sep.   | 124                     | 73      | 17                      | 110     | 98                             | 101     | 125                     | 133     | 155                     | 132     |
| Oct.   | 52                      | 39      | 54                      | 51      |                                | 45      |                         | 62      | 20                      | 61      |
| Nov.   | 0                       | 14      | 1                       | 25      |                                | 18      |                         | 17      | 6                       | 19      |
| Dec.   | 0                       | 28      | 1                       | 21      |                                | 32      |                         | 14      | 1                       | 17      |
| Yearly | 953                     | 643     |                         | 547     |                                | 573     |                         | 642     | 329                     | 618     |

| Month  | Pajonal,<br>Nuevo Leon |         | Tepehuaje,<br>Nuevo Leon |         | Santa Catarina,<br>Nuevo Leon |         | Una de Gato,<br>Nuevo Leon |         | Cerritos,<br>Nuevo Leon |         |
|--------|------------------------|---------|--------------------------|---------|-------------------------------|---------|----------------------------|---------|-------------------------|---------|
|        | 1990                   | Average | 1990                     | Average | 1990                          | Average | 1990                       | Average | 1990                    | Average |
| Jan.   | 0                      | 18      | 4                        | 40      | 0                             | 18      | 2                          | 31      | 13                      | 25      |
| Feb.   | 17                     | 16      | 14                       | 18      | 15                            | 11      | 22                         | 16      | 19                      | 16      |
| Mar.   | 19                     | 9       | 33                       | 17      | 11                            | 8       | 33                         | 13      | 38                      | 15      |
| Apr.   | 18                     | 29      | 30                       | 50      | 38                            | 21      | 48                         | 57      | 66                      | 45      |
| May    | 92                     | 54      | 37                       | 96      | 12                            | 26      | 15                         | 86      | 56                      | 100     |
| June   | 6                      | 63      | 0                        | 83      | 0                             | 47      | 0                          | 104     | 12                      | 152     |
| July   | 116                    | 64      | 86                       | 55      | 29                            | 41      | 86                         | 51      | 120                     | 130     |
| Aug.   | 136                    | 89      | 56                       | 89      | 76                            | 68      | 116                        | 86      | 172                     | 145     |
| Sep.   | 109                    | 139     | 81                       | 130     | 75                            | 119     | 185                        | 122     | 269                     | 296     |
| Oct.   | 100                    | 49      | 66                       | 40      | 136                           | 42      |                            | 85      | 193                     | 102     |
| Nov.   | 13                     | 6       | 17                       | 1       | 13                            |         |                            | 18      | 19                      | 18      |
| Dec.   | 14                     | 0       | 26                       | 1       | 14                            |         |                            | 42      | 1                       | 13      |
| Yearly |                        | 557     | 413                      | 661     | 394                           | 428     |                            | 711     | 978                     | 1,057   |

## RAINFALL ON THE RIO GRANDE WATERSHED

In Mexico

In Millimetres

| Month  | Cienega de La Purisima, Coahuila |         | Laguna de Sanchez, Nuevo Leon |         | Potrero de Abrego, Coahuila |         | Rodrigo Gomez Res., Nuevo Leon |         | Carbonera, Nuevo Leon |         |
|--------|----------------------------------|---------|-------------------------------|---------|-----------------------------|---------|--------------------------------|---------|-----------------------|---------|
|        | 1990                             | Average | 1990                          | Average | 1990                        | Average | 1990                           | Average | 1990                  | Average |
| Jan.   | 63                               | 63      | 0                             | 19      | 37                          | 13      | 25                             | 0       | 25                    |         |
| Feb.   | 162                              | 58      | 53                            | 16      | 55                          | 22      | 24                             | 0       | 14                    |         |
| Mar.   | 67                               | 17      | 1                             | 9       | 107                         | 23      | 48                             | 26      | 0                     | 12      |
| Apr.   | 20                               | 34      | 46                            | 30      | 55                          | 42      | 115                            | 47      | 0                     | 29      |
| May    | 103                              | 84      | 15                            | 47      | 96                          | 48      | 79                             | 74      | 0                     | 47      |
| June   | 80                               | 39      | 83                            | 32      | 33                          | 29      | 74                             | 139     | 0                     | 63      |
| July   | 88                               | 161     | 65                            | 85      | 29                          | 61      | 101                            | 120     | 74                    |         |
| Aug.   | 158                              | 116     | 125                           | 107     | 89                          | 65      | 109                            | 152     | 50                    | 80      |
| Sep.   | 132                              | 131     | 168                           | 66      | 65                          | 250     | 251                            | 27      | 66                    |         |
| Oct.   | 91                               | 58      | 63                            | 52      | 27                          | 205     | 125                            | 0       | 43                    |         |
| Nov.   | 36                               | 0       | 17                            | 0       | 33                          | 17      | 32                             | 0       | 23                    |         |
| Dec.   | 52                               |         | 16                            | 0       | 39                          | 2       | 22                             | 0       | 23                    |         |
| Yearly |                                  | 851     |                               | 640     |                             | 463     | 991                            | 1018    | 197                   | 499     |

| Month  | Miguel Aleman, Tamaulipas |         | Cienega del Toro, Nuevo Leon |         | Los Ramones, Nuevo Leon |         | Villa Allende, Nuevo Leon |         | San Juan, Nuevo Leon |         |
|--------|---------------------------|---------|------------------------------|---------|-------------------------|---------|---------------------------|---------|----------------------|---------|
|        | 1990                      | Average | 1990                         | Average | 1990                    | Average | 1990                      | Average | 1990                 | Average |
| Jan.   |                           | 25      | 33                           | 33      | 1                       | 21      | 18                        | 30      | 2                    | 16      |
| Feb.   |                           | 26      | 77                           | 15      | 42                      | 19      | 22                        | 32      | 18                   | 23      |
| Mar.   |                           | 13      | 51                           | 19      | 22                      | 17      | 48                        | 31      | 27                   | 17      |
| Apr.   |                           | 42      | 27                           | 42      | 22                      | 37      | 122                       | 68      | 36                   | 55      |
| May    |                           | 58      | 168                          | 65      | 10                      | 71      | 142                       | 98      | 37                   | 65      |
| June   |                           | 71      | 13                           | 58      | 4                       | 81      | 16                        | 139     | 3                    | 78      |
| July   | 10                        | 40      | 140                          | 74      | 44                      | 48      | 102                       | 89      | 42                   | 57      |
| Aug.   | 54                        | 53      | 137                          | 80      | 69                      | 88      | 58                        | 135     | 65                   | 90      |
| Sep.   | 195                       | 121     | 114                          | 84      | 180                     | 143     | 317                       | 237     | 133                  | 138     |
| Oct.   | 52                        | 57      | 106                          | 49      | 17                      | 64      | 80                        | 129     | 100                  | 78      |
| Nov.   | 22                        | 22      | 3                            | 19      | 14                      | 18      | 20                        | 40      | 11                   | 25      |
| Dec.   | T                         | 20      | 2                            | 17      | 0                       | 16      | 74                        | 29      | 2                    | 18      |
| Yearly |                           | 548     | 871                          | 555     | 425                     | 623     | 1,019                     | 1,057   | 476                  | 660     |

| Month  | Mimbres, Nuevo Leon |         | Potosi, Nuevo Leon |         | Rusio, Nuevo Leon |         | Cerro Prieto, Nuevo Leon |         | Los Herreras, (La Tableta), N.L. |         |
|--------|---------------------|---------|--------------------|---------|-------------------|---------|--------------------------|---------|----------------------------------|---------|
|        | 1990                | Average | 1990               | Average | 1990              | Average | 1990                     | Average | 1990                             | Average |
| Jan.   | 18                  | 40      | 15                 | 22      | 13                | 19      | 20                       | 27      | 0                                | 18      |
| Feb.   | 62                  | 29      | 49                 | 17      | 49                | 16      | 12                       | 15      | 3                                | 16      |
| Mar.   | 22                  | 26      | 17                 | 9       | 9                 | 13      | 42                       | 15      | 1                                | 15      |
| Apr.   | 26                  | 42      | 23                 | 33      | 23                | 34      | 24                       | 37      | 35                               | 34      |
| May    | 104                 | 69      | 109                | 44      | 88                | 45      | 41                       | 107     | 1                                | 73      |
| June   | 0                   | 81      | 4                  | 29      | 2                 | 51      | 76                       | 102     | T                                | 68      |
| July   | 129                 | 71      | 50                 | 36      | 71                | 45      | 17                       | 50      | 33                               | 48      |
| Aug.   | 101                 | 86      | 74                 | 38      | 23                | 50      | 21                       | 83      | 60                               | 67      |
| Sep.   | 133                 | 97      | 45                 | 38      | 47                | 50      | 113                      | 130     | 138                              | 117     |
| Oct.   | 80                  | 51      | 65                 | 37      | 83                | 35      | 55                       | 59      |                                  | 55      |
| Nov.   | 5                   | 31      | 1                  | 29      | 2                 | 19      | 1                        | 18      |                                  | 16      |
| Dec.   | 6                   | 31      | 9                  | 37      | 11                | 22      | 2                        | 26      |                                  | 15      |
| Yearly | 686                 | 654     | 461                | 369     | 421               | 399     | 424                      | 669     |                                  | 542     |

| Month  | Rayones, Nuevo Leon |         | Madero(Los Aldamas) Nuevo Leon |         | Montemorelos, Nuevo Leon |         | Galeana, Nuevo Leon |         | Las Enramadas, Nuevo Leon |         |
|--------|---------------------|---------|--------------------------------|---------|--------------------------|---------|---------------------|---------|---------------------------|---------|
|        | 1990                | Average | 1990                           | Average | 1990                     | Average | 1990                | Average | 1990                      | Average |
| Jan.   | 8                   | 13      | 1                              | 30      | 0                        | 24      | 4                   | 18      | 0                         | 24      |
| Feb.   | 30                  | 10      | 58                             | 22      | 23                       | 24      | 54                  | 16      | 20                        | 18      |
| Mar.   | 7                   | 8       | 17                             | 17      | 51                       | 28      | 14                  | 11      | 9                         | 17      |
| Apr.   | 9                   | 27      | 23                             | 34      | 86                       | 59      | 5                   | 31      | 0                         | 45      |
| May    | 80                  | 47      | 12                             | 78      | 97                       | 87      | 87                  | 47      | 40                        | 74      |
| June   | 0                   | 52      | 6                              | 84      | 0                        | 99      | 24                  | 57      | 0                         | 80      |
| July   | 41                  | 31      | 41                             | 60      | 41                       | 62      | 19                  | 48      | 114                       | 59      |
| Aug.   | 63                  | 71      | 82                             | 105     | 81                       | 107     | 190                 | 64      | 45                        | 94      |
| Sep.   | 142                 | 91      | 180                            | 132     | 237                      | 176     | 138                 | 88      | 136                       | 158     |
| Oct.   | 109                 | 40      | 2                              | 37      | 99                       | 94      | 94                  | 42      | 22                        | 65      |
| Nov.   | 0                   | 11      | 24                             | 13      | 29                       | 40      | 0                   | 17      | 8                         | 18      |
| Dec.   | 8                   | 11      | 0                              | 26      | 3                        | 24      | 0                   | 19      | 0                         | 20      |
| Yearly | 497                 | 412     | 446                            | 638     | 747                      | 824     | 629                 | 458     | 394                       | 672     |

RAINFALL ON THE RIO GRANDE WATERSHED  
IN MEXICO

IN MILLIMETRES

| Month  | Iturbide,<br>Nuevo Leon |         | Cabezones,<br>Nuevo Leon |         | Pobladores,<br>Nuevo Leon |         | El Cuchillo,<br>Nuevo Leon |         | Linares,<br>Nuevo Leon |         |
|--------|-------------------------|---------|--------------------------|---------|---------------------------|---------|----------------------------|---------|------------------------|---------|
|        | 1990                    | Average | 1990                     | Average | 1990                      | Average | 1990                       | Average | 1990                   | Average |
| Jan.   | 5                       | 18      | 46                       | 30      | 12                        | 44      | 2                          | 19      | 18                     | 24      |
| Feb.   | 54                      | 17      | 42                       | 22      | 20                        | 25      | 32                         | 15      | 29                     | 22      |
| Mar.   | 12                      | 15      | 43                       | 27      | 8                         | 15      | 13                         | 13      | 32                     | 26      |
| Apr.   | 26                      | 33      | 96                       | 64      | 21                        | 47      | 13                         | 35      | 36                     | 57      |
| May    | 89                      | 55      | 92                       | 102     | 18                        | 57      | 7                          | 61      | 64                     | 93      |
| June   | 34                      | 85      | 4                        | 102     | 25                        | 60      | 0                          | 55      | 33                     | 102     |
| July   | 149                     | 70      | 63                       | 72      | 55                        | 36      | 37                         | 48      | 120                    | 69      |
| Aug.   | 164                     | 109     | 207                      | 146     | 22                        | 39      | 95                         | 73      | 9                      | 97      |
| Sep.   | 175                     | 159     | 191                      | 213     | 78                        | 100     | 68                         | 112     | 212                    | 162     |
| Oct.   | 178                     | 62      | 79                       | 84      | 5                         | 26      | 3                          | 56      | 82                     | 83      |
| Nov.   | 2                       | 13      | 10                       | 25      |                           | 12      | 7                          | 14      | 7                      | 28      |
| Dec.   | 0                       | 15      | 3                        | 20      |                           | 56      | T                          | 15      | 11                     | 28      |
| Yearly | 888                     | 651     | 876                      | 907     |                           | 517     | 277                        | 526     | 653                    | 791     |

| Month  | El Realito,<br>Nuevo Leon |         | General Bravo,<br>Nuevo Leon |         | San Diego,<br>Nuevo Leon |         | Comales,<br>Tamaulipas |         | El Brasil,<br>Nuevo Leon |         |
|--------|---------------------------|---------|------------------------------|---------|--------------------------|---------|------------------------|---------|--------------------------|---------|
|        | 1990                      | Average | 1990                         | Average | 1990                     | Average | 1990                   | Average | 1990                     | Average |
| Jan.   | 0                         | 30      | 2                            | 21      | 2                        | 47      | 3                      | 23      | 0                        | 29      |
| Feb.   | 18                        | 13      | 52                           | 16      | 54                       | 14      | 40                     | 23      | 39                       | 29      |
| Mar.   | 54                        | 16      | 12                           | 14      | 37                       | 16      | 11                     | 15      | 14                       | 10      |
| Apr.   | 25                        | 41      | 8                            | 37      | 13                       | 109     | 14                     | 40      | 33                       | 43      |
| May    | 27                        | 74      | 8                            | 73      | 20                       | 118     | 15                     | 55      | 0                        | 60      |
| June   | 7                         | 75      | 8                            | 67      | 20                       | 103     | 3                      | 58      | 40                       |         |
| July   | 135                       | 62      | 29                           | 55      | 211                      | 66      | 7                      | 37      | 66                       | 54      |
| Aug.   | 49                        | 89      | 107                          | 70      | 55                       | 112     | 8                      | 64      | 10                       | 52      |
| Sep.   | 137                       | 124     | 88                           | 112     | 147                      | 137     | 188                    | 108     | 64                       | 88      |
| Oct.   | 37                        | 42      | 4                            | 48      | 27                       | 25      | 11                     | 61      | 5                        | 28      |
| Nov.   | 1                         | 10      | 6                            | 21      | 0                        | 14      | 32                     | 21      | 12                       |         |
| Dec.   | 2                         | 23      | 1                            | 21      | 4                        | 34      | T                      | 24      |                          | 20      |
| Yearly | 492                       | 599     | 325                          | 555     | 590                      | 795     | 332                    | 529     |                          | 465     |

| Month  | Camargo,<br>Tamaulipas |         | Valadeces,<br>Tamaulipas |         | La Pomona,<br>Nuevo Leon |         | Cd. Diaz Ordaz,<br>Tamaulipas |         | Vaqueria,<br>Nuevo Leon |         |
|--------|------------------------|---------|--------------------------|---------|--------------------------|---------|-------------------------------|---------|-------------------------|---------|
|        | 1990                   | Average | 1990                     | Average | 1990                     | Average | 1990                          | Average | 1990                    | Average |
| Jan.   | 7                      | 26      | 2                        | 32      | 0                        | 36      |                               |         | 31                      | 41      |
| Feb.   | 83                     | 29      | 47                       | 29      | 17                       | 16      |                               |         | 30                      | 24      |
| Mar.   | 6                      | 17      | 11                       | 13      | 46                       | 23      |                               |         | 14                      | 28      |
| Apr.   | 12                     | 37      | 18                       | 36      | 51                       | 57      |                               |         | 38                      | 42      |
| May    | 18                     | 66      | 15                       | 70      | 25                       | 109     |                               |         | 74                      | 92      |
| June   | 0                      | 72      | 0                        | 84      | 5                        | 72      |                               |         | 72                      | 63      |
| July   | 0                      | 35      | 14                       | 41      | 97                       | 58      |                               |         | 37                      | 36      |
| Aug.   | 20                     | 45      | 36                       | 53      | 22                       | 68      |                               |         | 52                      | 69      |
| Sep.   | 127                    | 115     | 58                       | 105     | 142                      | 125     | 107                           | 92      | 101                     | 106     |
| Oct.   | 55                     | 54      | 37                       | 56      | 14                       | 27      | 28                            | 64      | 11                      | 37      |
| Nov.   | 52                     | 30      | 30                       | 27      | 0                        | 14      | 42                            | 29      | 0                       | 15      |
| Dec.   | 0                      | 29      | 0                        | 25      | 5                        | 33      | T                             | 27      | 1                       | 42      |
| Yearly | 380                    | 555     | 268                      | 571     | 424                      | 638     |                               |         | 560                     | 595     |

| Month  | Bajo Rio San Juan,<br>Tamps., No. 2-38 |         | Bajo Rio San Juan,<br>Tamps., No. 2-33 |         | Reynosa,<br>Tamaulipas |         | Bajo Rio San Juan,<br>Tamps., No. 3-55 |         | Bajo Rio San Juan,<br>Tamps., No. 3-47 |         |
|--------|--|---------|--|---------|------------------------|---------|--|---------|--|---------|
|        | 1990                                   | Average | 1990                                   | Average | 1990                   | Average | 1990                                   | Average | 1990                                   | Average |
| Jan.   | 5                                      | 33      | 6                                      | 34      | 5                      | 31      | 14                                     | 47      |  | 45      |
| Feb.   | 51                                     | 26      | 44                                     | 27      | 59                     | 29      | 86                                     | 43      | 24                                     | 34      |
| Mar.   | 17                                     | 13      | 21                                     | 13      | 11                     | 18      | 3                                      | 16      | 3                                      | 15      |
| Apr.   | 25                                     | 35      | 49                                     | 39      | 52                     | 31      | 27                                     | 46      | 34                                     | 40      |
| May    | 107                                    | 87      | 91                                     | 103     | 108                    | 72      | 85                                     | 69      |  | 84      |
| June   | 37                                     | 81      | 74                                     | 58      | 58                     | 0       | 78                                     |         |  | 81      |
| July   | 46                                     | 46      | 44                                     | 28      | 40                     |         | 63                                     | 28      |  | 57      |
| Aug.   | 29                                     | 73      | 68                                     | 20      | 48                     | T       | 63                                     |         |  | 63      |
| Sep.   | 83                                     | 92      | 96                                     | 86      | 92                     | 172     | 108                                    |         |  | 107     |
| Oct.   | 35                                     | 49      | 56                                     | 58      | 58                     |         | 71                                     |         |  | 54      |
| Nov.   | 33                                     | 28      | 25                                     | 30      | 22                     | 25      | 21                                     | 25      |  | 23      |
| Dec.   | T                                      | 28      | 30                                     | 3       | 25                     |         | 32                                     | 0       |  | 30      |
| Yearly | 468                                    | 591     |  | 609     |                        | 524     |  | 657     |  | 633     |

RAINFALL ON THE RIO GRANDE WATERSHED  
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| Month  | Bajo Rio San Juan,<br>Tamps., 3-48A |         | Bajo Rio Bravo,<br>Tamps., No. 3-14 |         | Bajo Rio Bravo,<br>Tamps., No. 3-17 |         | Bajo Rio Bravo,<br>Tamps., No. 2-6 |         | Control,<br>Tamaulipas |         |
|--------|-------------------------------------|---------|-------------------------------------|---------|-------------------------------------|---------|------------------------------------|---------|------------------------|---------|
|        | 1990                                | Average | 1990                                | Average | 1990                                | Average | 1990                               | Average | 1990                   | Average |
| Jan.   | 0                                   | 37      | 17                                  | 37      | 0                                   | 43      | 19                                 | 50      | 12                     | 35      |
| Feb.   | 35                                  | 38      | 75                                  | 38      | 35                                  | 32      | 37                                 | 19      | 26                     | 29      |
| Mar.   | 2                                   | 17      |                                     | 14      | 16                                  | 12      | 19                                 | 26      | 16                     |         |
| Apr.   | 28                                  | 25      | 17                                  | 35      | 52                                  | 36      | 63                                 | 41      | 40                     | 41      |
| May    |                                     | 62      | 55                                  | 84      | 30                                  | 67      | 33                                 | 70      | 38                     | 72      |
| June   | 0                                   | 67      | 30                                  | 69      | 30                                  | 71      | 21                                 | 65      | 31                     | 70      |
| July   | 16                                  | 31      | 18                                  | 59      | 7                                   | 57      | 0                                  | 56      | 43                     | 45      |
| Aug.   | 13                                  | 40      | 22                                  | 62      | 141                                 | 84      | 16                                 | 83      | 107                    | 81      |
| Sep.   | 144                                 | 78      | 59                                  | 95      | 57                                  | 119     | 49                                 | 118     | 82                     | 128     |
| Oct.   |                                     | 30      | 89                                  | 61      | 114                                 | 61      | 100                                | 72      | 15                     | 67      |
| Nov.   | 27                                  | 21      | 19                                  | 21      | 0                                   | 29      | 14                                 | 34      | 6                      | 31      |
| Dec.   | 0                                   | 31      | 42                                  | 36      | 8                                   | 34      | 0                                  | 28      | T                      | 29      |
| Yearly |                                     | 477     |                                     | 611     |                                     | 652     | 359                                | 673     |                        | 644     |

| Month  | Bajo Rio Bravo,<br>Tamps., No. 2-5 |         | Valle Hermoso,<br>Tamaulipas |         | Bajo Rio Bravo<br>Tamps., No. 1-2 |         | Bajo Rio Bravo,<br>Tamps., No. 1-4 |         | Bajo Rio Bravo,<br>Tamps., No. 2-7 |         |
|--------|------------------------------------|---------|------------------------------|---------|-----------------------------------|---------|------------------------------------|---------|------------------------------------|---------|
|        | 1990                               | Average | 1990                         | Average | 1990                              | Average | 1990                               | Average | 1990                               | Average |
| Jan.   | 28                                 | 54      | 0                            | 31      | 16                                | 42      | 49                                 | 0       | 41                                 |         |
| Feb.   | 33                                 | 37      |                              | 32      | 23                                | 42      | 35                                 | 32      | 46                                 | 32      |
| Mar.   | 5                                  | 24      | 8                            | 17      | 36                                | 16      | 18                                 | 19      | 13                                 | 18      |
| Apr.   | 133                                | 51      | 104                          | 50      | 58                                | 42      | 153                                | 55      | 66                                 | 66      |
| May    | 68                                 | 61      | 68                           | 65      | 52                                | 76      | 50                                 | 67      | 48                                 | 67      |
| June   | 68                                 | 72      | 13                           | 76      | 85                                | 75      | 93                                 | 77      | 74                                 | 80      |
| July   | 110                                | 55      | 38                           | 53      | 33                                | 49      | 65                                 | 51      | 17                                 | 55      |
| Aug.   | 48                                 | 87      | 7                            | 66      | 60                                | 89      | 37                                 | 78      | 0                                  | 98      |
| Sep.   | 74                                 | 122     | 137                          | 126     | 103                               | 113     | 70                                 | 127     | 145                                | 128     |
| Oct.   | 54                                 | 66      | 41                           | 67      | 45                                | 68      | 64                                 | 67      | 25                                 | 59      |
| Nov.   | 73                                 | 31      | 15                           | 32      | 5                                 | 31      | 61                                 | 29      | 12                                 | 29      |
| Dec.   | T                                  | 32      | 8                            | 26      | T                                 | 27      | 2                                  | 33      | 0                                  | 26      |
| Yearly | 694                                | 692     |                              | 641     | 516                               | 670     |                                    | 684     | 446                                | 699     |

| Month  | Bajo Rio Bravo,<br>Tamps., No. 2-11 |         |  |  |  |  |  |  |  |  |
|--------|-------------------------------------|---------|--|--|--|--|--|--|--|--|
|        | 1990                                | Average |  |  |  |  |  |  |  |  |
| Jan.   | 15                                  | 45      |  |  |  |  |  |  |  |  |
| Feb.   |                                     | 38      |  |  |  |  |  |  |  |  |
| Mar.   | 5                                   | 17      |  |  |  |  |  |  |  |  |
| Apr.   | 76                                  | 60      |  |  |  |  |  |  |  |  |
| May    | 55                                  | 63      |  |  |  |  |  |  |  |  |
| June   | 15                                  | 90      |  |  |  |  |  |  |  |  |
| July   | 59                                  | 64      |  |  |  |  |  |  |  |  |
| Aug.   | 25                                  | 100     |  |  |  |  |  |  |  |  |
| Sep.   | 268                                 | 139     |  |  |  |  |  |  |  |  |
| Oct.   | 59                                  | 74      |  |  |  |  |  |  |  |  |
| Nov.   | 2                                   | 28      |  |  |  |  |  |  |  |  |
| Dec.   |                                     | 33      |  |  |  |  |  |  |  |  |
| Yearly |                                     | 751     |  |  |  |  |  |  |  |  |

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AVERAGE RAINFALL ON SUBDIVISIONS OF THE RIO GRANDE WATERSHED  
WITH AVERAGES FOR THE 120 YEARS 1871 - 1990, INCLUSIVE  
IN MILLIMETRES

The Precipitation records of all stations on or adjacent to the watershed subdivisions listed below have been used, with proper weighting for area, in calculating the average rainfalls shown here. The drainage area for each subdivision is shown in parentheses. The hundreds of individual records are delineated in the various "Indexes to Precipitation Records" shown in Water Bulletins Nos. 10, 14, 22, 26, and Supplement 40A.

| Month  | El Paso to Fort Quitman ( 6,933 Square Kilometres) |                | Fort Quitman to Above Rio Conchos ( 7,915 Square Kilometres) |                | # Above Rio Conchos to Johnson Ranch ( 9,795 Square Kilometres) |                | Johnson Ranch to Foster Ranch (33,623 Square Kilometres) |                |
|--------|--|----------------|--|----------------|---|----------------|--|----------------|
|        | 1990   | Period Average | 1990   | Period Average | 1990  | Period Average | 1990   | Period Average |
| Jan.   | 9  | 11             | 1  | 10             | 3   | 9              | 3  | 12             |
| Feb.   | 27   | 10             | 6  | 7              | 9   | 7              | 11   | 10             |
| Mar.   | 11   | 8              | 7  | 6              | 3   | 5              | 8  | 10             |
| April  | 29   | 7              | 4  | 9              | 20  | 10             | 17   | 20             |
| May    | 28   | 11             | 6  | 16             | 24  | 20             | 18   | 38             |
| June   | 0  | 20             | 3  | 31             | 2   | 30             | 16   | 43             |
| July   | 118  | 56             | 116  | 73             | 112   | 48             | 68   | 46             |
| Aug.   | 79   | 48             | 104  | 62             | 88  | 50             | 91   | 53             |
| Sept.  | 116  | 37             | 103  | 51             | 139   | 42             | 109  | 56             |
| Oct.   | 44   | 24             | 61   | 27             | 46  | 23             | 58   | 32             |
| Nov.   | 21   | 11             | 6  | 10             | 2   | 9              | 5  | 15             |
| Dec.   | 3  | 15             | 8  | 14             | 1   | 10             | 4  | 14             |
| Yearly | 485  | 258            | 425  | 316            | 449   | 263            | 408  | 349            |

| Month  | Pecos River below Sheffield ( 8,780 Square Kilometres) |                | # Foster Ranch to Amistad Dam ( 7,249 Square Kilometres) |                | Devils River (11,150 Square Kilometres) |                | + Amistad Dam to Eagle Pass ( 4,209 Square Kilometres) |                |
|--------|--|----------------|--|----------------|---|----------------|--|----------------|
|        | 1990   | Period Average | 1990   | Period Average | 1990                                    | Period Average | 1990   | Period Average |
| Jan.   | 8  | 17             | 10   | 19             | 19                                      | 17             | 13   | 19             |
| Feb.   | 19   | 22             | 8  | 23             | 51                                      | 19             | 50   | 23             |
| Mar.   | 27   | 19             | 34   | 24             | 51                                      | 27             | 58   | 25             |
| April  | 27   | 45             | 53   | 43             | 65                                      | 44             | 145  | 44             |
| May    | 51   | 47             | 50   | 73             | 93                                      | 66             | 71   | 73             |
| June   | 4  | 61             | 1  | 64             | 0                                       | 66             | 0  | 64             |
| July   | 139  | 46             | 144  | 47             | 221                                     | 47             | 198  | 48             |
| Aug.   | 41   | 50             | 13   | 48             | 50                                      | 54             | 48   | 49             |
| Sept.  | 132  | 64             | 82   | 76             | 193                                     | 75             | 141  | 77             |
| Oct.   | 40   | 48             | 39   | 53             | 62                                      | 57             | 24   | 53             |
| Nov.   | 39   | 23             | 13   | 26             | 23                                      | 37             | 24   | 26             |
| Dec.   | 5  | 19             | 5  | 22             | 2                                       | 24             | 5  | 22             |
| Yearly | 532  | 461            | 452  | 518            | 830                                     | 533            | 777  | 523            |

| Month  | ! Eagle Pass to Laredo ( 9,829 Square Kilometres) |                | ## Laredo to Falcon Dam ( 8,726 Square Kilometres) |                | ## Falcon Dam to Rio Grande City ( 1,212 Square Kilometres) |                | United States Side Below Rio Grande City ( 2,554 Square Kilometres) |                |
|--------|---|----------------|--|----------------|---|----------------|---|----------------|
|        | 1990  | Period Average | 1990   | Period Average | 1990  | Period Average | 1990  | Period Average |
| Jan.   | 27  | 18             | 10   | 20             | 5   | 23             | 9   | 33             |
| Feb.   | 74  | 21             | 82   | 21             | 74  | 22             | 32  | 29             |
| Mar.   | 22  | 22             | 24   | 20             | 25  | 22             | 27  | 26             |
| April  | 65  | 41             | 72   | 37             | 66  | 32             | 45  | 35             |
| May    | 46  | 78             | 13   | 80             | 12  | 61             | 48  | 71             |
| June   | 3   | 63             | 13   | 51             | 0   | 54             | 12  | 64             |
| July   | 147   | 38             | 75   | 52             | 47  | 47             | 24  | 46             |
| Aug.   | 58  | 57             | 72   | 48             | 76  | 54             | 28  | 59             |
| Sept.  | 77  | 75             | 87   | 77             | 76  | 89             | 85  | 110            |
| Oct.   | 38  | 49             | 42   | 44             | 30  | 49             | 21  | 63             |
| Nov.   | 38  | 24             | 65   | 38             | 56  | 20             | 20  | 34             |
| Dec.   | 17  | 24             | 24   | 22             | 3   | 18             | 9   | 32             |
| Yearly | 612   | 510            | 579  | 510            | 470   | 491            | 360   | 602            |

\* Excluding Rio Conchos, Alamito Creek, and Terlingua Creek

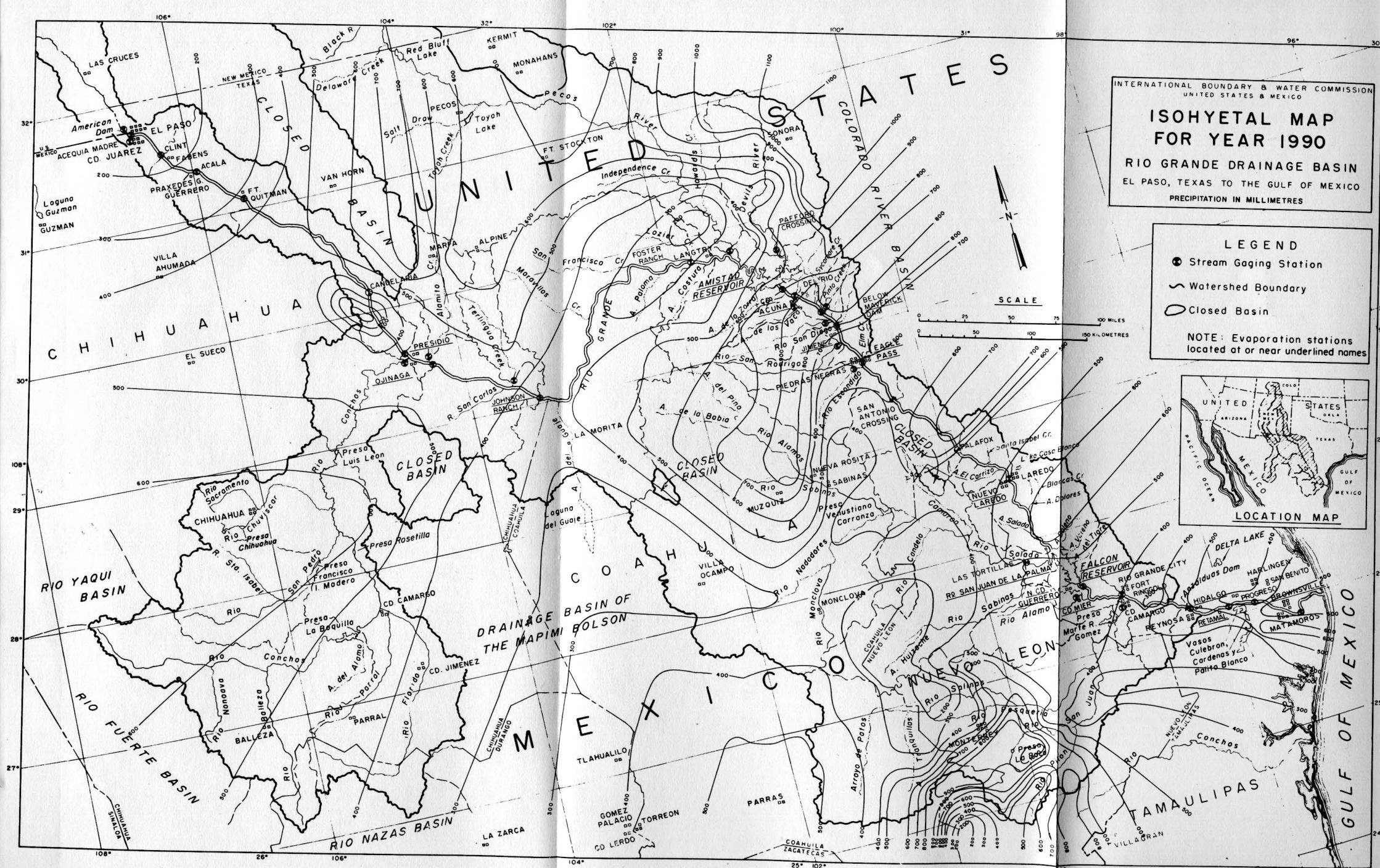
# Excluding Pecos and Devils Rivers

+ Excluding Arroyo Las Vacas, San Felipe Creek, Pinto Creek, Rio San Diego, and Rio San Rodrigo

! Excluding Rio Escondido

## Excluding Rio Salado above old Cd. Guerrero

## Excluding Rio Alamo and Rio San Juan



## LOCATION OF RAINFALL STATIONS ON THE RIO GRANDE WATERSHED

The precipitation records of stations listed below began on the date shown and extend through 1990. For detailed information regarding sources of data, specific periods of record, and other pertinent matters relative to these and additional rainfall stations on the Rio Grande watershed, see "Index to Precipitation Records" in Water Bulletins Nos. 10, 14, 22, 26, and Supplement 40A. With the exception of Las Cruces, New Mexico, all United States precipitation stations listed below are in Texas, while those in Mexico are in the indicated state as shown.

## IN THE UNITED STATES

| NAME OF STATION                 | TYPE GAGE | LATI-TUDE | LONGI-TUDE | ELEV. METRES | RECORD BEGAN | WATERSHED SUBDIVISION            | OBSERVER         |
|---------------------------------|-----------|-----------|------------|--------------|--------------|----------------------------------|------------------|
| A.A. Baker Ranch                | R         | 29° 44'   | 101° 08'   | 524          | July 1962    | Devils River                     | I. B. & W. C.    |
| Adobes Ranch                    | C         | 29° 46'   | 104° 34'   | 777          | # 1950       | Fort Quitman -                   | I. B. & W. C.    |
| American Dam                    | S         | 31° 47'   | 106° 32'   | 1,137        | # 1938       | Above Rio Conchos                | I. B. & W. C.    |
| Amistad Dam                     | R         | 29° 27'   | 101° 01'   | 351          | July 1962    | El Paso - Fort Quitman           | I. B. & W. C.    |
| Amistad Reservoir near Comstock | C         | 29° 32'   | 101° 12'   | 344          | # 1970       | Foster Ranch -                   | I. B. & W. C.    |
| Apache Ranch                    | C         | 27° 56'   | 99° 56'    | 152          | #May 1953    | Amistad Dam                      | I. B. & W. C.    |
| Big Satan Creek Station         | C         | 29° 34'   | 100° 57'   | 351          | Nov. 1968    | Eagle Pass - Laredo              | Ranch Foreman    |
| Bill Shannon Ranch              | C         | 29° 57'   | 104° 40'   | 817          | #July 1956   | Devs River                       | I. B. & W. C.    |
| Bricker Ranch                   | S         | 29° 58'   | 101° 52'   | 512          | #May 1952    | Fort Quitman -                   | Bill Shannon     |
| Brotherton Ranch                | S         | 29° 42'   | 101° 19'   | 427          | 1961         | Above Rio Conchos                | Lena Mae Bricker |
| Buoy No. 11                     | C         | 29° 30'   | 101° 10'   | **           | #Dec. 1969   | Johnson Ranch - Langtry          | Perry Calk       |
| CCWCID No. 19 (Adams Gardens)   | S         | 26° 10'   | 97° 47'    | 15           | 1952         | Langtry -                        | I. B. & W. C.    |
| CCWID # 11 (Bayview Dist. Off.) | S         | 26° 08'   | 97° 21'    | 8            | # 1952       | Below Amistad Dam                | CCWCID #19       |
| Cliff Lowry Ranch No. 1         | R         | 29° 28'   | 100° 52'   | 454          | July 1962    | Lower Rio Grande Valley          | I. B. & W. C.    |
| Coal Mine                       | R         | 28° 48'   | 100° 28'   | 235          | #Mar. 1959   | Devs River                       | I. B. & W. C.    |
| Comstock                        | R         | 29° 41'   | 101° 10'   | 466          | #May 1939    | Amistad Dam - Eagle Pass         | I. B. & W. C.    |
| Corralitos Ranch                | C         | 27° 07'   | 99° 25'    | 105          | 1953         | Foster Ranch -                   | I. B. & W. C.    |
| Cow Creek near Comstock         | C         | 29° 36'   | 101° 12'   | 399          | Apr. 1965    | Amistad Dam                      | I. B. & W. C.    |
| Dead Man's Canyon near Comstock | C         | 29° 47'   | 101° 19'   | 399          | Sept. 1967   | Pecos River below                | I. B. & W. C.    |
| Devils Lake                     | R         | 29° 34'   | 100° 58'   | 349          | #May 1939    | Sheffield                        | I. B. & W. C.    |
| Devils River at Caughorn Ranch  | S         | 30° 04'   | 101° 06'   | 505          | #Apr. 1976   | Devils River                     | I. B. & W. C.    |
| Eagle Pass                      | S         | 28° 42'   | 100° 30'   | 248          | 1964         | Eagle Pass - Laredo              | I. B. & W. C.    |
| Ed Crane Ranch                  | S         | 29° 50'   | 101° 05'   | 497          | # 1955       | Devs River                       | E. J. Crane Jr.  |
| Edinburg City Plant             | S         | 28° 18'   | 98° 10'    | 30           | # 1934       | Lower Rio Grande Valley          | City of Edinburg |
| El Indio                        | S         | 28° 31'   | 100° 19'   | 221          | #June 1941   | Eagle Pass - Laredo              | Mrs. Courtney    |
| Eugene Miller Ranch             | S         | 30° 25'   | 101° 09'   | 655          | July 1975    | Devs River                       | Mr. Miller       |
| Evans Creek near Comstock       | C         | 29° 32'   | 101° 06'   | 360          | #July 1969   | Devs River                       | I. B. & W. C.    |
| Falcon Dam                      | S         | 26° 33'   | 99° 08'    | 98           | Apr. 1950    | Laredo - Falcon Dam              | I. B. & W. C.    |
| Farias Ranch                    | R         | 28° 36'   | 100° 20'   | 219          | #Mar. 1959   | Eagle Pass - Laredo              | I. B. & W. C.    |
| Fort Hancock Bridge             | S         | 31° 16'   | 105° 51'   | 1,067        | #Apr. 1940   | El Paso - Fort Quitman           | I. B. & W. C.    |
| Garciasville                    | R         | 26° 20'   | 98° 41'    | 61           | #Apr. 1957   | Lower Rio Grande Valley          | I. B. & W. C.    |
| Gillis Headquarters             | S         | 29° 36'   | 100° 47'   | 430          | 1968         | Anistad Dam - Eagle Pass         | Jake Schiller    |
| Gillis Ranch                    | S         | 29° 40'   | 101° 03'   | 439          | # 1965       | Devs River                       | Walter Gillis    |
| Goldwire Ranch                  | C         | 29° 44'   | 100° 57'   | 514          | Nov. 1968    | Devs River                       | I. B. & W. C.    |
| Guayuco Arroyo                  | R         | 31° 10'   | 105° 40'   | 1,097        | #May 1940    | El Paso - Fort Quitman           | I. B. & W. C.    |
| H.K. Fawcett Ranch              | C         | 29° 52'   | 100° 53'   | 488          | # 1941       | Devs River                       | I. B. & W. C.    |
| H.T. Fletcher Ranch             | S         | 30° 12'   | 104° 16'   | 1,554        | # 1939       | Alamito Creek                    | H. Mitchell Jr.  |
| H.T. Miers Ranch Headquarters   | C         | 29° 44'   | 100° 50'   | 536          | # 1957       | Devs River                       | I. B. & W. C.    |
| H.T. Miers Ranch No. 2          | R         | 29° 43'   | 100° 53'   | 488          | Apr. 1964    | Devs River                       | I. B. & W. C.    |
| HCWCID #6 (Goodwin Pump No. 3)  | S         | 26° 15'   | 98° 23'    | 53           | # 1953       | Lower Rio Grande Valley          | HCWCID #6        |
| HCWCID #6 (Goodwin Pump No. 4B) | S         | 26° 18'   | 98° 22'    | 64           | # 1953       | Lower Rio Grande Valley          | HCWCID #6        |
| Harlow Ranch                    | C         | 29° 49'   | 101° 10'   | 517          | #Mar. 1969   | Devs River                       | I. B. & W. C.    |
| Huisache Ranch                  | C         | 26° 57'   | 99° 21'    | 117          | Aug. 1953    | Laredo - Falcon Dam              | I. B. & W. C.    |
| Hutto Ranch No. 1               | R         | 29° 30'   | 100° 50'   | 378          | # 1964       | Devs River                       | I. B. & W. C.    |
| Hutto Ranch No. 2               | R         | 29° 38'   | 100° 54'   | 369          | # 1964       | Devs River                       | I. B. & W. C.    |
| Indio Ranch                     | S         | 28° 31'   | 100° 22'   | 213          | 1959         | Eagle Pass - Laredo              | I. B. & W. C.    |
| J.G. Brite Ranch                | R         | 29° 33'   | 101° 01'   | 351          | #Sept. 1962  | Devs River                       | I. B. & W. C.    |
| Johnson Ranch                   | C         | 29° 01'   | 103° 23'   | 625          | #July 1933   | Johnson Ranch - Foster Ranch     | I. B. & W. C.    |
| Jones Ranch *                   | S         | 30° 43'   | 100° 58'   | 732          | #Oct. 1962   | Devs River                       | Mrs. Jones       |
| Keisling Ranch                  | S         | 28° 23'   | 100° 17'   | 226          | Dec. 1958    | Eagle Pass - Laredo              | I. B. & W. C.    |
| Kerr Mitchell Ranch             | S         | 30° 13'   | 104° 00'   | 1,356        | #Mar. 1941   | Alamito Creek                    | Mrs. K. Mitchell |
| La Feria Materials Yard         | V         | 26° 10'   | 97° 50'    | 18           | # 1960       | Lower Rio Grande Valley          | CCWCID #3        |
| La Feria Pumping Plant          | S         | 26° 03'   | 97° 50'    | 18           | # 1952       | Lower Rio Grande Valley          | CCWCID #3        |
| La Joya                         | C         | 26° 15'   | 98° 29'    | 46           | #Apr. 1957   | Lower Rio Grande Valley          | I. B. & W. C.    |
| La Macolla Farm                 | S         | 30° 00'   | 104° 41'   | 838          | #Apr. 1977   | Fort Quitman - Above Rio Conchos | Tom Pelton       |
| La Mota Ranch                   | S         | 29° 33'   | 103° 59'   | 1,175        | #Feb. 1943   | Alamito Creek                    | John Rice        |
| Laredo Water Plant              | S         | 27° 33'   | 99° 31'    | 125          | # 1930       | Eagle Pass - Laredo              | Laredo Wtr. Plt. |
| Las Cruces                      | S         | 32° 19'   | 106° 47'   | 1,187        | 1975         | Caballo Dam - El Paso            | I. B. & W. C.    |
| Las Moras Creek                 | S         | 29° 00'   | 100° 38'   | 244          | 1958         | Amistad Dam - Eagle Pass         | I. B. & W. C.    |
| Lateral No. 12 Headgate         | C         | 28° 54'   | 100° 34'   | 244          | 1959         | Amistad Dam - Eagle Pass         | I. B. & W. C.    |

S Standard R Recording

# Some months or years missing

C Cumulative V Visual

\* Formerly Line Store

\*\* Reservoir surface

## LOCATION OF RAINFALL STATIONS ON THE RIO GRANDE WATERSHED

## IN THE UNITED STATES

| NAME OF STATION                   | TYPE<br>GAGE | LATI-<br>TUDE | LONGI-<br>TUDE | ELEV.<br>METRES | RECORD<br>BEGAN | WATERSHED<br>SUBDIVISION          | OBSERVER                   |
|-----------------------------------|--------------|---------------|----------------|-----------------|-----------------|-----------------------------------|----------------------------|
| Laughlin Air Force Base           | S            | 29° 21'       | 100° 47'       | 329             | Dec. 1958       | Amistad Dam - Eagle Pass          | J. S. A. F.                |
| Lewis Billie C. Jr. Ranch         | S            | 29° 32'       | 100° 40'       | 427             | # 1964          | Amistad Dam - Eagle Pass          | Billie C. Lewis            |
| Lewis James Ranch                 | S            | 30° 11'       | 102° 07'       | 998             | # 1966          | Johnson Ranch - Foster Ranch      | Lewis James                |
| Long Ranch                        | R            | 29° 27'       | 100° 56'       | 347             | Oct. 1971       | Devils River                      | I. B. & W. C.              |
| Los Ebanos                        | C            | 26° 14'       | 98° 53'        | 46              | #Apr. 1957      | Lower Rio Grande Valley           | I. B. & W. C.              |
| Lowry Ranch No. 2                 | R            | 29° 37'       | 100° 55'       | 354             | May 1965        | Devils River                      | I. B. & W. C.              |
| Martin King Ranch                 | R            | 29° 43'       | 101° 02'       | 445             | #Nov. 1954      | Foster Ranch - Amistad Dam        | I. B. & W. C.              |
| Maverick County<br>Canal Headgate | S            | 29° 10'       | 100° 46'       | 265             | #Mar. 1948      | Amistad Dam - Eagle Pass          | MCWCID #1                  |
| Middle Fork San Pedro             | C*           | 29° 29'       | 100° 52'       | 357             | #June 1969      | Devils River                      | I. B. & W. C.              |
| Neely Ranch                       | S            | 30° 59'       | 105° 32'       | 1,021           | #Aug. 1941      | Fort Quitman - Above Rio Conchos  | Mrs. Tom Neely             |
| Normandy                          | S            | 28° 55'       | 100° 36'       | 238             | #Dec. 1958      | Amistad Dam - Eagle Pass          | Fannin G. Lowe             |
| North Fork San Pedro              | C            | 29° 31'       | 100° 53'       | 349             | #June 1969      | Devils River                      | I. B. & W. C.              |
| Owens Ranch                       | S            | 30° 48'       | 102° 42'       | 686             | #July 1963      | Pecos River below Sheffield       | Mrs. W. Owens              |
| Pafford Crossing                  | C            | 29° 40'       | 101° 00'       | 360             | Mar. 1960       | Devils River                      | I. B. & W. C.              |
| Pecos River near Langtry Station  | C            | 29° 48'       | 101° 26'       | 384             | July 1967       | Pecos River below Sheffield       | I. B. & W. C.              |
| Penitas (Edinburg Pumping Plant)  | S            | 26° 14'       | 98° 27'        | 30              | July 1957       | Lower Rio Grande Valley           | M. Stevens                 |
| Pinto Creek, Station              | C            | 29° 09'       | 100° 43'       | 265             | #Dec. 1958      | Amistad Dam - Eagle Pass          | I. B. & W. C.              |
| Presidio (IBWC Gage)              | S            | 29° 34'       | 104° 23'       | 792             | #Nov. 1949      | Above Rio Conchos - Johnson Ranch | I. B. & W. C.              |
| Prosser Ranch No. 1               | C            | 29° 53'       | 101° 14'       | 521             | Mar. 1965       | Pecos River Below Sheffield       | I. B. & W. C.              |
| Prosser Ranch No. 2               | C            | 29° 48'       | 101° 15'       | 564             | #Mar. 1965      | Devils River                      | I. B. & W. C.              |
| Prosser Ranch No. 3               | C            | 30° 02'       | 101° 16'       | 616             | #Mar. 1965      | Pecos River below Sheffield       | I. B. & W. C.              |
| Redford                           | C            | 29° 29'       | 104° 13'       | 762             | #July 1954      | Above Rio Conchos - Johnson Ranch | I. B. & W. C.              |
| Rio Grande near Dryden            | R            | 29° 48'       | 102° 08'       | 411             | May 1976        | Johnson Ranch - Foster Ranch      | N. W. Service              |
| Roma (International Bridge)       | S            | 26° 24'       | 99° 01'        | 70              | # 1941          | Falcon Dam - Rio Grande City      | I. B. & W. C.              |
| Ross Foster Ranch                 | C            | 29° 45'       | 101° 46'       | 375             | May 1961        | Johnson Ranch - Foster Ranch      | I. B. & W. C.              |
| Rough Canyon near Del Rio         | C            | 29° 34'       | 100° 56'       | 350             | #June 1969      | Devils River                      | I. B. & W. C.              |
| San Benito City                   | S            | 26° 03'       | 97° 45'        | 15              | Oct. 1933       | Lower Rio Grande Valley           | I. B. & W. C.              |
| Sellers Ranch                     | C            | 29° 34'       | 101° 02'       | 363             | #Mar. 1960      | Devils River                      | I. B. & W. C.              |
| Shafter                           | S            | 29° 49'       | 104° 19'       | 1,195           | #July 1968      | Above Rio Conchos - Johnson Ranch | Raymond Wylic              |
| Stewart Ranch                     | R            | 29° 35'       | 100° 52'       | 405             | #Apr. 1960      | Devils River                      | I. B. & W. C.              |
| Study Butte                       | S            | 29° 19'       | 103° 32'       | 777             | July 1977       | Terlingua Creek                   | Shirley Willard            |
| Terlingua Creek Station           | C            | 29° 12'       | 103° 36'       | 675             | #Mar. 1952      | Terlingua Creek                   | I. B. & W. C.              |
| Trees Farm                        | R            | 28° 38'       | 100° 25'       | 219             | #Mar. 1959      | Eagle Pass - Laredo               | I. B. & W. C.              |
| Tuffy Whitehead Ranch             | R            | 29° 37'       | 101° 07'       | 433             | July 1962       | Devils River                      | I. B. & W. C.              |
| United Irrigation District        | S            | 26° 11'       | 98° 24'        | !               | #Aug. 1961      | Lower Rio Grande Valley           | United Irrigation District |
| Van Dalsam Farm                   | C            | 28° 27'       | 100° 19'       | 213             | # 1959          | Eagle Pass - Laredo               | I. B. & W. C.              |
| Vinegarone                        | C            | 29° 56'       | 100° 45'       | 543             | #May 1966       | Devils River                      | I. B. & W. C.              |
| Walker Ranch                      | C            | 29° 49'       | 101° 13'       | 466             | #Aug. 1969      | Devils River                      | I. B. & W. C.              |
| Wardlaw Standart Ranch            | S            | 29° 18'       | 100° 38'       | 326             | Apr. 1977       | Pinto Creek                       | Hoddy Wardlaw              |
| Farborough Ranch                  | S            | 30° 06'       | 103° 36'       | 1,387           | # 1966          | Johnson Ranch - Foster Ranch      | Harold Smith               |
| Zapata Water Plant                | S            | 26° 54'       | 99° 16'        | 116             | #May 1953       | Laredo - Falcon Dam               | I. B. & W. C.              |
| Zuberbueler Ranch                 | S            | 29° 41'       | 101° 14'       | 445             | #Feb. 1975      | Foster Ranch - Amistad Dam        | J.U. Zuberbueler           |

R Recording

C Cumulative

V Visual

! Not available

S Standard

# Some months or years missing

## LOCATION OF RAINFALL STATIONS ON THE RIO GRANDE WATERSHED

IN MEXICO

| NAME OF STATION                         | TYPE<br>GAGE | LATI-<br>TUDE | LONGI-<br>TUDE | ELEV.<br>METRES | RECORD<br>BEGAN | WATERSHED<br>SUBDIVISION   | OBSERVER                     |
|---|--------------|---------------|----------------|-----------------|-----------------|----------------------------|------------------------------|
| Agualeguas, Nuevo Leon                  | S            | 26° 19'       | 99° 33'        | 184             | # 1979          | Rio Alamo                  | S. A. R. H.                  |
| Amistad Reservoir near Tlaloc, Coahuila | C            | 29° 26'       | 101° 07'       | 381             | # 1970          | Foster Ranch - Amistad Dam | I. B. & W. C.                |
| Anahuac, Nuevo Leon                     | S            | 27° 15'       | 100° 08'       | 200             | #June 1933      | Rio Salado                 | S. A. R. H.                  |
| Bajo Rio Bravo, Tamps.                  |              |               |                |                 |                 |                            |                              |
| No. 1-2                                 | S            | 25° 56'       | 97° 46'        | !               | # 1964          | Lower Rio Grande Valley    | S. A. R. H.                  |
| No. 1-4                                 | S            | 25° 51'       | 97° 45'        | !               | # 1964          | Lower Rio Grande Valley    | S. A. R. H.                  |
| No. 2-5                                 | S            | 25° 48'       | 97° 49'        | !               | # 1964          | Lower Rio Grande Valley    | S. A. R. H.                  |
| No. 2-6                                 | S            | 25° 44'       | 97° 53'        | !               | # 1964          | Lower Rio Grande Valley    | S. A. R. H.                  |
| No. 2-7                                 | S            | 25° 39'       | 97° 42'        | !               | # 1964          | Lower Rio Grande Valley    | S. A. R. H.                  |
| No. 2-11                                | S            | 25° 35'       | 97° 46'        | !               | # 1964          | Lower Rio Grande Valley    | S. A. R. H.                  |
| No. 3-14                                | S            | 25° 56'       | 97° 59'        | !               | # 1964          | Lower Rio Grande Valley    | S. A. R. H.                  |
| No. 3-17                                | S            | 25° 49'       | 97° 58'        | !               | # 1964          | Lower Rio Grande Valley    | S. A. R. H.                  |
| Bajo Rio San Juan, Tamps.               |              |               |                |                 |                 |                            |                              |
| No. 2-33                                | S            | 26° 10'       | 98° 28'        | !               | # 1964          | Lower Rio Grande Valley    | S. A. R. H.                  |
| No. 2-38                                | S            | 26° 06'       | 98° 34'        | !               | # 1964          | Lower Rio Grande Valley    | S. A. R. H.                  |
| No. 3-47                                | S            | 25° 58'       | 98° 07'        | !               | # 1964          | Lower Rio Grande Valley    | S. A. R. H.                  |
| No. 3-48A                               | S            | 25° 52'       | 98° 05'        | 28              | # 1985          | Lower Rio Grande Valley    | S. A. R. H.                  |
| No. 3-55                                | S            | 25° 52'       | 98° 12'        | !               | # 1964          | Lower Rio Grande Valley    | S. A. R. H.                  |
| Balleza, Chihuahua                      | S            | 26° 57'       | 106° 21'       | 1,790           | #May 1903       | Rio Conchos                | Meteor. Service of Chihuahua |
| Cabezones, Nuevo Leon                   | S            | 24° 59'       | 99° 45'        | !               | # 1962          | Adjacent to Rio San Juan   | S. A. R. H.                  |
| Camargo, Chihuahua                      | S            | 27° 42'       | 105° 10'       | 1,204           | #May 1903       | Rio Conchos                | S. A. R. H.                  |
| Camargo, Tamaulipas                     | S            | 26° 19'       | 95° 50'        | 68              | # 1921          | Rio San Juan               | S. A. R. H.                  |
| Carbonera, Nuevo Leon                   | S            | 24° 49'       | 106° 47'       | !               | # 1958          | Rio San Juan               | S. A. R. H.                  |
| Castanos, Coahuila                      | S            | 26° 47'       | 101° 27'       | 744             | #Oct. 1932      | Rio Salado                 | Meteor. Service of Mexico    |
| Cd. Acuna, Coahuila                     | S            | 29° 20'       | 100° 53'       | 274             | 1951            | Amistad Dam - Eagle Pass   | I. B. & W. C.                |
| Cd. Diaz Ordaz, Tamaulipas              | S            | 26° 14'       | 98° 36'        | 40              | # 1953          | Lower Rio Grande Valley    | S. A. R. H.                  |
| Cd. Guerrero, Chihuahua                 | S            | 28° 33'       | 107° 29'       | 2,000           | #May 1903       | Adjacent to Rio Conchos    | Meteor. Service of Mexico    |
| Cd. Juarez, Chihuahua                   | S            | 31° 45'       | 106° 27'       | 1,127           | #Feb. 1903      | El Paso - Fort Quitman     | I. B. & W. C.                |
| Cd. Mier, Tamaulipas                    | S            | 26° 26'       | 99° 09'        | 80              | #Oct. 1955      | Falcon Dam - Rio Grande    | I. B. & W. C.                |
| cerralvo, Nuevo Leon                    | R            | 26° 05'       | 99° 37'        | 345             | #June 1938      | Rio San Juan               | S. A. R. H.                  |
| cerritos, Nuevo Leon                    | S            | 25° 31'       | 100° 12'       | !               | # 1958          | Rio San Juan               | S. A. R. H.                  |
| cerro Prieto, Nuevo Leon                | S            | 25° 56'       | 99° 23'        | 270             | #May 1959       | Rio San Juan               | S. A. R. H.                  |
| Cienega de Flores, Nuevo Leon           | R            | 25° 57'       | 100° 10'       | 540             | #Apr. 1938      | Rio San Juan               | S. A. R. H.                  |
| Cienega de La Purisima, Coahuila        | S            | 25° 20'       | 100° 32'       | !               | # 1958          | Rio San Juan               | S. A. R. H.                  |
| Cienega del Toro, Nuevo Leon            | S            | 25° 05'       | 100° 20'       | 2,137           | # 1958          | Rio San Juan               | S. A. R. H.                  |
| Colombia, Nuevo Leon                    | S            | 27° 42'       | 99° 45'        | !               | #Sept. 1976     | Eagle Pass - Laredo        | S. A. R. H.                  |
| Comales, Tamaulipas                     | S            | 26° 11'       | 98° 55'        | 80              | # 1940          | Rio San Juan               | S. A. R. H.                  |
| control, Tamaulipas                     | S            | 25° 58'       | 97° 49'        | 18              | #June 1942      | Lower Rio Grande Valley    | S. A. R. H.                  |
| Coyame, Chihuahua                       | S            | 29° 28'       | 105° 06'       | !               | #Nov. 1961      | Rio Conchos                | Meteor. Service of Chihuahua |
| Cuarto Cienegas, Coahuila               | S            | 26° 59'       | 102° 04'       | 742             | #May 1907       | Rio Salado                 | S. A. R. H.                  |
| Delicias, Chihuahua                     | S            | 28° 11'       | 105° 28'       | 1,130           | #Aug. 1933      | Rio Conchos                | S. A. R. H.                  |
| Ejido lo de Mayo, Coahuila              | S            | 27° 13'       | 101° 13'       | !               | # 1980          | Rio Salado                 | S. A. R. H.                  |
| Ejido Marin, Nuevo Leon                 | S            | 25° 50'       | 100° 00'       | !               | #Mar. 1979      | Rio San Juan               | S. A. R. H.                  |
| El Alamo, Nuevo Leon                    | S            | 26° 24'       | 100° 23'       | !               | # 1981          | Rio Salado                 | S. A. R. H.                  |
| El Brasil, Nuevo Leon                   | S            | 25° 53'       | 98° 59'        | !               | #July 1979      | Rio San Juan               | S. A. R. H.                  |
| El Cuchillo, Nuevo Leon                 | S            | 25° 43'       | 99° 16'        | 180             | #June 1938      | Rio San Juan               | S. A. R. H.                  |
| El Realito, Nuevo Leon                  | S            | 25° 18'       | 99° 21'        | !               | # 1971          | Rio San Juan               | S. A. R. H.                  |
| Emiliano Zapata, Coahuila               | S            | 29° 01'       | 100° 49'       | !               | #Mar. 1976      | Eagle Pass - Laredo        | S. A. R. H.                  |
| Escalón, Chihuahua                      | S            | 26° 45'       | 100° 20'       | 1,267           | # 1957          | Adjacent to Rio Conchos    | S. A. R. H.                  |
| Espinazo, Nuevo Leon                    | S            | 26° 15'       | 101° 05'       | !               | # 1980          | Rio Salado                 | S. A. R. H.                  |
| Estacion Rosario, Durango               | S            | 26° 30'       | 105° 38'       | !               | #July 1962      | Rio Conchos                | S. A. R. H.                  |
| Galeana, Nuevo Leon                     | S            | 24° 50'       | 100° 04'       | 1,656           | #Oct. 1904      | Adjacent to Rio San Juan   | Meteor. Service of Mexico    |
| Garza Ayala, Nuevo Leon                 | S            | 26° 29'       | 100° 03'       | !               | # 1968          | Rio San Juan               | S. A. R. H.                  |
| General Bravo, Nuevo Leon               | S            | 25° 48'       | 99° 11'        | 180             | #Sept. 1906     | Rio San Juan               | S. A. R. H.                  |
| General Cepeda, Coahuila                | S            | 25° 24'       | 101° 29'       | 1,485           | #Aug. 1926      | Rio San Juan               | S. A. R. H.                  |
| General Trevino, Nuevo Leon             | S            | 26° 13'       | 99° 28'        | !               | #Oct. 1976      | Rio Alamo                  | S. A. R. H.                  |
| Gomez Farias, Coahuila                  | S            | 24° 58'       | 101° 03'       | !               | #June 1979      | Rio San Juan               | S. A. R. H.                  |
| Hacienda Mamulique, Nuevo Leon          | S            | 26° 07'       | 100° 14'       | !               | #Sept. 1973     | Rio San Juan               | S. A. R. H.                  |
| Hidalgo del Parral, Chihuahua           | S            | 26° 56'       | 100° 39'       | 1,750           | #Mar. 1903      | Rio Conchos                | Meteor. Service of Mexico    |
| Higueras, Nuevo Leon                    | S            | 25° 58'       | 100° 01'       | 500             | #Sept. 1906     | Rio San Juan               | Meteor. Service of Mexico    |
| Hipolito, Coahuila                      | S            | 25° 42'       | 101° 24'       | !               | # 1980          | Rio San Juan               | S. A. R. H.                  |
| Huachichil, Coahuila                    | S            | 25° 12'       | 100° 50'       | 2,100           | #Apr. 1980      | Rio San Juan               | S. A. R. H.                  |
| Icamole, Nuevo Leon                     | S            | 25° 55'       | 100° 43'       | 1,494           | # 1958          | Rio San Juan               | S. A. R. H.                  |
| Iturbide, Nuevo Leon                    | S            | 24° 44'       | 98° 54'        | !               | # 1941          | Adjacent to Rio San Juan   | S. A. R. H.                  |
| Jarita, Nuevo Leon                      | S            | 27° 26'       | 98° 48'        | 207             | #Mar. 1961      | Laredo - Falcon Dam        | S. A. R. H.                  |
| Jimenez, Chihuahua                      | S            | 27° 08'       | 104° 56'       | 1,377           | # 1951          | Rio Conchos                | Meteor. Service of Chihuahua |
| Jimenez, Coahuila                       | S            | 29° 04'       | 100° 40'       | 248             | # 1951          | Amistad Dam - Eagle Pass   | I. B. & W. C.                |
| La Amistad, Coahuila                    | S            | 29° 27'       | 101° 05'       | 316             | #Feb. 1977      | Amistad Dam - Eagle Pass   | I. B. & W. C.                |
| La Arena, Nuevo Leon                    | S            | 25° 46'       | 100° 01'       | !               | # 1968          | Rio San Juan               | S. A. R. H.                  |
| La Chuparrrosa, Coahuila                | R            | 29° 30'       | 101° 15'       | 351             | # 1970          | Foster Ranch - Amistad Dam | I. B. & W. C.                |

## LOCATION OF RAINFALL STATIONS ON THE RIO GRANDE WATERSHED

IN MEXICO

| NAME OF STATION            | TYPE<br>GAGE | LATI-<br>TUDE | LONGI-<br>TUDE | ELEV.<br>METRES | RECORD<br>BEGAN | WATERSHED<br>SUBDIVISION     | OBSERVER                     |
|----------------------------|--------------|---------------|----------------|-----------------|-----------------|------------------------------|------------------------------|
| La Cruz, Nuevo Leon        | S            | 25° 28'       | 100° 26'       | 1,500           | # 1958          | Rio San Juan                 | S. A. R. H.                  |
| La Escondida, Nuevo Leon   | S            | 25° 16'       | 99° 46'        | 300             | #Feb. 1979      | Rio San Juan                 | S. A. R. H.                  |
| La Pomonita, Nuevo Leon    | S            | 24° 59'       | 99° 12'        | !               | #Mar. 1979      | Rio San Juan                 | S. A. R. H.                  |
| La Popa, Nuevo Leon        | S            | 25° 10'       | 100° 50'       | 984             | # 1958          | Rio San Juan                 | S. A. R. H.                  |
| La Trasquila, Chihuahua    | S            | 29° 08'       | 107° 08'       | !               | # 1962          | Adjacent to Rio Conchos      | S. A. R. H.                  |
| Laguna de Sanchez,         |              |               |                |                 |                 |                              |                              |
| Nuevo Leon                 | R            | 25° 21'       | 100° 16'       | 1,600           | #Apr. 1941      | Rio Salado                   | S. A. R. H.                  |
| Lampazos, Nuevo Leon       | S            | 21° 02'       | 100° 30'       | 341             | #May 1903       | Rio Salado                   | S. A. R. H.                  |
| Las Barreras, Chihuahua    | S            | 29° 31'       | 105° 25'       | 1,096           | #July 1949      | Rio Conchos                  | S. A. R. H.                  |
| Las Comitas, Nuevo Leon    | S            | 25° 30'       | 100° 24'       | 1,220           | # 1940          | Rio San Juan                 | S. A. R. H.                  |
| Las Enramadas, Nuevo Leon  | S            | 25° 48'       | 99° 16'        | 222             | #Sept. 1926     | Rio San Juan                 | S. A. R. H.                  |
| Las Virgenes, Chihuahua    | S            | 28° 09'       | 105° 38'       | 1,220           | # 1943          | Rio Conchos                  | S. A. R. H.                  |
| Linares, Nuevo Leon        | R            | 24° 52'       | 99° 34'        | 360             | # 1900          | Adjacent to Rio San Juan     | S. A. R. H.                  |
| Los Herreras,(La Tableta), |              |               |                |                 |                 |                              |                              |
| Nuevo Leon                 | R            | 25° 54'       | 99° 24'        | 250             | #Sept. 1939     | Rio San Juan                 | S. A. R. H.                  |
| Los Ramones, Nuevo Leon    | R            | 25° 42'       | 99° 38'        | 80              | #Sept. 1939     | Rio San Juan                 | S. A. R. H.                  |
| Maclovio Herrera,          |              |               |                |                 |                 |                              | Meteor. Service              |
| Chihuahua                  | S            | 29° 04'       | 105° 09'       | 982             | # 1924          | Rio Conchos                  | of Chihuahua                 |
| Madero (Los Aldamas),      |              |               |                |                 |                 |                              |                              |
| Nuevo Leon                 | S            | 26° 02'       | 99° 12'        | !               | #May 1970       | Rio San Juan                 | S. A. R. H.                  |
| Meoqui, Chihuahua          | S            | 28° 16'       | 105° 28'       | 1,155           | #Nov. 1926      | Rio Conchos                  | Meteor. Service of Chihuahua |
| Miguel Aleman, Tamaulipas  | S            | 26° 24'       | 99° 02'        | 56              | # 1951          | Falcon Dam - Rio Grande City | S. A. R. H.                  |
| Mimbres, Nuevo Leon        | S            | 24° 58'       | 100° 16'       | 1,750           | # 1958          | Rio San Juan                 | S. A. R. H.                  |
| Mina, Nuevo Leon           | S            | 25° 00'       | 100° 31'       | 500             | # 1958          | Rio San Juan                 | S. A. R. H.                  |
| Montemorelos, Nuevo Leon   | S            | 25° 12'       | 99° 50'        | 433             | #Mar. 1904      | Rio San Juan                 | S. A. R. H.                  |
| Monterrey, Nuevo Leon      | S            | 25° 40'       | 100° 18'       | 530             | # 1896          | Rio San Juan                 | S. A. R. H.                  |
| Muzquiz, Coahuila          | S            | 27° 53'       | 101° 31'       | 504             | #June 1923      | Rio Salado                   | S. A. R. H.                  |
| Nueva Cd. Guerrero,        |              |               |                |                 |                 |                              |                              |
| Tamaulipas                 | S            | 26° 35'       | 99° 15'        | 106             | #May 1954       | Laredo - Falcon Dam          | I. B. & W. C.                |
| Nuevo Laredo,              |              |               |                |                 |                 |                              |                              |
| Tamaulipas                 | S            | 27° 30'       | 99° 30'        | 126             | # 1950          | Eagle Pass - Laredo          | I. B. & W. C.                |
| Nuevo Laredo               |              |               |                |                 |                 |                              | Meteor. Service of Mexico    |
| Tamaulipas                 | S            | 27° 30'       | 99° 30'        | 126             | #Mar. 1909      | Eagle Pass - Laredo          | S. A. R. H.                  |
| Ocampo, Coahuila           | S            | 27° 19'       | 102° 24'       | 1,149           | #May 1960       | Adjacent to Rio Salado       | I. B. & W. C.                |
| Ojinjala, Chihuahua        | S            | 29° 34'       | 104° 25'       | 788             | #Apr. 1954      | Rio Conchos                  | S. A. R. H.                  |
| Ojo Caliente, Chihuahua    | S            | 29° 37'       | 105° 16'       | 1,222           | # 1942          | Rio Conchos                  | S. A. R. H.                  |
| Pajonai, Nuevo Leon        | S            | 25° 29'       | 100° 23'       | 1,531           | # 1958          | Rio San Juan                 | S. A. R. H.                  |
| Palestina, Coahuila        | S            | 29° 09'       | 100° 59'       | 330             | # 1931          | Eagle Pass - Laredo          | S. A. R. H.                  |
| Paras, Nuevo Leon          | S            | 26° 30'       | 99° 31'        | 165             | # 1958          | Rio Alamo                    | S. A. R. H.                  |
| Parras, Coahuila           | S            | 25° 27'       | 102° 10'       | 1,679           | # 1958          | Adjacent to Rio San Juan     | S. A. R. H.                  |
| Parrita, Chihuahua         | S            | 29° 25'       | 106° 29'       | !               | #Sept. 1958     | Adjacent to Rio Conchos      | S. A. R. H.                  |
| Piedras Negras, Coahuila   | S            | 28° 43'       | 100° 31'       | 250             | # 1951          | Amistad Dam - Eagle Pass     | Meteor. Service of Mexico    |
| Pobladores, Nuevo Leon     | S            | 25° 31'       | 99° 24'        | !               | # 1982          | Rio San Juan                 | S. A. R. H.                  |
| Posta Zootecnica,          |              |               |                |                 |                 |                              | Meteor. Service of Chihuahua |
| Chihuahua                  | S            | 28° 41'       | 106° 04'       | 1,445           | #Mar. 1957      | Rio Conchos                  | S. A. R. H.                  |
| Potosi, Nuevo Leon         | S            | 24° 51'       | 100° 19'       | 1,908           | # 1958          | Adjacent to Rio San Juan     | S. A. R. H.                  |
| Potrero de Abrego,         |              |               |                |                 |                 |                              |                              |
| Coahuila                   | S            | 25° 17'       | 100° 21'       | !               | # 1985          | Rio San Juan                 | S. A. R. H.                  |
| Presa Cabeceras, Coahuila  | S            | 29° 02'       | 101° 05'       | !               | # 1964          | Amistad Dam - Eagle Pass     | S. A. R. H.                  |
| Presa Carranza, Coahuila   | S            | 27° 31'       | 100° 37'       | 240             | #June 1927      | Rio Salado                   | S. A. R. H.                  |
| Presa Centenario,          |              |               |                |                 |                 |                              |                              |
| Coahuila                   | S            | 29° 13'       | 100° 57'       | !               | # 1964          | Arroyo Las Vacas             | S. A. R. H.                  |
| Presa Chihuahua,           |              |               |                |                 |                 |                              |                              |
| Chihuahua                  | S            | 28° 34'       | 105° 10'       | 1,595           | Oct. 1961       | Rio Conchos                  | S. A. R. H.                  |
| Pres Luis L. Leon,         |              |               |                |                 |                 |                              |                              |
| Chihuahua                  | S            | 28° 57'       | 105° 17'       | !               | #Apr. 1958      | Rio Conchos                  | S. A. R. H.                  |
| Presa San Miguel,          |              |               |                |                 |                 |                              |                              |
| Coahuila                   | S            | 29° 02'       | 100° 57'       | 305             | # 1964          | Rio San Diego                | S. A. R. H.                  |
| Progreso, Coahuila         | S            | 29° 25'       | 101° 00'       | 370             | #Feb. 1943      | Rio Salado                   | S. A. R. H.                  |
| Ramon Arizpe, Coahuila     | S            | 25° 32'       | 100° 57'       | 1,400           | #Apr. 1907      | Rio San Juan                 | S. A. R. H.                  |
| Rayones, Nuevo Leon        | S            | 25° 01'       | 100° 05'       | 600             | #Oct. 1926      | Rio San Juan                 | S. A. R. H.                  |
| Reata, Coahuila            | S            | 26° 08'       | 101° 05'       | 936             | #July 1944      | Rio San Juan                 | S. A. R. H.                  |
| Represta Amistad, Coahuila | R            | 29° 26'       | 101° 02'       | 280             | #June 1969      | Amistad Dam - Eagle Pass     | I. B. & W. C.                |
| Reynosa, Tamaulipas        | R            | 26° 06'       | 98° 19'        | 40              | # 1941          | Lower Rio Grande Valley      | S. A. R. H.                  |
| Rinconada, Nuevo Leon      | S            | 25° 41'       | 100° 42'       | 1,460           | #Apr. 1944      | Rio San Juan                 | S. A. R. H.                  |
| Rodrigo Gomez Reservoir,   |              |               |                |                 |                 |                              |                              |
| Nuevo Leon                 | S            | 25° 25'       | 100° 07'       | 445             | # 1923          | Rio San Juan                 | S. A. R. H.                  |
| Rusico, Nuevo Leon         | S            | 24° 42'       | 100° 26'       | 2,004           | #June 1956      | Rio San Juan                 | S. A. R. H.                  |
| Sabinas Hidalgo,           |              |               |                |                 |                 |                              |                              |
| Nuevo Leon                 | S            | 26° 30'       | 100° 10'       | 314             | #May 1958       | Rio Salado                   | I. B. & W. C.                |
| Sabinas, Coahuila          | S            | 27° 51'       | 101° 07'       | 341             | #May 1922       | Rio Salado                   | S. A. R. H.                  |
| Saitilote, Coahuila        | S            | 25° 26'       | 101° 00'       | 1,610           | # 1886          | Rio San Juan                 | S. A. R. H.                  |
| Samalayuca, Chihuahua      | S            | 31° 21'       | 106° 28'       | 1,275           | # 1958          | El Paso - Fort Quitman       | Meteor. Service of Mexico    |
| San Antonio de las         |              |               |                |                 |                 |                              |                              |
| Azalazanas, Coahuilla      | S            | 25° 15'       | 100° 35'       | 2,170           | # 1958          | Rio San Juan                 | S. A. R. H.                  |
| San Diego, Nuevo Leon      | S            | 25° 14'       | 99° 15'        | !               | #Feb. 1979      | Rio San Juan                 | S. A. R. H.                  |
| San Juan de Vaqueira,      |              |               |                |                 |                 |                              |                              |
| Coahuila                   | S            | 25° 15'       | 101° 13'       | !               | #Apr. 1980      | Rio San Juan                 | S. A. R. H.                  |
| San Juan, Nuevo Leon       | S            | 25° 33'       | 99° 50'        | 268             | #Nov. 1943      | Rio San Juan                 | S. A. R. H.                  |
| San Nicolas, Nuevo Leon    | S            | 25° 45'       | 100° 17'       | !               | #Sept. 1978     | Rio San Juan                 | S. A. R. H.                  |
| Santa Catarina,            |              |               |                |                 |                 |                              |                              |
| Nuevo Leon                 | R            | 25° 40'       | 100° 28'       | 880             | #Oct. 1937      | Rio San Juan                 | S. A. R. H.                  |

## LOCATION OF RAINFALL STATIONS ON THE RIO GRANDE WATERSHED

## IN MEXICO

| NAME OF STATION           | TYPE<br>GAGE | LATI-<br>TUDE | LONGI-<br>TUDE | ELEV.<br>METRES | RECORD<br>BEGAN | WATERSHED<br>SUBDIVISION                 | OBSERVER                     |
|---------------------------|--------------|---------------|----------------|-----------------|-----------------|--|------------------------------|
| Sierra Mojada, Coahuila   | S            | 27° 17'       | 103° 42'       | 1,256           | #Mar. 1897      | Adjacent to Johnson Ranch - Foster Ranch | S. A. R. H.                  |
| Tepehuaje, Nuevo Leon     | S            | 25° 30'       | 99° 46'        | !               | #June 1979      | Rio San Juan                             | S. A. R. H.                  |
| Topo Chico, Nuevo Leon    | R            | 25° 44'       | 100° 20'       | 555             | #Aug. 1939      | Rio San Juan                             | S. A. R. H.                  |
| Una de Gato, Nuevo Leon   | S            | 25° 58'       | 99° 41'        | 320             | # 1979          | Rio San Juan                             | S. A. R. H.                  |
| Valadeces, Tamaulipas     | S            | 26° 14'       | 98° 40'        | !               | 1964            | Lower Rio Grande Valley                  | S. A. R. H.                  |
| Valle Allende, Chihuahua  | S            | 26° 56'       | 105° 23'       | !               | #Mar. 1962      | Rio Conchos                              | Meteor. Service of Chihuahua |
| Valle Hermoso, Tamaulipas | S            | 25° 41'       | 97° 48'        | 16              | #June 1949      | Lower Rio Grande Valley                  | S. A. R. H.                  |
| Vaillecillo, Nuevo Leon   | S            | 26° 40'       | 99° 59'        | 274             | #June 1958      | Rio Salado                               | S. A. R. H.                  |
| Vaqueria, Nuevo Leon      | S            | 25° 08'       | 99° 04'        | !               | #Mar. 1979      | Rio San Juan                             | S. A. R. H.                  |
| Villa Allende, Nuevo Leon | S            | 25° 17'       | 100° 01'       | 447             | #Nov. 1938      | Rio San Juan                             | S. A. R. H.                  |
| Villa Coronado, Chihuahua | S            | 26° 44'       | 105° 10'       | 1,460           | #Aug. 1964      | Rio Conchos                              | S. A. R. H.                  |
| Villa Hidalgo, Coahuila   | S            | 27° 47'       | 99° 52'        | 200             | # 1951          | Eagle Pass - Laredo                      | I. B. & W. C.                |
| Villaldama, Nuevo Leon    | S            | 26° 30'       | 100° 25'       | 469             | #Apr. 1979      | Rio Salado                               | Meteor. Service of Mexico    |
| Zaragoza, Coahuila        | S            | 23° 58'       | 99° 46'        | 1,370           | #Aug. 1977      | Eagle Pass - Laredo                      | S. A. R. H.                  |

S Standard

R Recording

! Not available

# Some months or years missing

EVAPORATION IN THE RIO GRANDE BASIN  
IN THE UNITED STATES  
IN MILLIMETRES

Tabulated below are records of evaporation observed at eight stations in Texas operated by the United States Section of the Commission from Presidio to Brownsville. At all stations, the exposure to wind was uniform and relatively unimpeded. The sites were kept cleared of all high brush and trees within 46 metres, and all brush, tall weeds, and other obstructions within 30 metres of the fenced enclosures. Within the enclosures all vegetation has been eradicated or kept trimmed to within 0.10 metre of the ground surface. For specific location of these stations, refer to data opposite same station name shown in "Location of Rainfall

Stations on the Rio Grande Watershed," on preceding pages of this bulletin.

Records were obtained by means of:

1. Standard National Weather Service pan. A circular pan, 1.22 metres in diameter and 0.25 metre deep, made of 22-gage galvanized iron, is set on a wooden platform with the rim of the pan 0.41 metre above the ground. The water level is maintained between 0.05 and 0.08 metre below the rim of the pan and is measured with a micrometer gage. This type of pan was in operation at Amistad Dam and Falcon Dam.

2. A circular pan, 0.61 metre in diameter and 0.91 metre deep, made of 22-gage galvanized iron, is set in the ground with the rim of the pan 0.08 metre above the ground surface and the top covered with a circular screen of No. 4 (6 millimetre) galvanized hardware cloth. This type of pan, equipped with an automatic feed tank that maintains the water at a level 0.08 metre below the rim of the pan, was in operation at Martin King Ranch and Eagle Pass.

3. An evaporimeter, developed by the United States Section of the Commission and calibrated against a 0.61 metre pan described above, was in operation at Presidio, Johnson Ranch, Long Ranch, and at a site 11.3 kilometres east of Brownsville.

| Month | Presidio |                   | Johnson Ranch |                   | Martin King Ranch |                   | Long Ranch |                   |
|-------|----------|-------------------|---------------|-------------------|-------------------|-------------------|------------|-------------------|
|       | 1990     | Average 1950-1990 | 1990          | Average 1950-1990 | 1990              | Average 1956-1990 | 1990       | Average 1971-1990 |
| Jan.  | 62       | 87                | 140           | 85                | 130               | 78                | 81         | 58                |
| Feb.  | 84       | 118               | 174           | 121               | 168               | 93                | 140        | 71                |
| Mar.  | 122      | 189               | 213           | 204               | 185               | 156               | 126        | 117               |
| Apr.  | 154      | 231               | 243           | 253               | 188               | 191               | 104        | 142               |
| May   | 215      | 268               | 307           | 288               | 286               | 212               | 172        | 157               |
| June  | 219      | 289               | 323           | 294               | 485               | 257               | 279        | 192               |
| July  | 158      | 272               | 295           | 294               | 272               | 287               | 178        | 214               |
| Aug.  | 138      | 250               |               | 266               | 259               | 280               | 172        | 199               |
| Sep.  | 67       | 208               |               | 219               | 198               | 206               | 112        | 152               |
| Oct.  | 75       | 164               | 56            | 169               | 186               | 150               | 185        | 111               |
| Nov.  | 44       | 112               | 89            | 110               | 112               | 102               | 43         | 69                |
| Dec.  | 41       | 82                | 62            | 81                | 143               | 78                | 64         | 55                |
| Total | 1,379    | 2,270             |               | 2,384             | 2,612             | 2,090             | 1,656      | 1,537             |

| Month | Amistad Dam |                   | Eagle Pass |                   | Falcon Dam |                   | Brownsville |                   |
|-------|-------------|-------------------|------------|-------------------|------------|-------------------|-------------|-------------------|
|       | 1990        | Average 1963-1990 | 1990       | Average 1964-1990 | 1990       | Average 1956-1990 | 1990        | Average 1958-1990 |
| Jan.  | 121         | 95                | 121        | 82                | 146        | 100               | 102         | 76                |
| Feb.  | 155         | 120               | 123        | 92                | 149        | 130               | 132         | 92                |
| Mar.  | 162         | 205               | 120        | 144               | 190        | 210               | 123         | 125               |
| Apr.  | 181         | 252               | 124        | 182               | 222        | 255               | 124         | 151               |
| May   | 247         | 274               | 181        | 190               | 302        | 291               | 177         | 153               |
| June  | 387         | 323               | 314        | 247               | 425        | 336               | 169         | 165               |
| July  | 304         | 368               | 243        | 278               | 380        | 383               | 196         | 186               |
| Aug.  | 290         | 339               | 201        | 259               | 327        | 341               |             | 179               |
| Sep.  | 179         | 250               | 181        | 198               | 214        | 249               |             | 142               |
| Oct.  | 168         | 188               | 156        | 154               | 221        | 191               |             | 125               |
| Nov.  | 101         | 126               | 121        | 106               | 146        | 135               |             | 100               |
| Dec.  | 100         | 92                | 108        | 86                | 127        | 99                | 140         | 81                |
| Total | 2,395       | 2,632             | 1,993      | 2,018             | 2,849      | 2,720             |             | 1,575             |

EVAPORATION IN THE RIO GRANDE BASIN  
IN MEXICO  
IN MILLIMETRES

Tabulated below are records of evaporation observed at nine stations operated and maintained by the Mexican Section of the Commission. Eight stations are along the Rio Grande from Cd. Acuna, Coahuila to Retamal, Tamaulipas, and one is located on the Rio Conchos near Ojinaga, Chihuahua. At all stations, except Ojinaga, the sites were kept cleared of all high brush and trees within 40 metres and of all brush and tall weeds within 30 metres of the fenced enclosures. The Ojinaga station is 9 metres landward of the east Rio Conchos levee with a concrete V-shaped irrigation ditch and road between the levee and the 8 x 8-metre woven wire pen, which encloses a 150-cm evaporation pan and a 70 x 50-cm shelter with thermometers. Inside the enclosures, all vegetation has been eradicated or kept trimmed to within 0.08 metre of the ground surface. The exposure to wind was uniform and relatively unimpeded. For specific location of these stations, refer to data opposite same station name shown in "Location of Rainfall Stations on the Rio Grande Watershed."

The type of pan used at all these stations was a standard National Weather Service-type pan, 1.22 metres in diameter and 254 millimetres inches deep, made of 22-gage galvanized iron, set on a wooden platform with the rim of the pan 406 millimetres above the ground. The water level was maintained between 51 and 76 millimetres below the rim of the pan and was measured with a micrometer gage.

Data for other evaporation stations in the Rio Grande basin in Mexico, which were operated by various Mexican agencies, are available in Water Bulletin No. 60 published by the Mexican Section of the Commission.

|       | Ojinaga,<br>Chihuahua |       | La Amistad,<br>Coahuila |       | Cd. Acuna,<br>Coahuila |       | Jimenez,<br>Coahuila |       | Villa Hidalgo,<br>Coahuila |       |
|-------|-----------------------|-------|-------------------------|-------|------------------------|-------|----------------------|-------|----------------------------|-------|
|       | Month                 | 1990  | Average<br>1954-1990    | 1990  | Average<br>1977-1990   | 1990  | Average<br>1951-1990 | 1990  | Average<br>1951-1990       | 1990  |
| Jan.  | 92                    | 86    | 115                     | 89    | 93                     | 82    | 122                  | 93    | 86                         | 92    |
| Feb.  | 131                   | 122   | 135                     | 115   | 131                    | 111   | 173                  | 119   | 122                        | 122   |
| Mar.  | 195                   | 207   | 141                     | 184   | 131                    | 188   | 145                  | 184   | 111                        | 183   |
| Apr.  | 166                   | 259   | 163                     | 233   | 138                    | 218   | 146                  | 207   | 154                        | 234   |
| May   | 247                   | 312   | 254                     | 247   | 208                    | 242   | 221                  | 233   | 224                        | 266   |
| June  | 339                   | 327   | 360                     | 294   | 335                    | 285   | 360                  | 280   | 285                        | 314   |
| July  | 254                   | 322   | 263                     | 339   | 209                    | 323   | 290                  | 315   | 220                        | 354   |
| Aug.  | 176                   | 275   | 269                     | 320   | 213                    | 294   | 232                  | 289   | 235                        | 325   |
| Sep.  | 152                   | 215   | 170                     | 243   | 136                    | 213   | 147                  | 213   | 140                        | 239   |
| Oct.  | 88                    | 163   | 144                     | 177   | 135                    | 151   | 151                  | 152   | 161                        | 179   |
| Nov.  | 52                    | 103   | 88                      | 116   | 73                     | 95    | 94                   | 100   | 86                         | 116   |
| Dec.  |                       | 82    | 82                      | 85    | 74                     | 74    | 93                   | 82    | 68                         | 88    |
| Total |                       | 2,473 | 2,184                   | 2,442 | 1,876                  | 2,276 | 2,174                | 2,267 | 1,892                      | 2,512 |

|       | Nuevo Laredo,<br>Tamaulipas |       | Nueva Cd. Guerrero,<br>Tamaulipas |       | Cd. Mier,<br>Tamaulipas |       | Retamal,<br>Tamaulipas |       |                      |  |
|-------|-----------------------------|-------|-----------------------------------|-------|-------------------------|-------|------------------------|-------|----------------------|--|
|       | Month                       | 1990  | Average<br>1964-1990              | 1990  | Average<br>1954-1990    | 1990  | Average<br>1955-1990   | 1990  | Average<br>1951-1990 |  |
| Jan.  | 92                          | 103   | 118                               | 84    | 127                     | 89    | 113                    | 98    |                      |  |
| Feb.  | 139                         | 133   | 130                               | 107   | 125                     | 119   | 154                    | 115   |                      |  |
| Mar.  | 136                         | 216   | 160                               | 181   | 172                     | 194   | 172                    | 167   |                      |  |
| Apr.  | 171                         | 266   | 187                               | 217   | 182                     | 233   | 169                    | 194   |                      |  |
| May   | 207                         | 293   |                                   | 251   | 276                     | 265   | 210                    | 206   |                      |  |
| June  | 323                         | 340   | 364                               | 289   | 371                     | 306   | 205                    | 222   |                      |  |
| July  | 269                         | 377   | 355                               | 328   | 319                     | 347   | 239                    | 249   |                      |  |
| Aug.  | 269                         | 349   | 319                               | 304   |                         | 312   | 238                    | 242   |                      |  |
| Sep.  | 190                         | 262   | 193                               | 220   | 203                     | 237   | 207                    | 191   |                      |  |
| Oct.  | 158                         | 197   | 189                               | 165   | 196                     | 183   | 159                    | 156   |                      |  |
| Nov.  | 105                         | 133   | 129                               | 115   | 132                     | 122   | 115                    | 112   |                      |  |
| Dec.  | 82                          | 102   | 105                               | 83    | 108                     | 91    |                        | 96    |                      |  |
| Total | 2,141                       | 2,771 |                                   | 2,344 |                         | 2,498 |                        | 2,048 |                      |  |

## TEMPERATURE, HUMIDITY, AND WIND

The maximum and minimum temperatures shown for the stations in Mexico are from daily maximum and minimum thermometer observations. The mean monthly temperatures are averages of these daily maximum and minimum temperatures.

The mean monthly temperatures and relative humidities shown for stations in the United States were integrated from continuous records of hygrothermographs, housed in louvered shelters, with the sensing elements of the instruments 0.41 metres above the ground and 2.74 metres southwest of either a 0.61 or 1.22-metre diameter evaporation pan. The maximum and minimum temperatures shown below are the extreme temperatures for the month as recorded on the charts except for Falcon Dam and Amistad Dam, where the readings are based on daily maximum and minimum thermometer observations.

Monthly mean wind velocities are based on the total kilometres of wind movement indicated by a standard 3-cup anemometer installed and operated according to specifications for a Class A National Weather Service evaporation station.

## TEMPERATURE - DEGREES IN CELSIUS

## IN THE UNITED STATES

| Month  | Amistad Dam, Texas |                      |      |      | Eagle Pass, Texas |                      |      |      | Falcon Dam, Texas |                      |      |      |
|--------|--------------------|----------------------|------|------|-------------------|----------------------|------|------|-------------------|----------------------|------|------|
|        | Mean<br>1990       | Average<br>1963-1990 | 1990 |      | Mean<br>1990      | Average<br>1964-1990 | 1990 |      | Mean<br>1990      | Average<br>1950-1990 | 1990 |      |
|        |                    |                      | Max. | Min. |                   |                      | Max. | Min. |                   |                      | Max. | Min. |
| Jan.   | 13                 | 10                   | 27   | 2    | 14                | 11                   | 28   | 0    | 18                | 13                   | 29   | 2    |
| Feb.   | 16                 | 12                   | 29   | 4    | 16                | 13                   | 33   | 2    | 19                | 15                   | 33   | 6    |
| Mar.   | 17                 | 17                   | 30   | 2    | 17                | 18                   | 30   | 4    | 22                | 19                   | 34   | 7    |
| April  | 21                 | 22                   | 37   | 7    | 21                | 23                   | 36   | 8    | 26                | 24                   | 41   | 8    |
| May    | 25                 | 25                   | 37   | 11   | 26                | 26                   | 37   | 12   | 30                | 27                   | 41   | 15   |
| June   | 31                 | 28                   | 42   | 22   | 32                | 28                   | 41   | 22   | 33                | 29                   | 41   | 22   |
| July   | 28                 | 29                   | 38   | 18   | 29                | 30                   | 38   | 21   | 31                | 30                   | 40   | 21   |
| Aug.   | 29                 | 29                   | 38   | 21   | 29                | 30                   | 39   | 20   | 31                | 30                   | 40   | 21   |
| Sept.  | 26                 | 26                   | 38   | 16   | 25                | 27                   | 37   | 16   | 29                | 27                   | 39   | 17   |
| Oct.   | 21                 | 21                   | 33   | 6    | 21                | 22                   | 35   | 7    | 25                | 23                   | 37   | 7    |
| Nov.   | 17                 | 16                   | 31   | 2    | 17                | 16                   | 31   | 2    | 21                | 18                   | 34   | 4    |
| Dec.   | 12                 | 11                   | 28   | -8   | 12                | 12                   | 29   | -7   | 16                | 14                   | 31   | -3   |
| Yearly | 21                 | 21                   | 42   | -8   | 22                | 21                   | 41   | -7   | 25                | 22                   | 41   | -3   |

## IN MEXICO

| Month  | Cd. Juarez, Chihuahua |                      |      |      | Ojinaga, Chihuahua |                      |      |      | La Amistad, Coahuila |                      |      |      |
|--------|-----------------------|----------------------|------|------|--------------------|----------------------|------|------|----------------------|----------------------|------|------|
|        | Mean<br>1990          | Average<br>1960-1990 | 1990 |      | Mean<br>1990       | Average<br>1954-1990 | 1990 |      | Mean<br>1990         | Average<br>1977-1990 | 1990 |      |
|        |                       |                      | Max. | Min. |                    |                      | Max. | Min. |                      |                      | Max. | Min. |
| Jan.   | 7                     | 8                    | 18   | -4   | 9                  | 10                   | 24   | -6   | 14                   | 10                   | 30   | 1    |
| Feb.   | 8                     | 10                   | 21   | -4   | 12                 | 12                   | 27   | -4   | 16                   | 12                   | 32   | 3    |
| Mar.   | 12                    | 14                   | 25   | 1    | 17                 | 16                   | 35   | -1   | 18                   | 17                   | 31   | 3    |
| April  | 17                    | 18                   | 22   | 6    | 23                 | 21                   | 42   | 13   | 26                   | 26                   | 38   | 11   |
| May    | 19                    | 23                   | 33   | 6    | 29                 | 26                   | 45   | 20   | 31                   | 29                   | 42   | 23   |
| June   | 31                    | 28                   | 43   | 13   | 33                 | 30                   | 42   | 18   | 29                   | 31                   | 39   | 17   |
| July   | 27                    | 28                   | 37   | 17   | 30                 | 30                   | 38   | 17   | 30                   | 31                   | 40   | 21   |
| Aug.   | 26                    | 27                   | 37   | 15   | 29                 | 29                   | 37   | 15   | 27                   | 28                   | 39   | 14   |
| Sept.  | 24                    | 24                   | 34   | 12   | 26                 | 26                   | 37   | 15   | 27                   | 22                   | 33   | 8    |
| Oct.   | 19                    | 19                   | 30   | 4    | 17                 | 21                   | 29   | 5    | 22                   | 22                   | 29   | 4    |
| Nov.   | 13                    | 12                   | 26   | 0    | 16                 | 14                   | 30   | 2    | 17                   | 16                   | 27   | 0    |
| Dec.   | 9                     | 8                    | 23   | -6   | 10                 |                      |      |      | 12                   | 12                   | 27   |      |
| Yearly | 18                    | 18                   | 43   | -6   |                    | 20                   |      |      | 22                   | 21                   | 42   | 0    |

| Month  | Cd. Acuna, Coahuila |                      |      |      | Jimenez, Coahuila |                      |      |      | Villa Hidalgo, Coahuila |                      |      |      |
|--------|---------------------|----------------------|------|------|-------------------|----------------------|------|------|-------------------------|----------------------|------|------|
|        | Mean<br>1990        | Average<br>1951-1990 | 1990 |      | Mean<br>1990      | Average<br>1951-1990 | 1990 |      | Mean<br>1990            | Average<br>1951-1990 | 1990 |      |
|        |                     |                      | Max. | Min. |                   |                      | Max. | Min. |                         |                      | Max. | Min. |
| Jan.   | 13                  | 9                    | 29   | -2   | 14                | 11                   | 29   | 0    | 9                       | 12                   | 32   | 0    |
| Feb.   | 14                  | 12                   | 31   | 0    | 14                | 14                   | 33   | 3    | 15                      | 14                   | 30   | 0    |
| Mar.   | 17                  | 17                   | 30   | 2    | 18                | 17                   | 38   | 5    | 19                      | 19                   | 32   | 1    |
| April  | 21                  | 22                   | 37   | 7    | 22                | 22                   | 37   | 7    | 24                      | 23                   | 42   | 7    |
| May    | 26                  | 25                   | 37   | 12   | 26                | 25                   | 37   | 12   | 28                      | 26                   | 43   | 13   |
| June   | 31                  | 29                   | 41   | 23   | 31                | 29                   | 42   | 15   | 32                      | 29                   | 42   | 21   |
| July   | 28                  | 30                   | 39   | 17   | 29                | 30                   | 39   | 18   | 30                      | 30                   | 42   | 21   |
| Aug.   | 28                  | 30                   | 39   | 19   | 29                | 30                   | 40   | 21   | 30                      | 30                   | 43   | 21   |
| Sept.  | 26                  | 27                   | 39   | 16   | 27                | 27                   | 38   | 16   | 28                      | 27                   | 40   | 16   |
| Oct.   | 21                  | 22                   | 34   | 6    | 21                | 22                   | 35   | 5    | 22                      | 23                   | 40   | 6    |
| Nov.   | 17                  | 15                   | 34   | 2    | 18                | 16                   | 30   | 2    | 19                      | 16                   | 31   | 4    |
| Dec.   | 11                  | 10                   | 29   | -6   | 13                | 12                   | 30   | 10   | 13                      | 13                   | 37   | -3   |
| Yearly | 21                  | 21                   | 41   | -6   | 22                | 21                   | 42   | 0    | 22                      | 22                   | 43   | -3   |

## TEMPERATURE, HUMIDITY, AND WIND

TEMPERATURE - DEGREES IN CELSIUS

IN MEXICO

| Month  | Nuevo Laredo, Tamaulipas (13-20) |                      |      |      | Nuevo Cd. Guerrero, Tamaulipas |                      |      |      | Cd. Mier, Tamaulipas |                      |      |      |
|--------|----------------------------------|----------------------|------|------|--------------------------------|----------------------|------|------|----------------------|----------------------|------|------|
|        | Mean<br>1990                     | Average<br>1964-1990 | 1990 |      | Mean<br>1990                   | Average<br>1958-1990 | 1990 |      | Mean<br>1990         | Average<br>1955-1990 | 1990 |      |
|        |                                  |                      | Max. | Min. |                                |                      | Max. | Min. |                      |                      | Max. | Min. |
| Jan.   | 17                               | 13                   | 30   | 4    | 17                             | 13                   | 32   | 4    | 18                   | 13                   | 36   | 1    |
| Feb.   | 19                               | 16                   | 35   | 6    | 19                             | 15                   | 35   | 7    | 16                   | 15                   | 38   | 1    |
| Mar.   | 21                               | 21                   | 32   | 5    | 20                             | 20                   | 34   | 6    | 22                   | 20                   | 41   | -1   |
| April  | 24                               | 25                   | 40   | 10   | 25                             | 24                   | 42   | 11   | 26                   | 24                   | 44   | 8    |
| May    | 29                               | 28                   | 41   | 16   | 28                             | 27                   |      |      | 32                   | 27                   | 44   | 19   |
| June   | 33                               | 30                   | 41   | 25   | 32                             | 30                   | 42   | 23   | 33                   | 30                   | 44   | 20   |
| July   | 30                               | 31                   | 40   | 23   | 30                             | 30                   | 40   | 21   | 33                   | 31                   | 43   | 22   |
| Aug.   | 31                               | 31                   | 40   | 23   | 30                             | 30                   | 40   | 23   | 32                   | 31                   | 42   | 24   |
| Sept.  | 28                               | 29                   | 39   | 17   | 28                             | 28                   | 39   | 18   | 29                   | 28                   | 41   | 4    |
| Oct.   | 24                               | 24                   | 36   | 10   | 25                             | 24                   | 36   | 9    | 26                   | 24                   | 39   | 4    |
| Nov.   | 20                               | 19                   | 31   | 6    | 21                             | 19                   | 33   | 7    | 22                   | 19                   | 36   | 7    |
| Dec.   | 15                               | 16                   | 30   | -3   | 16                             | 15                   | 32   | -1   | 11                   | 15                   | 30   | -6   |
| Yearly | 24                               | 24                   | 41   | -3   | 24                             | 23                   |      |      | 25                   | 23                   | 44   | -6   |

## TEMPERATURE, HUMIDITY AND WIND

## MEAN WIND SPEED - KILOMETRES PER HOUR

## IN THE UNITED STATES

| Month  | Martin King Ranch, Texas |                   | Amistad Dam, Texas |                   | Eagle Pass, Texas |                   | Falcon Dam, Texas |                   |
|--------|--------------------------|-------------------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|        | 1990                     | Average 1956-1990 | 1990               | Average 1963-1990 | 1990              | Average 1963-1990 | 1990              | Average 1950-1990 |
| Jan.   | 6.1                      | 6.1               | 4.3                | 4.9               | 5.1               | 4.5               | 6.8               | 5.7               |
| Feb.   | 8.7                      | 7.3               | 5.3                | 5.6               | 6.6               | 5.8               | 6.0               | 6.6               |
| Mar.   | 9.8                      | 9.5               | 6.1                | 6.6               | 7.4               | 6.3               | 7.7               | 7.4               |
| Apr.   | 10.6                     | 9.9               | 5.8                | 6.7               | 6.3               | 6.5               | 7.7               | 8.1               |
| May    | 10.1                     | 10.6              | 5.3                | 6.7               | 6.6               | 6.3               | 7.9               | 8.2               |
| June   | 12.4                     | 11.5              | 6.3                | 7.1               | 7.2               | 6.3               | 9.2               | 8.6               |
| July   | 9.3                      | 10.7              | 5.6                | 6.6               | 6.6               | 6.3               | 7.1               | 8.9               |
| Aug.   | 7.9                      | 10.0              | 4.3                | 5.9               | 4.7               | 5.7               | 5.3               | 7.7               |
| Sept.  | 6.6                      | 8.1               | 3.4                | 5.4               | 3.7               | 5.0               | 2.6               | 5.9               |
| Oct.   | 6.3                      | 7.6               | 3.9                | 5.1               | 3.5               | 4.2               | 2.9               | 5.3               |
| Nov.   | 6.6                      | 6.4               | 4.3                | 4.8               | 4.8               | 4.0               | 4.3               | 5.6               |
| Dec.   | 5.8                      | 5.7               | 4.5                | 4.7               | 4.5               | 4.0               | 4.2               | 5.2               |
| Yearly | 8.4                      | 8.6               | 4.9                | 5.8               | 5.6               | 5.4               | 6.0               | 6.9               |

## MEAN RELATIVE HUMIDITY - PERCENT

## IN THE UNITED STATES

| Month  | Amistad Dam, Texas |                   | Eagle Pass, Texas |                   | Falcon Dam, Texas |                   |
|--------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|        | 1990               | Average 1963-1990 | 1990              | Average 1964-1990 | 1990              | Average 1950-1990 |
| Jan.   | 50.8               | 61.9              | 49.9              | 60.7              | 59.5              | 66.9              |
| Feb.   | 47.2               | 59.6              | 50.2              | 50.3              | 62.7              | 64.8              |
| Mar.   | 66.7               | 54.8              | 69.1              | 56.7              | 65.7              | 62.4              |
| Apr.   | 74.3               | 57.5              | 72.2              | 58.4              | 65.5              | 62.5              |
| May    | 66.4               | 64.3              | 61.2              | 64.6              | 62.2              | 66.2              |
| June   | 51.4               | 63.0              | 48.9              | 63.2              | 59.1              | 64.9              |
| July   | 68.0               | 59.8              | 62.8              | 59.5              | 61.5              | 61.8              |
| Aug.   | 62.0               | 60.2              | 58.5              | 61.0              | 61.2              | 62.5              |
| Sept.  | 77.2               | 64.6              | 72.1              | 66.2              | 65.1              | 66.6              |
| Oct.   | 64.2               | 64.2              | 56.9              | 66.9              | 58.5              | 66.5              |
| Nov.   | 73.1               | 62.7              | 65.5              | 66.7              | 65.6              | 66.8              |
| Dec.   | 54.3               | 60.7              | 51.1              | 65.9              | 60.1              | 67.0              |
| Yearly | 63.0               | 61.1              | 59.9              | 62.5              | 62.2              | 64.9              |

## In Mexico

| Nueva Cd. Guerrero,<br>Tamaulipas |      |                      |
|-----------------------------------|------|----------------------|
| Month                             | 1990 | Average<br>1961-1990 |
| Jan.                              | 68   | 77                   |
| Feb.                              | 70   | 75                   |
| Mar.                              | 76   | 70                   |
| Apr.                              | 77   | 71                   |
| May                               | 72   | 76                   |
| June                              | 71   | 74                   |
| July                              | 65   | 71                   |
| Aug.                              | 68   | 72                   |
| Sept.                             | 67   | 76                   |
| Oct.                              | 71   | 76                   |
| Nov.                              | 76   | 76                   |
| Dec.                              | 75   | 77                   |
| Yearly                            | 71   | 74                   |

## DRAINAGE BASIN AND IRRIGATED AREAS

## ALONG THE RIO GRANDE AND TRIBUTARIES - 1990

The total area within the outer rim of the Rio Grande basin is about 868,945 square kilometres, but it contains large areas, especially along its southwestern boundary, that contribute no surface runoff to the Rio Grande. Such noncontributing areas constitute about 47 percent of the total area, leaving 456,701 square kilometres of productive watershed which is listed in the tabulation below.

The irrigated areas shown below are listed in accordance with the location of their diversions points and are all within the Rio Grande Basin, except in the lower Rio Grande Valley where large portions of irrigated lands in both countries lie outside the basin boundary line.

On the United States side, only the areas irrigated in 1990 are shown, except that in the reaches below Falcon Dam, the figures shown represent acreages which were subject to irrigation in 1990 but for which data on the portion actually irrigated is not known. On the Mexican side, part of the data may have been gathered previous to 1990. The irrigated area data tabulated are the best data that could be obtained.

| DESIGNATION OF AREAS AND GAGING STATIONS   | Drainage Basin Square Kilometres |         |         | Irrigated Areas - Hectares |         |         |
|--|----------------------------------|---------|---------|----------------------------|---------|---------|
|  | United States                    | Mexico  | Total   | United States              | Mexico  | Total   |
| Above Elephant Butte Dam   | 67,141                           | 0       | 67,141  | 0                          | 0       | 0       |
| Elephant Butte Dam to Caballo Dam  | 3,354                            | 0       | 3,354   | 0                          | 0       | 0       |
| Above Caballo Dam  | 70,495                           | 0       | 70,495  | 0                          | 0       | 0       |
| Caballo Dam to American Dam  | 5,317                            | 0       | 5,317   | 34,644                     | 0       | 34,644  |
| Above American Dam   | 75,812                           | 0       | 75,812  | 34,644                     | 0       | 34,644  |
| American Dam to Acala Station  | 1,740                            | 1,409   | 3,149   | 16,464                     | 5,336   | 21,800  |
| Above Acala Gaging Station   | 77,552                           | 1,409   | 78,961  | 51,108                     | 5,336   | 56,444  |
| Acala Station to Fort Quitman Station  | 1,717                            | 2,056   | 3,773   | 6,047                      | 0       | 6,047   |
| Above Fort Quitman Gaging Station  | 79,269                           | 3,465   | 82,734  | 57,155                     | 5,336   | 62,491  |
| Fort Quitman Station to Above Presidio Station   | 4,263                            | 3,652   | 7,915   | a) 115                     | a) 76   | 191     |
| Above Presidio Station above Rio Conchos   | 83,532                           | 7,117   | 90,649  | 57,270                     | 5,412   | 62,682  |
| Rio San Pedro above Francisco I. Madero Dam  | 0                                | 10,778  | 10,778  | 0                          | 4,905   | 4,905   |
| Rio Conchos above Boquilla Dam   | 0                                | 10,282  | 10,282  | 0                          | 11,385  | 11,385  |
| Boquilla Dam to Luis L. Leon Dam   | 0                                | 38,490  | 38,490  | 0                          | 88,710  | 88,710  |
| Luis L. Leon Dam to mouth of river   | 0                                | 8,837   | 8,837   | 0                          | 21,195  | 21,195  |
| Rio Conchos - Total  | 0                                | 68,387  | 68,387  | 0                          | 126,195 | 126,195 |
| Alamito Creek above Gaging Station   | 3,895                            | 0       | 3,895   | 0                          | 0       | 0       |
| Presidio Station Above Rio Conchos to Presidio Station below Rio Conchos - excluding above tributaries | 881                              | 235     | 1,116   | 845                        | 99      | 944     |
| Presidio Station above Rio Conchos to Presidio Station below Rio Conchos - Total                       | 4,776                            | 68,622  | 73,398  | 845                        | 126,294 | 127,139 |
| Above Presidio Station below Rio Conchos   | 88,308                           | 75,739  | 164,047 | 58,115                     | 131,706 | 189,821 |
| Terlingua Creek above Gaging Station   | 2,771                            | 0       | 2,771   | 0                          | 0       | 0       |
| Presidio Station below Rio Conchos to Johnson Ranch Station - excluding Terlingua Creek                | 2,831                            | 5,848   | 8,679   | 376                        | 622     | 998     |
| Presidio Station below Rio Conchos to Johnson Ranch Station - Total                                    | 5,602                            | 5,848   | 11,450  | 376                        | 622     | 998     |
| Above Johnson Ranch Gaging Station   | 93,910                           | 81,587  | 175,497 | 58,491                     | 132,328 | 190,819 |
| Johnson Ranch Station to Foster Ranch Station  | 16,607                           | 17,016  | 33,623  | 22                         | 0       | 22      |
| Above Foster Ranch Gaging Station  | 110,517                          | 98,603  | 209,120 | 58,513                     | 132,328 | 190,841 |
| Foster Ranch Station to Langtry Station  | 471                              | 1,308   | 1,779   | 0                          | 0       | 0       |
| Above Langtry Gaging Station (Discontinued)  | 110,988                          | 99,911  | 210,899 | 58,513                     | 132,328 | 190,841 |
| Pecos River above Girvin (In the State of Texas)   | 76,566                           | 0       | 76,566  | 2,409                      | 0       | 2,409   |
| Pecos River, Girvin to Station near Langtry  | 14,518                           | 0       | 14,518  | 0                          | 0       | 0       |
| Station near Langtry to Station at Mouth (Discontinued)  | 334                              | 0       | 334     | 0                          | 0       | 0       |
| Pecos River - Total  | 91,448                           | 0       | 91,448  | 2,409                      | 0       | 2,409   |
| Devils River above Pafford Crossing  | 10,259                           | 0       | 10,259  | 0                          | 0       | 0       |
| Pafford Crossing to Station at Mouth (Discontinued)  | 891                              | 0       | 891     | 0                          | 0       | 0       |
| Devils River - Total   | 11,150                           | 0       | 11,150  | 0                          | 0       | 0       |
| Langtry Station to Amistad Dam - excluding above tributaries   | 562                              | 4,856   | 5,418   | 0                          | 0       | 0       |
| Langtry Station to Amistad Dam - Total   | 103,160                          | 4,856   | 108,016 | 2,409                      | 0       | 2,409   |
| Above Amistad Dam  | 214,148                          | 104,767 | 318,915 | 60,922                     | 132,328 | 193,250 |
| Amistad Dam to Below Amistad Dam Gaging Station  | 13                               | 10      | 23      | 0                          | 0       | 0       |
| Above the Below Amistad Dam Gaging Station   | 214,161                          | 104,777 | 318,938 | 60,922                     | 132,328 | 193,250 |
| Below Amistad Dam Station to Del Rio Station   | 155                              | 259     | 414     | 128                        | 0       | 128     |
| Above Del Rio Gaging Station   | 214,316                          | 105,036 | 319,352 | 61,050                     | 132,328 | 193,378 |
| Arroyo Las Vacas above Gaging Station  | 0                                | 906     | 906     | 0                          | 146     | 146     |
| San Felipe Creek above Gaging Station  | 119                              | 0       | 119     | 660                        | 0       | 660     |

## DRAINAGE BASIN AND IRRIGATED AREAS

ALONG THE RIO GRANDE AND TRIBUTARIES - 1990

| DESIGNATION OF<br>AREAS AND GAGING STATIONS                                 | Drainage Basin<br>Square Kilometres |         |         | Irrigated Areas - Hectares |         |         |
|---|-------------------------------------|---------|---------|----------------------------|---------|---------|
|   | United<br>States                    | Mexico  | Total   | United<br>States           | Mexico  | Total   |
|   |                                     |         |         |                            |         |         |
| Pinto Creek Above Gaging Station  | 645                                 | 0       | 645     | 101                        | 0       | 101     |
| Rio San Diego above Gaging Station  | 0                                   | 2,209   | 2,209   | 0                          | 3,102   | 3,102   |
| Gaging Station to mouth of river  | 0                                   | 16      | 16      | 0                          | 88      | 88      |
| Rio San Diego - Total   | 0                                   | 2,225   | 2,225   | 0                          | 3,190   | 3,190   |
| Del Rio Station to Jimenez Station - excluding<br>above tributaries         | 1,733                               | 285     | 2,018   | b) 15,952                  | 1,540   | 17,492  |
| Del Rio Station to Jimenez Station - Total                                  | 2,497                               | 3,416   | 5,913   | 16,713                     | 4,876   | 21,589  |
| Above the Jimenez Gaging Station  | 216,813                             | 108,452 | 325,265 | 77,763                     | 137,204 | 214,967 |
| Rio San Rodrigo above Gaging Station  | 0                                   | 2,717   | 2,717   | 0                          | 0       | 0       |
| Rio San Rodrigo - Total   | 0                                   | 2,717   | 2,717   | 0                          | 0       | 0       |
| Jimenez Station to Maverick Power Plant -<br>excluding Rio San Rodrigo      | 743                                 | 295     | 1,038   | 573                        | 864     | 1,437   |
| Jimenez Station to Maverick Power Plant - Total                             | 743                                 | 3,012   | 3,755   | 573                        | 864     | 1,437   |
| Above Maverick Power Plant  | 217,556                             | 111,464 | 329,020 | 78,336                     | 138,068 | 216,404 |
| Maverick Power Plant to Piedras Negras Station                              | 632                                 | 83      | 715     | 65                         | 0       | 65      |
| Above Piedras Negras Gaging Station   | 218,188                             | 111,547 | 329,735 | 78,401                     | 138,068 | 216,469 |
| Rio Escondido above Gaging Station  | 0                                   | 3,779   | 3,779   | 0                          | 80      | 80      |
| Rio Escondido - Total   | 0                                   | 3,810   | 3,810   | 0                          | 80      | 80      |
| Piedras Negras Station to El Indio Station -<br>excluding Rio Escondido     | 614                                 | 533     | 1,147   | 129                        | 1,952   | 2,081   |
| Piedras Negras Station to El Indio Station -<br>Total                       | 614                                 | 4,343   | 4,957   | 129                        | 2,032   | 2,161   |
| Above El Indio Gaging Station   | 218,802                             | 115,890 | 334,692 | 78,530                     | 140,100 | 218,630 |
| El Indio Gaging Station to<br>Villa Hidalgo Station (Discontinued)          | 1,629                               | 4,360   | 5,989   | 423                        | 1,962   | 2,385   |
| Above Villa Hidalgo Gaging Station  | 220,431                             | 120,250 | 340,681 | 78,953                     | 142,062 | 221,015 |
| Villa Hidalgo Station to Laredo Station                                     | 1,572                               | 1,121   | 2,693   | 1,340                      | 3,239   | 4,579   |
| Above Laredo Gaging Station   | 222,003                             | 121,371 | 343,374 | 80,293                     | 145,301 | 225,594 |
| Rio Salado above Venustiano Carranza Dam                                    | 0                                   | 41,002  | 41,002  | 0                          | 1,325   | 1,325   |
| Rio Salado above Las Tortillas Gaging Station                               | 0                                   | 59,971  | 59,971  | 0                          | 23,447  | 23,447  |
| Rio Salado above River Road Crossing  | 0                                   | 60,406  | 60,406  | 0                          | 24,772  | 24,772  |
| Laredo Station to Falcon Dam - excluding<br>Rio Salado                      | 5,289                               | 3,437   | 8,726   | c) 1,985                   | 844     | 2,829   |
| Laredo Station to Falcon Dam - Total  | 5,289                               | 63,813  | 69,132  | 1,985                      | 25,616  | 27,601  |
| Amistad Dam to Falcon Dam -<br>excluding above tributaries                  | 12,380                              | 10,383  | 22,763  | 20,595                     | 10,401  | 30,996  |
| Above Falcon Dam  | 227,292                             | 185,214 | 412,506 | 82,278                     | 170,917 | 253,195 |
| Rio Alamo above Gaging Station  | 0                                   | 4,339   | 4,339   | 0                          | 3,100   | 3,100   |
| Rio San Juan above Marte Gomez Dam  | 0                                   | 33,010  | 33,010  | 0                          | 1,212   | 1,212   |
| Rio San Juan - Marte Gomez Dam to Camargo<br>Gaging Station                 | 0                                   | 505     | 505     | 0                          | 75,949  | 75,949  |
| Rio San Juan - Total  | 0                                   | 33,538  | 33,538  | 0                          | 77,161  | 77,161  |
| Falcon Dam to Rio Grande City Station -<br>excluding above tributaries      | 575                                 | 637     | 1,212   | 1,799                      | 1,821   | 3,620   |
| Falcon Dam to Rio Grande City Station - Total                               | 575                                 | 38,514  | 39,089  | 1,799                      | 82,082  | 83,881  |
| Above Rio Grande City Gaging Station  | 227,867                             | 223,728 | 451,595 | 84,077                     | 252,999 | 337,076 |
| Rio Grande City Station to Anzalduas Dam                                    | 2,466                               | 2,067   | 4,533   | 74,611                     | 8,997   | 83,608  |
| Anzalduas Canal   |                                     |         |         | 0                          | 190,300 | 190,300 |
| Above Anzalduas Dam   | 230,333                             | 225,795 | 456,128 | 158,688                    | 452,296 | 610,984 |
| Anzalduas Dam to Progreso Station (Discontinued)                            | 34                                  | 423     | 457     | 48,298                     | 666     | 48,964  |
| Above Progreso Gaging Station   | 230,367                             | 226,218 | 456,585 | 206,986                    | 452,962 | 659,948 |
| Progreso Station to San Benito Station                                      | 18                                  | 23      | 41      | 128,627                    | 1,660   | 130,287 |
| Above San Benito Gaging Station   | 230,385                             | 226,241 | 456,626 | 335,613                    | 454,622 | 790,235 |
| San Benito Station to Brownsville Station                                   | 36                                  | 39      | 75      | 36,088                     | 709     | 36,797  |
| Falcon Dam to Brownsville Station -<br>excluding Rio Alamo and Rio San Juan | 3,129                               | 3,188   | 6,317   | 289,423                    | 204,153 | 493,576 |
| Above Brownsville Gaging Station  | 230,421                             | 226,280 | 456,701 | 371,701                    | 455,331 | 827,032 |
| Brownsville Station to Gulf of Mexico                                       |                                     |         |         | 2,294                      | 0       | 2,294   |
| Falcon Dam to Gulf of Mexico -<br>excluding Rio Alamo and Rio San Juan      |                                     |         |         | 291,717                    | 204,153 | 495,870 |
| Amistad Dam to Gulf of Mexico<br>excluding above tributaries                |                                     |         |         | 312,312                    | 214,554 | 526,866 |
| Above Gulf of Mexico  |                                     |         |         | 373,995                    | 455,331 | 829,326 |

a) Total area irrigated from the Rio Grande at least once during the year; additional irrigations from this source dependent on availability of river water in this reach.

b) Includes 15,377 hectares irrigated from the Maverick Canal below Mile 13 gaging station.

c) Includes 45 hectares irrigated from small reservoirs.

## 08-4507.00 SUPPLEMENTARY DATA--INTERNATIONAL AMISTAD RESERVOIR

## DEDUCED INFLOWS

Considering that a knowledge of the mean daily inflows reaching the International Amistad Reservoir would serve a useful purpose, such data have been deduced for 1990 showing the flows as closely as they can be approximated. These data are based on the daily operation of the International Amistad Reservoir, taking into account: a) record of gage heights at the dam; b) releases; c) filtrations; d) elevation-area-capacity tables based on 1981 survey; and e) rate of evaporation measured at the dam.

Flow contributions from different sources, river channel losses, reservoir evaporation, accuracy of gage-height records, displacement due to wind action on the reservoir, and bank storage and return incident to changes in reservoir level, all tend to cause variations in the deduced determinations; and the inflows shown below should not necessarily be in agreement with the combined flow of the Rio Grande at Foster Ranch, Pecos River near Langtry, and Devils River at Pafford Crossing.

In spite of the deficiencies noted above and others that may occur, the data shown below represent a reasonable approximation of the flows entering the International Amistad Reservoir.

## Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day     | Jan.    | Feb.    | Mar.    | April   | May     | June    | July    | Aug.    | Sept.   | Oct.    | Nov.    | Dec. |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|------|
| 1       | 44.3    | 51.8    | 61.7    | 75.3    | 56.9    | 70.6    | 39.3    | 412     | 225     | 523     | 169     | 67.9 |
| 2       | 44.2    | 52.0    | 62.6    | 74.7    | 130     | 57.1    | 38.7    | 459     | 195     | 595     | 162     | 67.6 |
| 3       | 45.2    | 46.9    | 60.6    | 70.8    | 114     | 67.1    | 35.7    | 386     | 176     | 690     | 161     | 65.0 |
| 4       | 42.7    | 47.7    | 61.3    | 58.2    | 128     | 64.5    | 32.4    | 289     | 137     | 823     | 151     | 59.3 |
| 5       | 41.3    | 48.2    | 64.3    | 65.4    | 65.2    | 64.6    | 32.3    | 274     | 139     | 1,120   | 145     | 52.4 |
| 6       | 42.2    | 45.7    | 64.6    | 56.1    | 71.9    | 52.6    | 28.9    | 467     | 121     | 1,020   | 137     | 55.9 |
| 7       | 38.4    | 45.9    | 62.7    | 45.6    | 59.7    | 38.9    | 31.6    | 504     | 133     | 514     | 150     | 51.7 |
| 8       | 35.4    | 48.0    | 65.9    | 43.2    | 56.4    | 56.5    | 31.2    | 480     | 110     | 595     | 149     | 52.2 |
| 9       | 39.2    | 56.7    | 65.0    | 47.6    | 61.5    | 64.0    | 43.5    | 358     | 104     | 552     | 147     | 52.0 |
| 10      | 42.0    | 59.9    | 68.4    | 49.0    | 49.0    | 74.3    | 52.6    | 380     | 63.5    | 552     | 145     | 49.7 |
| 11      | 44.2    | 58.6    | 82.9    | 45.5    | 54.3    | 50.0    | 53.1    | 319     | 68.8    | 456     | 146     | 50.5 |
| 12      | 46.3    | 58.2    | 68.6    | 45.8    | 56.0    | 44.0    | 77.3    | 232     | 90.0    | 385     | 149     | 49.1 |
| 13      | 45.5    | 60.6    | 70.4    | 51.4    | 58.6    | 43.7    | 66.7    | 182     | 89.3    | 336     | 147     | 52.8 |
| 14      | 47.2    | 65.0    | 61.7    | 51.0    | 48.7    | 48.0    | 44.6    | 187     | 99.9    | 318     | 135     | 57.0 |
| 15      | 50.0    | 67.1    | 63.7    | 41.5    | 49.4    | 55.5    | 62.8    | 247     | 105     | 305     | 119     | 63.6 |
| 16      | 45.4    | 64.4    | 62.3    | 56.1    | 61.7    | 64.7    | 289     | 377     | 140     | 290     | 97.8    | 62.8 |
| 17      | 53.5    | 60.7    | 57.0    | 61.5    | 72.7    | 60.1    | 80.7    | 546     | 198     | 241     | 84.3    | 67.6 |
| 18      | 53.4    | 60.5    | 50.7    | 57.3    | 82.9    | 62.2    | 128     | 463     | 429     | 250     | 85.0    | 62.7 |
| 19      | 51.7    | 58.0    | 48.9    | 59.2    | 261     | 63.0    | 844     | 534     | 196     | 222     | 86.5    | 64.2 |
| 20      | 49.9    | 59.3    | 43.9    | 65.3    | 182     | 52.9    | 235     | 517     | 212     | 215     | 84.3    | 67.6 |
| 21      | 49.5    | 61.7    | 51.6    | 55.8    | 75.4    | 49.0    | 190     | 502     | 257     | 206     | 89.8    | 69.9 |
| 22      | 46.2    | 60.4    | 51.3    | 52.2    | 125     | 49.4    | 92.0    | 426     | 509     | 218     | 90.4    | 63.0 |
| 23      | 46.5    | 59.0    | 54.9    | 49.4    | 104     | 54.0    | 358     | 430     | 1,380   | 182     | 85.3    | 56.5 |
| 24      | 52.2    | 56.6    | 62.7    | 56.4    | 97.0    | 50.5    | 292     | 413     | 732     | 196     | 86.3    | 54.2 |
| 25      | 47.1    | 54.3    | 58.1    | 112     | 60.1    | 43.9    | 185     | 421     | 676     | 204     | 84.6    | 53.3 |
| 26      | 49.8    | 54.7    | 68.2    | 109     | 60.3    | 44.3    | 161     | 409     | 531     | 202     | 78.3    | 56.2 |
| 27      | 46.5    | 61.8    | 57.7    | 107     | 57.3    | 45.0    | 323     | 442     | 425     | 200     | 78.8    | 53.7 |
| 28      | 45.5    | 62.3    | 60.5    | 106     | 54.8    | 48.7    | 236     | 406     | 430     | 187     | 72.2    | 59.7 |
| 29      | 43.2    | 66.1    | 111     | 50.7    | 45.9    | 180     | 358     | 429     | 180     | 66.1    | 61.4    |      |
| 30      | 45.0    | 66.6    | 67.6    | 54.5    | 45.5    | 229     | 319     | 493     | 175     | 64.6    | 62.1    |      |
| 31      | 46.7    | 60.9    | —       | 62.4    | —       | 313     | 267     | —       | 174     | —       | 54.5    |      |
| Sum     | 1,586.0 | 1,946.9 | 1,905.8 | 2,521.4 | 1,630.5 | 4,806.4 | 12,006  | 8,893.5 | 12,126  | 3,446.3 | 1,816.1 |      |
| 1,420.2 | 1,420.2 | 1,420.2 | 1,420.2 | 1,420.2 | 1,420.2 | 1,420.2 | 1,420.2 | 1,420.2 | 1,420.2 | 1,420.2 | 1,420.2 |      |

## Current Year 1990

## Period 1977-1990

| Month  | Extreme Gage Metres |     | Extreme-Cubic Metres per Second |        | Average | Volume - Thousands of Cubic Metres |       |           |           |           |           |
|--------|---------------------|-----|---------------------------------|--------|---------|------------------------------------|-------|-----------|-----------|-----------|-----------|
|        | High                | Low | Day                             | 0 High |         | Day                                | Total | Average   | Maximum   |           |           |
| Jan.   |                     |     | 17                              | 53.5   | 8       | 35.4                               | 45.8  | 122,705   | 151,775   | 325,517   | 104,028   |
| Feb.   |                     |     | 15                              | 67.1   | 6       | 45.7                               | 56.6  | 137,030   | 145,705   | 274,407   | 103,343   |
| Mar.   |                     |     | 11                              | 82.9   | 20      | 43.9                               | 61.5  | 164,661   | 175,571   | 322,164   | 115,807   |
| Apr.   |                     |     | 25                              | 112    | 15      | 41.5                               | 64.9  | 168,212   | 199,761   | 437,055   | 112,640   |
| May    |                     |     | 19                              | 261    | 14      | 48.7                               | 81.3  | 217,849   | 245,864   | 379,291   | 160,977   |
| June   |                     |     | 10                              | 78.3   | 7       | 38.9                               | 54.4  | 140,875   | 264,585   | 516,300   | 136,012   |
| July   |                     |     | 19                              | 844    | 6       | 28.9                               | 155   | 415,273   | 243,969   | 415,273   | 107,307   |
| Aug.   |                     |     | 17                              | 546    | 13      | 182                                | 387   | 1,037,318 | 357,172   | 1,037,318 | 159,859   |
| Sept.  |                     |     | 23                              | 1,380  | 10      | 63.5                               | 296   | 768,398   | 350,215   | 768,398   | 114,484   |
| Oct.   |                     |     | 5                               | 1,120  | 31      | 174                                | 391   | 1,047,686 | 433,641   | 1,172,715 | 110,732   |
| Nov.   |                     |     | 1                               | 169    | 30      | 64.6                               | 115   | 297,760   | 198,148   | 560,631   | 99,013    |
| Dec.   |                     |     | 21                              | 69.9   | 12      | 49.1                               | 58.6  | 156,911   | 147,181   | 321,211   | 98,905    |
| Yearly |                     |     | =                               | 1,380  | =       | 28.9                               | 148   | 4,674,678 | 2,913,587 | 4,674,678 | 1,734,955 |

② Mean daily

## 06-4011.00 SUPPLEMENTARY DATA - INTERNATIONAL FALCON RESERVOIR

## DEDUCED INFLOWS

Considering that a knowledge of the mean daily inflows reaching the International Falcon Reservoir would serve a useful purpose, such data have been deduced for 1990 showing the flows as closely as they can be approximated. These data are based on the daily operation of the International Falcon Reservoir, taking into account: a) record of gage heights at the dam; b) releases as measured at both hydroelectric plants and outlet works; c) elevation-area-capacity tables based on 1971-1972 surveys; and d) rate of evaporation measured at the dam and Nueva Cd. Guerrero applied to an area one foot higher than the average area of two consecutive days.

Flow contributions from different sources, irrigation diversion between Laredo and Falcon, river channel losses, reservoir evaporation, accuracy of gage-height records, displacement due to wind action on the reservoir, and bank storage and return incident to changes in reservoir level, all tend to cause variations in the deduced determinations; and the inflows shown below should not necessarily be in agreement with the combined flow of the Rio Grande at Laredo and the Rio Salado at Las Tortillas.

In spite of the deficiencies noted above and others that may occur, the data shown below represent a reasonable approximation of the flows entering the International Falcon Reservoir.

Mean Daily Discharge in Cubic Metres per Second 1990 — Annual and Period Summary

| Day     | Jan. | Feb.    | Mar. | April   | May | June    | July | Aug.    | Sept. | Oct.    | Nov. | Dec.    |
|---------|------|---------|------|---------|-----|---------|------|---------|-------|---------|------|---------|
| 1       | 50.5 | 121     | 95.1 | 126     | 223 | 157     | 32.4 | 89.1    | 56.9  | 403     | 131  | 73.3    |
| 2       | 50.4 | 178     | 88.6 | 127     | 245 | 73.4    | 16.5 | 204     | 53.2  | 303     | 142  | 90.5    |
| 3       | 75.9 | 174     | 116  | 98.5    | 282 | 252     | 50.8 | 216     | 119   | 358     | 172  | 119     |
| 4       | 74.8 | 173     | 108  | 104     | 222 | 143     | 47.3 | 203     | 107   | 350     | 136  | 50.9    |
| 5       | 65.0 | 190     | 46.5 | 109     | 241 | 83.6    | 37.0 | 156     | 134   | 354     | 74.4 | 35.4    |
| 6       | 79.4 | 232     | 127  | 183     | 278 | 99.1    | 51.7 | 99.2    | 112   | 350     | 105  | 99.2    |
| 7       | 76.5 | 233     | 102  | 120     | 263 | 94.1    | 54.8 | 151     | 74.3  | 365     | 389  | 87.3    |
| 8       | 81.1 | 185     | 74.2 | 110     | 225 | 90.6    | 54.5 | 83.0    | 75.3  | 334     | 282  | 52.1    |
| 9       | 59.7 | 218     | 83.7 | 127     | 288 | 99.3    | 43.6 | 89.4    | 70.7  | 582     | 115  | 43.9    |
| 10      | 79.7 | 211     | 95.6 | 172     | 178 | 80.8    | 24.9 | 62.8    | 54.4  | 345     | 110  | 53.1    |
| 11      | 81.8 | 233     | 148  | 126     | 306 | 32.4    | 28.4 | 66.4    | 103   | 377     | 149  | 103     |
| 12      | 91.9 | 229     | 78.5 | 113     | 237 | 85.7    | 58.7 | 68.7    | 144   | 370     | 160  | 76.0    |
| 13      | 92.2 | 244     | 85.6 | 124     | 154 | 68.3    | 25.4 | 61.7    | 104   | 352     | 108  | 73.0    |
| 14      | 93.8 | 240     | 96.1 | 119     | 137 | 93.5    | 49.3 | 63.2    | 101   | 369     | 116  | 97.0    |
| 15      | 45.6 | 160     | 86.4 | 118     | 120 | 70.6    | 72.3 | 52.3    | 66.4  | 333     | 82.2 | 87.1    |
| 16      | 74.0 | 173     | 38.3 | 170     | 156 | 81.0    | 92.3 | 71.8    | 80.7  | 376     | 127  | 98.8    |
| 17      | 73.4 | 176     | 39.3 | 147     | 132 | 83.5    | 194  | 93.7    | 73.1  | 415     | 73.4 | 109     |
| 18      | 72.8 | 121     | 51.5 | 140     | 132 | 89.3    | 249  | 128     | 130   | 303     | 104  | 123     |
| 19      | 150  | 118     | 62.9 | 171     | 153 | 51.5    | 217  | 97.4    | 134   | 325     | 74.4 | 94.1    |
| 20      | 37.5 | 151     | 30.8 | 173     | 140 | 30.5    | 152  | 92.3    | 137   | 368     | 108  | 91.7    |
| 21      | 56.6 | 263     | 20.1 | 160     | 186 | 58.2    | 328  | 82.4    | 106   | 439     | 85.1 | 101     |
| 22      | 93.3 | 236     | 27.2 | 174     | 160 | 52.5    | 526  | 79.2    | 196   | 302     | 112  | 86.1    |
| 23      | 72.6 | 211     | 72.8 | 299     | 189 | 57.6    | 278  | 81.5    | 202   | 315     | 84.0 | 10.1    |
| 24      | 83.5 | 106     | 59.9 | 226     | 226 | 53.7    | 122  | 120     | 141   | 350     | 93.9 | 22.8    |
| 25      | 56.5 | 119     | 96.1 | 181     | 270 | 53.0    | 232  | 93.5    | 294   | 301     | 67.0 | 89.0    |
| 26      | 68.8 | 108     | 86.4 | 231     | 110 | 24.6    | 391  | 85.7    | 326   | 380     | 113  | 97.5    |
| 27      | 150  | 112     | 83.5 | 413     | 202 | 34.3    | 166  | 76.8    | 386   | 367     | 136  | 95.3    |
| 28      | 147  | 147     | 74.2 | 691     | 123 | 85.3    | 137  | 74.7    | 383   | 265     | 121  | 69.2    |
| 29      | 144  |         | 77.0 | 475     | 164 | 54.2    | 103  | 67.7    | 346   | 108     | 35.2 | 85.4    |
| 30      | 110  |         | 113  | 328     | 187 | 25.8    | 96.2 | 34.0    | 350   | 142     | 46.8 | 121     |
| 31      | 144  |         | 104  |         | 149 | 61.2    | 54.5 |         |       | 154     |      | 53.6    |
| Sum     |      | 5,062   |      | 5,855.5 |     | 2,358.4 |      | 2,999.0 |       | 10,455  |      | 2,488.4 |
| 2,632.3 |      | 2,468.3 |      | 6,078   |     | 3,992.3 |      | 4,660.0 |       | 3,652.4 |      |         |

Current Year 1990

Period 1968-1990

| Month  | Extreme Gage Metres |     | Extreme-Cubic Metres per Second |     |      | Average | Volume-Thousands of Cubic Metres |           |           |           |         |         |
|--------|---------------------|-----|---------------------------------|-----|------|---------|----------------------------------|-----------|-----------|-----------|---------|---------|
|        | High                | Low | Day                             | 0   | High | Day     | 0                                | Low       | Total     | Average   | Maximum | Minimum |
| Jan.   |                     |     | 119                             | 150 | 20   | 37.5    | 84.9                             | 227,431   | 172,374   | 311,600   | 62,457  |         |
| Feb.   |                     |     | 21                              | 263 | 24   | 106     | 181                              | 437,357   | 209,998   | 558,832   | 67,760  |         |
| Mar.   |                     |     | 11                              | 148 | 21   | 20.1    | 79.6                             | 213,261   | 213,164   | 531,720   | 65,453  |         |
| Apr.   |                     |     | 28                              | 691 | 3    | 98.5    | 195                              | 509,915   | 243,586   | 705,201   | 61,564  |         |
| May    |                     |     | 11                              | 306 | 26   | 110     | 196                              | 525,139   | 394,550   | 948,235   | 125,635 |         |
| June   |                     |     | 3                               | 252 | 26   | 24.6    | 78.6                             | 203,766   | 361,250   | 950,656   | 57,491  |         |
| July   |                     |     | 22                              | 526 | 2    | 16.5    | 129                              | 344,935   | 341,913   | 1,302,974 | 41,298  |         |
| Aug.   |                     |     | 3                               | 216 | 30   | 34.0    | 96.7                             | 259,118   | 309,725   | 1,262,211 | 79,452  |         |
| Sept.  |                     |     | 27                              | 386 | 2    | 53.2    | 155                              | 402,628   | 458,116   | 1,779,519 | 128,942 |         |
| Oct.   |                     |     | 9                               | 582 | 29   | 108     | 337                              | 903,312   | 419,184   | 1,684,791 | 69,890  |         |
| Nov.   |                     |     | 7                               | 389 | 29   | 35.2    | 122                              | 315,567   | 213,483   | 664,758   | 50,153  |         |
| Dec.   |                     |     | 18                              | 123 | 23   | 10.1    | 80.3                             | 214,998   | 172,135   | 376,045   | 52,879  |         |
| Yearly |                     |     | 691                             | —   | 10.1 | 144     | 4,553,419                        | 3,509,478 | 7,690,686 | 1,578,937 |         |         |

<sup>a</sup> Mean daily

! And other days

## CORRECTIONS TO PREVIOUS WATER BULLETINS

Water  
Bulletin  
And Page  
Number

Heading

Reference

Published As

Correction

56-115 RAINFALL ON THE RIO Ejido Marin,  
GRANDE WATERSHED Nuevo Leon  
In Mexico 301  
In Inches

(Omission)

| Month  | Ejido Marin,<br>Nuevo Leon |         |
|--------|----------------------------|---------|
|        | 1986                       | Average |
| Jan.   | 0.04                       | 1.51    |
| Feb.   | 0.20                       | 0.74    |
| Mar.   | 0.20                       | 0.58    |
| April  | 2.68                       | 1.77    |
| May    | 5.31                       | 3.05    |
| June   | 5.83                       | 2.16    |
| July   | 0.91                       | 1.43    |
| Aug.   | 0.59                       | 1.72    |
| Sept.  | 6.02                       | 4.14    |
| Oct.   | 3.78                       | 1.81    |
| Nov.   | 1.18                       | 0.67    |
| Dec.   | 6.02                       | 1.65    |
| Yearly | 32.76                      | 21.23   |

56-125 Location of Rainfall Ejido Marin,  
Stations on the Rio Nuevo Leon  
Grande Watershed 301  
In Mexico

(Omission)

Lat. 25° 50'  
Long. 100° 00'

58-118 RAINFALL ON THE RIO Maijoma, Chihuahua  
GRANDE WATERSHED 203  
In Mexico  
In Inches

| Month  | Maijoma<br>Chihuahua |         |
|--------|----------------------|---------|
|        | 1988                 | Average |
| Jan.   | T                    | 0.45    |
| Feb.   | 0.12                 | 0.34    |
| Mar.   | 0.04                 | 0.19    |
| April  | 0.16                 | 0.35    |
| May    | 0.04                 | 0.84    |
| June   | 1.38                 | 1.74    |
| July   | 5.16                 | 2.86    |
| Aug.   | 2.83                 | 3.25    |
| Sept.  | 0.28                 | 2.70    |
| Oct.   | 0.63                 | 1.08    |
| Nov.   | T                    | 0.44    |
| Dec.   | 0.16                 | 0.44    |
| Yearly | 10.80                | 14.68   |

| Month  | Maijoma<br>Chihuahua |         |
|--------|----------------------|---------|
|        | 1988                 | Average |
| Jan.   | 0.39                 | 0.46    |
| Feb.   | 0.20                 | 0.34    |
| Mar.   | T                    | 0.18    |
| April  | 0.55                 | 0.36    |
| May    | 0.28                 | 0.84    |
| June   | 0.55                 | 1.72    |
| July   | 2.64                 | 2.78    |
| Aug.   | 1.73                 | 3.22    |
| Sept.  | 0.59                 | 2.71    |
| Oct.   | 0.59                 | 1.07    |
| Nov.   | 0.00                 | 0.44    |
| Dec.   | 0.35                 | 0.45    |
| Yearly | 7.87                 | 14.57   |

58-120 RAINFALL ON THE RIO Reata, Coahuila  
GRANDE WATERSHED 288  
In Mexico  
In Inches

(Omission)

| Month  | Reata,<br>Coahuila |         |
|--------|--------------------|---------|
|        | 1988               | Average |
| Jan.   | 0.28               | 0.43    |
| Feb.   | 0.00               | 0.26    |
| Mar.   | 0.20               | 0.25    |
| April  | 0.98               | 0.59    |
| May    | 0.00               | 0.90    |
| June   | 0.51               | 1.22    |
| July   | 0.67               | 1.04    |
| Aug.   | 3.23               | 1.49    |
| Sept.  | 4.96               | 1.62    |
| Oct.   | 0.12               | 0.78    |
| Nov.   |                    | 0.49    |
| Dec.   |                    | 0.38    |
| Yearly |                    | 9.45    |

58-132 Location of Rainfall Reata, Coahuila  
Stations on the Rio 288  
Grande Watershed  
In Mexico

(Omission)

Lat. 26° 08'  
Long. 101° 05'

## CORRECTIONS TO PREVIOUS WATER BULLETINS

Water  
Bulletin  
And Page  
Number

Heading

Reference

Published As

Correction

59-82 STORED WATER IN  
LARGE RESERVOIRS  
OF THE RIO GRANDE  
BASIN  
In Thousands of  
Acre-Feet  
In the United States

Brantley

23

| Month | BRANTLEY<br>(Capacity 348.5) |                      |
|-------|------------------------------|----------------------|
|       | 1989                         | Average<br>1988-1989 |
| Jan.  | 19.1                         | 19.6                 |
| Feb.  | 19.1                         | 19.1                 |
| Mar.  | 22.3                         | 22.3                 |
| April | 25.1                         | 25.1                 |
| May   | 42.3                         | 42.3                 |
| June  | 37.0                         | 37.0                 |
| July  | 23.3                         | 23.3                 |
| Aug.  | 13.9                         | 7.4                  |
| Sept. | 10.1                         | 11.5                 |
| Oct.  | 5.4                          | 12.3                 |
| Nov.  | 6.6                          | 12.9                 |
| Dec.  | 7.5                          | 13.3                 |
| Avg.  | 19.3                         | 20.5                 |
| Max.  | 42.3                         | 42.3                 |
| Min.  | 5.4                          | 0.9                  |

| Month | BRANTLEY<br>(Capacity 348.5) |                      |
|-------|------------------------------|----------------------|
|       | 1989                         | Average<br>1988-1989 |
| Jan.  | 19.6                         | 19.6                 |
| Feb.  | 19.1                         | 19.1                 |
| Mar.  | 22.3                         | 22.3                 |
| April | 25.1                         | 25.1                 |
| May   | 42.3                         | 42.3                 |
| June  | 37.0                         | 37.0                 |
| July  | 23.3                         | 23.3                 |
| Aug.  | 13.9                         | 7.4                  |
| Sept. | 10.1                         | 11.5                 |
| Oct.  | 5.4                          | 12.3                 |
| Nov.  | 6.6                          | 12.9                 |
| Dec.  | 7.5                          | 13.3                 |
| Avg.  | 19.4                         | 20.5                 |
| Max.  | 42.3                         | 42.3                 |
| Min.  | 5.4                          | 0.9                  |

59-108 RAINFALL ON THE RIO Jones Ranch  
GRANDE WATERSHED 47  
In the United States  
In Inches

(Omission)

| Month  | Jones<br>Ranch |         |
|--------|----------------|---------|
|        | 1989           | Average |
| Jan.   | 0.03           | 0.89    |
| Feb.   |                | 1.02    |
| Mar.   |                | 0.82    |
| April  |                | 1.78    |
| May    |                | 2.54    |
| June   |                | 2.08    |
| July   |                | 1.98    |
| Aug.   |                | 2.42    |
| Sept.  | 1.24           | 3.21    |
| Oct.   | 4.30           | 2.45    |
| Nov.   | 0.95           | 0.93    |
| Dec.   | 0.20           | 0.64    |
| Yearly |                | 20.76   |

59-123 Location of Rainfall Jones Ranch  
Stations on the Rio 47  
Grande Watershed  
In the United States

(Omission)

Lat. 30° 43'  
Long. 100° 58'